

John Dee: Interdisciplinary Studies in English Renaissance Thought

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

193

John Dee: Interdisciplinary Studies in English Renaissance Thought

edited by

STEPHEN CLUCAS

Founding Directors:

P. Dibon† (Paris) and R.H. Popkin† (Washington University, St. Louis & UCLA)

Director:

Sarah Hutton (Middlesex University, United Kingdom)

Associate-Directors: J.E. Force (Lexington); J.C. Laursen (Riverside)

Editorial Board: M.J.B. Allen (Los Angeles); J.R. Armogathe (Paris); A. Gabbey (New York);

T. Gregory (Rome); J. Henry (Edinburgh); J.D. North (Oxford); J. Popkin (Lexington);

G.A.J. Rogers (Keele); Th. Verbeek (Utrecht)

John Dee: Interdisciplinary Studies in English Renaissance Thought

edited by

STEPHEN CLUCAS

Birkbeck, University of London, U.K.



Springer

A C.I.P. Catalogue record for this book is available from the Library of Congress.

ISBN-10 1-4020-4245-0 (HB)
ISBN-13 978-1-4020-4245-4 (HB)
ISBN-10 1-4020-4246-9 (e-book)
ISBN-13 978-1-4020-4246-1 (e-book)

Published by Springer,
P.O. Box 17, 3300 AA Dordrecht, The Netherlands.

www.springer.com

Printed on acid-free paper

All Rights Reserved
© 2006 Springer

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

Printed in the Netherlands.

This book is dedicated to the memory of
Robert O. Lenkiewicz (1941–2002)
Painter, Researcher and Bibliophile.

TABLE OF CONTENTS

Abbreviations	ix
List of Plates	xi
Notes on Contributors	xv
 Introduction: Intellectual History and the Identity of John Dee	 1
1. Nicholas H. Clulee – John Dee’s Natural Philosophy Revisited	 23
 PART ONE: ASTRONOMY AND ASTROLOGY	
2. Robert Goulding – Wings (or Stairs) to the Heavens: The Parallactic Treatises of John Dee and Thomas Digges	 41
3. Stephen Johnston – Like Father, Like Son? John Dee, Thomas Digges and the Identity of the Mathematician	 65
4. Richard Dunn – John Dee and Astrology in Elizabethan England	 85
 PART TWO: DEE AND MARITIME AFFAIRS	
5. Robert Baldwin – John Dee’s Interest in the Application of Nautical Science, Mathematics and Law to English Naval Affairs	 97
6. William H. Sherman – John Dee’s Columbian Encounter	131
 PART THREE: DEE AND THE OCCULT SCIENCES	
7. Karen De Léon-Jones – John Dee and the Kabbalah	143
8. Federico Cavallaro – The Alchemical Significance of John Dee’s <i>Monas Hieroglyphica</i>	 159
9. Jim Reeds – John Dee and the Magic Tables in the <i>Book of Soyga</i>	 177
 PART FOUR: DEE’S CONVERSATION WITH ANGELS	
10. György E. Szönyi – Paracelsus, Scrying and the <i>Lingua Adamica</i> : Contexts For John Dee’s Angel Magic	 207
11. Stephen Clucas – John Dee’s Angelic Conversations and the <i>Ars Notoria</i> : Renaissance Magic and Mediaeval Theurgy	 231

12. Deborah E. Harkness – The Nexus of Angelology, Eschatology and Natural Philosophy in John Dee’s Angel Conversations and Library	275
PART FIVE: DEE AND KELLEY	
13. Susan Bassnett – Absent Presences: Edward Kelley’s Family in the Writings of John Dee	285
14. Jan Bäcklund – In the Footsteps of Edward Kelley: Some Manuscript References at the Royal Library in Copenhagen Concerning an Alchemical Circle around John Dee and Edward Kelley	295
PART SIX: LIBRARY CATALOGUE AND BIBLIOGRAPHY	
15. Julian Roberts – Additions and Corrections to “John Dee’s Library Catalogue”	333
16. Stephen Clucas – Recent works on John Dee (1988-2005): A Select Bibliography	345
Index	351

ABBREVIATIONS

- Alae* Thomas Digges, *Alae, seu Scalae Mathematicae, quibus visibilium remotissima Coelorum Theatra conscendi, & Planetarum omnium itinera nouis & inauditis Methodis explorari: tum huius portentosi Syderis in Mundi Boreali plaga insolito fulgore coruscantis. Distantia, & Magnitudo immensa, Situsque protinus tremendus indagari, Deique stupendum ostentum, Terricolis expositum cognosci liquidissime possit* (London: Thomas Marsh, 1573).
- DNB* *Dictionary of National Biography*, ed. by Sidney Lee and Leslie Stephen, 22 vols (London, 1908).
- JDEP* I.R.F. Calder, *John Dee Studied as an English Neoplatonist*, 2 vols (Unpublished PhD thesis, The Warburg Institute, University of London, 1952).
- Lib.Myst.* John Dee, *Liber Mysteriorum*, London, British Library, Sloane MS 3188.
- MH* *Monas Hieroglyphica Ioannis Dee, Londinensis, ad Maximilianum, Dei Gratia Romanorum, Bohemiae et Hungariae Regem Sapientissimum* (Antwerp: Gulielmus Silvius, 1564), facsimile edition of the Latin with facing page translation by C.H. Josten, *Ambix*, 12:2-3 (1964): 82-221.
- MP* *The Elements of Geometrie of the most auncient Philosopher EVCLIDE of Megara. Faithfully (now first) translated into the Englishe toung, by H. Billingsley, Citizen of London. Wherevnto are annexed certaine Scholies, Annotations, and Inuentions, of the best Mathematiciens, both of time past, and in this our age. With a very fruitfull Praeface made by M. I. Dee, specifying the chiefe Mathematicall Sciences, what they are, and wherunto commodious: where, also, are disclosed certaine new Secrets Mathematicall and Mechanicall, vntill these our daies, greatly missed* (London: John Daye, 1570).
- NP* Nicholas H. Clulee, *John Dee's Natural Philosophy: Between Science and Religion* (London and New York: Routledge, 1988).

<i>PA</i>	Wayne Shumaker and John L. Heilbron, eds. and trans. <i>John Dee on Astronomy. Propaedeumata Aphoristica (1558 and 1568), Latin and English</i> (Berkeley, Los Angeles and London: University of California Press, 1978). ¹
<i>Parallaticae</i>	John Dee, <i>Parallaticae Commentationis Praxeosque Nucleus quidam</i> (London: John Daye, 1573).
<i>Private Diary</i>	<i>The Private Diary of Dr. John Dee and the catalogue of his library of manuscripts, from the original manuscripts in the Ashmolean Museum at Oxford, and Trinity College Library, Cambridge</i> , ed. James Orchard Halliwell (London, 1842).
<i>R&W</i>	Julian Roberts and Andrew Watson, <i>John Dee's Library Catalogue</i> (London: The Bibliographical Society, 1990). ²
<i>T&FR</i>	<i>A True & Faithful Relation of What passed for many Yeers Between Dr. John Dee (A Mathematician of Great Fame in Q. ELIZ. And King James their Reignes) and Some Spirits: Tending (had it Succeeded) To a General Alteration of most States and Kingdomes in the World.</i> [etc], ed. Meric Casaubon (London: D. Maxwell for T. Garthwait, 1659).

¹ This edition conflates two separate editions of Dee's *Propaedeumata*. These are: ΠΡΟΓΑΙΔΕΥΜΑΤΑ ΑΦΟΡΙΣΤΙΚΑ *Ioannis Dee, Londinensis, de Praestantioribus quibusdam naturae virtutibus, ad Gerardum Mercatorem Rupelmundanum, Mathematicum et Philosophum insignem* (London: Henry Sutton, 1558) and *Propaedeumata Aphoristica Ioannis Dee, Londinensis, De Praestantioribus quibusdam Naturae Virtutibus* (London: Reginald Wolf, 1568). All quotes, references and translations in this volume are taken from the Heilbron-Shumaker edition.

² Readers should note that where this abbreviation is followed by a number only (as "*R&W*, 13", the reference is to a page-number in Roberts and Watson's book. Where the abbreviation is followed by "no." or "nos." (as "*R&W*, no. 13") the reference is to a catalogue number assigned by Roberts and Watson to an item in Dee's Library catalogue. Further information regarding these items may be found by consulting the section of their book headed "Notes to the 1583 Catalogue" (*R&W*, 79 et seq.).

LIST OF PLATES

Plate 1: John Dee's circumpolar chart, drawn in 1580. Reproduced by courtesy of the Burghley House Collection.

p.102

Plate 2: The Frontispiece of Dee's *General and Rare Memorials pertayning to the perfect Arte of Navigation* (London, 1577). Reproduced courtesy of Durham University Library.

p. 110

Plate 3: A navigational chart of the North Atlantic, 1578. Drawn by William Borough, revised by Christopher Hall. Hatfield House CPM1/69. Reproduced by courtesy of the Marquess of Salisbury.

p. 122

Plate 4: The geometrical construction of Dee's 'Hieroglyphic Monad', *Monas Hieroglyphica* (Antwerp, 1564), p. 24^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

p. 160

Plate 5: The 'Hieroglyphic Monad', *Monas Hieroglyphica* (Antwerp, 1564), p. 25^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

p. 163

Plate 6: The 'Egg diagram', *Monas Hieroglyphica* (Antwerp, 1564), p. 17^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

p. 168

Plate 7: The 'artificial vessel' (*Vas artificiale*) *Monas Hieroglyphica* (Antwerp, 1564), p. 22^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

p. 171

Plate 8: The 'Horizon Æternitatis' figure, *Monas Hieroglyphica* (Antwerp, 1564), p. 27^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

p. 173

Plate 9: *Book of Soyga*, T1 Aries table. The Bodleian Library, University of Oxford, Bodley MS, 908, fol. 180^r.

p. 181

Plate 10: *Book of Soyga*, T1 Aries table. Department of Manuscripts, British Library, Sloane MS 8, fols. 102^v and 103^v. (By Permission of the British Library).

p. 182

Plate 11: *Book of Enoch*, equivalent of T1 'Aries' Table. Department of Manuscripts, British Library, Sloane MS 3189, ^vfol. 58. (By Permission of the British Library).

p. 184

Plate 12: *Book of Enoch*, non-*Soyga*, 'Bapporgel bvrioldepnay' table. Department of Manuscripts, British Library, Sloane MS 3189, ^vfol. 56. (By Permission of the British Library).

p. 198

Plate 13: H. C. Agrippa von Nettesheim, *De Occulta Philosophia Libri Tres*, 'Ziruph' Table: III, 25, sig. y iii^v. Reproduced courtesy of Robert O. Lenkiewicz.

p. 200

Plate 14: The 'Sigillum Aemeth' or 'Sigillum Dei' from John Dee's *Liber Mysteriorum*, Department of Manuscripts, British Library, Sloane MS 3188, f. 30^r. (By permission of the British Library).

p. 246

Plate 15: A 'Sigillum Dei' from Dee's own fourteenth-century copy of the Pseudo-Solomonic *Liber Juratus* [*R & W*, DM 70], Department of Manuscripts, British Library, Sloane MS 313, f. 4^r. (By permission of the British Library).

p. 247

Plate 16: Portrait of Elizabeth Jane Weston by an anonymous Dutch artist. Reproduced by courtesy of the Hessisches Landesmuseum, Darmstadt.

p. 289

Plate 17: Edward Kelley's 'The praise of vniti for frendships sake' (dated, 1589). Copenhagen, Royal Library MS, GKS 242, fol. 37^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

p. 301

Plate 18: Attribution of manuscript treatise to 'M^r John Tycheborn'. Copenhagen, Royal Library MS, GKS 246, fol. 1^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

p. 303

Plate 19: Attribution of manuscript treatise to 'Sir Edw[ard] K[elley]'. Copenhagen, Royal Library MS, GKS 246, fol. 6^r. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

p. 304

Plate 20: Attribution of manuscript treatise to 'Iohannis Carpionis de Kaprstein'. Copenhagen, Royal Library MS 1723, fol. 20^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

p. 305

Plate 21: Note concerning a Lullian manuscript owned by ‘D. Johanne[m] C[arpionem]’, Prague 1613. Copenhagen, Royal Library MS 1723, fol. 17^r
Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

p. 307

NOTES ON CONTRIBUTORS

Jan Bäcklund gained his PhD in Cultural Studies from Aarhus University, Denmark in 1992. He was research fellow at the Center for Cultural Research, Aarhus 1992-2002, and has been Associate Lector at the Department of Art theory at the Royal Academy of Fine Arts in Copenhagen since 2002. He has published a number of essays (in Danish) on art theory and related subjects, and is co-editor of a forth-coming volume on Art and Alchemy.

Robert Baldwin has published widely in the history of navigation and maritime exploration. He has contributed extensively to exhibition planning for the Museum of London, the National Maritime Museum and the Canadian Museum of Civilisation. Since 1997 he has been working on a number of archival projects mostly related to civil engineering. Together with Sir Peter Baldwin he has edited *The Motorway Achievement* (2004) and *Visions of Reconstruction, 1940-1948* (2005).

Susan Bassnett is Professor in the Centre for Translation and Comparative Cultural Studies at the University of Warwick. Recent publications include *Sylvia Plath: An Introduction to the Poetry* (2004), *Constructing Cultures* (1998) written with André Lefevere, and *Post-Colonial Translation* (1999), co-edited with Harish Trivedi. Besides her academic research, Susan Bassnett writes poetry. Her latest collection is *Exchanging Lives* (2002).

Federico Cavallaro was born in Rome in 1941. He studied Natural Science and then Theology and History of Religion. In 1986 he gained a PhD with a thesis on "Time, Planetary Symbols and the Journeys of the Soul". Presently he is engaged in a study of alchemical symbolism in the Arthurian romances of Chretien de Troyes.

Stephen Clucas is Senior Lecturer in English and Humanities at Birkbeck, University of London. He has published widely in the field of Early Modern intellectual history. Recent publications include *The Wizard Earl's Advices to his Son* (2002) and *A Princely Brave Woman: Essays on Margaret Cavendish, Duchess of Newcastle* (2003). He is currently editing Thomas Hobbes's *De Corpore* (with Timothy J. Raylor) for the Clarendon Edition of Hobbes.

Nicholas H. Clulee is currently professor and chair of history at Frostburg State University in Frostburg, Maryland, and studied at Hobart College and the University of Chicago. He is author of *John Dee's Natural Philosophy: Between Science and Religion* (1988).

Karen de Léon-Jones is currently an independent scholar in Religious Studies. Formerly she was a member of research institutes in the Centre National de Recherche Scientifique and the École Pratique des Hautes Études in Paris. She is author of *Giordano Bruno and the Kabbalah* (1997), as well as other publications on Kabbalah and spirituality in Early Modern thought. She contributes to the Pico Pro-

ject, a joint collaboration between Brown University and L'Università di Bologna; as well as collaborating on theatre productions and conferences.

Richard Dunn completed his doctoral thesis "The Status of Astrology in Elizabethan England" at the University of Cambridge in 1992. He is currently Curator of the History of Navigation at the National Maritime Museum.

Robert Goulding is assistant professor in the Program in History and Philosophy of Science at the University of Notre Dame. His research interests include the history of optics and the history of magic. He is currently completing a monograph on Renaissance histories of mathematics.

Deborah E. Harkness is associate professor of history at the University of Southern California. She is the author of *John Dee's Conversations with Angels: Cabala, Alchemy, and the End of Nature* (Cambridge University Press, 1999) and is currently completing a study of science, medicine, and technology in Elizabethan London for Yale University Press entitled *The Jewel House of Art and Nature: Elizabethan London and the Social Foundations of the Scientific Revolution*.

Stephen Johnston is Assistant Keeper at the Museum of the History of Science, University of Oxford. He researches and teaches the history of scientific instruments and has published on sixteenth-century mathematical practitioners and nineteenth-century calculation. He has also co-authored *The Geometry of War, 1500-1750* (Oxford, 1996) and *Solomon's House in Oxford: New Finds from the First Museum* (Oxford, 2000), and was associate editor of *Instruments of Science: an Historical Encyclopedia* (New York, 1998).

Jim Reeds is a professional cryptographer with an interest in the history of his subject. He has published on the solution to the cipher in Book III of Johannes Trithemius's *Steganographia* (*Cryptologia*, 1998) and on the Voynich Manuscript. He lives in Princeton, New Jersey.

Julian Roberts retired in 1997 as Deputy Librarian of the Bodleian Library Oxford, and is an Emeritus Fellow of Wolfson College. Apart from his joint-editorship of *John Dee's Library Catalogue* (1990) he has published other articles on Dee and on the history of the English book-trade and the history of libraries.

William H. Sherman is Professor of English and Co-Director of the Centre for Renaissance and Early Modern Studies at the University of York, and Associate Editor of *Shakespeare Quarterly*. He is the author of *John Dee: The Politics of Reading and Writing in the English Renaissance* (1995) and of articles on Renaissance drama, Elizabethan travel writing, and the history of reading; and the editor of several plays and essay collections.

György E. Szönyi is the director of the Institute of English at the University of Szeged, Hungary. He is a cultural- and literary historian with special interest in the Renaissance, the role of the occult in early modern culture and contemporary literature and in cultural theory, especially the relationship of words and images.

Recent publications include: *Gli Angeli di John Dee* (Rome: Tre Editori, 2004); *Pictura & Scriptura* (in Hungarian, Szeged, 2004); *John Dee's Occultism: Magical Exaltation Through Powerful Signs* (Albany: SUNY Press, 2005). He has also edited among others: *European Iconography East & West* (Leiden, 1996); *The Iconography of Power* (with R. Wymer, Szeged, 2000); *The Iconography of the Fantastic* (with A. Kiss and M. Baróti-Gaál, Szeged, 2002).

STEPHEN CLUCAS

INTRODUCTION

Intellectual History and the Identity of John Dee

In April 1995, at Birkbeck College, University of London, an interdisciplinary colloquium was held so that scholars from diverse fields and areas of expertise could exchange views on the life and work of John Dee.¹ Working in a variety of fields – intellectual history, history of navigation, history of medicine, history of science, history of mathematics, bibliography and manuscript studies – we had all been drawn to Dee by particular aspects of his work, and participating in the colloquium was to confront other narratives about Dee’s career: an experience which was both bewildering and instructive. Perhaps more than any other intellectual figure of the English Renaissance Dee has been fragmented and dispersed across numerous disciplines, and the various attempts to re-integrate his multiplied image by reference to a particular world-view or philosophical outlook have failed to bring him into focus. This volume records the diversity of scholarly approaches to John Dee which have emerged since the synthetic accounts of I.R.F. Calder, Frances Yates and Peter French. If these approaches have not succeeded in resolving the problematic multiplicity of Dee’s activities, they will at least deepen our understanding of specific and local areas of his intellectual life, and render them more historiographically legible.

JOHN DEE AND INTELLECTUAL HISTORY

The life and work of John Dee first re-emerged into twentieth-century historical consciousness in the works of historians of science, who strove to “recover” Dee from the oblivion of his reputation as an occultist, and to reinstate him as a “progressive” Renaissance scientist, whose work contributed to the fitful beginnings of the scientific revolution in England. In the 1930s E. G. R. Taylor’s *Tudor Geography 1483-1583*, and Francis Johnson’s *Astronomical Thought in Renaissance England* both allotted a significant role to Dee in their narratives of Tudor scientific advancement.² Johnson saw Dee’s achievement as primarily “scientific” – he was, according to Johnson, “the leading mathematical scientist in England and the most influential teacher and adviser in that field after [Robert] Recorde’s death.”³ Johnson viewed Dee’s occult scientific activities as a detraction from his scientific reputation:

Dee’s later career, during which his unrestrained optimism concerning the possibilities of natural science made him a dupe of the charlatan Edward Kelley and caused him to turn his energies to alchemy and crystal gazing, has tended to obscure his real merit as a scientist and his very great services to his country.⁴

Johnson criticised Charlotte Fell-Smith for having “emphasized his reputation as an astrologer, alchemist and dabbler in spiritualism at the expense of his significant work in legitimate science,” and accordingly praised Taylor for having given a “truer picture of the man”.⁵ Taylor for her part shared Johnson’s need to expunge or explain away Dee’s occult interests:

The fact that John Dee was a practitioner of Judicial Astrology has, however, created such a prejudice against him, and has led to such a one-sided estimate of his place in history, that it is here necessary to state emphatically that a close examination of the evidence leaves no doubt of his intellectual honesty and genuine patriotism [...] his preoccupation with the search for the Philosopher’s Stone and the Elixir of Life lent urgency to his desire for a discovery of the way to Cathay, since it has been a constant tradition that Initiates and adepts are to be found among the learned men of the Far East. That such was the case, nevertheless, does not detract from the value of his geographical studies or his geographical teaching.⁶

If Taylor seems to harbour a suspicion that occult interests were intellectually dishonest and unpatriotic she was at least able to concede that Dee’s occult interests were a motivating force in his career, although in seeking to mitigate them it is clear that her sense of Dee’s “value” is dictated by early twentieth-century norms of what constituted legitimate forms of knowledge. The fame of Taylor’s Dee rests on the fact that he was a mathematician, a cartographer, the promoter of Gemma Frisius’s globes and instruments in England, and the friend and intimate of Gerard Mercator.⁷ The fact that Mercator shared and encouraged Dee’s astrological interests is noted, but only in so far as Dee’s “suspect” occultism can be palliated by the reflected glory of Mercator:

The high character of Mercator alone should be sufficient to acquit Dee of the charges of sorcery and conjuring – interpreted today as charlatanism – brought against him by the fanatical English mob, a charge which he frequently and earnestly repudiated.⁸

If the great Mercator was interested in astrology the implication seems to be, then Dee could too, and the guarantee of Mercator’s scientific reputation is mysteriously used to endorse the idea that Dee’s reputation for magic was a malicious invention. In a series of books and articles in the 1950s Taylor continued her “recovery” of Dee from charges of charlatanism. In her biographical entry on Dee in *The Mathematical Practitioners of Tudor and Stuart England*, for example, she presented Dee as essentially a practical scientific figure. “The practical applications of astronomy and geometry were foremost in his mind”, she said, “whether for casting nativities or advancing navigation, for reforming the calendar or mapping subterranean mines.”⁹ Although she characterises him as an “astrological expert”, Taylor takes pains to point out elsewhere that he “accepted the Copernican hypothesis.”¹⁰ In her 1955 article “John Dee and the Nautical Triangle, 1575”, Taylor is more explicit, complaining that historians had “treated him slightly, dubbing him astrologer and alchemist, by which words they understand ‘charlatan’.” In their characterisation of Dee as a “servile and ignoble figure”, she says, “the acclaimed mathematician and ever-ready instructor are forgotten.” While she accepts the reality of Dee’s interests in alchemy, astrology and what she calls “crystal-gazing”, “by this date”, she says, “his work on navigation had come to an end.”¹¹ Taylor then constructs a Dee who is internally contradictory (“Dee’s imagination often predominated over his science – but science he had”) but whose career could be neatly divided into the legitimate and scientific navigator (whose navigational works are said to have “foreshadowed” the “modern Nautical manual”)

and the illegitimate and imaginative “crystal-gazer”.¹² Curiously while Taylor was able to accept the historical specificity of Dee’s thought in some areas (his *Great and Rich Discoveries*, she argued, was important because it provided “direct and detailed evidence of how an Elizabethan cosmographer went to work”), she was openly contemptuous of his later career, when he was (as she puts it) “overseas chasing the will o’ the wisps of alchemy and crystal-gazing in Prague”.¹³ For Taylor “cosmography” seems to have more historical importance than alchemy and “crystal-gazing”, although they were all significant parts of Dee’s own sense of his intellectual activities.

While one could dismiss the lack of attention to the “occult” side of Dee in Taylor’s work as simply peripheral to her historical concerns, Taylor’s own repeated protestations and apologetic references to Dee’s occult interests marks a significant point of historiographical tension. This tension turns upon the problematic question of how the occult sciences (or “occult philosophy”) fit into the field of knowledge in the sixteenth and seventeenth centuries, a question which current discussions of the nature of the Scientific Revolution are doing little to address. Taylor’s approach is not dissimilar in many respects from that of Brian Vickers, who in his introductory essay to *Occult and Scientific Mentalities* argued that the occult was radically distinct from the scientific and should be studied and considered separately from the development of scientific thought.¹⁴ Taylor, of course, was writing at a time when the history of alchemy, astrology and magic had not yet gained the credence which it has today, and her failure of historical imagination is in large part due to the historiographical climate in which she was writing.

It was in the 1950s, in fact (some time between the publication of Taylor’s *Tudor Geography* and her *Mathematical Practitioners*) that the first major advances in the historiography of the occult sciences took place in Anglo-American scholarship, and with this the historical significance of Dee took on a new prominence.¹⁵ In 1952, I. R. F. Calder, working under the supervision of Frances A. Yates at the Warburg Institute made probably one of the most significant single contributions to Dee studies in the imposing shape of his sadly unpublished two volume PhD thesis “John Dee studied as an English Neoplatonist.”¹⁶ In its courageous attempt to survey the whole of Dee’s intellectual output, Calder rescued Dee from the narrow confines of the illuminating but partial accounts of Taylor and Johnson, and revealed the full historical complexity of Dee’s work. For the first time Dee’s occult philosophical interests – his interests in astrology, alchemy, and the cabala, the influence of Roger Bacon and Alkindi, the Pythagorean mysticism of the *Monas Hieroglyphica*, the neoplatonic aspects of the *Mathematicall Praeface*, and even the angelic conversations – received a sympathetic and objective historical examination. The strength of Calder’s thesis was, however, also one of its weaknesses – in his determination to present Dee as a typical figure, he was profoundly influenced by a particular thesis: that of Edwin Burtt, who had argued that neoplatonic metaphysics had played a significant, albeit unrecognised, role in the development of modern science.¹⁷ Calder’s main aim was thus to show that

Dee may properly be considered a typical, though outstanding, example and exponent of sixteenth century English scientific neoplatonism – a movement which made a significant, if somewhat neglected, contribution to later and more generally appreciated development in science and philosophy.¹⁸

It is clear from Calder's preface to his thesis that his handling of Dee had been influenced by his discussions with both Yates and D. P. Walker. It is difficult to divine who was the originator of this interpretation, Yates, or Walker, or Calder himself, but what is certain is that Calder's "neoplatonic" Dee was taken up by his supervisor, and another of her students Peter J. French and developed into an even more influential interpretation, that of Dee as an "Elizabethan Hermetic Magus".¹⁹

In her influential 1964 study of the "Hermetic Tradition" (a Renaissance synthesis of neoplatonic, pythagorean and cabalistic themes putatively catalysed by Marsilio Ficino's translations of the *Corpus Hermeticum*, and the syncretistic philosophy of Pico della Mirandola), Yates argued that:

John Dee has to the full the dignity, the sense of operational power, of the Renaissance Magus. And he is a very clear example of how the will to operate, stimulated by Renaissance magic, could pass into, and stimulate, the will to operate in genuine applied science.²⁰

While she retains the Burtian flavour of Calder's Dee (the stimulation of "genuine applied science" by Neoplatonism), Yates subtly moulded him into a representative of her own "Hermetic tradition" whose representative figure was the "Renaissance magus". This becomes even clearer in her 1967 essay "The Hermetic Tradition in Renaissance Science":

John Dee seems obviously placeable historically as a Renaissance magus of the later Rosicrucian type. Paracelsist and alchemist, a practical scientist who wished to develop applied mathematics for the advantage of his countrymen, full of schemes for the advancement of learning [...].²¹

Peter J. French who worked closely with Yates while he was in England researching his study of Dee,²² developed Yates's thumbnail sketches into a book-length study in his *John Dee: The World of an Elizabethan Magus*, published in 1972. While French's study is sensitive to the interdisciplinary range of Dee's activities,²³ and touches upon his activities as "Philosopher, mathematician, technologist, antiquarian, teacher and friend of powerful people", it is the idea of Dee as "Elizabethan magus" which is the dominant idea of his book. Dee, French argued, was "a magician deeply immersed in the most extreme forms of occultism: he was Elizabethan England's great magus [...] one of a line of philosopher-magicians" who "lived in a world [which was] half magical, half scientific."²⁴ Hermeticism, French argued, that is to say "the gnostic philosophy based on the rediscovered texts of the legendary Hermes Trismegistus," was "basic to Dee's thought," and "pervaded his natural magic, his science and his religion."²⁵ While French is aware of the diversity of Dee's activities, ultimately he produces a homogeneous vision of Dee where, for example, his mathematics, architecture, navigation and technology are "all part of a broader magically oriented philosophy."²⁶ Dee's "science and magic, his art and even his antiquarianism," French argued, "all form part of a universal vision of the world as a continuous and harmonious unity."²⁷ In short, John Dee was "totally in the Hermetic tradition" as it had been conceived by Frances Yates.²⁸ The closeness of French's and Yates's ideas on Dee extends at points to direct verbal echoes, as we can see from the following two quotations:

Although his experiments in theurgy are regarded as pointless endeavours today, he saw them as a means of pursuing science at a higher level.²⁹

What Dee wanted to learn from the angels was the secrets of nature; it was a way of prosecuting science on a higher level.³⁰

The historiographical apogee of the Yatesian “Hermetic magus” however was relatively short-lived. In 1974 Robert S. Westman gave a paper at the Clark Memorial Library, in which he roundly criticised Yates’s contention that there was an occult philosophical impetus behind the Copernicanism of Dee and Giordano Bruno.³¹ Westman cites at length from a passage in Peter French’s book which argues that Dee embraced the Copernican hypothesis, and that this “scientific advance” was “spurred by the renewed interest in the magical Hermetic religion of the world.” This passage is (not unfairly) taken to be “entirely characteristic of the Yatesian mode of analysis.”³² While Westman concedes that Dee had praised Copernicus’s labours in “reforming the celestial discipline” (*in coelesti disciplina restauranda*) in his preface to John Feild’s *Ephemeris for the Year 1557*, and made use of Erasmus Reinhold’s Prutenic Tables in his manuscript treatise on the reform of the calendar, he refuses to accept that this constitutes proof that he was a Copernican. In fact, Westman goes on to argue, “wherever Dee had the opportunity to assert his belief in the reality of Copernicus’s theory, he did *not* do so.”³³ Westman also rejects the supposed Hermetic interest which Dee took in Copernican theory (what French calls his “spiritual affinity with heliocentricity”), pointing to the absence of Hermetic references in Dee’s private marginalia to Paulus Crusius’s *Instructions Concerning the Equal and Apparent Revolutions of the Sun* (Jena, 1567) as proof of his claims. While Westman ignores the Neoplatonic emphasis in the collection of quotations on the sun which Dee collects at the back of his copy of Crusius (there is a quote from Plato’s *Timaeus*, and a quote from one of the Orphic hymns), he is probably correct in suggesting that Dee’s views on Copernicus, far from being “Hermetic”, “fall into the same pattern of reading the Copernican theory that we find among almost all university astronomers of the period.” Dee, he argued, “had no need of a heliocentric system, whether magical or astronomical”.³⁴ Westman’s conclusions are aggressive, if not unfair: firstly he believes that Yates’s (and French’s) claims about a “Hermetic reform” in Copernicanism is fundamentally flawed. “Not a single leading thinker included by Dr Yates in the Hermetic tradition interpreted the Copernican theory as a magical symbol or made it the operational basis of a system of magical forces.” There was, in any case, “no single ‘Hermetic interpretation’” of the Copernican theory, but a “diversity of responses”.³⁵ “Hermetic” thinkers, he argued, reflected rather than initiated Copernican advances, and while Giordano Bruno’s cosmological innovations were grounds for allowing the Hermetic tradition a “modest supporting role” in scientific advances, he does not agree that the magical worldview was “responsible for spurring these conceptualizations”.³⁶ In Westman’s view, the “significant physical and mathematical insights Bruno and other alleged Hermeticists arrived at came from their individual, creative intuitions, often under the influence of doctrines first formulated in mediaeval natural philosophy, and *in spite of* their adherence to Hermetic doctrines.” There was, in fact, no evidence for a general thesis concerning the influence of “magic” on “science”.³⁷

Another, even more unsympathetic response from the history of science lobby came in 1978, when John Heilbron, in his introduction to the edition and translation of Dee's *Propaedeumata aphoristica* (which he co-edited with Wayne Shumaker) assessed Dee's intellectual activities in terms which make it clear that he – like Westman – rejected the Burtian interpretation of the Scientific revolution promoted by Calder, Yates and French. Whilst affecting to give a balanced picture of Dee's career Heilbron barely disguises his antipathy towards the occult side of Dee's activities, characterising his career as “a continuous progress toward the occult and the irrational.” Dee's mathematics he argued, “did not grow from or together with his occultism,” as Yates and French had argued, “but, rather, preceded it, and [...] in so far as he devoted himself to occult studies he moved off the high road of the scientific revolution.”³⁸ Heilbron identifies Dee's mathematical career as a turning away from “hard headed” and “technical” mathematics towards that of “Platonizing philosophies”, the province of “circle squarers and [...] fuzzy-minded astrologers.”³⁹ Heilbron utterly rejects what he scathingly calls Dee's “chats with angels”, and sees his work on calendrical reform, presented to Queen Elizabeth in 1582 as “his last tract of any scientific importance.”⁴⁰ Although Heilbron acknowledges that Dee's contemporaries had a high opinion of his mathematical abilities, he finds this reputation “easier to ascertain than its basis.”⁴¹ While Dee's *Praeface* had been extolled by Calder, Yates and French as a triumph of neoplatonic scholarship, Heilbron criticises it for its inclusion of unorthodox mathematical sciences – which he sneeringly refers to as “jabberwocky disciplines”⁴² – such as “thaumaturgike”, which Heilbron dismisses as a confection of “the thousand amusing, silly, practical, or useless things set forth in the books of Giammbattista della Porta, Athanasius Kircher, Gaspar Schott, and Francesco Lana.”⁴³ In the light of these observations Heilbron felt that Dee deserved only “a modest place in the intellectual history of Tudor England.”⁴⁴ For Heilbron Dee's occultism was an obstacle, and not a stimulus to scientific endeavour diverting Renaissance “scientists” from “investigations of the ordinary and the regular” into fanciful mystical speculations.⁴⁵ What is at stake in Heilbron's account of Dee is a certain conception of the Scientific Revolution which radically excludes the occult sciences as “non-scientific”. This begs the question, of course, of why Heilbron felt drawn to edit Dee's *Propaedeumata* at all. The answer would seem to be that Heilbron was only able to countenance the *Propaedeumata* by denaturing it. Ignoring the cabalistic, astrological and magical themes of the work and focussing on Dee's grappling with the problems of the measurement of planetary distances and motions, Heilbron presents the *Propaedeumata* as “a fully intelligible series of recipes for applying arithmetic and geometry to a standard scholastic physics and astronomy.”⁴⁶ Dee's primary source for the idea of stellar radiation, Al-Kindi's *De radiis* (a work which often bore the subtitle “seu theorica magica” in manuscript) is likewise misleadingly described as “a straightforward determinist astrology” which “urged its merits as a mathematical science, and grounded it physically in the interplay of radiations continually [...] pouring out of celestial bodies,”⁴⁷ which ignores, for example, Al-Kindi's radiative theories of incantational, talismanic and sacrificial magic.

In his introduction to his 1975 edition of Dee's *Mathematical Praeface* the renowned historian of Paracelsianism and the “chemical philosophy”, Allen G. Debus steered a difficult course between the Yatesian view of Dee and more traditional views

of Dee's *Praeface* (such as that of E. G. R. Taylor) which saw it as a precursor of a modern scientific outlook. Debus cautioned against views which took Dee's concept of *scientia experimentalis* as a precursor of the "modern controlled experiment",⁴⁸ and cautioned against the sanguinity of those who might be tempted to view his championing of "applied" mathematics in the *Praeface* as a "modern" scientific tendency. "Any [modern] definition of mathematics", Debus observed, "would be insufficient to encompass Dee's approach to the subject," which embraced "a mathematical spectrum that ranged from the study of navigation and mechanics to mysticism."⁴⁹ The "revised interpretations" of Yates and French, he felt, had gone "too far in their claims for Dee as a scientific prophet". The alchemical and cabalistic mysteries of the *Monas Hieroglyphica*, he pointed out, had been far more "influential" than the supposedly scientifically progressive *Mathematicall Praeface*, and the vagaries of his reputation should sound a note of caution, he said, to "those who might wish to interpret the Scientific Revolution simply as the growth of positive knowledge accompanied by an almost inevitable decay of the pseudo-sciences."⁵⁰

Probably the most important breakthrough in Dee studies in the aftermath of the Yates thesis was made by Debus's student Nicholas H. Clulee, who in his 1973 doctoral thesis and in a series of articles in the late seventies and early eighties began to formulate a view of Dee which radically questioned the Yates-French version of Dee without trivialising the importance of his occult scientific outlook.⁵¹ This culminated in the publication of his groundbreaking study *John Dee's Natural Philosophy: Between Magic, Science and Religion* in 1988, which was a watershed for the study of Dee's natural philosophy. Breaking free of the "Hermetic Dee" of Yates and French, Clulee provided a new, and more plausible, set of contexts for Dee's natural philosophy, and rather than treating Dee's career as a homogeneous worldview, sought to trace a discrete intellectual development, moving from an early phase of eclectic Aristotelianism (albeit augmented by his readings in mediaeval *perspectiva*) at the time he was writing the *Propaedeumata aphoristica*,⁵² to his later essentially religious orientation in the angelic conversations which – in Clulee's view – were "antithetical to science as both empirical investigation and rational inquiry."⁵³

We are fortunate indeed to have in this volume a retrospective survey of Dee studies by Nicholas Clulee, from the vantage-point afforded by the 1995 conference. As a key figure in the intellectual historical understanding of Dee, he is in a unique position to chart the changing fortunes of Dee as an object of historical inquiry. Clulee revisits the critique of the "Warburg interpretation" of Dee, but this time he places it the context of the changing historiography of the history of science as a discipline. The emergence of the "Warburg" Dee, Clulee points out, was conditioned by the emergence of the "Scientific Revolution" as a concept. Clulee shows how recent reappraisals of this powerful concept, or "master-narrative", have opened the way for different understandings of Dee's place in the period. Clulee sees recent contextualist approaches to early modern science (such as that proposed by John Schuster) as providing more scope for the study of figures like Dee who do not really fit the Scientific Revolution narrative. If our focus on the natural philosophers of the sixteenth century is not orientated towards the culmen of the seventeenth-century "heroes" (Galileo, Boyle, Newton), but instead towards the "contingencies of the process of change in natural

philosophy” in the “Scientific Renaissance” itself, then we can begin to understand the achievements of the period for their own sake, and not simply as stages on the way to the Scientific Revolution. Of equal importance to this historiographical “positioning” of Dee studies are Clulee’s proleptic remarks on future possibilities for Dee studies. His call for “rethinking the Dee canon” is a timely one, and while some of the directions which he indicates in this essay have already begun to come to pass (Clulee’s own recent essay on Dee and Paracelsianism, for example, or Steven vanden Broecke’s study of Dee’s natural philosophy in the context of the community of mathematical practitioners in Louvain), the broad outlines of his suggestions remain pertinent for the study of Dee in the forthcoming decades.⁵⁴

Clulee’s essay also highlights the singular importance for Dee studies of the work of Julian Roberts and Andrew Watson. The publication in 1990 of *John Dee’s Library Catalogue* marked a significant watershed for our understanding of Dee’s intellectual life.⁵⁵ In addition to providing an invaluable finding-list of the extant volumes once owned by John Dee, including notices of marginalia and other inscriptions, this volume also includes vital new historical information about the growth of Dee’s private library – an invaluable resource for the historian attempting to trace the development of Dee’s intellectual and practical interests. In recording the locations of the books and manuscripts which Dee owned and annotated, Roberts and Watson have given Dee scholars a whole new body of evidence to assess beside his established oeuvre of manuscript and printed works. This work, as Clulee says, is “a touchstone for almost all future work on Dee”⁵⁶ “Because we have [...] this] record of his library [...] and many existing copies of his books with his annotations can be identified,” Clulee says, “the possibilities of doing a cultural history of his intellectual life are particularly rich.”⁵⁷

Two recent examples of Dee scholarship attest to the accuracy of this statement. Detailed knowledge of Dee’s library and close attention to his marginalia, for example, play a vital role in William H. Sherman’s important study *John Dee: The Politics of Reading and Writing in the English Renaissance* (1995). “Dee’s extensive marginalia”, Sherman argued, had “disappeared from our intellectual map of the Renaissance”, before the work of Clulee, Roberts and Watson. Sherman is emphatic about the importance of this newly rediscovered evidence: “However messy, modest, and (as it were) marginal they at first appear, it is no exaggeration to say that Dee’s marginalia are central to the recovery of his intellectual activities, and [...] his role in society.”⁵⁸ The new kinds of evidence which marginalia provide are an important part of Sherman’s radical reappraisal of Dee’s intellectual activities. Deliberately eschewing the post-Yatesian focus on Dee’s occult philosophical interests, Sherman sought to bring to light Dee’s role as a courtly advisor and political intelligencer. Sherman’s approach stresses Dee’s “scholarly mediation between a body of knowledge (England’s administrative, fiscal and military strengths and weaknesses) and a body of political readers (an elite group of government officials).”⁵⁹ That is to say, he looks at Dee as an “intelligencer”, and focuses on his contributions to what he calls his “political science”. This focus is both timely and salutary. Intellectual historians have in the past been content to deal with intellectual figures of the past as if their work existed in a timeless and transcendent realm of “pure” thought. Sherman tries to reposition Dee, and his intellectual labours, within a concrete social and political context. In emphasising the

courtly, political aspects of Dee's career, Sherman does not so much seek to obliterate the "occult" or philosophical Dee so much as to present another facet of Dee's work. He does not "claim to present 'the whole Dee'", but rather to "offer [...] a range of perspectives which have not figured in previous pictures of the whole Dee."⁶⁰ Sherman focused on the court patronage enjoyed by Dee and his undertaking of a variety of intellectual services in the service of Queen Elizabeth and various courtiers. His work on Dee's role in Elizabethan maritime enterprises in particular have added a whole side to Dee's work which had previously been neglected in Dee studies. Sherman argued that a close scrutiny of Dee's manuscript works "cast serious doubts on the packaging of Dee as – exclusively or even primarily – a Hermetic Neoplatonic magus". The "many traces of [Dee's] non-magical activities," he suggested, had been systematically "played down or left out altogether" in previous accounts of Dee's career.⁶¹ While one might want to qualify Sherman's compensatory secularisation of Dee,⁶² his recovery of a "lost Dee" of political intelligence and policy has vitally enriched our understanding both of Dee's own activities and of the historical and socio-political specificity of English Renaissance intellectual life in general.

The "occult" side of Dee's career came to the fore once again in the work of Deborah E. Harkness, although she took her cues far more from the natural philosophical Dee of Clulee than the Hermetic magus of Frances Yates and Peter French. Like Clulee, Harkness wrote her PhD thesis on Dee,⁶³ and published significant articles on the angelic conversations⁶⁴ and Dee's scientific household,⁶⁵ prior to the publication of her book *John Dee's Conversations with Angels: Cabala, Alchemy, and the End of Nature* in 1999.⁶⁶ The first book-length study of Dee's dealings with the angels, Harkness's historically sensitive account of the angelic conversations emphasised the ways in which Dee's library informed his understanding of what he assumed were communications from angels – providing him with corroboration for what Kelley was relating to him, or with grounds for disputing and questioning some aspects of the narratives. In particular Harkness stresses the role of works on angelology, Christian cabala, and alchemy, which helped Dee "to formulate his own Christian natural philosophy."⁶⁷ Harkness also indicates the ways in which Dee's post-1583 career constitutes a continuation rather than an abrupt break with the natural philosophical, mathematical, astronomical and alchemical interests of the 1550s, 60s and 70s. Harkness describes Dee's angelic conversations as "Dee's last universal science", which was "an attempt to provide a universal basis for natural philosophy [... which] sought to unify and make coherent all religious beliefs, natural knowledge and ancient theory."⁶⁸ It is precisely this attempt at unifying different forms of knowledge which has made Dee such a challenging and important figure for Renaissance intellectual historians. If in the past Dee's incongruence with modern disciplinary frameworks made him (or particular aspects of his work) marginal to many scholars, increasingly his perceived disciplinary incongruity is being seen as a symptom of the unique ways in which Renaissance thought and practices were constituted, rather than as problematic or anomalous. With the growing realisation that interdisciplinary approaches are vital for a fuller understanding of the structures of Renaissance thought or mentalities, figures like Dee are becoming more important for us to understand. Increasingly Dee's "problematic" career has been explained, rather than explained away.

DEE AND INTERDISCIPLINARY STUDIES

The subtitle of the present volume, “interdisciplinary studies in English Renaissance thought” is motivated by a profound conviction that when studying intellectual formations of the early modern period interdisciplinarity is not simply a fashionable methodological option, or theoretical reflex, but a historiographical necessity. The history of Dee studies has been a history of disciplinary confusions and antagonisms. In order to understand the multiplicity and complexity of Dee’s practises and beliefs requires a purposeful suspension of the epistemological categories of contemporary disciplines in order that we can understand the epistemological matrix which allowed the co-existence of what are now often perceived to be contradictory or mutually exclusive elements.

Dee himself seems to have consciously avoided disciplinary specialisation. In a letter written by Dee’s son Arthur in 1649, in response to biographical queries about his father’s life, we hear that Dee “was a generall Scholler and would neuer take the degree of D[octo]r, although he was generally styled so [...] he neuer would take any profession vpon hym.”⁶⁹ This conscious avoidance of a singular “profession,” and the role of “generall Scholler” is a category of intellectual self-definition typical of humanist scholars in sixteenth- and early seventeenth-century England.⁷⁰ Dee’s avoidance of a university career, however, cannot be attributed simply to humanist idealism. In the preface to his *Propaedeumata aphoristica* in 1558, Dee declared himself to be the professor of a continental style of philosophy (*peregrina philosophandi ratio*) which was not that of the universities (*Communi, tritave philosophandi via*).⁷¹ In a letter to William Cecil, Lord Burleigh in 1563, Dee explicitly contrasted the intellectual narrowness of the English universities with his own desire for a more interdisciplinary approach to natural philosophy:

Albeit that o’ vniversities, both, in them have Men in sundrye knowledges right excellent, as, in Diuinitie, the hebrue, greke and latin tung, &c. Yet forasmuche as, the Wisdome Infinite of o’ Creator, is branched into manifold mo sort of wunderfull Sciences, greatly ayding Dyuine Sights to the better Vew of his Powre and Goodnes, wherin o’ cuntry hath no man (that I ever yet could hereof) hable to set furth his fote, or shew his hand : as in the Science *De Numeris formalibus*, the Science *De Ponderibus mysticis*, and ye Science *De Mensuris Diuinis* : (by which three, the huge frame of this world is fashioned, compact, rered, stablished & preserved) and in other Sciences, eyther wth these Collaterall, or from them derived, or to themwards, greatly us fordering.⁷²

Dee’s career was characterised by this passionate pursuit of “manifold [...] sorts of wunderfull Sciences.” He proudly refers to his *Monas Hieroglyphica* as founding a “new discipline” (*Disciplina noua*), for example,⁷³ and his *Mathematicall Praeface* to Billingsley’s *Elements of Euclide* introduces a bewildering variety of new subjects (such as “hypogeiodi” – the science of subterranean measurement, or “menadrie”, the science of artificially augmenting natural forces) to the traditional classification of the mathematical sciences.⁷⁴ There has been an increased focus in recent intellectual history on the problematic nature of early modern disciplines and their relationship to current disciplinary formations, and Dee seems to offer an extremely rich and instructive example of the tension between disciplinary recuperation and disciplinary innovation in the late sixteenth century.⁷⁵

There is clearly nothing distinctively “Renaissance” about interdisciplinarity *per se*. Renaissance thinkers often valued the stability offered by clear disciplinary boundaries, and the proliferation of attempts to classify the arts and sciences in the late sixteenth and early seventeenth century suggests an increased concern for fixing and stabilising the field of knowledge. Conrad Gesner, for example, in his *Pandectarum sive Partitionum uniuersalium* made a strong case for maintaining disciplinary boundaries:

To put in order what has been written is impossible unless the precise location of all knowledge has been established. This must be done, not only because there are so many and diverse kinds of subjects, but also because one and the same subject, if considered from different points of view, may belong to different branches of knowledge. And yet it is necessary that a subject be held together within its own boundaries, so that it does not intrude on others.⁷⁶

Like Dee, Gesner embraces the *diversification* of knowledge even as he tries to insist upon its unity, and acknowledges the importance of viewing subjects “from different points of view”. Scholars like Dee, who embraced this diversity, seem to create problems for the intellectual historian because the process of partitioning (of increasing specialisation) – which begins with works like Gesner’s *Pandectarum* – has accelerated to the point where diversification has become problematic. Coming from distinct provinces of historical scholarship it is often incomprehensible to those studying, say, Dee’s contributions to geometry, or cartography, that the same man embraced the divinatory *ars sintrillia*, folklore on hidden treasure (“hill-digging”), antiquarianism or conversations with angels. If intellectual history is to locate a historical figure within a coherent discipline or domain (Dee as “mathematician”, as “cartographer”), how does one account for these other disciplinary enterprises? Sometimes, too, the very nature of what structures these endeavours is problematic, what is the place, for example, of “secrets” or “mysteries” within the disciplines currently recognised by intellectual history?

Nicholas Clulee has drawn our attention to the difficulty of what he calls Dee’s “omnidisciplinarity” and William Sherman has pointed out that the range of Dee’s interests “gives twentieth-century intellectual historians a strong sense of cognitive dissonance, if not schizophrenia”.⁷⁷ Anthony à Wood was responding – in his own mid-seventeenth-century fashion – to the interdisciplinarity of Dee’s career when he described him, in his *Athenae Oxoniensis*, as “a searcher into profound Studies, a great Investigator of the more secret hermetical Learning, a perfect Astronomer, a curious Astrologer, an excellent Geometrician, and indeed excellent in all kinds of Learning.”⁷⁸ There is an implicit danger, however, in thinking about “early-modern interdisciplinarity” – that is, that we might reconfigure various instances of Renaissance thought as if they were hybridised “mixtures” or composites of our own disciplines. The dangers of such unconscious anachronism can only be overcome by appealing to contemporary definitions and categories, and rethinking early-modern intellectual (or practical) formations not as “mixed” or divided within themselves but as unique and self-constituting modes of thought (or practice). This collection of essays aims to reflect the disciplinary complexity of Dee’s intellectual project, without attempting to reduce that complexity to a “continuous and harmonious unity.”⁷⁹ Bringing together disparate areas of Dee’s work, from metallurgy to astrology, from cartography to magic, from mathematics to antiquarianism, our aim is to bring this interdisciplinary complexity to

the foreground and to invite renewed historical scrutiny of the field of knowledge in Elizabethan England.

One area in which Dee enjoyed an unparalleled reputation during his lifetime was in the field of mathematics, and it is fitting that this volume has two essays which address this aspect of Dee's career. In his survey of Dee's mathematical work in the introduction to the English translation of Dee's *Propaedeumata Aphoristica*, John Heilbron was rather critical of Dee's abilities. "The fact of Dee's contemporary reputation," Heilbron suggested "is easier to ascertain than its basis", it was only amongst "the less able," he adds, that "Dee passed as a prodigy".⁸⁰ Be that as it may, Anthony à Wood described Dee (along with Thomas Harriot, Nathaniel Torperley and Walter Warner), as one of "the Atlantes of the mathematic world",⁸¹ and cites one of Dee's contemporaries who considered him to be "the prince of all the philosophers and mathematicians of our age."⁸² Heilbron's conclusions may, in fact, tell us more about what some mid-twentieth-century historians of science considered to be "significant" achievements than it tells us about Dee's place in late sixteenth-century English mathematics.

The essays of Robert Goulding and Stephen Johnston give us a more historically sensitive and measured assessment of Dee's mathematical achievements. Both essays consider Dee's relationship to his younger contemporary Thomas Digges, and reflect upon Dee's mentorial influence and upon the divergence of the two men's mathematical careers. Goulding's essay focuses on Dee's *Parallaticae commentationis praxeosque nucleus quidam* and Digges's *Alae seu scalae mathematicae*, works published in 1573 ostensibly in response to the appearance of the 'New Star' (or supernova) in 1572. Goulding provides a detailed comparison of the two men's methods of measuring parallax and how it compared to the existing method of Johannes Regiomontanus who had developed a method for calculating the parallax of occasional astronomical bodies (such as comets) by means of spherical triangles. Although he identifies flaws in the treatments of both Dee and Digges, Goulding emphasises that "their mastery of parallax far exceeded that of any of their contemporaries" and he shows that their ideas about the nature of the New Star were taken seriously enough to be subjected to a critique by Tycho Brahe in his *Astronomiae instauratae progymnasmata*.⁸³ While both Dee and Digges's works claimed to be addressing the New Star, Goulding notes their failure to apply their new parallax theories to the new phenomenon and suggests other reasons for their decision to publish at this time. Goulding shows how the two mathematicians use the theory of parallax to promote their own (very different) mathematical agendas which were independent of the novel astronomical phenomenon they were ostensibly commenting upon. Goulding shows that Digges's interest in accurate astronomical measurement reflected his desire to provide proof of the Copernican hypothesis, while Dee was more interested in increasing the accuracy of his new astrological theory.

While Stephen Johnston also looks at Dee and Digges's responses to the New Star, his essay reflects more widely on the mathematical careers of the two men and sees the relationship between Dee and his young protégé as a symptom of a changing conception of the mathematical profession at the end of the sixteenth century. The career of

Digges, Johnston suggests, “provides an opportunity to assess Dee’s role in forming the next generation of mathematicians.”⁸⁴ Digges, who had been taught mathematics by Dee after the death of his father in 1559, had been profoundly influenced by Dee’s example. Although Digges had “reworked the terms of his mathematical identity” in the 1570s-80s, moving from his defense of the “intellectual nobility” of purely theoretical mathematics in his *Mathematicall Discourse of Geometrical Solids* appended to his edition of his father’s *Pantometria* (1571) to an ethos of “active service of prince and commonwealth” after the publication of his *Stratoticos* in 1579, Johnston doesn’t see this as a break with Dee’s mentorship influence.⁸⁵ Rather than seeing Dee and Digges as polarised figures, Johnston sees the influence of Dee behind Digges’s early concern with abstruse problems in solid geometry, and his later turn toward practice and utility. In many respects, Johnston argues, there is a “strong parallel” between the careers of Dee and Digges in the 1570s, with both men increasingly embracing a “vernacular ethic of mathematical service.”⁸⁶ However, like Goulding, Johnston also identifies a “fundamental divergence in their respective conceptions of the identity of the mathematician” which he feels is particularly visible in their respective attitudes towards mathematical astronomy, and particularly the Copernican hypothesis.⁸⁷ While Digges “adopted and advocated the Copernican world system as the best representation of the actual order of the planets”, Dee avoided discussing the truth or falsity of Copernicus’s “Hypotheses Theoricall”.⁸⁸ While Digges stressed the autonomy and superiority of mathematical astronomy, Johnston argues, for Dee “cosmological principles were [...] rooted in a wider disciplinary constellation than mathematics alone,” and mathematical astronomy was seen as subordinate to wider philosophical questions.⁸⁹ This profoundly different conception of the disciplinary status of mathematics, Johnston suggests, underlies the very different paths their careers took in the 1580s, with Digges pursuing “military and civil duties” and Dee pursuing his angelic conversations in Europe.⁹⁰

Johnston’s and Goulding’s essays both highlight the problems of disciplinarity in Elizabethan England. “For Dee,” Johnston says, “mathematics was thus always placed in explicit relation with other learned disciplines, as part of a larger hierarchy of knowledge.” He sought to “integrate disciplines in order to straddle boundaries between natural, mathematical and esoteric knowledge”, whereas Digges “restricted the mathematical arts to a narrower intellectual terrain” but “elevated mathematics above other disciplines.”⁹¹ While Johnston is undoubtedly right to suggest that Dee’s “long term impact” on mathematics was the practical ethos of his *Mathematicall Praeface*, which promoted “mathematics as worldly, instrumental, practical, vernacular and public”, his account of the philosophical orientation of Dee’s mathematics (and Goulding’s account of the epistemological assumptions of the *Propaedeutica aphoristica*), show that a full understanding of Dee’s mathematics requires us to rethink the place of mathematics amongst the disciplines at this time.⁹² Nicholas Clulee’s account of the mathematical science of “Archemasterie” in the *Mathematical Praeface*, (which includes prophecy and divination) makes it clear that Dee had a distinctively premodern understanding of the boundaries of mathematics, and that the “practical” ethos of the *Praeface* co-exists with more “occult” or “neoplatonic” understandings of the discipline.⁹³ In a letter to Lord Burghley in 1574 Dee refers to a mediaeval treatise on caves by Pandulfus, the *De meatibus terrae* (which deals with astrology, geomancy

and divination) as a work of “mathematics and philosophy”.⁹⁴ Until we can find a way of placing Dee’s conception of mathematics “as part of a larger hierarchy of knowledge” the full significance of his mathematics seems likely to elude us.

One area in which Dee’s practical mathematical expertise made him an influential figure was maritime navigation. The essays of Robert Baldwin and William Sherman both address Dee’s involvement in maritime affairs and the ways in which his “studious exercises” contributed to the elaboration of an expansionist, imperialist project for dominating the seas and extending the limits of England’s dominions. Baldwin’s essay shows how the various branches of Dee’s studies intersected in his role as intellectual advisor to (and investor in) the Cathay Company voyages to the North West in the 1570s. Baldwin shows how these activities brought together Dee’s knowledge of navigation, geography and cartography (he taught navigational mathematics and the use of navigational instruments to English mariners in his library at Mortlake, worked with Stephen Borough on circumpolar sea charts and corresponded with Abraham Ortelius and Gerard Mercator about their world maps), and his knowledge of alchemy, metallurgy and mining law. Like Johnston, Baldwin stresses Dee’s role as a practical mathematician, who sought ways in which “his skill in spherical geometry and his knowledge of terrestrial variation might be put to practical use”, but also emphasises Dee as a political figure and an economic investor.⁹⁵ Baldwin’s essay shows the disastrous impact of the failure of the Frobisher voyages (which failed to find gold-bearing mineral ores in Baffin and Kodlunarn Islands) on Dee’s court reputation (a number of leading court figures, including William Cecil and Francis Walsingham, were among the investors), and suggests that Dee’s flight to the continent with Edward Kelley in 1583 may have had strong economic incentives. Despite the failure of this key project Baldwin sees the venture as a realisation of an “interdisciplinary, technological and mathematical vision” which Dee derived from his contacts in the 1560s with mathematicians such as Gemma Frisius and Gerard Mercator in Louvain.⁹⁶

William Sherman, like Baldwin, sees the Frobisher voyages of 1576-8 as a key moment in Dee’s career, and emphasises the way in which Dee’s reading and research were fundamental to his practical involvement in maritime affairs. Dee’s “textual exploration”, Sherman argues, was as important as the “geographical exploration” of figures such as Martin Frobisher.⁹⁷ The ability to amass and keep track of the proliferating textual information about voyages of discovery was a vital part of these economic enterprises. “Libraries”, Sherman says, “played an especially important role in the launching and directing of voyages of exploration and colonization”.⁹⁸ Sherman uses the marginalia in Dee’s copy of Ferdinand’s Columbus’s account of his father’s famous voyage to the New World as a “sustained example” of the kinds of reading practices which he outlined in his *John Dee: The Politics of Reading and Writing in the English Renaissance*, and as an “occasion for some further thoughts on Dee’s reading practices [...] on English Imperialism.”⁹⁹ Sherman’s detailed account of Dee’s annotations in Columbus’s book gives us a vignette on the ways in which Dee was involved in “advocating policies gleaned from his reading of historical texts”, and how marginalia can “take us closer to the important ways in which texts mediated both personal lives and power politics in the early modern period.”¹⁰⁰

Dee's interests in the occult sciences of astrology, alchemy and the cabala are dealt with in the essays of Richard Dunn, Federico Cavallaro and Karen de León-Jones. Dunn's account of Dee's astrology focuses on the discrepancy between Dee's innovative new theory of astrological prediction as set out in his *Propaedeumata aphoristica* (1558) – which was based on natural philosophical principles derived from the mediaeval tradition of *perspectiva* – and the traditional house-based horoscopes (including birth charts and horary figures) which make up the bulk of his actual astrological practice. While Dee's published works promised a radical reform of astrology, Dunn, concludes, Dee was “applying traditional doctrines in his private astrological practices and his charts resembled those of other astrological consultants of the time”.¹⁰¹ Dunn also notes the links between the reformed astrology of the *Propaedeumata* and Dee's *Monas Hieroglyphica* which sought to present a new discipline which would deal with both “superior” and “inferior” astronomy (i.e. astrology and alchemy).

Federico Cavallaro's reading of the *Monas Hieroglyphica* focuses on the second of these two “astronomies” – alchemy – and seeks to give an outline of how the various parts of the *Monas* relate to stages in the alchemical process. Cavallaro's analysis sheds new light on this notoriously difficult work and advances some useful speculations on the allegorical intentions underlying some of this work's most obscure passages. Cavallaro's analysis shows the interpretative difficulties posed by the work which combines citations of Greek alchemical authors such as Ostanos and Pseudo-Democritus, with Paracelsianism, Pythagorean numerology and the Cabala.

Julian Roberts and Andrew Watson's account of Dee's book purchases in the 1560s has shown that Dee bought many books on the cabala and Hebrew scholarship and although Dee has gone on record as having a limited knowledge of Hebrew, it was clearly an area of scholarship which he considered extremely important.¹⁰² Karen De León-Jones's essay takes a critical look at Dee's interest in the Jewish mystical tradition of the cabala, or rather his interest in the “Christian cabala” which was derived from it in the course of the sixteenth century by scholars such as Johannes Reuchlin and Henricus Cornelius Agrippa. Taking issue with Frances Yates's facile characterisation of Dee as “an inherently and intrinsically Hermetic-Cabalistic thinker” De León-Jones both problematises the notion of a “Christian Cabala” itself (which has an uneasy relationship with the Jewish mystical traditions which go under the name of Cabala) and assesses the extent of Dee's interest in cabalistic doctrines and the use which he makes of them in his printed works.¹⁰³ De León-Jones stresses Dee's critique of traditional Jewish cabala in his *Monas Hieroglyphica* and his insistence that his own doctrines constituted a “cabala of the real” rather than a grammarian cabala of the Hebrew language. De León-Jones stresses the innovative and creative aspect of Dee's use of the cabala, retaining its hermeneutical techniques but divorcing it from the meditative and mystical aspects of the Jewish cabala and divesting it of the Jewish cosmological principle of the *sefirot* (the emanations or names of God). Dee, she argues, was deeply influenced by Reuchlin's belief that the cabala was congruent with Pythagorean doctrines, and this led him to transform the cabala into a mathematical discipline that drew both on Pythagorean numerology and Euclidean geometry.

Probably the most controversial and difficult area of Dee's "occult" or "magical" studies is undoubtedly the so-called "angelic conversations" – a series of crystallomantic visions fastidiously recorded by Dee between 1581 and 1609. As Peter French astutely remarked in his 1972 monograph, accounts of Dee's work often come to grief on the question of Dee's belief that he could communicate with spiritual beings: "There are always those angels lurking in the background," French complained, "to make people uncomfortable."¹⁰⁴ Those of us working primarily on the angelic materials are only too keenly aware of the continued difficulties and discomfort experienced by modern historians when faced with these kinds of beliefs.

György Szönyi's essay seeks to provide some specific contexts for Dee's 'scrying' practices, and focuses particularly on the influence of Paracelsus, which, he argues, was "systematically overlooked" by Frances Yates and treated only superficially by Peter French. Szönyi shows that Dee used Paracelsus's term for magical talismans – *gamaaea* – in both his *Propaedeumata aphoristica* and the *Monas Hieroglyphica* and argues that it was Paracelsus's mystical goal of *exaltatio* which prepared Dee for his crystallomantic activities.¹⁰⁵ He also looks at the "angelic language" or *lingua adamica* supposedly revealed to Dee and Kelley in the context of the sixteenth-century vogue for "universal" or "artificial" languages, and the search for universal knowledge. Unlike Clulee and Sherman, Szönyi is an advocate (with some minor modifications) of the Yatesian thesis of Dee as a "Hermetic philosopher", although (unlike Yates) he sees Dee not as a precursor of modern science, but as a "forefather" of seventeenth-century "esotericism".¹⁰⁶

My own contribution to the volume emphasises the extent to which Dee's angelic conversations were shaped by mediaeval magical practices. Beginning with a survey of the various ways in which intellectual historians have characterised the conversations and a brief excursus on the terms which Dee used to describe his communications with spiritual beings (spiritual "actions" and "mysticall exercises"), I go on to show the considerable influence of Pseudo-Solomonic magical arts of the late middle ages, which were widely disseminated in the second half of the sixteenth century. I argue that mediaeval and renaissance magic relied heavily on existing traditions of Christian prayer, and particularly the idea of the divine granting of petitions (*impetratio*). While there is a considerable overlap between Dee's conversations and mediaeval theurgy, I also stress the peculiarity of Dee's project: its apocalyptic and millenarian objectives and pseudo-prophetic claims.

Deborah Harkness's essay – presented to the John Dee Colloquium prior to the publication of her 1999 book – explores on a smaller scale some of the themes of her book-length study. In particular Harkness focuses on the extent to which Dee's involvement in the angelic conversations was continually mediated by the knowledge which he gleaned from the works which he collected in his Mortlake library. While Sherman has rightly stressed the civic and political role of the *Bibliotheca Mortlacensis* as "a space where independent scholarship could be carried out and circulated among the academic, commercial, and political communities",¹⁰⁷ Harkness shows that his library was also a repository of more recondite and arcane knowledge, and played a vital role in Dee's more private, theurgical activities. Dee's library, Harkness argues,

“provides the ideal starting point for an investigation of the angels’ revelations”.¹⁰⁸ In particular, she shows how Dee made use of books on angelology and eschatology to help him make sense of his turn toward angelic revelations in the 1570s and 80s. Harkness sets Dee in the context of a more general European “millenarian moment” prompted by “an alarming number of comets, new stars, earthquakes, grand conjunctions and other strange natural events.” and shows how he used his extensive holdings of books on angelology to shed light on the visions which he recorded so assiduously.¹⁰⁹

In her book on Dee’s angelic conversations, Harkness announced her discovery of not one, but two copies of the mysterious *Book of Soyga*, about which Dee had sought angelic advice in 1583.¹¹⁰ In his essay in this volume professional cryptologist Jim Reeds, well known for his work on Trithemius’s *Steganographia*,¹¹¹ brings modern cryptological expertise to bear on the mysterious “magical tables” of *Soyga* (cellular tables filled with apparently random sequences of letters) and compares them with Dee’s use of similar tables in his *Liber Logaeth* (Sloane MS 3189) which incorporates eight of the 36 tables contained in the *Book of Soyga*. Reeds gives the first detailed description of the *Soyga* tables and analyses their formal characteristics. Identifying recurrent patterns Reeds is able to arrive at a “recipe for recreating the tables” given a six letter code-word and a blank grid.¹¹² While Reeds is modest about his achievement there is no doubt that his work on the underlying mathematical structure of the *Soyga* tables will be of enormous help to anyone attempting to understand the original method of their construction. Not only has Reeds been able to reconstruct the implicit mathematical structures of the tables, he has also used modern techniques of error analysis to emend the inadvertent mistakes produced by scribal mistranscription. This analysis also gives Reeds a sound basis for suggesting that Sloane MS 8 (Dee’s copy of the *Book of Soyga*) is the more accurate of the two copies, and was also the manuscript which was used by Dee when he compiled the *Liber Logaeth*.¹¹³ Reeds ends his study with a comparison of the formal structures of different kinds of magic tables used in the early modern period which, he suggests, has received “scant attention” from historians of magic such as Frances Yates.

While most of the essays in this volume seek to offer new perspectives on Dee’s known works, the pieces by Susan Bassnett, Jan Bäcklund and Julian Roberts in this volume shed new light on Dee through presenting new archival, bibliographical and biographical information. Bassnett and Bäcklund focus on the shadowy and often misrepresented figure of Edward Kelley. Routinely presented by historians and biographers as a diabolical charlatan – duplicitous, schizophrenic or criminal – Bassnett shows us a hitherto unknown side of Kelley through a close examination of materials relating to his stepdaughter Elizabeth Weston, while Bäcklund’s piece describes an unnoticed collection of documents in the Royal Library in Copenhagen relating to Edward Kelley and alchemists moving in the Dee-Kelley circle.

Instead of depicting Edward Kelley as a disreputable and criminal character, Bassnett emphasises the extent to which he was able to use the connections he made during his travels with Dee to carve a respectable niche for himself in Central Europe (with “family connections to the emergent figures of the new Bohemian middle class”)

and his role as a “loving stepfather” to the Neo-Latin poet Elizabeth Weston.¹¹⁴ Bringing together new evidence from Oxfordshire county records and autobiographical details from Westonia’s Latin poetry, Bassnett sketches out a tantalising new set of possibilities for our understanding of Kelley and his relationship with Dee which, in contradistinction to previous historical accounts (which stress Dee’s innocent credulity), “is not altogether favourable to Dee”.¹¹⁵

Julian Roberts, who presented a privately printed set of corrections to *John Dee’s Library Catalogue* to participants in the 1995 John Dee Colloquium gives us an invaluable account of newly discovered books which once formed part of Dee’s library, including such remarkable finds as Dee’s densely annotated copy of Marsilio Ficino’s *Omni Divini Platonis Opera* (Basel, 1532), found in the library of St John’s College Cambridge, and the two manuscripts of the *Aldaraia sive Soyga*, discovered by Deborah Harkness in the Bodleian Library and the British Library.

These essays introducing new materials which shed light on Dee and his associates, and the other essays which introduce new perspectives on aspects of Dee’s intellectual and professional activities suggest that there is still a great deal of work to be done on Dee and his involvements in many aspects of Elizabethan life. Dee certainly remains an enduringly fascinating figure: in their different ways Edward Fenton’s popular edition of Dee’s diaries, Benjamin Woolley’s popular biography *The Queen’s Conjuror: the science and magic of Doctor Dee* (2001) and Håkan Håkansson’s recent PhD thesis on the occult-philosophical dimensions of Dee’s work, *Seeing the Word: John Dee and Renaissance Occultism* (2001) provide ample testimony that Dee’s interest in “rare and strange Artes” continues to exercise a fascination for scholars and the general public alike.¹¹⁶ As a brief look at the selective bibliography at the end of this volume will testify, a considerable amount of new work on various aspects of Dee’s intellectual legacy has been published since 1990. With new materials and new studies emerging at this rate we can expect our understanding of Dee and his significance for sixteenth-century intellectual life to continue changing and developing throughout the twenty-first century.

NOTES

¹ *John Dee: An Interdisciplinary Colloquium*, Birkbeck College, University of London, 20-21 April 1995. Two further Dee colloquia have been held since this meeting, the first (organised by György Szönyi) in Szeged in 1998 and the second in Aarhus in 2001 (organised by Jan Bäcklund).

² E.G.R. Taylor, *Tudor Geography 1483-1583* (London: Methuen, 1930), and Francis R. Johnson, *Astronomical Thought in Renaissance England: A Study in English Scientific Writings from 1500 to 1645* (Baltimore: The Johns Hopkins Press, 1937).

³ Johnson, *Astronomical Thought*, 135.

⁴ Johnson, *Astronomical Thought*, 135-6.

⁵ Johnson, *Astronomical Thought*, 136.

⁶ Taylor, *Tudor Geography*, 77.

⁷ Taylor, *Tudor Geography*, 82-3, 85-6. For recent work on Dee and Mercator see Steven Vanden Broecke, ‘Dee, Mercator, and Louvain Instrument Making: an Undescribed Astrological Disc by Gerard Mercator (1551)’, *Annals of Science*, 58:3 (2001): 219 – 240.

⁸ Taylor, *Tudor Geography*, 86.

⁹ E.G.R. Taylor, *The Mathematical Practitioners of Tudor and Stuart England* (Cambridge: Cambridge University Press for the Institute of Navigation, 1954), 170.

¹⁰ Taylor, *Mathematical Practitioners*, 26, 317.

¹¹ E.G.R. Taylor, "John Dee and the Nautical Triangle, 1575", *Journal of the Institute of Navigation*, 8 (1955): 318-325 (318).

¹² Taylor, "Nautical Triangle", 325.

¹³ E.G.R. Taylor, "John Dee and the map of North-East Asia", *Imago Mundi*, 12 (1955): 103-6 (103);

E.G.R. Taylor, "A Letter Dated 1577 from Mercator to John Dee", *Imago Mundi*, 13 (1956): 56-68 (68).

¹⁴ Brian Vickers, *Occult and Scientific Mentalities* (Cambridge: Cambridge University Press, 1984), 'Introduction', 1-54.

¹⁵ Although it could be argued that the beginnings of the serious historical consideration of the occult begins much earlier, with Lynn Thorndike's, *The Place of Magic in the Intellectual History of Europe*, Studies in History, Economics and Public Law, 24 (New York: Columbia University Press, 1905), and his magisterial *A History of Magic and Experimental Science during the first thirteen centuries of our era*, 8 vols. (New York: Macmillan & Co., 1923-58).

¹⁶ I. R. F. Calder, "John Dee Studied as an English Neoplatonist" (Unpublished PhD thesis, The Warburg Institute, 1952), 2 vols. [*JDEP*]

¹⁷ Calder, *JDEP*, I, i: "The basic assumptions of this study [...] are similar to those of Burt's *Metaphysical Foundations of Modern Physical Science*."

¹⁸ Calder, *JDEP*, I, i.

¹⁹ For earlier critical historiographical reflections on the Yates-French thesis see Clulee, *NP*, 2-9, and William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance*, (Amherst: University of Massachusetts Press, 1995), xxi-xiii, 13-21.

²⁰ Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964), 150.

²¹ Frances A. Yates, "The Hermetic Tradition in Renaissance Science" in Charles S. Singleton, ed., *Art, Science and History in the Renaissance* (Baltimore: The Johns Hopkins Press, 1967), 255-274 (264)

²² See Peter. J. French, *John Dee: The World of an Elizabethan Magus* (London: Routledge and Kegan Paul, 1972), xi.

²³ French, *Elizabethan Magus*, 19: "Clearly much work remains to be done before so complex a polymath as John Dee can be fully understood and properly appreciated."

²⁴ French, *Elizabethan Magus*, 1.

²⁵ French, *Elizabethan Magus*, 2-3, 89.

²⁶ French, *Elizabethan Magus*, 187.

²⁷ French, *Elizabethan Magus*, 208.

²⁸ French, *Elizabethan Magus*, 209.

²⁹ French, *Elizabethan Magus*, 19.

³⁰ Yates, *Giordano Bruno and the Hermetic Tradition*, 149.

³¹ Robert S. Westman, "Magical Reform and Astronomical Reform: The Yates Thesis Reconsidered" in Robert S. Westman and J. E. McGuire, *Hermeticism and the Scientific Revolution. Papers read at a Clark Library Seminar, March 9, 1974*. (Los Angeles: William Andrews Clark Memorial Library, 1977), 1-91.

³² French, *Elizabethan Magus*, 103, cit. Westman and McGuire, *Hermeticism and the Scientific Revolution*, 45.

³³ Westman and McGuire, *Hermeticism and the Scientific Revolution*, 46-7.

³⁴ Westman and McGuire, *Hermeticism and the Scientific Revolution*, 47. For Dee's annotations in Crusius see Westman and McGuire's Plate 3.

³⁵ Westman and McGuire, *Hermeticism and the Scientific Revolution*, 68.

³⁶ Westman and McGuire, *Hermeticism and the Scientific Revolution*, 69-70.

³⁷ Westman and McGuire, *Hermeticism and the Scientific Revolution*, 70, 72.

³⁸ *PA*, ix.

³⁹ *PA*, 5.

⁴⁰ *PA*, 15.

⁴¹ *PA*, 17.

⁴² *PA*, 31.

⁴³ *PA*, 37.

⁴⁴ *PA*, 34.

⁴⁵ *PA*, 37.

⁴⁶ *PA*, ix.

⁴⁷ *PA*, 53.

⁴⁸ Debus, 21-2.

⁴⁹ Allen G. Debus, *The Mathematicall Praeface to the Elements of Geometrie of Euclide of Megara (1570)* (New York: Science History Publications, 1975), 8-9.

⁵⁰ Debus, 24-25.

⁵¹ Nicholas H. Clulee, "'The Glas of Creation': Renaissance Mathematicism and Natural Philosophy in the Work of John Dee", University of Chicago Ph.D, 1973. "John Dee's Mathematics and the Grading of Compound Qualities", *Ambix*, 18 (1971), 178-211. "Astrology, Magic and Optics: Facets of John Dee's Early Natural Philosophy", *Renaissance Quarterly* 30 (1977): 632-680, "At the Crossroads of Magic and Science: John Dee's Archemasterie" in Brian Vickers, ed., *Occult and Scientific Mentalities in the Renaissance* (Cambridge: Cambridge University Press, 1984), 57-71.

⁵² *NP*, 71-2. Clulee emphasizes the decisive influence on Dee's *Propaedeumata Aphoristica* of Roger Bacon, Robert Grosseteste and Al-Kindi's *De radiis*.

⁵³ *NP*, 215-216.

⁵⁴ Nicholas H. Clulee, "John Dee and the Paracelsians" in Allen G. Debus and Michael T. Walton, eds., *Reading the Book of Nature: The Other Side of the Scientific Revolution*, Sixteenth Century Essays and Studies, 41 (Ann Arbor Michigan: Sixteenth Century Journal Publishers, 1998), 111-132. Steven Vanden Broecke, *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology*, Medieval and Early Modern Science, 4 (Leiden: Brill, 2003).

⁵⁵ *R&W*.

⁵⁶ *Infra*, 32.

⁵⁷ *Infra*, 28.

⁵⁸ William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995), 79.

⁵⁹ Sherman, *John Dee*, 129.

⁶⁰ Sherman, *John Dee*, xiii-xiv.

⁶¹ Sherman, *John Dee*, xii.

⁶² I am thinking particularly here of Sherman's citation of Geoffrey Elton to characterise Dee as "one of those who 'thought coolly, secularly and constructively about the problems of the common weal and who faced the practical tasks involved in turning aspiration into action.'", *Politics of reading*, 145-6, but also, more generally, of his tendency to downplay the religious dimensions of Dee's political statements.

⁶³ Deborah E. Harkness, "The Scientific Reformation: John Dee and the Restitution of Nature" (Unpublished PhD Thesis, University of California Davis, 1994).

⁶⁴ "Shows in the Showstone: A Theater of Alchemy and Apocalypse in the Angel Conversations of John Dee", *Renaissance Quarterly*, 49 (1996): 707-737.

⁶⁵ Deborah E. Harkness, "Managing an Experimental Household: The Dees of Mortlake", *Isis*, 88 (1997): 242-262.

⁶⁶ Deborah E. Harkness, *John Dee's Conversations with Angels: Cabala, Alchemy, and the End of Nature* (Cambridge: Cambridge University Press, 1999).

⁶⁷ Harkness, *John Dee's Conversations with Angels*, 217.

⁶⁸ Harkness, *John Dee's Conversations with Angels*, 130.

⁶⁹ Arthur Dee to "Mr Aldrich", 15 December 1649, autograph, Northamptonshire Record Office, Isham-Lamport papers, IC 272. The account was requested by a friend of Aldrich "that meant to register yt among som other lerned men of our Age or Byrth."

⁷⁰ On the ideal of the "general scholar" and its relationship to encyclopaedism in the early modern period see Richard Serjeantson, ed., *Generall Learning. A seventeenth-century treatise on the formation of the general scholar by Meric Casaubon*, Renaissance Texts from Manuscript, 2 (Cambridge: RTM Publications, 1999), 13-26.

⁷¹ *PA*, 110-111, 120-121.

⁷² John Dee to William Cecil, Lord Burghley, 16 February 1563, Public Record Office, State Papers Domestic 12/27, item 63. See John E. Bailey, "Dee and Trithemius's 'Steganography'", *Notes and Queries*, fifth series, 11 (1879): 401-2, 422-3.

⁷³ *MH*, Theorem XXIII, 25r.

⁷⁴ See *NP*, 154-162.

⁷⁵ See Donald R. Kelley, *History and the Disciplines: The Reclassification of Knowledge in Early Modern Europe* (Rochester: The University of Rochester Press, 1997), "Introduction", 1-9, and "The Problem of

Knowledge and the Concept of Discipline”, 13-28; Donald R. Kelley and Richard H. Popkin, eds. *The Shapes of Knowledge from the Renaissance to the Enlightenment* (Dordrecht: Kluwer Academic Publishers, 1991) and Anthony Grafton and Nancy G. Siraisi, eds., *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge Mass. and London: MIT Press, 1999).

⁷⁶ Conrad Gesner, *Pandectarum sive Partitionum uniuersalium Conradi Gesneri Tigurini, medici & philosophiae professoris, libri XXI* (Zurich, 1548), Preface, cit. Hans Wellisch, “How to Make an Index - 16th Century Style: Conrad Gessner on Indexes and Catalogs”, *International Classification*, 8:1 (1981), 10-15 (13).

⁷⁷ NP, xi; Sherman, *Politics*, xii.

⁷⁸ Anthony à Wood, *Athenae Oxoniensis. An Exact History of all the Writers and Bishops who have had their education in the University of Oxford. To which are added the Fasti, or Annals of the said University*, ed. P. Bliss, 3 vols (London, 1813-17), III, col. 289.

⁷⁹ French, *John Dee*, 208.

⁸⁰ PA, 16-17. For Heilbron’s account of Dee as mathematician see *ibid.*, 16-34. For a more sympathetic assessment of Dee’s involvement in sixteenth-century mathematical enterprises see Mordechai Feingold, *The Mathematicians’ Apprenticeship: Science, Universities and Society in England, 1560-1640* (Cambridge: Cambridge University Press, 1984), 129-137, *et passim*.

⁸¹ *Athenae Oxoniensis*, II, col. 542.

⁸² *Athenae Oxoniensis*, III, col. 291: “omnium hac nostra aetate tum philosophorum, tum mathematicorum facile princeps.”

⁸³ *Infra*, 42, 47.

⁸⁴ *Infra*, 65.

⁸⁵ *Infra*, 66.

⁸⁶ *Infra* 66, 72.

⁸⁷ *Infra*, 66.

⁸⁸ *Infra*, 75.

⁸⁹ *Infra*, 75.

⁹⁰ *Infra*, 72-3.

⁹¹ *Infra*, 77.

⁹² *Infra*, 79, 81.

⁹³ On the mathematical epistemological complexity of Dee’s *Mathematical Praeface*, see Stephen Clucas, “‘No small force’: mathematics and natural philosophy in Thomas Gresham’s London” in Francis Ames-Lewis, ed., *Sir Thomas Gresham and Gresham College: Studies in the Intellectual History of London in the Sixteenth and Seventeenth Centuries* (Aldershot: Ashgate Press, 1999), 146-173 and Enrico Rambaldi, “John Dee and Federico Commandino: An English and an Italian Interpretation of Euclid during the Renaissance”, *Rivista di Storia della Filosofia*, 44 (1989): 211-247.

⁹⁴ Dee to Lord Burghley, 3 Oct 1574, British Library, Lansdowne MS 19, Burghley Papers 1574-5, fols. 81^v-82^r.

⁹⁵ *Infra*, 100.

⁹⁶ See Baldwin, *infra*, 108. On Dee and the Louvain mathematical community see also Vanden Broecke, “Dee, Mercator, and Louvain Instrument Making”.

⁹⁷ *Infra*, 132.

⁹⁸ *Infra*, 132.

⁹⁹ *Infra*, 132.

¹⁰⁰ *Infra*, 138.

¹⁰¹ *Infra*, 92.

¹⁰² On Dee’s collecting of books on Hebrew scholarship see *R&W*, 11, 29.

¹⁰³ *Infra*, 143-4. This is a topic which De León-Jones has addressed at greater length in her book *Giordano Bruno and the Kabbalah: Prophets, Magicians and Rabbis* (New Haven and London: Yale University Press, 1997).

¹⁰⁴ French, *Elizabethan Magus*, 18.

¹⁰⁵ *Infra*, 212-213.

¹⁰⁶ *Infra*, 222-3.

¹⁰⁷ Sherman, *John Dee*, 45.

¹⁰⁸ *Infra*, 276.

¹⁰⁹ *Infra*, 277-8.

¹¹⁰ Harkness, *John Dee’s Conversations with Angels*, 44-5. See also *infra*, 178, 278-9, 334.

¹¹¹ Jim Reeds, “Solved: The Ciphers in Book III of Trithemius’s *Steganographia*”, *Cryptologia*, 22:4 (1998): 291-317.

¹¹² *Infra*, 188.

¹¹³ *Infra*, 195.

¹¹⁴ *Infra*, 287, 290.

¹¹⁵ *Infra*, 292.

¹¹⁶ Benjamin Woolley, *The Queen’s Conjuror: the Science and Magic of Doctor John Dee, Adviser to Queen Elizabeth I* (London and New York: Harper Collins, 2001); Edward Fenton, ed., *The Diaries of John Dee* (Charlbury: Day Books, 1998); Håkan Håkansson, *Seeing the Word: John Dee and Renaissance Occultism*, Ugglan Minervaserien, 2 (Lund: Lund Universitet, 2001). Published PhD Thesis.

NICHOLAS H. CLULEE

JOHN DEE'S NATURAL PHILOSOPHY REVISITED

Almost thirty years ago I presented my first paper on Dee, and the reception at the History of Science Society meeting was not so much hostile as vacant and indifferent. At a time when the "Scientific Revolution" had pride of place in the history of science, Dee could not hold a candle to Copernicus, Vesalius, Galileo, Descartes, Newton, or the other heroes of scientific progress. For close to the next quarter century I could not count on anyone in an audience knowing who Dee was, let alone recognizing him as of any importance. Because of these experiences I developed an almost ritual like formula of several sentences to introduce Dee and plug his claim to scholarly attention. If Dee, perhaps, has not in the last decade become the latest counter-hero in the revisionist culture wars of the scientific revolution, he has at least moved out of the shadows of preterition. In the ten years since I published *John Dee's Natural Philosophy*, I have sensed a more easy familiarity with Dee in scholarly circles. This is less because of my work, I think, than of the accumulation of a critical mass of scholarship. There has been a mounting volume of studies on Dee, most notably William Sherman's *John Dee: The Politics of Reading and Writing in the English Renaissance* and Deborah Harkness's studies of Dee's angel conversations.¹ This improvement of Dee's status in scholarship, however, does not mean that his identity has been resolved. Trying to bring who, or what Dee was into focus has not been easy. To paraphrase Peter Novick, trying to pin Dee down may be like trying to nail jelly to a wall.² Since my primary concern with Dee has been in the context of the history of science, a field that has experienced considerable changes to its conceptual framework in the past decade, I think it appropriate in this context to reflect on the historiographic locus of John Dee in the history of science.

Now historiography may be the refuge of those with little new to say, but two things suggest otherwise on this occasion. First, Yates's "reintroduction of Dee" was carried out against the backdrop of a particular stage in the history of science; making these relationships clear will assist in critically appreciating her work and the Dee that emerged from it. Second, major changes have accrued over the last ten years in the historiography of early modern science and these present an altered framework for understanding Dee in relation to science.

I have previously referred to Yates's and French's picture of Dee as the Warburg interpretation,³ because Frances Yates, from her position at the Warburg Institute, was its root and guiding inspiration, and I will use that designation here for its verbal convenience. For the first of my themes, I want to suggest that this Warburg John Dee was very much conditioned by its development in the context of the concept of

the Scientific Revolution. As Floris Cohen recently has made clear, the concept of the “Scientific Revolution” as a localized historical occurrence that created a specifically modern and western science of the natural world was a very specific historical creation, barely fifty years old, that in its earliest formulation wove together several strands at cross purposes.⁴

What became the modern idea of the Scientific Revolution was articulated in 1943 when Alexandre Koyré, localizing the emergence of modern science within astronomy and physics, applied this phrase to his sense of a sharp conceptual shift yielding Galileo’s and Descartes’s new understanding of motion. While never entirely lost, this sharp disjunction was progressively flattened out.⁵ Koyré himself eventually placed it within a broader historical process beginning with Copernicus and only resolved with a “Newtonian synthesis,” a process that seemed to parallel Edwin Burt’s theme of the mathematization of nature from Copernicus to Newton.⁶ Finally, in 1948 Herbert Butterfield’s lectures on *The Origins of Modern Science* gave greater general currency to the idea that this great story of the transformation of astronomy and mechanics was the decisive shift in the transition to the modern world. He also further broadened it by extending the dates from 1300 to 1800 to encompass Vesalius and Harvey, a host of other interesting things happening in the Renaissance, and a “Postponed Scientific Revolution in Chemistry.”⁷ Butterfield thereby bequeathed something of a “dual usage” of the concept of the Scientific Revolution. One usage referred to the master narrative of an inner revolution in astronomy and mechanics and the attendant philosophical shifts progressing from Copernicus to Newton that became something of a standard model. The other usage applied to the congeries of developments in the broader chronological period in which the master narrative was embedded and whose relation to the inner revolution remained unclear and problematical.⁸

On an individual level, John Dee exemplifies a number of challenges presented by this new conception of a Scientific Revolution. His learning, interests, and activities in mathematics, navigation, and astronomy had never been forgotten, and bits and pieces of his work could be associated with some of the novelties of the sixteenth century and hints of some progressive strand, such as Copernicanism, could, with enough effort, be teased from his legacy.⁹ But if all of Dee’s activities are considered, including his conversations with angels through Edward Kelley and other mediums, there might seem to be no place for the likes of him in Koyré’s and Burt’s conceptual mutations or in the master narrative of Butterfield’s “inner revolution,” whose core Rupert Hall identified with the triumph of rationality.¹⁰ Despite any positive glimmers, this new concept of the Scientific Revolution threatened to consign Dee to Hall’s “vast deal of esoteric chaff” that had to be eliminated before a pure science emerged.¹¹

This “litmus test” had a real impact in casting Dee into preterition. I remember a meeting much like this one devoted to Thomas Harriot in 1971. For the opening of his keynote address, Edward Rosen chose to quote from a passage in Vesalius on the renewal and usefulness of the sciences, using this text to highlight themes he related to Harriot. Since all of these themes could be found in Dee’s *Mathematicall*

Praeface, I was puzzled. I asked Rosen why he did not take for his text Dee's *Praeface*. Besides Harriot and Dee being acquainted, the *Praeface* seemed more appropriate in that it was English, to say nothing of actually recommending mathematics on which Vesalius is silent. Rosen replied that he did not want Dee's funny business with angels and so forth to confuse the issue.

Not only Dee but the entire character of the Renaissance was implicated in the concept of the Scientific Revolution. If it was the seventeenth-century mutation in science that marked the beginning of the modern world, what then of Burckhardt's Renaissance and "The Discovery of the World and of Man"? Butterfield implied that the Renaissance was merely preliminary to the Scientific Revolution which he claimed "outshines everything since the rise of Christianity and reduces the Renaissance and Reformation to the rank of mere episodes, mere internal displacements, within the system of medieval Christendom."¹² The new history of science, which was gaining status as a professional academic discipline, threatened to consign Renaissance scholars to the pre-modern shadows.¹³ In response, there developed a considerable literature by Renaissance scholars concerned to establish the positive relation of Renaissance culture to the progressive movement toward modern science.¹⁴ Frances Yates shared these concerns. When she began working on Bruno in the 1930s, she inherited from Duhem the notion that science was medieval and that the Renaissance and humanism had impeded it.¹⁵ Later, reflecting the new concept of the Scientific Revolution, she was concerned that science came later and independently of the Renaissance. As she observed:

we all descend from Descartes and the seventeenth century, and surely someone ought to be able to tell us what the seventeenth century emerged from? Did it spring ready armed like Minerva out of nothing, as professor Kristeller says some people think? Did it spring from medieval philosophy and science after their interruption by Renaissance humanism? Neither seems likely according to the normal rules of progression. There ought to be an intermediate ancestor and it ought to be Renaissance philosophy.¹⁶

The Warburg Interpretation sought to rescue the Renaissance and Dee from preterition by developing how Renaissance philosophy was this intermediate ancestor. This ultimately centred on presenting Dee, because of his recognized scientific activities, as a key vehicle through which a strand of Renaissance culture flowed into the progressive movement that became the Scientific Revolution. Consequently, the Scientific Revolution actually offered a framework for legitimating Dee, including even his apparently non-scientific diversions, as an important historical figure. This approach is first evident in Calder's 1952 dissertation, "John Dee Studied as an English Neoplatonist," done under the direction of Yates and already reflecting her interest in Dee and science.¹⁷ Working in the early years of the concept of the Scientific Revolution, Calder accepts as his framework the emphasis on mathematization and mechanistic causality that Koyré, Burt, and others took as the essentials of the new science. Calder argued that Dee's advocacy of a scientifically oriented form of Renaissance Neoplatonism put him in a line with Kepler and Galileo as a proponent of the extension of methods of quantitative analysis to natural questions in place of the qualitative approach of Aristotelian science.¹⁸

However, it proved difficult to find within the Neoplatonism of the Renaissance a clear mechanism of transition from number symbolism to mathematics as a tool of quantitative analysis other than Koyré's mutation in Galileo's thought, leaving the Renaissance and science as distinct as ever.¹⁹ This weakness was alleviated by Frances Yates in 1964 in *Giordano Bruno and the Hermetic Tradition*. Here she identifies the specific texts of the Hermetic corpus as the "vital core of Renaissance thought on nature" and linked them very directly to the start of the Scientific Revolution through the Hermetic conception of magic.²⁰ In her search for the intermediate ancestor of Descartes, Yates said,

perhaps we should look harder for the hidden springs of the movement which was to be so fateful, seeking them, not in humanism nor in a rather confused 'Neoplatonist' philosophy, but in the accompaniments of that philosophy, Hermeticism, Cabalism, Lullism, Pythagorean numerology – that labyrinthine maze in which the late Renaissance seeks ever more feverishly for an operative 'method' – until Descartes emerged with a method that worked.²¹

Yates was not the first to recognize the importance of the *Hermetica* or to make a connection between magic and science, nor was this the central or exclusive concern of her works, but she constantly gravitated to the question, and her formulations became popular and the centre of controversy over what came to be called the Yates thesis. The formulation of this evolved with each of her works, but the core idea is that an intellectual movement, such as the Scientific Revolution, begins with a "movement of the will" – a change in attitude and intellectual direction – not the specific breakthroughs that come later.²² The Hermetic magus as operator, in this interpretation, began this movement of the will and shaped it in the direction of the control of nature, experiment, and the use of number and mathematics, and ultimately provided the atmosphere and impulse for the crystallization of the new conception of science in what is almost a Gnostic revelation.²³

Yates turned to Dee in support of her contention that it was the union of Hermetic magic with the Neoplatonic-Pythagorean view of number as the key to the secrets of nature that promoted an interest in the mathematical study of nature through the mathematical arts and physics. The key text here is his *Mathematicall Praeface* to the English translation of Euclid's *Elements* of 1570, in which he strongly advocated the study of the mathematical and mechanical sciences that were to triumph in the seventeenth century.²⁴ The source, she suggested, of not only Dee's advocacy but also of his actual practical scientific work and of the central place of mathematics in the expressions of his natural philosophy in the *Propaedeumata Aphoristica* and the *Monas Hieroglyphica*, was the union within the Renaissance Hermetic tradition of magic with Pythagorean speculative mathematics.²⁵ In her noteworthy formulation, Dee is:

a clear example of how the will to operate, stimulated by Renaissance magic, could pass into, and stimulate, the will to operate in genuine applied science; or of how operating with number in the higher sphere of religious magic could belong with, and stimulate, operating with number in the lower sphere of 'real artificial magic'.²⁶

Yates's association of Dee with Hermetic magic preserves Calder's theme that Neoplatonic mathematicism was preparatory to the development of early modern science. What is new is the role of magic. The idea of operational power inherent in

Hermetic magic is the key both to understand how Dee's angelic conversations and his practical scientific activities and interest in mechanics flow from a single source but also to explain why the view of mathematics inherent in Neoplatonism came to be actively applied to the study of nature.

In Yates's later works Dee became even more central. As she admitted, the Elizabethan Renaissance and its continental connections had been an early and persistent concern, and Dee increasingly became the medium through which she extended the influence of the "hermetic-cabalist tradition" in an English guise into even wider areas of sixteenth-century culture than she had in her work on Bruno.²⁷ Yates eventually came to distinguish two phases within the Hermetic tradition: an early Renaissance phase and a later Rosicrucian phase. The Rosicrucian type of magic, so-called because of its role in the Rosicrucian manifestos, evolved in the later sixteenth century and aimed at more direct operation in the external world and contributed most directly to science.²⁸

Yates traced the formation of this Rosicrucian type of Hermeticism to John Dee's combination of magic, cabala, and alchemy in the *Monas Hieroglyphica* and the spiritual exercises he carried out with angels. In 1583 he carried this brand of Hermeticism to Eastern Europe and became the leader of a religious movement centred on a cabalist and alchemical philosophy that became the root of the later Rosicrucian movement.²⁹ The culmination of Yates's progressive unravelling of the English Renaissance is *The Occult Philosophy in the Elizabethan Age*, where she finds the key component of Elizabethan culture to be a cabalistic variety of the Hermetic occult philosophy built from Lull, Ficino, Pico, Agrippa, and Francesco Giorgi, given a particularly English and Rosicrucian expression by Dee with his addition of alchemy.³⁰

For all the importance that Yates gave to Dee as a "towering figure" in the history of European thought, she herself never seems to have studied him intensively. In her early works, she relied upon Calder for basic information and even detailed textual readings, as well as his broad interpretation, which she subsumed within the larger Hermetic tradition. Later she could turn to Peter French's *John Dee*, which appeared when Yates's interpretation of Dee was still a group of scattered suggestions.³¹ His accomplishment was to elaborate these suggestions into a comprehensive interpretation of Dee as a Hermetic magus encompassing not only Dee's works but arguing as well for Dee's importance in English culture through his work in navigation, the influence of the *Mathematicall Praeface* on English mechanicians, and the influence of his philosophy in literature through his association with the "Sidney circle" and patrons at court. Subsequently, this Warburg Interpretation became an accepted framework, accepted with little question in many circumstances, including Couliano's *Eros and Magic in the Renaissance*, a number of dissertations, including mine, and as the starting point for rich fictional elaboration as in Eco's *Foucault's Pendulum*.³²

Returning to Yates, her "thesis" generated considerable controversy among historians of Renaissance thought and of early modern science. It was originally to

pursue Dee as a test case in exploring the relations among mathematics, magic, and the development of science that I began working on him. The extent of his concrete work in mathematics, astronomy, alchemy, and the practical mathematical arts offered opportunities that were insufficiently exploited by Yates or French. In pursuing this, however, I became progressively dissatisfied with the Warburg Dee. Beginning with a sense that important elements of Dee's thought ill fit the Hermetic framework, this dissatisfaction extended to the basic approach of the Warburg Interpretation. Common to Calder, Yates, and French was an approach in which Dee's importance was established by splicing him into an existing intellectual tradition that intersected with science. This yielded a Dee who was a static embodiment of tradition, with his texts as mere containers of ideas. If he was to be important in his own right, I thought he deserved better.

When I wrote *John Dee's Natural Philosophy* I had two objectives. One was to contribute to the discussion of the place of the "occult" sciences in the Renaissance and their relation to the development of natural philosophy and science, for which Dee seemed an ideal case study. The second was to give Dee's natural philosophy the study it seemed to deserve if he was indeed as important a figure as Yates claimed. I therefore endeavoured to approach him not as someone to be placed within an existing tradition or as an instance of influences but as an individual whose works must first be studied in their own right. I began then with Dee's writings that most significantly engaged issues of natural philosophy: the *Propaedeumata Aphoristica* of 1558, the *Monas Hieroglyphica* of 1564, the *Mathematicall Praeface* of 1570, and the records of his conversations with angels from 1583 to 1589. I attempted to situate each text within Dee's career at that point – to discover issues he was engaging, how these grew out of both practical concerns and his reading, how his texts reflect a creative engagement with the cultural resources available to him, and how both the issues and his formulations might have been related to his social situation and aspirations. Because we have a record of his library, now available in a magnificent edition by Julian Roberts and Andrew Watson, and many existing copies of his books with his annotations can be identified, the possibilities of doing a cultural history of his intellectual life are particularly rich.³³ Considering his writings as creative products of his engaging particular issues, of his reading in his wonderful library, and of his dialogues with his books and contemporaries, leads to an appreciation of the complexity and individuality of Dee's philosophical roots, to the awareness that his thinking changed over time and needs to be related to changing social and cultural frameworks, and to different conclusions on the central historiographic issue of magic and science.

I did not find in his work in natural philosophy a further elaboration of Renaissance Florentine Neoplatonism, or of a coherent recognized "Hermetic" tradition, or of a Renaissance "occult philosophy" with a Hermetic, or Neoplatonist, or Pythagorean, or Cabalist core as Yates variously specified. He began with a neoplatonizing Aristotelianism, giving a particular role to optics derived principally from Roger Bacon. Later he evolved a more clearly neoplatonic, alchemical and magical occultism and spiritualism derived principally from Johannes Trithemius.

His theory of the status of mathematics and of the possibilities of its application to reality was derived from Proclus. He moved beyond the optical physics of astrological influence in the *Propaedeumata* to come to share with others of his time the search for an “ancient theology,” a pristine divine language of things transcending the conventional character of human languages, and a religious immediacy through magic as a religious mysticism, but his realization of these things came through his own personal development and an idiosyncratic blend of sources in which medieval Latin and Arabic authors were of as much importance as those of the Renaissance.

The evolution of Dee's thinking and his changing interests were socially conditioned by his pursuit of patronage and the effort to define an identity and role for himself. While the Warburg Interpretation mentioned Dee's practical activities and his relations with the court, his writings and intellectual life were not closely tied to his practical need to establish and build a career. In actuality, he presented his work in natural philosophy as a claim to elevate himself from the narrow instrumental role of teacher and practical adviser to the status of royal intellectual with the financial security and freedom to pursue his special studies. In the *Monas* the image of the natural philosopher evolved into an exalted source of wisdom and advice in the polity because as an adept he had privileged access to secret and divine understanding. This new image was suggested by the *Secretum secretorum* and Roger Bacon's annotations on it, where the occult wisdom of the philosopher is the basis of Aristotle's special claims as adviser to Alexander. This association spurred and shaped Dee's assimilation of more spiritually occult sources in his quest to be Elizabeth's and Britain's “Christian Aristotle.”

On Yates's central issue of magic, I see Dee's writings presenting two strands tending in different directions. One strand was a natural magic encompassing natural lore, the practical arts, a natural philosophy providing for powers and correspondences that can be manipulated, and an ethos that sought to understand and to capture and control the powers and processes of nature. The other was a religious magic in which occult correspondences and powers were seen as paths to the divine and the spiritual ascent of the magus. Of the two, natural magic was the more conducive to the investigation of nature we associate with science, the religious variety referencing nature and natural knowledge as a source of spiritual insight rather than as subjects of study in their own right. On the issue of the connection of Renaissance occultism with the Scientific Revolution, which had been the original objective of my study of Dee and for which Dee was a mainstay of the Yates thesis, the jury is still out. Although there are pointed demurrers, a variety of studies have accumulated indications of continuity from various occult traditions into facets of the new sciences of the seventeenth century.³⁴ Specific connections from the works of Dee have not, however, been forthcoming. Nonetheless, for what it is worth, John Henry has suggested that the most positive connection of the occult with seventeenth-century science was a natural magic of the type Dee related to Roger Bacon.³⁵

Now I would like to think that I have made some useful contributions to understanding Dee, but with regard to the Warburg Dee and the Yates thesis these conclusions are rather bleakly negative. Dee is not the “towering figure in European thought” whose example will support a connection between the Renaissance in the guise of a revival of Hermetic magic and the new science of the Scientific Revolution. While the continuity from Renaissance to new science is still problematic, I think Dee also suggests a good deal of continuity between medieval and Renaissance, with the medieval elements being the more productive for Dee’s investigation of nature.

Rather than make Dee a unique case, some of these conclusions actually accord with other scholarly directions that have emerged since Yates’s work. That hermeticism and the *Hermetica* played little role in Dee’s thought is not surprising in the light of Brian Copenhaver’s work. Copenhaver has shown that Hermes and the *Hermetica* served a mainly doxographic role, providing a basis of legitimacy for magic that was based on the theoretical foundation of a Neoplatonic cosmology most clearly expressed by Proclus and supported by a long tradition of supposedly empirical information about magical objects. The *Hermetica* were not necessary for the adoption of or pursuit of an occult or magical natural philosophy, as is clear in the case of Dee, who appealed little to authority and when he did, usually invoked Roger Bacon. When the *Hermetica* went beyond legitimating magic to actually shaping it, as in the case of Robert Fludd, it was the religious elements that predominated, driving magic away from its natural orientation toward a spiritual theosophy similar to Dee’s later inclinations and less conducive to science.³⁶

On a larger scale, changes in the historiography of science have made the issue of continuities between the Renaissance and early modern science of less central concern. In recent years there has been a sense of considerable difficulty with the entire idea of the Scientific Revolution. The sense of crisis reflected in Jan Golinski’s “question as to whether the notion of a coherent, European-wide, Scientific Revolution can survive continued historiographical scrutiny” seems confirmed when Cohen, after reading the wide-ranging collection of papers in *Reappraisals of the Scientific Revolution*, came to wonder “whether such a thing as the ‘Scientific Revolution’ mentioned in the title ever took place at all.”³⁷ Originally designating an event – Koyré’s sharp mutation in the science of motion – the concept has been progressively diluted and flattened out to designate a chronological period encompassing such a variety of developments that its claim to mark a unique and decisive stage in the development of the West is in serious jeopardy.³⁸

A number of things contributed to this state of affairs, but overall, they are at root a function of the progressive historicization of science. The very emergence of the notion of the Scientific Revolution was coupled with an historicist aim on Koyré’s part to analyse the thought of a scientist in the context of his own work and that of his contemporaries and predecessors rather than just tracing prevailing scientific ideas back to their origins or as a way of illustrating preconceived philosophical viewpoints.³⁹ In its earliest stage, this effort yielded a sharply defined turning point within the clear line of a narrative from Copernicus to Newton.

Butterfield's broadening of coverage and the dual usage of the term blurred the clear narrative line, as did growing specialist studies highlighting lesser-known scientific characters and previously unknown sides of familiar figures.⁴⁰ Inclusion of elements previously marginalized by the great story became a deluge following the publication of Yates's *Giordano Bruno*, as magic, alchemy, Paracelsian medicine, and hosts of other occultist and mystical approaches to nature claimed equal status with and came to jostle side by side with and even to displace the traditional heroes.⁴¹ Recently, more serious challenges have come from the "linguistic turn," which at its most radical raises doubts that there is a reality of nature that could be known by science, reducing the privileged status of "modern" science at the expense of the older "occult" science, and the contextualist approach of social constructivism by which what used to be seen as purely scientific advances are seen as contingent products of problems and solutions that develop in local frames of meaning produced in a social context by rival interest groups.⁴² In sum, the clear line of a master narrative from Copernicus to Newton has been muddled, and the traditional framework of debate between internalist and externalist causes, and evolutionary versus revolutionary change, which rested on the assumption that modern science has some defining feature, whose appearance in the Scientific Revolution it is the historian's task to explain and present in a "great story," has been rendered problematic by doubts that such a feature can be grasped.⁴³

While historians of science who made their careers as investigators of the Scientific Revolution may anguish over the "uncertainties of a larger historiographic framework in flux" and lament the passing of the distinctiveness of what the concept originally denoted, this may be a positive step for the study of Dee and figures like him.⁴⁴ First, in the area of science, this frees us of the burden and constriction of ever trying to relate him to a progressive movement whose outcome in Newton was foreordained. The contextualist approach, offered by John Schuster in response to the difficulties in the historiography of the Scientific Revolution, by focusing on the contingencies of the process of change in natural philosophy and the sciences rather than developments destined to culminate in Newton, offers a framework that looks promising for the investigation of Dee. This approach takes natural philosophy and the various sciences as sub-cultures whose social and cognitive enterprises interact internally and among each other, while also being conditioned by "the larger social, political, and economic contexts in which they were practiced and promoted."⁴⁵ The challenge thus becomes the description and explanation of these processes of not necessarily progressive change within the natural philosophies and sciences of the early modern period.

Freed of the Whiggish concern with progressive change, what Schuster calls the "Scientific Renaissance" of the sixteenth century can be considered independent of any progressive contribution to the future. In conjunction with the increasing erosion of Aristotelian natural philosophy, the availability of the scientific, mathematical, and natural philosophical heritages of classical antiquity and of Arabic and Latin medieval civilizations provided a host of competing socio-cognitive subcultures as they interacted with the re-evaluation of the status of the practical arts and found new and receptive social, political, and economic audiences and avenues of

advancement outside the universities in courts, commerce, administration, and popular culture. What prevailed was not a single alternative to Aristotle, whether Neoplatonic, Hermetic, or Chemical, but a broad, eclectic, shifting, and confused range of intellectual and social initiatives.⁴⁶

This characterization accords well with Dee's eclectic reading from classical to medieval Arabic and Latin sources, his openness to the practical arts, his groping for an appropriate social identity and locus, and his shifting definition of problems as he cut himself loose from the natural philosophical framework of Aristotelianism. What follows are some scattered observations on what I see as some of the opportunities for Dee scholarship flowing from these shifts in historiography. First, opportunity exists for much more work on Dee as natural philosopher and scientist. Many of Dee's works could use further investigation, the *Mathematicall Praeface* being one. Some years ago Bert Hansen embarked on a project, which has since lapsed, to produce a detailed annotated edition of the *Praeface*, identifying references and exploring the sources and functions of its various components. I think it would still be valuable to carry this out. Of course, anyone undertaking this now has at their disposal Julian Roberts's and Andrew Watson's magnificent edition and study of Dee's library. It goes almost without saying that this must be a touchstone for almost all future work on Dee and could be the subject for studies of its own.

If studied in a larger context, Dee could also serve to illuminate aspects of the dynamics of Schuster's Scientific Renaissance. In a recent paper, Bernard Goldstein and Peter Barker called attention to the important influence of Christoph Rothmann's rejection of solid celestial orbs on Tycho Brahe's promulgation of his geo-heliocentric alternative to Copernicus. Rothmann came to his conclusion from studies of the position and parallax of the comet of 1585, for which he relied on Johannes Pena's translation and promotion of the practical use of Euclid's *Optics*, as well as the work of Gemma Frisius.⁴⁷ What strikes me is that Dee had studied these same works from his interest in optics, he had also worked on the parallax of the Nova of 1572, and he had corresponded with Tycho, yet Dee never reached the point where he had anything of interest to offer Tycho. Now this could be taken as an instance of Dee missing the progressive boat, but from another perspective it could provide an opportunity for a comparative study of the intersection and interaction of texts, of the definition of problems at hand, of the constraints of social contexts, and of the possibilities and limitations of disciplinary dialogues.

A second consequence of abandoning the search for strong links between the Renaissance and the Scientific Revolution is that science and natural philosophy need not be the only historiographic context in which to consider Dee. Establishing Dee as a, or even the, link between Renaissance and new science was the problematic that framed the Warburg Dee. However much I may have managed to present a different Dee, the same problematic served as my starting point and my issues and consideration of Dee as natural philosopher. Decoupling Dee from science presents other possibilities. Most obviously, consideration of a number of his activities, and I am thinking particularly of the angelic conversations, should benefit from freeing them from the implicit question of how could a man of science

do this? In addition to the contributions at this colloquium to this facet of Dee, we now have several important studies from Deborah Harkness.⁴⁸

This also implies rethinking the Dee canon. Since Calder, the *Propaedeumata*, the *Monas*, and the *Praeface* have stood at the core of that canon, with other writings as peripheral or marginal. William Sherman has called attention to the “unreading” suffered by some of Dee’s texts and their contexts that accompanied the picture of Dee as primarily philosopher/natural philosopher/scientist.⁴⁹ Sherman’s initiative reached fruition just as this colloquium opened with the availability of the first copies of his *John Dee: The Politics of Reading and Writing in the English Renaissance*.⁵⁰ Using Dee’s library, his marginalia, and manuscript remains to their fullest, and analysing the intellectual activity they reflect, Sherman presents Dee in the new context of consultant within commercial, academic, and courtly spheres, and reconstructs the scholarly network that centred on Dee’s library and household. Deborah Harkness has also contributed to transforming Dee from isolated intellectual into a more multidimensional personality with her recent study of the management of Dee’s “experimental household,” evoking the importance of Jane Dee’s role along side that of John.⁵¹

This unreading, despite Sherman, is persistent and results from more than exclusive focus on Dee’s natural philosophy or printed sources. In two recent pieces on maps in Tudor England, one particularly concerned with the political function of maps, Dee is barely mentioned, and then only on the basis of the older secondary literature.⁵² Richard Helgerson in his *Forms of Nationhood. The Elizabethan Writing of England*, has only one reference to Dee in a note on maps. Helgerson’s silence on Dee partly results from the condition that Dee is not part of the literary canon that Helgerson takes as his matter; so, the picture of Dee as scientist is not the only source of an unreading.⁵³ Dee left writings appropriate to Helgerson’s subject, but they are in manuscript, which is a further obstacle to reading Dee fully. All post-Warburg studies of Dee have given serious consideration to his manuscript remains, and it should go without saying that any future work on Dee cannot ignore the manuscript remains. The larger problem that these examples present for this colloquium is that historical studies can apparently be written without Dee. Is he really so inconsequential? Just as I complete this draft, I am encouraged that this situation may have taken a turn for the better after seeing a notice for Lesley B. Cormack’s *Charting an Empire. Geography at the English Universities, 1580-1620*.⁵⁴

One thing that has struck me lately is that the actual history that Dee has experienced serves to define a number of areas that deserve further investigation. For instance, the *Mathematicall Praeface* was reprinted twice in the seventeenth century, in 1651 and in 1661, as part of the republication of Billingsley’s Euclid. This could provide a concrete line on Dee’s possible influence into the core period of the Scientific Revolution, which might yield results through an investigation of these re-editions, their readership, and how Dee’s *Praeface* fared among them. To be truly fruitful, this ought to investigate the motives for republication, how Dee was read and by whom, and how his ideas may have functioned in that period.

Again, with the change in the historiography of science, perhaps the most interesting possibilities are in other areas. In the broad sweep of history we should acknowledge that despite the efforts of Calder, Yates, and French, Dee's name is not and probably never will be invoked in the company of Galileo, Descartes, Boyle, *et. al.* to stand for certain intellectual values associated with enlightenment. This marginalization may be the product of the social construction of an ideology of science, but it speaks to a cultural artefact that might yield to historical analysis. At the same time as he has been marginalized in one tradition, he has been absorbed into a different mainstream in being evoked from his own day to ours in occultist and spiritualist contexts. I am thinking of the sensationalism of Deacon's secret agent, the fascination with his angelic language and mystical books from Casaubon to Laycock's *Enochian Dictionary*, and how readily Umberto Eco could use Yates's Rosicrucian Dee to create for him a major role in *Foucault's Pendulum*. Quite recently, Erik Davis traced modern computers to the magic and art of memory of Lull and Bruno, and drew parallels between Dee's channelling to the spirit world and Davis's own evocation of a spiritualized New Age cyberculture. Dee's angels are seen as prefiguring software agents, his angel magic giving us a "hermetic image of information space." Thus, we have "Dee accessing angelic agents through the interface of coded Calls and 'shew-stone glass'."⁵⁵ In thoroughly de-historicizing Dee, I find this approach less than helpful in understanding Dee. Since I have also worked as a computer consultant, this does not even do anything for my understanding of computers and the "information highway." This is a cultural artefact, however, and why Dee is invoked in this context may tell us something about the thing Davis calls cyberculture; certainly it speaks volumes about the mystifications evoked by novel technologies in the manner so luxuriantly explored by Pynchon as well as the "excess of wonder" leading the hermetic interpreter on that is one of Umberto Eco's themes.⁵⁶

Closer to our scholarly home in the sixteenth and seventeenth centuries, Dee's *Monas* had by far the strongest history of all of his works. In addition to the original 1564 edition, there was one printed in 1591 at Frankfurt, as well as its inclusion in the 1622 and 1659 editions of Zetzner's great *Theatrum chemicum*. Further, the *Monas*, its central symbol, or its ideas are mentioned, referenced, discussed, or critiqued by Johann Valentin Andreae, Petrus Bongus, Gerard Dorn, Andreas Libavius, Heinrich Khunrath, and Athanasius Kircher, and possibly others. In addition, it was clearly suggestive to the author of the *Consideratio brevis* that precedes the second Rosicrucian manifesto, the *Confessio fraternitatis* of 1615.⁵⁷ This association with the Rosicrucian phenomenon also absorbed other Dee influences such as the publication of Dee's edition of and notes to Roger Bacon's *Epistola de secretis operibus artis et naturae*, to which has been added introductory material and additional notes indicating Rosicrucian sympathies.⁵⁸

Yates's *Rosicrucian Enlightenment* may have been on to something after all. Tracing the Rosicrucian phenomenon to Dee's "mission" to the East and his association there may be without foundation, but we need to acknowledge a historical reality here. Dee's *Monas* in some way became a part of a cultural ferment in the late sixteenth and early seventeenth centuries that could well repay study.

Such study should involve looking at things not exclusively from Dee's side but also from the perspective of those who read him. For instance, only four years after the *Monas* appeared, Gerard Dorn featured the *Monas* symbol and other figures from the *Monas* as part of a device on the title page of his *Chymisticum artificium naturae*. This is interesting in a number of regards. Dee owned a copy of this, and complained that Dorn used the symbols without properly crediting him.⁵⁹ Dorn, in fact, uses Dee's figures in his own particular context. Dorn, and other authors who mention Dee's *Monas*, provide materials for the study of how others read and filtered Dee's ideas to give the richest picture of how Dee became part of this cultural ferment. Further, Dorn is particularly important as a major agent in the dissemination of Paracelsian ideas in the late sixteenth century. Because of the large collection of Paracelsian works in Dee's library catalogue, Dee's relation to the Paracelsian strand in the sixteenth century is of interest, and Dorn's work presents one intersection of Dee and Paracelsian ideas that should be of interest not only from the point of view of Dee, but also in terms of the development of the Paracelsian tradition.⁶⁰

In making all these suggestions, and suggestions is all they are, my main concern is to suggest that there is ample opportunity for fresh perspectives to tell us more about who John Dee was and what his significance was in the culture of early modern Europe.

NOTES

¹ William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995) and Deborah E. Harkness, "Shows in the Showstone: A Theater of Alchemy and Apocalypse in the Angel Conversations of John Dee (1527-1608/9)", *Renaissance Quarterly*, 49 (1996): 707-37, as well as her larger study *John Dee's Conversations with Angels: Cabala, Alchemy, and the End of Nature* (Cambridge: Cambridge University Press, 1999), and other studies.

² Peter Novick, *That Noble Dream: The 'Objectivity Question' and the American Historical Profession* (Cambridge: Cambridge University Press, 1988).

³ NP, 2.

⁴ H. Floris Cohen, *The Scientific Revolution: A Historiographical Inquiry* (Chicago: University of Chicago Press, 1994), 2.

⁵ Cohen, 74-75.

⁶ Cohen, 98.

⁷ Herbert Butterfield, *The Origins of Modern Science*. Rev. edn. (New York: The Free Press, 1965).

⁸ Cohen, 112-13, 121.

⁹ E.G.R. Taylor, *Tudor Geography, 1485-1583* (London: Methuen, 1930), and E.G.R. Taylor, *Mathematical Practitioners of Tudor and Stuart England* (Cambridge: Cambridge University Press for the Institute of Navigation, 1954); Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore: Johns Hopkins University Press, 1937).

¹⁰ Cohen, 116.

¹¹ A. Rupert Hall, *The Scientific Revolution, 1500-1800*. 2nd edn. (Boston: Beacon Press, 1962), 309.

¹² Butterfield, 7.

¹³ Cohen, 2.

¹⁴ See, for instance, the excerpts collected in Vern L. Bullough, ed., *The Scientific Revolution* (New York: Holt, Rinehart and Winston, 1970).

¹⁵ Frances A. Yates, *Ideas and Ideals in the North Italian Renaissance*, Collected Essays, 3 (London: Routledge & Kegan Paul, 1984), 313.

¹⁶ Frances A. Yates, *Renaissance and Reform: The Italian Contribution*, Collected Essays, 2 (London: Routledge & Kegan Paul, 1983), 78.

¹⁷ *JDEP*.

¹⁸ *JDEP*, I, 14, 48-67, 124-42.

¹⁹ Cohen, 285.

²⁰ Cohen, 286.

²¹ Yates, *Renaissance and Reform*, 78.

²² Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964), 448-49.

²³ Cohen, 287-96.

²⁴ Frances A. Yates, "The Hermetic Tradition in Renaissance Science" in Charles S. Singleton, ed., *Art, Science, and History in the Renaissance* (Baltimore: Johns Hopkins University Press, 1968), 259, 261-62.

²⁵ Yates, *Giordano Bruno*, 146-47; Yates, "The Hermetic Tradition", 258-62; Frances A. Yates, *Theatre of the World* (London: Routledge & Kegan Paul, 1969), 5.

²⁶ Yates, *Giordano Bruno*, 150.

²⁷ Frances A. Yates, *Shakespeare's Last Plays: A New Approach* (London: Routledge & Kegan Paul, 1975), 3-9.

²⁸ Yates, "The Hermetic Tradition", 263; Frances A. Yates, *The Rosicrucian Enlightenment* (London: Routledge & Kegan Paul, 1972), 222-23.

²⁹ Yates, *Rosicrucian*, 220-21.

³⁰ Frances A. Yates, *The Occult Philosophy in the Elizabethan Age* (London: Routledge & Kegan Paul, 1979).

³¹ After her *Giordano Bruno*, *Art of Memory*, essay on 'The Hermetic Tradition,' and *Theatre of the World*, but before *The Rosicrucian Enlightenment* and *The Occult Philosophy in the Elizabethan Age*.

³² Ioan P. Couliano, *Eros and Magic in the Renaissance*. Trans. Margaret Cook (Chicago: University of Chicago Press, 1987), 60-63; Graham Yewbrey, "John Dee and the 'Sidney Group': Cosmopolitics and Protestant 'Activism' in the 1570s." (Unpublished doctoral thesis, University of Hull, 1981); Nicholas H. Clulee, "'The Glas of Creation': Renaissance Mathematicism and Natural Philosophy in the Work of John Dee" (Unpublished doctoral thesis, University of Chicago, 1973); Umberto Eco, *Foucault's Pendulum*, trans. William Weaver (New York: Harcourt Brace Jovanovich, 1989), 195, 399-401, 404, 406-420.

³³ *R&W*.

³⁴ The literature on this issue is too extensive to cite fully, but the following give some indication of the dimensions of the issue. Brian Copenhaver, "A Tale of Two Fishes: Magical Objects in Natural History from Antiquity through the Scientific Revolution", *Journal of the History of Ideas*, 52 (1991): 373-398; Keith Hutchison, "Supernaturalism and the Mechanical Philosophy", *History of Science*, 21 (1983): 297-333; Prabir Mitra, "Explanations in the History of Science: A Study of the Interpretation of Hermetic Influence on the Sixteenth and Seventeenth Science", *Organon*, 20/21 (1984-5): 81-104; G. MacDonald Ross, "Occultism and Philosophy in the Seventeenth Century" in *Philosophy, Its History and Historiography*, edited by A. J. Holland (Dordrecht: D. Reidel, 1985), 95-115; Simon Schaffer, "Occultism and Reason" in Holland, ed., 117-143; William R. Newman, "Alchemical Corpuscular Theory in the Art/Nature Debate: The Case of Daniel Sennert", *History of Science Society Annual Meeting*, November 8, 1997; Brian Vickers, "Critical Reactions to the Occult Sciences During the Renaissance" in *The Scientific Enterprise*, edited by Edna Ullmann-Margalit (Dordrecht: Kluwer Academic Publishers, 1992), 43-92; and Brian Vickers, "On the Goal of the Occult Sciences in the Renaissance" in *Die Renaissance im Blick der Nationen Europas*, edited by George Kauffmann (Wiesbaden: Otto Harrassowitz, 1991), 51-93.

³⁵ John Henry, "Magic and Science in the Sixteenth and Seventeenth Centuries" in *Companion to the History of Modern Science*, edited by R. C. Olby et al. (London: Routledge, 1990), 583-96.

³⁶ Brian P. Copenhaver, "Natural magic, hermetism, and occultism in early modern science" in *Reappraisals of the Scientific Revolution*, edited by David C. Lindberg and Robert S. Westman (Cambridge: Cambridge University Press, 1990), 261-90.

³⁷ Cohen, 499-500, quoting Golinski.

³⁸ Cohen, 494-500.

³⁹ Cohen, 97-98.

⁴⁰ Westman and Lindberg, "Introduction," *Reappraisals*, xvii.

⁴¹ Cohen, 169-71; John A. Schuster, "The Scientific Revolution" in *Companion*, 221-22.

⁴² Westman and Lindberg, xix; Cohen, 229-31.

⁴³ Schuster, 218-23.

⁴⁴ Westman and Lindberg, xx.

⁴⁵ Schuster, 223.

⁴⁶ Schuster, 228-31.

⁴⁷ Bernard R. Goldstein and Peter Barker, "The Role of Rothmann in the Dissolution of the Celestial Spheres", *British Journal for the History of Science*, 28 (1995): 385-403; Victor E. Thoren, *The Lord of Uraniborg: A Biography of Tycho Brahe* (Cambridge: Cambridge University Press, 1990), 257-58, 271-80.

⁴⁸ Deborah E. Harkness, "Shows in the Showstone: A Theatre of Alchemy and Apocalypse in the Angel Conversations of John Dee (1527-1608/9)", *Renaissance Quarterly*, 49 (1996): 707-737; and her *John Dee's Conversations with Angels*.

⁴⁹ William H. Sherman, "John Dee's *Brytannicae Reipublicae Synopsis*: a Reader's Guide to the Elizabethan Commonwealth", *The Journal of Medieval and Renaissance Studies*, 20 (1990): 293-94.

⁵⁰ Sherman, *John Dee*.

⁵¹ Deborah E. Harkness, "Managing an Experimental Household: The Dees of Mortlake and the Practice of Natural Philosophy", *Isis*, 88 (1997): 247-62.

⁵² Peter Barber, "England II: Monarchs, Ministers, and Maps, 1550-1626" in *Monarchs, Ministers, and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*, edited by David Buisseret (Chicago: University of Chicago Press, 1992), 57-98; P. D. A. Harvey, *Maps in Tudor England* (Chicago: University of Chicago Press, 1993).

⁵³ Richard Helgerson, *Forms of Nationhood. The Elizabethan Writing of England* (Chicago: University of Chicago Press, 1992), 1-18.

⁵⁴ Lesley B. Cormack, *Charting an Empire: Geography at the English Universities, 1580-1620* (Chicago: University of Chicago Press, 1997).

⁵⁵ Erik Davis, "Techgnosis: Magic, Memory, and the Angels of Information", *South Atlantic Quarterly*, 92:4 (1993): 585-616 (603).

⁵⁶ On the cults inspired by technology and science, Thomas Pynchon's *Gravity's Rainbow* and *Crying of Lot 49* furnish numerous examples. On Eco see Bernard Williams, "The Riddle of Umberto Eco", *New York Review of Books*, 2 February 1995, 33.

⁵⁷ Yates, *Rosicrucian Enlightenment*, 46-47.

⁵⁸ Roger Bacon, *Epistolæ Fratris Rogerij Baconis, De secretis operibus artis et naturæ, et de nullitate magiæ. Opera Iohannis Dee [...] e pluribus exemplaribus castigata olim, et ad sensum integrum restituta* (Hamburg, 1618).

⁵⁹ Gerard Dorn, *Chymisticum artificium naturæ, theoricum & practicum* ([n.p., n.pub], 1568). Dee's copy is in the New York Society Library. The title page of this has Dee's initials at the top and an inscription at the bottom to the effect that Dorn used Dee's symbol without acknowledgement. The title page is illustrated in Nicholas H. Clulee, "John Dee and the Paracelsians" in *Reading the Book of Nature. The Other Side of the Scientific Revolution*, edited by Allen G. Debus and Michael T. Walton. Sixteenth Century Essays & Studies, 41 (Kirkville: Truman University Press, for The Sixteenth Century Journal Publishers Inc., 1998), 120.

⁶⁰ Clulee, "John Dee and the Paracelsians."

PART ONE : ASTRONOMY AND ASTROLOGY

ROBERT GOULDING

WINGS (OR STAIRS) TO THE HEAVENS

The Parallactic Treatises of John Dee and Thomas Digges

A NEW STAR

In November 1572, a new object appeared in the night sky over Europe. A contemporary observer, Bartolomaeus Raisacher of Vienna, recorded a detailed description:

The apparition is some kind of brilliant luminous body, in brightness equalling the stars of the first magnitude – even outshining some of them. It has a bright, yellowish-gold light so that it resembles Jupiter, yet its glow is rather reddish, resembling in a certain way Mars at its acronychal appearance. It has been visible for some months now, in the northern part of the sky, circling each night around the north celestial pole in the constellation of Cassiopeia. It has only a single motion – the diurnal motion – and always maintains the same distance from the surrounding stars; in itself it is immobile as it is revolved around the pole.¹

The New Star in fact took seventeen months to disappear entirely from sight. It was, as we now know, a supernova – the catastrophic explosion of a star that had, until then, been invisible to the naked eye.² Astrologers predicted dire consequences would result from the marvel, for they knew that comets – the only phenomena in their experience even remotely comparable to the New Star – were sure portents of ill fortune. But although many astronomers feared the star was as ominous as a comet, most recognized that it differed from a comet in several ways. Most noticeably, it had no tail, and thus resembled more closely a planet or fixed star. And, as Raisacher noted (indeed, as was clear to all who observed the star), it had no motion of its own. It remained, night after night, in the same position relative to the stars surrounding it, unlike the comets which astronomers were used to tracking across the sky. These obvious differences led many observers to wonder whether the star might in fact be entirely new, and unrelated to comets in any way.

Aristotle had defined a comet as the ignition of a dry terrestrial exhalation in the upper sphere of air.³ Thus comets alone among all the other bright objects in the sky resided below the sphere of the moon, within the terrestrial world of change and decay. In this sense, the *location* of a comet was practically its defining characteristic. So, in order to determine whether the New Star was the same sort of thing as a comet, contemporary astronomers saw there could be only one deciding factor: the location of the New Star in the universe or, more specifically, its distance from the earth.

Astronomers had a technique for measuring celestial distances that promised to solve the problem, based on parallax, or the apparent change in position of a nearby object when observed from different angles. This paper will examine the ways in which contemporary European astronomers, chief among them Thomas Digges and John Dee, adapted the ancient method of parallactic observation to the problem of the New Star. In doing so, we shall see that Digges and Dee were already familiar with the uses of parallax, and in fact had long cherished an ambitious programme of reforming the whole of astronomy on the basis of the technique. The fortuitous appearance of the New Star in 1572, and the consequent revival of interest in parallax, as we shall see, forced the two astronomers to make public, somewhat prematurely, their unfinished project. While their work actually had little specific relevance to the appearance of the New Star, nevertheless we shall see from their texts that their mastery of parallax far exceeded that of any of their contemporaries.

THE TECHNIQUE OF PARALLACTIC OBSERVATION

Understanding of parallax dates back at least to the second century BC, when the Greek astronomer Hipparchus wrote a treatise on parallaxes, and used parallax to find a value for the distances from the earth of both the sun and the moon.⁴ Ptolemy employed Hipparchus's work in his own treatment of the same problem, recorded in the fifth book of the *Almagest*, where he established a value for the distance of the moon from the earth that was remarkably accurate.⁵

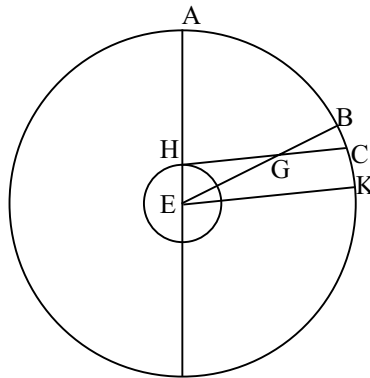


Figure 1. Based on Regiomontanus, *De cometis*, Problem 1

The principle behind parallax is simple. In Figure 1. the small circle with radius EH represents the earth, while the larger circle, radius EA , is the celestial sphere. The object being observed is at G . Most astronomical observations assume that the earth is a point in comparison with the celestial sphere, that the radius of the earth is negligible in comparison with celestial distances, and that the observer can thus be assumed to be at the centre of the earth. The position of the body G is given by the line through E , the centre of the earth, and G , which meets the celestial sphere at B . This is the 'true position' of the body. Parallax arises when the body is so close to

the earth that the assumption that the earth's radius is negligible no longer holds. In such a situation, if the observer is at H , then the line of sight to the object is HG , and the object will appear against the celestial sphere at C , the object's 'apparent position'. If our theory predicts that the true position of the object is B , then the difference between the true, predicted position and the apparent position is the parallax, angle BGC , or, more conveniently, the corresponding angle BEK , at the centre of the earth.

Brief consideration of this diagram reveals the following basic facts about parallax:

- Parallax causes a body to appear lower in the sky than it actually is.
- The closer an object is to earth, the greater is its parallax.
- At the observer's zenith (A) the parallax of an object is zero, and it increases as the object gets closer to the local horizon, where it is at a maximum.

More precisely, since the alternate angles BEK and HGE are equal, we find that:

$$\frac{EG}{EH} = \frac{\sin(EHG)}{\sin(parallax)}$$

where EHG is the apparent angular distance of the object from the zenith. Knowing the radius of the earth, then, one discovers the distance of the object from the earth.⁶

This method does require us to have an idea of where the object *should* be, in that we determine the parallax of an object by measuring the deviation of its observed position from its expected position. In the case of the moon, Ptolemy's method was to measure the position of the moon first when it crossed the meridian at the closest possible point to the zenith. The effect of parallax here is negligible, and from this observation he could determine what the moon's distance from the zenith *should* be – if there were no parallax – when it reached a point on its cycle such that its distance from the zenith was greatest. It is precisely at this point, however, that the moon is most affected by parallax. For this reason the deviation from the expected position is large and relatively easy to measure, and in this way Ptolemy could calculate the distance of the moon from the earth.⁷

In measuring the lunar parallax, Ptolemy had centuries of observation of the moon's regular behaviour to draw upon, so that he was able to determine, very accurately, the exact moment when the moon reached its expected position, and its parallax was at a maximum. It was more difficult to see how to apply the technique to a comet (or, indeed, to the New Star). In the case of such an ephemeral phenomenon, the astronomer had no way to predict when the object's parallax would be at a maximum and a minimum. In general, and this was the crux of the problem, there did not appear to be any theoretical means for locating the true position of the phenomenon, against which its observed position could be compared, and its parallax determined.

REGIOMONTANUS ON THE PARALLAX OF COMETS

The solution came in 1531, with the posthumous publication of a work, *On Comets*, by the Nuremberg astronomer Johannes Regiomontanus (1436-76).⁸ Regiomontanus proposed and solved sixteen problems on comets, demonstrating that it was possible to find the parallax of an object even though its true position might be unknown at the outset. We need only concern ourselves here with the problems that deal directly with parallax.⁹ Problem III is typical in its requirements and method:

The altitude of the comet and its azimuth arc are taken either before or after meridian, and the exact time of this observation is noted, together with the exact time that the comet passes the meridian. This is easily done through observation of any fixed star having a known place.¹⁰

Two observations of the comet are required, one on the meridian and one at any other point. The exact time, taken from a reference star, of each observation is noted, as is the altitude and azimuth of the second observation. This provides enough information to solve a single spherical triangle, of which one of the ‘unknowns’ is the true position of the comet at the second observation. Having established the true position in this way, the astronomer can then take the difference between this true position and the observed position, and determine the parallax.¹¹

Although the complexity of the constructions and the dryness of his presentation obscure his method somewhat, Regiomontanus takes essentially the same approach in all of his problems: in effect, he takes one observation and then works out, using the simple principles of the celestial sphere, where the comet *should* appear in the second observation if it were not affected by parallax. Sometimes, as in Problem III, this can be done very straightforwardly. In other problems – especially those that analyse observations taken *anywhere* in the celestial sphere – the process is much more difficult, requiring the solution of as many as four spherical triangles. While each problem may ask for a different type of observation, all require two observations and an accurate measure of the time between them. As we shall see a little later on, the difficulty of satisfying the last requirement was precisely what inspired Thomas Digges to search for new methods of determining parallax.

REGIOMONTANUS’S METHODS APPLIED TO THE NEW STAR

Most contemporary astronomers were content to use Regiomontanus’s method of determining parallax, in spite of its many difficulties. Tadeáš Hájek, the imperial physician and close friend of Tycho Brahe, for example, wrote one of the most competent accounts of the star. He used Regiomontanus’s third problem to establish that the star had no observable parallax.¹² Once he had shown that there was no parallax, he demonstrated how this could be discovered even more easily, by taking two observations on the meridian and finding that the star was the same distance from the celestial pole at upper and lower meridian crossings.¹³

Since, in the latitudes of Europe, the New Star was circumpolar and could be observed crossing the meridian twice in a night, several astronomers opted for this simple test of its parallax. Instead of attempting to improve on Regiomontanus, most astronomers considered that there were more direct ways to demonstrate the New Star's immunity to parallax than his complex parallax problems with their multitudes of spherical triangles. While these might be useful in some circumstances, the star's fortunate position, high in the sky, and within a bright, well-defined constellation, offered more direct methods for observing it. Michael Maestlin, for example, showed that the star lacked parallax by lining it up with pairs of fixed stars using a thread held taut above his head.¹⁴

DIGGES AND DEE ON THE NEW STAR

Thus we see that most astronomers confronting the phenomenon of the New Star in the first few years after its appearance either applied old and familiar mathematical methods to explain its appearance; or used even simpler techniques. They did not develop the theory of parallax beyond the level to which Regiomontanus had brought it, nor, more importantly, did they feel the need to do so. Early in 1573, however, Thomas Digges and John Dee each published a treatise in response to the appearance of the New Star; both works were quite different from the tracts of Hájek and other contemporaries that we have just examined.¹⁵ Unlike these earlier authors, the two English astronomers presented fully worked-out mathematical treatises on the theory of parallax, including new methods for measuring parallax that avoided the necessity of measuring time (the major, and most difficult, requirement of Regiomontanus's method).

Digges and Dee produced these innovative works, moreover, within just four months of the New Star's appearance. There can be no question that the two astronomers had been working on the problem of parallax for some time before this event. Indeed, one of the more curious aspects of both treatises is the way that the very fact of the New Star's existence seems to have been incompletely incorporated into the exposition of the mathematical theorems. We must conclude that they had been pursuing this theoretical work without any reference to the New Star, but that it was its appearance in the sky that spurred them into publication.

While the opinions of Digges and Dee on the New Star are of interest, they appear to be independent of their theoretical work on parallax. In Digges's case, he seems to think that parallax will be *really* useful as a means for determining the exact distances of the planets, and thus establishing the Copernican world system. In fact, so great is his interest in the Copernican system that he even turns his discussion of the nature of the New Star into a further proof of the system. Dee, by contrast, finds parallax most useful as a way to establish his naturalistic, physically-grounded astrology. His treatise does not even consider the nature of the New Star, although we do have information on his views from other sources, which will be explored below.

DIGGES ON PARALLAX

The theoretical core of Digges's *Alae* is a series of twenty-one "Problems" on parallax. The title he gave to his geometrical constructions was clearly meant to recall the cometary "Problems" of Regiomontanus; but Digges was determined to overcome what he saw as flaws in his predecessor's method, principally the need to measure the time elapsed between the two observations.¹⁶ Yet while it is true that Digges's parallactic Problems do not require the measurement of time, they are by no means free from defects.

The first nine Problems are preliminary results in arithmetic and in plane and spherical trigonometry. In the remaining twelve Problems Digges presents his new methods of parallactic observation. In order to assess his work, it will be useful to examine some representative examples of these Problems, and consider whether through them he achieved what he had hoped.

Regiomontanus's third Problem requires the astronomer to take one observation (of altitude and azimuth) of a comet on the meridian, and another when the comet was at any other point in the sky. In addition, of course, the astronomer had to make a record of the time elapsed between the two observations using, as Regiomontanus suggests, a reference star. He also assumes that the astronomer knows his local terrestrial latitude, a basic astronomical fact. Digges reworks Regiomontanus's method in his Problem XVIII. He too requires two observations of the object (again, altitude and azimuth), one on the meridian and another anywhere else on the celestial sphere. But he does *not* require the time between the two observations — imposing instead a bewildering array of *other* measurements that have to be made simultaneously when the astronomer observes the object: the angular distance of the object from two fixed stars, the angular separation of the two fixed stars, and the altitudes and azimuths of each of the stars at each of the moments of observation. As something of a consolation, he finds that he can dispense with the local latitude, and does not require the astronomer to know the celestial coordinates of the two fixed stars.

This is hardly an improvement on Regiomontanus, who had required eight "crucial" measurements: four to find the altitude and azimuth of the phenomenon at two instances, and four to find the same coordinates of a reference star (in order to measure the elapsed time). In addition, Regiomontanus's method called for three data that could be determined at leisure: the local latitude, and the longitude and latitude of the reference star, all of which an astronomer would most probably have had at hand in any case. In contrast, Digges demands sixteen crucial measurements: the same four altitude and azimuth observations of the phenomenon, eight more to obtain the same coordinates of the stars, and the distance of the phenomenon from each of the stars at each moment of observation. There is only one datum that can be determined at any time: the angular distance between the two fixed stars.

Although Digges was anxious to avoid any explicit measurement of time, in effect he replaced that requirement with something far more complicated, as Tycho

Brahe recognized in the large section of his *Astronomiae instauratae progymnasmata* that is devoted to a critique of Digges's work.¹⁷ Tycho considered Digges's measurement of the position of the New Star to be among the most accurate,¹⁸ but it is Digges's new methods that are of the most interest to him. He delivers a terse judgement on this Problem: "The eighteenth Problem is complicated by more prerequisites than it is reasonable to demand, which cannot easily be provided without any suspicion of error."¹⁹

Other Problems require less data, but are beset with difficulties of their own. The fourteenth Problem, for instance, appears to ask only for a single observation: the altitude of the phenomenon at its maximum azimuth. In order to determine when this moment will be, however, the astronomer must first have taken an altitude measurement of the star on the meridian, as well as repeated azimuth measurements of the star until its azimuth equals its polar distance on the meridian. Indeed, the astronomer would have great difficulty finding the precise moment to make his observation unless he used a reference star, which is, in effect, a measurement of time. Even apart from these difficulties, the Problem has a more fundamental flaw. Digges requires the altitude of the object at the very moment that the altitude is most affected by the diurnal rotation of the heavens and most difficult to measure accurately – and he then hopes to find the parallax from a tiny discrepancy in the object's expected altitude. Tycho, as one might expect, criticizes this infelicity.²⁰ Even Digges, in his own summary of the Problems, is forced to admit that this Problem is not his best: "It is completely unsuitable for practical use, although the geometrical construction is quite perfect."²¹

In fact, Digges considers that Problems 10 to 14 are all difficult to put into practice. He is much more enthusiastic about Problems 15 to 21, claiming that they will "very precisely and simply reveal true parallaxes."²² These latter problems all require the astronomer to measure the separation of the phenomenon from one or more fixed stars. Digges used only a cross-staff in observation,²³ an instrument admirably suited to the measurement of stellar separations, but far less reliable for making even simple altitude measurements in the meridian. This no doubt explains Digges's preference for the later Problems. Tycho, on the other hand, considered these Problems to be needlessly complicated. He could recommend only Problem 10, ironically one of those that Digges rejected as ill-suited for practical observation. All this Problem requires are the altitudes of the phenomenon at its two, upper and lower, meridian transits. The data are easy to obtain if one uses a quadrant, as Tycho did, rather than a staff; it is a trivial matter, moreover, to analyse the data and obtain the parallax. This is the method that Tycho himself preferred; Tadeáš Hájek recommended the method, and both the Landgrave of Hessen-Kassel and Paul Hainzel had used it to show that the star had no parallax.²⁴

Although Digges's Problems are flawed, they nevertheless show great ingenuity in their attempt to overcome the infelicities in Regiomontanus's methods. As a work of theoretical astronomy, and as examples of the geometer's art, they are quite the equal of Regiomontanus's constructions. It is interesting to note, however – as Tycho

did several times in his critique – that Digges provides no numerical examples based on actual observation of the New Star.

Digges, indeed, recognized this failing himself, pleading that lack of time and the pressure of other commitments had not allowed him to provide practical examples for any of the Problems.²⁵ It seems unlikely, however, that Digges *had* any examples based on observations of the New Star. Despite the wealth of complex observational possibilities that he had opened up in his Problems, his own method of observing the New Star was much simpler.

Using the rule of the staff, he says, line the New Star up with two fixed stars in the same vertical circle. Some hours later, line the staff up again with the two fixed stars. If the New Star appears again on the line joining the two fixed stars, then it is unaffected by parallax.²⁶

By this means, on many nights, I noted that the miraculous Phenomenon always appeared in a straight line with the small star in the knee of Cassiopeia and the other star beneath the belt of Cepheus on the right-hand side.²⁷

In this solitary description of his observational practice, Digges reveals that he did not use the battery of methods he had developed in the Problems. What, after all, would be the point when the supra-lunar nature of the star could be demonstrated so directly? Indeed, the complexity and number of the constructions suggest that they were devised over a period of time far longer than the few weeks since the star had appeared in the sky. It does appear, then, that the Problems were not in fact invented for the analysis of the New Star. Presumably the interest in parallax that the New Star aroused encouraged Digges to publish his results, and inform other astronomers of the improvements he had made to the older parallax methods that they were still using. But if the new techniques were not developed specifically for the New Star, perhaps Digges had another purpose in mind. He himself suggests what this purpose might be; but before we examine this, it will be useful to pause and consider Digges's view of the New Star. For, although his treatment of it stands separate from his parallax theories, we shall see that ultimately both contribute to a larger project.

DIGGES ON THE NEW STAR

Digges wrote two prefaces to his book, the first entitled *Praefatio authoris*, and the second, *Proemium*.²⁸ It is only in these two passages that he gives a detailed exposition of his opinions on the New Star; and even here, there are some inconsistencies between the two accounts.

In the *Praefatio authoris*, Digges condemns the “common opinion” that the star is a comet located in the upper atmosphere. He promises instead that

whoever wears these Platonic or – to use a more accurate expression – Mathematical Wings and heads upwards into the ethereal realm, leaving behind entirely the elemental regions, will see that [the star] is much further away than the place of the comets.²⁹

As we have seen, Digges found no parallax in the New Star. It was this, together with the fact that the apparition lacked a tail, that convinced him that it was not a comet but an entirely different phenomenon. To establish just what it was, Digges used some curious Aristotelian reasoning to arrive at a very un-Aristotelian conclusion.

Digges sets out to reconcile the mathematically proven fact that the New Star was a phenomenon located in the celestial sphere with the Aristotelian physical principle that the appearance of something new – indeed, change of any sort – is impossible in that part of the universe. He considers, and rejects, the possibility that the star could be composed of cometary matter somehow carried up into the celestial realm: Aristotle had shown that terrestrial matter could never stray outside its own, sublunar sphere. In the end, Digges asserts, there can be no natural cause for such an enormous phenomenon (and seeing how very bright it burns, and at such a distance from the earth, Digges knows it to be very large – in fact, “bigger than Europe”). Therefore, he concludes, the star must be a special creation of God.

Digges does have another contribution to make concerning the star, however. In the months after its first brilliant appearance, the star had grown noticeably dimmer (it was eventually to fade away altogether). He again uses an unorthodox line of Aristotelian reasoning to explain the apparent change in the new celestial object. He accepts, as he did in the previous argument, that no alteration can occur in the celestial realm, and extends this dictum to apply to the star as well. If the star is not subject to change, then the alteration in its light must be due to an increase in the distance between it and the earth – and in the *Praefatio* he attributes this increase to the Copernican motion of the earth around the sun. He writes:

A handhold has been provided, a particularly opportune chance to test whether the motion of the earth assumed in the planetary theories of Copernicus is the sole reason why the star has been diminishing in apparent magnitude.³⁰

If the star should reach its minimum brightness at the spring equinox,³¹ and then gradually recover its brightness over the next few months, once again reaching a maximum at the autumnal equinox, then, Digges says, we can confidently conclude that the earth moves in an annual orbit about the sun. This is a lot to hope for and, needless to say, nothing of the sort did happen. Digges’s reasoning is, in any case, open to criticism. As Tycho argued, if a New Star could appear in the sky against all known physical laws, then there was no reason why it could not also change in brightness, in contravention of these same laws.³²

But it is here that Digges presents an alternative use – perhaps the originally intended one – for the parallax Problems that we have examined above. His suggestion that the star could be a test-case for the Copernican system is part of a larger argument developed in the *Praefatio*. Digges sets out an ambitious plan to reform astronomy, and criticizes the Ptolemaic system both for the methodological error of arguing from theory to reality, rather than following the natural order of reality to theory, and for the clumsy *ad hoc* planetary models that arise from this

inverted procedure. He declares that the key to the reform of astronomy may be found in his new parallax methods:

I perceived that the ancients had proceeded in inverted order: from their invented planetary theories they sought the true distances and parallaxes. But they should have instead proceeded the other way around, starting with observed and known parallaxes, and then considering the planetary theories.³³

Towards the end of the *Praefatio*, Digges promises:

I have attempted, and succeeded, in the various Problems to determine demonstratively, practically and precisely the parallax of this Phenomenon and also of any other. Although the parallaxes of Saturn, Jupiter and Mars are so small as to be hardly discernible by our weak senses, if they can be truly detected by any method, then I would dare to say that they can be found by means of the following Problems of mine, or by no geometric method at all.³⁴

In the Ptolemaic system, the distances of the planets from the earth can be set at any arbitrary values.³⁵ The Copernican system, on the other hand, relies on relative motions to explain astronomical phenomena. The distances of the planets to one another are thus integral to the Copernican system, and Digges praises this harmonious arrangement, in contrast to the ill-assorted jumble of arbitrarily sized eccentrics and epicycles that made up the Ptolemaic system.³⁶ The ancients, according to Digges, had constructed planetary models, and then used the positions predicted by these models to calculate parallax. His programme is to work in the opposite direction, finding the absolute distances empirically and individually, using the new parallax techniques, and then constructing planetary hypotheses from these physical facts. The result, he believes, will be the Copernican system.³⁷

Digges was interested in parallax, therefore, because he thought he could use it to determine the exact distances of the planets from one another and, in doing so, establish the Copernican system on physical data. One assumes that when Digges turned to the question of the New Star, he hoped to find even more direct proof of an earth in motion around the sun, by finding annual parallax in the phenomenon.³⁸ Since, however, he could detect no parallax of any variety in the New Star, he came up with another argument, namely, the change in its brightness, that allowed the star to be used as proof of the Copernican system.

It seems, then, that Digges's complex parallax techniques were not originally developed for the investigation of the New Star. His opinion that the star was supralunar was based on very simple parallax observations and more general considerations of its appearance. He hoped to use both the New Star and the parallactic techniques, however, as proofs of the Copernican system. Although the parallax techniques were most probably developed before the New Star even appeared, in Digges's mind there seems to have been a link between them.

DIGGES'S ALTERNATIVE VIEW OF THE NEW STAR

In the *Proemium* that follows the *Praefatio authoris*, Digges appears to contradict the arguments he set out in his previous preface, namely that if the star appears to

change in brightness, it must be because the earth is moving away from it, in its annual circuit around the sun. In the *Proemium*, he seems to maintain that while the diminution of the star's brightness is still due to an increase in the distance between it and the earth, the motion is that of the star, and not of the earth:

This marvellous new Phenomenon which appears in the seat of Cassiopeia seems to turn so uniformly around the pole with the other fixed stars that in each revolution it returns to shine in exactly the same place, without any discernible discrepancy. In that short period of time it is not found to have any motion of its own. I have no doubt, however, that this Phenomenon is further from the earth than it was at its first appearance; but this recession is so slow and minute that it cannot be detected in a single revolution. If you wish to observe other phenomena that do have a sensible motion in a single revolution, then you can very easily use arithmetical calculations to adjust for the movement in any part of a daily revolution.³⁹

The context of Digges's remarks is the suitability of the New Star for parallax observation. Bodies that have a large motion of their own in a single night present the astronomer with a special difficulty. Digges stresses that the star does not have any significant, measurable motion that the astronomer would have to take account of during a night's observation. The star does have, however, a very slow motion away from the earth. It might be argued that, by "recession" from the earth, Digges again means the Copernican motion of the earth itself. The context of the passage, however, on the allowances that must be made for the proper motions of bodies, makes it more likely that Digges does mean that the star itself is receding, very slowly, from the earth. In contrast with the stress laid on the Copernican system in the *Praefatio*, elsewhere in the *Proemium* he says that the choice of world-system is irrelevant to the question of the star's proper motion.

This inconsistency between the two prefaces is difficult to explain away as a "development" in Digges's thought, since the *Praefatio* and the *Proemium* seem to be contemporaneous, both written shortly before the publication of the *Alae*. One explanation, however, may be that while the statements in Digges's *Proemium* are directly contradictory to those of his *Praefatio*, they correspond quite closely to the thoughts on the star expressed by his "mathematical father", John Dee.

DEE ON THE NEW STAR

Dee's treatise on the New Star, entitled *Parallaticae commentationis praxeosque nucleus quidam*, is less substantial than Digges's work, both in size and mathematical ambition.⁴⁰ In his short preface to the *Nucleus*, Dee expresses no opinion on the nature of the New Star; his ideas about it can, however, be reconstructed from other sources. There is, for instance, an account and critique of Dee's theory in the works of Tycho Brahe.⁴¹ Tycho, in his *Progymnasmata*, recounts a letter he received from Christoph Rothmann, the court astronomer of the Landgrave of Hessen-Kassel. Rothmann had met Dee when the latter passed through the Landgrave's court at Kassel on his return to England in 1589. Rothmann was familiar with Dee and Digges's works on parallax, and naturally he asked Dee his opinion of the New Star. Rothmann reported to Tycho that in Dee's opinion, the New Star was certainly "within the ambit of the universe" – that is, below the fixed

stars, or among the planetary orbs. It had not, however, always maintained the same distance from the earth. Dee believed that the star had moved in a straight line, slowly and gradually, from a lower position to a higher one. This is the same theory, of course, that Digges put forward in his *Proemium*.

Tycho notes that Cornelius Gemma (the son of Dee's old Louvain friend, Gemma Frisius) had arrived at a very similar model, but that neither Gemma's model nor Dee's seems very convincing to him. While he concurs in the Aristotelian objection to rectilinear motion in the celestial realm, he finds even stronger astronomical reasons to reject both men's theories. Dee's assertion should have been supported by parallactic observation; that is, only if he had found that the parallax of the star steadily decreased during its period of visibility, says Tycho, could he have argued that the star was moving away from the earth. But in fact no parallax had ever been observed in the star. Instead, Dee had made the case for the star's movement away from the earth on the grounds that it had diminished in brightness over time.

To refute this claim, Tycho refers the reader to his criticism of Cornelius Gemma.⁴² He assumes that Dee's theory is similar to that of Gemma, who had argued that the star first appeared above the sphere of Saturn, among the fixed stars, and was then drawn up through the ninth and tenth spheres – the “empty” spheres that were the supposed causes of the diurnal motion and the precession of the equinoxes. Tycho pointed out that, if the star had been reduced from the first magnitude to invisibility solely by rectilinear movement, it would have had to travel far beyond the eighth sphere – over a distance many times that between the earth and the eighth sphere. This would extend the size of the universe far beyond its usually accepted dimensions. When arguing against Dee, Tycho repeats the objection, saying that in order to explain the reduction of the star's brightness from the first magnitude to even the sixth, given its starting point above the sphere of Saturn, the star would have had to travel 300,000 earth diameters out into space. (He does not specify his method of calculation.) This makes the universe too large even to contemplate.⁴³

A few other pieces of evidence for Dee's views on the nature of the star remain, more trustworthy than Tycho's second-hand report. In his *Compendious Rehearsal*, Dee lists the title of another book he wrote on the New Star, which he says he composed in 1573 (this book is now lost):

On the marvellous star in Cassiopeia, sent down from heaven all the way to the sphere of Venus, and then drawn up again perpendicularly into the depths of the heavens sixteen months after its first appearance.⁴⁴

From its title alone we can tell that the book could not have been completed in 1573. Dee refers to the disappearance of the star “sixteen months after its first appearance”, that is, in 1574, and this is the more likely year of composition. The title reaffirms Dee's opinion that the star disappeared because it moved rectilinearly away from the earth. This is further supported by information given by William Camden:

I do not know whether it is worthwhile to rehearse what all the historians of our age have recorded, that in November [of 1572] a New Star or, if you prefer, a Phenomenon

was seen in the throne of Cassiopeia [...] carried about by the diurnal motion of the sky, it remained in the same place for sixteen months. It was in the celestial region, not elemental, as those noble mathematicians of our land John Dee and Thomas Digges have learnedly demonstrated by the parallactic doctrine; they were of the opinion that it gradually disappeared by ascending. Indeed, after the eighth month everyone noticed that it was gradually weakening.⁴⁵

Dee mentions, in the *Compendious Rehearsal*, another book of his which surely concerned the New Star: a pamphlet entitled *Hipparchus redivivus* – “Hipparchus reborn” – and also written in 1573.⁴⁶ As Calder has argued, Dee is perhaps alluding in the title to the ancient tradition that Hipparchus had seen a new star appear in the heavens; Dee’s book would thus be another account of the nature of the New Star.⁴⁷ It may equally be an allusion to Hipparchus’s invention of parallax techniques and his measurement of the distances of the sun and moon from the earth, which would suggest that Dee’s lost work concerned the use of parallax. On either interpretation, the book dealt with something promised by, but missing from, the published *Nucleus*.

DEE ON PARALLAX

Dee’s *Nucleus*, like Digges’s *Alae*, purports to treat the subject of the New Star. We have already seen, however, that Dee’s preface barely mentions the New Star at all, and that his opinion of it has to be deduced from other sources. The body of Dee’s tract likewise has little specific to say on the subject of the New Star. As with Digges, Dee seems to be in a rush to publish older research, directed towards a different practical goal, with promises to treat the New Star more specifically, at a later date.

The work opens with a short preface by Digges, which we shall examine below. Dee follows with his own preface, which explains the method employed in the work as well as his reasons for publishing it. Parallax problems are necessary, he says, because the ideal situation enjoyed by Ptolemy in his measurement of the moon’s parallax cannot usually be obtained. But, he argues, despite the difficulty in measuring the parallax of other phenomena, they can all in fact be reduced to two basic cases: either the sum, or the difference, of the parallaxes from two observations is known; in both cases, the astronomer must then discover the individual value of each of the two parallaxes.⁴⁸

In the body of the *Nucleus*, Dee does indeed proceed on the assumption that all attempts to measure parallax concern either the sum or the difference of two parallaxes derived from two distinct observations. He shows how the astronomer, having determined this combined parallax (by unspecified means), should then go about distinguishing the values of the individual parallaxes.

After two preliminary theorems, of little interest, Dee produces the centrepiece of his parallax method in the third and final theorem:

In any two different parallaxes of the same star or similar phenomenon (provided that it is perceived to be moved only by the daily motion of the universe), the ratio of the sine

of the greater parallax to the sine of the smaller will be as the ratio of the sine of the greater apparent angular distance from the zenith to the sine of the smaller.⁴⁹

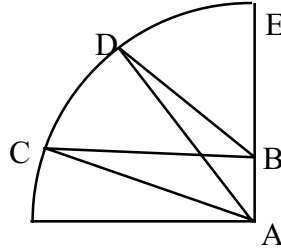


Figure 1.

Figure 1, then, where A is the centre of the earth, B the observer, C and D the two observations of the star, and E the zenith, Dee shows that:

$$\frac{\sin ACB}{\sin ADB} = \frac{\sin EBC}{\sin EBD}$$

As Dee points out at the end of his proof, it is not necessary to make the two sightings in the same vertical circle. One can, therefore, take two observations of the zenith distance of the phenomenon anywhere in the heavens, and obtain the proportion of the parallaxes.

In the second “porism” to this theorem, Dee provides the method of separating “combined parallax” that he promised in the preface. If, he says, the astronomer knows the ratio of the parallaxes (which, as we have seen, he can obtain from the zenith distances) and, somehow, the *sum* of the parallaxes, then the individual parallaxes can be found. He takes his method from Regiomontanus’s *De triangulis omnimodis* IV, 21, which itself is a version of the second lemma in Ptolemy, *Almagest* I.10. This trigonometrical theorem shows how to divide a single arc of a circle into two arcs, the sines of which are in a given ratio.

Dee thus gives a very general account of parallax. Whereas Digges lays down certain observational conditions, and provides a specific parallactic construction, Dee is concerned with the general principles,⁵⁰ and leaves the specifics to a later date:

Likewise, from the properties that have been demonstrated in this way, I shall more fully explain what other kinds of Theorems and Problems, necessary to my project, can be advanced and proven, in the book that we have decided to write, God willing, on this marvellous Phenomenon.⁵¹

Here is the same curious omission that we noticed in Digges. There is no application of the parallactic methods to the New Star. Dee, like Digges, pleads occupation with too many other matters to write up his results on the star and, as we have seen, promises a book on the subject.⁵² Again, it appears that Dee had developed the

parallactic methods for another purpose – and below we shall argue that they represent part of Dee's attempt to establish a mathematically precise, naturalistic science of astrology, specifically, by establishing the correct distances from the earth to celestial and terrestrial objects.

DEE'S ASTROLOGICAL PHYSICS

Dee had first expressed an interest in the problem of celestial distances some fifteen years earlier, in his *Propaedeumata Aphoristica*.⁵³ In this very obscure work, he tries to find exact mathematical, and naturalistic, principles on which to build a theory of astrological influences.⁵⁴ When in Louvain in 1548-9, Mercator and others had asked Dee to move beyond the common study of astrological effects and to consider the causes of these effects.⁵⁵ Dee found his solution in medieval optical writings, particularly those of Roger Bacon and Robert Grosseteste.

It was clear to Dee that the influence of heavenly bodies over the earth was propagated in straight lines, in a manner identical to the transmission of light. Although a planet emitted occult rays uniformly in all directions, only a part of these reached any one observer. Following Bacon, Dee reasoned that only those rays that reached the observer's eye would have any influence. These were the rays circumscribed in the volume of a cone whose apex was at the observer P (see Figure 2), and whose base was the portion of the planet visible from P.

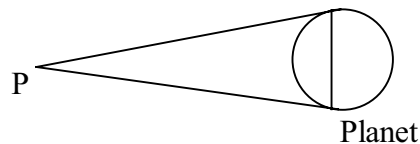


Figure 2.

Every point P on earth would form the apex of a collection of cones extending from the planets and other bodies, whose shape and size would be unique for that location and moment in time. This seemed the perfect mechanism for explaining astrological influence and its manifold effects throughout the world. To find the precise astrological influences operating at a particular time and place, the astrologer therefore had to measure the cones of influence.⁵⁶ Dee spelled out in two aphorisms what was required:

XXX. The true sizes not only of the terrestrial globe but also of the planets and all the fixed stars ought to be known to the astrologer.

XXXI. The true distances of the fixed stars and each of the planets from the centre of the earth at any given time should be determined by the astrologer, as also the varying altitudes of clouds or the thicker air above the earth.⁵⁷

Dee does not specifically mention parallax in the *Propaedeumata*, but it is clear that the precise measurement of planetary distances and dimensions he demands would have required parallactic observation. In fact, in his preface to the *Propaedeumata*, he lists several books that he intended to publish when he had the time; among them is a work whose title suggests that, at this early date, Dee was not only interested in celestial distances, but had worked on the mathematical techniques needed to measure them:

Concerning the distances of planets, fixed stars and clouds from the centre of the earth, and concerning the discovery of the true magnitudes of all the stars: a [mathematical] demonstration in two books.⁵⁸

In both aphorism XXXI and in the title of his unpublished book, Dee mentions the distances of ‘clouds’ (*nubes*). In his effort to find a mathematically precise description of celestial influences, he may be intending to take into account the atmospheric obstructions to the planetary rays. Alternatively, by the word *nubes* he may be referring to that most portentous of meteorological phenomena: comets.

It is clear, then, that Dee had been working on the problem of celestial distances from the 1550s, or even the late 1540s. His interest was directly linked to his ambitious programme to set astrology upon a solid, naturalistic foundation, in which it would be essential to know the true distances and sizes of the planets, stars and other celestial objects. There is evidence, moreover, that Dee’s interest in celestial distances lasted long after the first publication of the *Propaedeumata*. In 1568 he revised and republished the work; and in his *Mathematicall Praeface* to Henry Billingsley’s 1570 English translation of Euclid, Dee expressed some views on astronomy and astrology closely related to his ideas in the *Propaedeumata*.

In the *Praeface* Dee classified astronomy and astrology as part of the series of auxiliary, practical sciences. The highest rank in this group he gave to perspective. This is hardly surprising since he extended the definition of perspective far beyond its usual ambit. It embraces not only the ancient science of optics, as we might expect, but also “catoptrics”, or the study of lenses and mirrors. Both study the propagation of light in straight lines, and the effects produced by these beams either naturally or artificially. But this is not the limit of Dee’s “perspective”:

It concerneth all Creatures, all Actions, and passions, by Emanation of beames perfourmed. Beames, or naturall lines, (here) I mean, not of light onely, or of colour [...] but also of other *Formes*, both *Substantiall* and *Accidentall*.⁵⁹

Dee’s definition of astronomy is equally idiosyncratic. Most contemporary astronomers divided astronomy into two component disciplines: the elementary grounding of the “sphere”, which accounted for the diurnal movements of the heavens, the rising and setting of the sun and stars, the seasons and so forth; and (the main pre-occupation of astronomers) the theory of the planets, which used “hypotheses” of circular motions to account for the observed progressions and retrogressions of the planets. While Dee’s definition overlapped with the common understanding of

astronomy in several places, there was an element that was distinctively his, and which recalls his insistence in the *Propaedeumata* that scholars should establish the proper sizes and distances of celestial bodies.

Astronomie is an Arte Mathematicall, which demonstrateth the distance, magnitudes, and all naturall motions, apparences, and passions propre to the Planets and fixed Sterres [...]. By this Arte we are certified of the distance of the Starry Skye, and of eche Planete from the Centre of the Earth: and of the greatnes of any Fixed starre sene, or Planete, in respect of the Earthes greatnes.⁶⁰

While other astronomers might consider parallax to be a useful tool in certain situations – especially during the appearance of a comet – Dee makes it practically the foundation and central concern of astronomy.

He considers astrology separately from astronomy, not as an art inferior to or derivative of astronomy, but as a great discipline founded on the mastery of many sciences. Expertise in astronomy is, of course, required; but the astrologer must also be an adept of perspective, cosmography, natural philosophy and more. It is not enough to learn the conventional meanings of planetary configurations. Dee cites with approval the opinion of the philosophers that the astrologer must investigate and discover the impressions which the celestial bodies make upon all earthly things. But even this is not sufficient; the astrologer should consider

Not only (by *Apotelesmes*), το οτι but by Naturall and Mathematicall demonstration το διοτι.⁶¹ Whereunto, what Sciences are requisite (without exception) I partly haue here warned: And in my *Propaedeumes* (besides other matter there disclosed) I haue Mathematically furnished vp the whole Method [...]. I was (for 21 yeares ago)⁶² by certaine earnest disputations, of the Learned *Gerardus Mercator*, and *Antonius Gogaua* (and other,) therto so prouoked: and (by my constant and inuincible zeal to the veritie) in obseruations of Heauenly Influencies (to the Minute of time) than, so diligent.⁶³

Here Dee explicitly links his programme for astrology with that presented in the *Propaedeumata*. Astrology, in short, is not only the study of the effects of the planets upon the earth; it is the investigation of the *causes* of these influences, using the tools of astronomy, natural philosophy and perspective.

In the *Mathematicall Praeface*, Dee stresses the interrelationship of perspective, astronomy and astrology. Perspective is the study of all influences that propagate in straight lines: not only light, but also the occult “substantial” and “accidental forms”. Astronomy is a science founded on perspective and is principally about parallax measurement. Astrology, finally, draws upon astronomy and perspective (as defined in Dee’s peculiar sense) to discover the causes and mechanisms of celestial influence. Dee is restating, for a popular audience, his arguments for a naturalistic astrology, which he had first presented in the *Propaedeumata* of 1558, and had restated in the revised edition of this work only two years previously.

It seems, then, that Dee retained his preoccupations with astrology and celestial distances into the 1570s – and this is confirmed by the postscript to the *Nucleus*. He marvels at the aid that Nature herself, in the form of the diameter of the earth, has provided for the investigation of the heavens. But the use of the parallax method is not limited to the investigation of the New Star:

If you are willing to apply yourself to this [method] with concentration, care and love for the truth, then you will be able to join me in bearing unassailable witness to students of the truth, of how incredible is the situation and nature of this celestial phenomenon; moreover, you will also become much more informed in discovering innumerable other facts about the causes, locations, distances, magnitudes, stations and motions of all celestial and subcelestial phenomena. I would hope that this most beautiful part of philosophy will be complete before all the predicted consequences of this marvellous herald (which seems to me to portend in a variety of ways) are unfolded into actual events.⁶⁴

The parallax techniques, then, were to be used as the principal tool of investigation of the heavenly bodies. Recall Dee's concern in the *Propaedeumata* and in the *Mathematicall Praeface* that the correct distances of the planets be established; also recall from the former work, and from his unpublished treatise on parallax, that *nubes* – meaning either obstacles to the celestial influences, or comets – were to be investigated. Perhaps he included these under the rubric of “subcelestial phenomena.” In any case, there is no doubt that the parallax techniques that Dee presented in the *Nucleus* had a pedigree that long predated the appearance of the New Star.

DEE AND DIGGES IN COLLABORATION

How, finally, did the two astronomers come to publish their works together?⁶⁵ In his preface to the *Nucleus*, Dee explains why he was publishing his pamphlet on parallax in tandem with Digges's weightier contribution. Before Digges had ever mentioned his own treatise (and, one presumes, long before the appearance of the New Star), Dee says that he and his “mathematical heir” had met frequently at Dee's house and discussed the development of new methods for the measurement of parallax. Dee was surprised, however, when at the end of February 1573, Digges arrived at his house with the finished text of his *Alae* ready for the printer. Digges was filled with confidence in the value of his treatise, as Dee describes:

[Digges] added that he had good reason for publishing his book: he would free me from the burden of writing anything on this subject; furthermore, he would send out in advance works that would shed light, by his own industry, on my more dense writings on this and similar subjects. Finally, his writings would create more, and more trustworthy, observers, since [his readers] would be taught to observe this unprecedented spectacle (which still shines in the heavens) methodically, with an educated and mathematical eye.⁶⁶

It is most interesting that Digges, at least in an attempt to gain Dee's interest, maintains that the purpose of his *Alae* was to illuminate Dee's more obscure writings on parallax. Dee had not published anything specifically on parallax techniques: there were only his references to the measurement of celestial distances in the *Propaedeumata*, the work that Digges is surely referring to here. We might presume, then, that the discussions on parallax that the two men had held at Dee's house were stimulated by Dee's continuing interest in a naturalistic physics of astrological influences. Whether Digges shared this interest is another question, but we should not be surprised that Dee should have asked his mathematical heir to consider methods to find the correct distances of the planets. It appears that Dee's interest in

planetary distance coincided, by chance, with Digges's preoccupation with the same subject on quite different grounds, namely, the establishment of Copernicanism.

There seems to be an element of gentle mockery in Dee's description of his young collaborator's self-confidence. Dee writes that he does not want to seem merely one who praises another's accomplishments, and that he therefore revealed to Digges that he too had been working on parallax theorems of his own, which would be of great value in educating the public:

I was unwilling to keep these Theorems locked up any longer in our study (where they had recently been conceived). Instead, I wanted to publish them immediately, although they are extracted from a certain book of mine that is not yet finished. In this way they might be useful to mathematicians, at least until our other writings in this philosophical genre are ready to appear.⁶⁷

This unfinished work, from which the Theorems of the *Nucleus* were extracted, could be any of the unfinished works on parallax that Dee has mentioned – either the *De planetarum [...] distantiiis* of the early 1550s, or the work that, perhaps, recorded Dee's latest thoughts on parallax, the *Hipparchus redivivus*.⁶⁸

Dee's account of their collaboration in the *Nucleus* contradicts the version of the same events given in Digges's preface to Dee's tract. There, Digges says that he had allowed Dee to publish the *Nucleus* as an appendix to the *Alae*. Dee's Theorem III, he says, provides nothing new for the reader of the *Alae*, and indeed can be derived from Digges's eleventh problem. However, Digges concedes, it would be against natural justice if Dee should publish his work at a later date (recalling that the Theorems were extracted from a larger, unfinished work), only to find that the public presumed they were plagiarised from Digges. Besides, Digges adds, Dee's Theorem is suitable for novices who cannot yet grasp the Problems.⁶⁹

Although the master and his protégé engaged in this good-natured rivalry, there was no doubt that it had been left to Dee to write the final account of the New Star. In the *Alae*, Digges frequently mentions Dee's intention to publish their observations and conclusions on the star, and often uses this to excuse himself for saying so little on the subject. In the *Praefatio authoris*, for example, he stops himself from getting too carried away with his theories on the phenomenon:

But I have resolved not to write anything more on the history of this star, because that extraordinary man John Dee – most learned in these studies and a prodigy in the rest of philosophy, whom I esteem as my second Mathematical Father – has taken on the task of expounding this material, and I have no doubt that it will soon be published.⁷⁰

It is to our frustration that Digges had such confidence in Dee's intentions to publish their material.

NOTES

¹ Bartolomaeus Raisacherus, *De mirabili Novae ac splendidissimae Stellae [...] Phaenomeno* (Vienna, 1573), sig. A3^{r-v} (from the *prooemium*): “Est igitur apparentia illa corpus quoddam luminosum splendidum, quantitate stellas primae magnitudinis adaequans, aliquas etiam exuperans, calore ex candido ac aureo fulvescenti Iovem, subrutilanti autem Martem Chronicum quodammodo referens, in parte illa septentrionali, et circa polum arcticum in imagine Cassiopaeae, singulis noctibus, ab aliquot nunc mensibus sese ostendens, motu autem saltem unico, eoque diurno, in eadem cum reliquis stellis circumstantibus semper distantia, per sese autem immobile, circum polum se revolvens.”

² The remnants of the event are detectable today as X-ray source Oep. XR-1, or “Tycho’s Supernova”.

³ Aristotle, *Meteora*, 344a9-344b18. See Clarisse Doris Hellman, *The Comet of 1577: Its Place in the History of Astronomy*, Studies in History, Economics and Public Law, 510 (New York: Columbia University Press, 1944), 19-23.

⁴ Otto Neugebauer, *History of Ancient Mathematical Astronomy* (Berlin: Springer Verlag, 1975), 322-9.

⁵ Neugebauer, 100-112. See also Janice Adrienne Henderson, *On the Distances between the Sun, Moon and Earth according to Ptolemy, Copernicus and Reinhold* (Leiden: E.J. Brill, 1991).

⁶ See Henderson, *On the Distances*, 17-18. The term ‘parallax’ should perhaps be qualified as *diurnal* parallax, to distinguish it from *annual* parallax, used by modern astronomers, which describes the apparent change of position of a star owing to the annual motion of the earth.

⁷ This is a simplification; because he did not have an accurate way of dealing with refraction, Ptolemy avoided the absolute lowest point of the moon’s cycle. A full exposition of Ptolemy’s method is in Henderson, *On the Distances*, 21-6.

⁸ Johannes Regiomontanus, *De cometarum magnitudine, longitudineque ac de loco eius vero, problemata XVI* (Nuremberg, 1531). A second edition was published as part of the *Scripta clarissimi mathematici M. Ioannis Regiomontani* (Nuremberg, 1544). A translation and commentary on this work is given in Jane L. Jervis, *Cometary Theory in Fifteenth-Century Europe* (Dordrecht: D. Reidel, 1985).

⁹ Regiomontanus’s first problem states the general principle of diurnal parallax, in much the same terms as we have expressed it above. Problems II to V directly concern the measurement of cometary parallax; Problems VI to VIII consider the effect of parallax in various coordinate systems; Problems IX to XVI are a miscellany, dealing with observational techniques (including a description of the cross-staff) and the analysis of parallactic data to find the distance of a comet from the earth and thence its true length and even its volume.

¹⁰ Regiomontanus, *De cometis* (1531), fol. 3^r: “Notanda est altitudo Cometarum antemeridiana vel postmeridiana cum arcu azimuth eius, instansque huiusmodi observationis animadvertendum est, sed et instans quo Cometa ipse meridianum possidet non est negligendum, quod facile fiet per observationem cuiuspiam stellae fixae locum notum habentis.” Translation by Jane L. Jervis, *Cometary Theory*, 100, with facsimile of the original at 179.

¹¹ Jervis, *Cometary Theory*, 99-100.

¹² Thaddaeus Hagecius, *Dialexis de novae et prius incognitae stellae [...] apparitione [...]* (Frankfurt am Main, 1574), 62-4.

¹³ Hagecius, *Dialexis*, 66-72.

¹⁴ Tycho Brahe, *Astronomiae instauratae progymnasmata*, in John Louis Emil Dreyer, ed., *Tychonis Brahe Dani Opera omnia*, 15 vols (Hven, 1913-1929), III, 63.

¹⁵ *Alae; Parallaticae*. For reasons that we shall see below, the two works were published together, and are usually bound into a single volume. Digges refers to Dee’s work in the prefatory material to his own volume, and provided a brief preface to Dee’s treatise. On both works see *JDEP*, 667-71.

¹⁶ He criticizes Regiomontanus several times in the work (at, for instance, sigs A3^v, H3^v, L2^r, but especially at B2^r, where he identifies the principal problem as the measurement of time. The use of clocks is not even worth considering, so inaccurate are they; and even the measurement of time by reference stars is rejected because of the necessity of making several simultaneous observations.

¹⁷ Brahe, “*Astronomiae*”, III, 167-203.

¹⁸ Brahe, “*Astronomiae*”, III, 169.

¹⁹ Brahe, “*Astronomiae*”, III, 201: “Decimum octavum, iusto pluribus praesuppositis intricatur, quae non facile absque omni erroris suspitione offeruntur.”

²⁰ Brahe, “*Astronomiae*”, III, 200-201.

²¹ *Alae*, sig. L1^r: “Omnino Praxi non convenit, quamvis Demonstratio perfectissima sit.”

²² *Alae*, sig. L1^v: “perfectissime et liquidissime veras Parallaxeis enucleabunt.”

²³ See his notes on observation at *Alae*, sig. II^r-4^r.

²⁴ Brahe, “*Astronomiae*”, 200; Hagecius, *Dialexis* 66-72.

²⁵ *Alae*, sig. K4^r.

²⁶ He adds that, if it is no longer on the same line, then the amount of parallax can be determined by his sixteenth Problem. But since the New Star *always* appeared in the same line, this is in fact superfluous.

²⁷ *Alae*, sig. K3^v: “Hac ratione plurimis noctibus animadverti Phaenomenon istud mirabile, in una apparere recta linea cum ea stellula quae in genu Cassiopeae, et altera quae in latere dextro Cephei sub Cingulo est.”

²⁸ *Alae*, sigs A1^r-B1^r and B1^v-B3^r.

²⁹ *Alae*, sig. A1^v: “At qui Platonis, seu ut verius loquar Mathematicis istis instructus Alis, sursum in Aethera contendat, Elementaribusque prorsus Regionibus traiectis, longe remotiorem Cometae locis esse perspexerit.”

³⁰ *Alae*, sig. A3^r: “ansam oblatam esse, et occasionem maxime opportunam experiendi an Terrae motus in Copernici Theoricis suppositus, sola causa siet [*sic*] cur haec stella magnitudine apparante minuat.”

³¹ The star was situated very close to the great circle through the spring equinox and the celestial poles. When the sun is at the spring equinox, according to the Copernican theory, the earth is at the vernal equinox, and thus at its maximum distance from the spring equinox. The *Praefatio* is dated February 1573, a month before the equinox.

³² Brahe, “*Astronomiae*”, III, 172.

³³ *Alae*, sig. A2^v: “Praepostere etiam Antiquos progredi perspexi ex Theoricis scilicet fictis Parallaxeis et distantias venari veras, cum inverso ordine procedere potius debuissent, et ex Parallaxibus observatis et cognitis, Theoricas examinare.”

³⁴ *Alae*, sig. A4^r: “Conatus igitur sum et assequutus, variis Problematibus demonstrative, et practice exactissime Parallaxin huius Phaenomeni et cuiusvis etiam alterius concludere, licet Saturni, Iovis, et Martis, Parallaxeis adeo sint exiguae, ut sensuum imbecillitate vix discerni possint, Si tamen ulla arte vere animadverti queant (hoc ausim dicere) aut his nostris sequentibus problematibus, aut nullis penitus praeceptis Geometricis inveniri possint.”

³⁵ Values were known for the distance of the moon and the sun. For each of the other planets, the deferent, or principal circle was scaled so that the uppermost extent of one planet’s epicycle coincided with the lowermost extent of the next highest planet’s epicycle. In effect, the planetary mechanisms were fitted like layers of an onion between and around the layers of the sun and moon. It is important to note that this arrangement was entirely arbitrary, and the same planetary motions would be observed whatever the scale chosen for the deferents and epicycles. An account of the origins of this arrangement can be found in Olaf Pedersen, *A Survey of the Almagest* (Odense: Odense Universitetsforlag, 1974), 391-7.

³⁶ *Alae*, sigs A2^v-A3^r. See Henderson, *On the Distances*, 93-9; also 4-5 on the different role of the solar distance in the Ptolemaic and Copernican systems.

³⁷ *Alae*, sig. A4^v,

³⁸ Although annual parallax is not mentioned in the *Praefatio authoris*, it was clearly on Digges’s mind at the time, as he makes clear in a passage towards the end of the volume: “Concerning these matters [*sc.* diurnal parallaxes] and others hitherto unheard of, and about an easy method of investigating them with a new kind of instrument, I shall, God willing, perhaps expound more fully at a later date, if these first writings meet with approval. I shall also expound upon other parallaxes, which no one to this date has discussed, and which few know of, or even believe in. I mean those parallaxes which occur not because of the distance of our place of observation from the centre of the earth, but which happen through the different positions of the centre of the earth itself.” (*Alae*, sig. K4^r: “De his autem aliisque hactenus inauditis, facillima ratione per Instrumentum novum perscrutandis, fusius forsitan posthac, si ista exordia placere intellexerimus, Deo annuente, disseremus. Deque Parallaxibus aliis hactenus a nemine tractatis, a paucissimis cognitis aut saltem creditis; iis scilicet, quae contingunt non propter visus nostri a Terrae centro deviationem, sed per varios ipsius centri situs.”).

³⁹ *Alae*, sigs B1^v-B2^r: “Phaenomenon admirabile novum in Cassiopaea sede conspicuum, adeo uniformiter circa Polum volvi cum caeteris fixis videtur, ut singulis revolutionibus ad eadem loca absque ulla differentia sensibili quam exactissime ardeat, neque ullum motum peculiarem tantulo tempore habere

cernitur. Nihil tamen dubito remotius esse istud Phaenomenon a terra quam prima apparitione fuerat, sed haec elongatio adeo lenta et exigua est ut unica revolutione omnino non sentiat. Et si Phaenomena alia observare volueris quae motum sensibilem unica revolutione habeant, ea animadversa, poterit facillime Arithmeticis supputationibus, ad partem revolutionis quamcunque accommodari.”

⁴⁰ By “nucleus”, Dee means to suggest that he has broken through the “hard shell” of parallax, and now presents the reader with the essential, digestible kernel: *Parallatica*, sig. Aiii^v; Digges gives a similar explanation in his preface to *Parallatica*, at sig. Aii^f.

⁴¹ Brahe, “Astronomiae”, III, 204-5.

⁴² Tycho’s critique of Gemma is at Brahe, “Astronomiae”, III, 67-87; esp. 77-9, on the decrease of the star’s brilliance.

⁴³ Johnson and Larkey have argued, on the other hand, that it might be the very immensity of the movement required to reduce the star’s great brilliance that inspired Digges’s conception of the infinite universe. See F. R. Johnson and S. V. Larkey, “Thomas Digges, the Copernican System, and the Idea of the Infinity of the universe in 1576,” *The Huntington Library Bulletin*, 5 (1934): 69-117, esp. 113.

⁴⁴ J. Crossley, *Autobiographical Tracts of Dr John Dee* (Manchester, 1851), 25: “11: De stella admiranda in Cassiopeiae asterismo, coelitus demissa ad orbem usque Veneris, iterumque in coeli penetralia perpendiculariter retracta, post decimum sextum suae apparitionis mensem. Lib. 3. A. 1573.” See also *NP*, 287, n.2. Dee may have chosen the sphere of Venus for the star’s location because of the physical resemblance of the New Star to the planet Venus at its first appearance; Cornelius Gemma, for instance, named it “Phosphorus alter”.

⁴⁵ William Camden, *Rerum Anglicarum et Hibernicarum Annales* (Oxford, 1717), 272: “Nescio an operae pretium sit memorare, quod historici nostri temporis omnes memorarunt, mense Novembri novam stellam, aut, si mavis, Phaenomenum conspectum fuisse in Cathedra Asterismi Cassiopeae [...] eodem loco diurno coeli motu circumlata, totos sedecim menses haesit. In coelesti, non elementari regione exstitisse, ex Parallaxica doctrina Thomas Digseius et Joannes Deus, nobiles apud nos Mathematici, erudite demonstrarunt, sensimque ascendendo disparere opinati sunt. Post octavum sane mensem paulatim extenuari omnes senserunt.”

⁴⁶ Crossley, *Autobiographical Tracts*, 25: “12: Hipparchus redivivus, tractatulus, 1573.”

⁴⁷ *JDEP*, 671.

⁴⁸ *Parallatica*, sig. Aii^v. Compare the similar approach of Hagecius’s meridian method, where the two observations on the meridian are used to find the combined parallaxes, which are then separated by an approximate method, using a table. See Hagecius, *Dialexis*, 65-73.

⁴⁹ *Parallatica*, sig. Biii^f: “In duabus quibuscunque diversis, eiusdem Stellae similisve Phaenomeni, Parallaxibus (modo interea, diurno Totius solum ferri concipiatur motu) eadem ratio erit sinus recti maioris Parallaxeos, ad sinum rectum minoris, quae est sinus recti maioris a vertice distantiae apparentis, ad minoris distantiae apparentis sinum rectum.”

⁵⁰ It is interesting to note that a seventeenth-century writer saw, and made use of, this complementarity between the two works. Richard Holland used Digges’s Problems for specific observational conditions; instead of following the whole of Digges’s procedure, however, Holland used his construction only until the sum or difference of the parallaxes could be found. He then used Dee’s theorem to separate the parallaxes. See Richard Holland, *Notes shewing how to get the angle of Parallax of a comet or other Phaenomenon, at two observations; To be taken in any one Station or Place of the Earth, and thereby the distance from the Earth* (Oxford, 1668).

⁵¹ *Parallatica*, sig. Diiii^f: “Similiter, ex proprietatibus hisce sic [...] demonstratis qualia inferri, demonstrarique alia possint, tum Theoremata, tum Problemata (ad nostrum institutum necessaria) fusius explicabimus in eo, quem (Deo favente) de Phaenomeno isto mirabili, edere statuimus libro.”

⁵² *Parallatica*, sig. Diiii^f.

⁵³ *PA*.

⁵⁴ The central significance of the *Propaedeumata* in Dee’s philosophy, and its connection with medieval optical theory is demonstrated in Nicholas H. Clulee, “Astrology, Magic and Optics: Facets of John Dee’s Early Natural Philosophy”, *Renaissance Quarterly*, 30 (1977): 632-80; and *NP*, esp. 39-73.

⁵⁵ *MP*, sig. biii^v

⁵⁶ Because of a discrepancy in his sources (Bacon and Grosseteste) for this idea, however, Dee was unclear whether a short, stout cone or a long narrow one represented a stronger planetary influence. See *NP*, 49-50.

⁵⁷ “XXX. Magnitudines verae non solum terrestri globi, sed & planetarum fixarumque omnium stellarum, astrologo debent esse notae. XXXI. Distantiae verae tam fixarum, quam singulorum planetarum a centro terrae quocunque proposito tempore, astrologo constare debent: sicut & nubium, sive crassioris aëris, variae a terra altitudines.” *PA*, 136-7.

⁵⁸ “De Planetarum, Inerrantium stellarum, Nubiumque a centro terrae distantis: & stellarum omnium veris inveniendis magnitudinibus, lib. 2. demonstr.” *PA*, 116-117.

⁵⁹ *MP*, sig. bi^r. Clulee identifies the “Formes, both Substantiall and Accidentall” as synonymous with occult influences, in Clulee, “Astrology, Magic and Optics”, 654.

⁶⁰ *MP*, sig. bi^v-ii^r. Dee furnishes the example of the ancient measurement of the distances and sizes of the sun and moon.

⁶¹ “το οτι” – “the fact that”, or effects, “το διοτι” – “the why”, or causes. These are standard logical terms, taken from Aristotle’s *Posterior Analytics*, 89b24.

⁶² Comment printed in the margin: “Anno 1548 and 1549 in Louayn.”

⁶³ *MP*, sig. biii^v-iiii^r.

⁶⁴ *Parallatica*, sig. Diiii^v: “Cui si, de caetero, accurate, caute, et φιλαληθως, incumbere velitis: non solum Coelestis huius Phaenomeni, quam sit incredibilis Dispositio, Conditioque, una mecum veritatis studiosis, testatissimum reddere poteritis: Sed, ad quam plurima eruenda alia, circa Coelestium quorumcumque vel Subcoelestium Phaenomenorum Causas, Loca, Distantias, Magnitudines, Stationes, Motionesve, longe instructiores evadetis. Quam pulcherrimam Philosophiae partem (mortalibus summe necessariam) omnibus suis numeris, ante, absolvendam fore speramus, quam universa huius admirandi Prodromi (quae vario nobis videtur innuere modo) rebus ipsis, explicata penduntur Apotelesmata.”

⁶⁵ The works were actually published by two different printers: Digges’s work by Thomas Marsh, in late February 1573; and Dee’s by John Daye, in March 1573. These were the usual printers of the men’s tracts. The references in the prefatory material and in the body of the works to each other’s writings do imply, however, that the two tracts were meant to appear in a single volume. See *JDEP*, 668.

⁶⁶ *Parallatica*, sig. Aiii^r: “adieciturque editionis suae haud minimam esse causam, ut ea me liberaret (huiusmodi scribendi) molestia: illaque praemitteret, quae, pressius a me scriptis (de istis, similibusve rebus) lucem aliquam, hac sua adferrent industria: et quo plures, interea, instruerentur, redderentur testes, maiori fide digni: cum et ipsi, doctioribus et Mathematicis oculis, istud artificiose observare docerentur, quod caelo adhuc fulget, rarissimum Spectaculum.”

⁶⁷ *Parallatica*, sig. Aiii^r: “nostro proinde diutius inclusa ergastulo (ubi nuper nata sunt) haec nolui detinere Theoremata: sed ex quodam nostro (nondum absoluto) selecta libro, actūtum potius, in publicum emittere: ut fructum haud parvum Mathematicis reportent, donec alia nostra (in hoc Philosophandi genere) scripta, tempore sunt proditura opportuno.”

⁶⁸ See intra, 53.

⁶⁹ *Parallatica*, sig. Aii^r.

⁷⁰ *Alae*, sig. A2^r: “Sed plura de huius stellae historia scribere non decrevi, quia eximius vir Iohannes Dee (quum in reliqua philosophia admirandus, tum harum scientiarum peritissimus, quem tanquam mihi Parentem alterum Mathematicum veneror...) hanc sibi tractandam assumpserit materiam, quam ita absoluturam esse, ut in Dei optimi maximi gloriam, et Mathematicarum artium studiosorum delectationum, utilitatem et admirationem summam, brevi prodeat, nihil dubito.”

STEPHEN JOHNSTON

LIKE FATHER, LIKE SON?

John Dee, Thomas Digges and the Identity of the Mathematician

In early 1573 two English mathematical books were being prepared for the press. Though produced by different printers they were issued as a pair and today are usually found bound together. John Dee's *Parallatice commentationis praxeosque nucleus quidam* and Thomas Digges's *Alae seu scalae mathematicae* were both prompted by the new star of 1572. The material fact of their joint publication neatly echoes the sentiments of familiarity expressed by the two authors. Digges supplied a preface to Dee's work, explaining the extent to which the two texts had been composed independently, while also praising Dee's learning and the benefits of their collaboration and discussion. Both Dee and Digges further specified their relationship in the prefaces to their own works. The bond between them was avowedly close, indeed paternal: for Dee, Digges was "my most worthy mathematical heir", while Digges repeatedly referred to Dee as a "revered second mathematical father" and acknowledged the pleasure of their intellectual intimacy.¹

These comments have often been noted and, in light of Thomas Digges's Copernicanism, occasionally been incorporated in attempts to establish Dee's views on heliocentric cosmology.² Nevertheless, Digges has not figured prominently in studies of Dee – no doubt because the scarcity of additional evidence has seemed to preclude any extended analysis of their association. Yet the relationship was more than simply a passing alliance inflamed by the excitement of the new star. In his all too brief comments in the preface and proemium to *Alae*, Digges indicated that the connection with Dee stretched back much further. Thomas recorded that his mathematical education had been begun by his father Leonard, himself a mathematician in his own right and the author of two popular vernacular texts published in the 1550s. But according to Thomas, Leonard had only been able to plant certain seeds of elementary mathematical learning in his son, and after his death it was left to Dee to cultivate and supplement these with further instruction.³

The mutually acknowledged paternal relationship between John Dee and Thomas Digges therefore gives us a remarkable window onto Dee's work and significance. Digges certainly provides an opportunity to assess Dee's role in forming the next generation of mathematicians. I argue that Dee offered the youthful Digges not only specific mathematical instruction but that he also supported his pupil's vision of the character and value of mathematics. In particular, I suggest that Dee's prior investigations underlie the studies embodied in Digges's first mathematical publication, in 1571. Moreover, Dee's early career in the 1550s as a mathematical client in noble

households provided an exemplar for emulation as Digges first fashioned his own role in the early 1570s.

As well as illuminating the issue of Dee's contemporary influence, Digges can also be used to examine Dee's own mathematical values and commitments. Over the course of the 1570s and 1580s, Digges reworked the terms of his mathematical identity, shifting away from a commitment to advanced and novel topics and prioritising instead the active service of prince and commonwealth. However, rather than representing a break with the pattern of Dee's career, I suggest that Digges's civic turn helps us to understand the changing character of Dee's own role as he advocated and practised a vernacular ethic of mathematical service in the 1570s.

While seeking to emphasise the importance of this series of connections between the careers of Dee and Digges, I do not conclude that they pursued identical ambitions. Digges never followed Dee's broadest conceptions of the terrain of mathematics and its relationship to other areas of learning. I examine the significance of this difference through the lens of Copernicanism and argue that the different responses of master and pupil reflect a fundamental divergence in their respective conceptions of the identity of the mathematician.

Mathematics has long been crucial to evaluations of Dee's work. Since E.G.R. Taylor's *Tudor Geography* of 1930, Dee's conception and practice of the mathematical arts have been a touchstone for those seeking to rescue his reputation, whether in order to proclaim his significance within Elizabethan culture or to instate him in the pantheon of the Scientific Revolution. Conversely, Dee has also been enrolled in the arguments of those sceptical of the positive impact of occult philosophies in the late Renaissance. Querying Dee's attainments as a mathematician has provided one means of undermining claims for Neoplatonism, Hermeticism and related magical traditions. At the extremes, these approaches become indiscriminating apology on the one hand and dismissive anachronism on the other, in either case blurring the possibility of a critical evaluation of Dee himself. By using Digges as a constant point of comparison, we can establish a perspective on Dee that is distanced and yet close to contemporary categories, in which we seek to recover the integrity of Dee's own enterprise while retaining a sensitivity to its differences and distinctions.

The obvious place to begin is Dee's *Mathematicall Praeface* to Euclid of 1570. Now probably his most frequently cited work, this text integrates a philosophical account of mathematics with a richly ramified classification of the various mathematical arts and sciences, elaborated and combined to create a mathematical manifesto whose claims are both disciplinary and yet personal to Dee. But despite its seeming timeliness – Digges's first publication is dated from the following year – I do not want to take this apparently obvious route.

Although Digges recorded Dee's mathematical instruction in print he gave no details or dates. Julian Roberts and Andrew Watson have recorded a small but vital fragment of independent evidence which suggests that Dee became Thomas's mathematical master soon after Leonard's death, which most likely occurred in 1559

when Thomas was only about 13 years old. Dee had signed his copy of the 1544 Basel edition of Archimedes's *Opera* on 1 January 1550 but, in addition to Dee's signature, the title page also carries the revealing note "Thomas Diggius 1559".⁴ The striking coincidence of dates hints strongly that Dee assumed the mantle of tutor immediately after Leonard's death. Certainly, the language of fatherhood which both Dee and Thomas Digges used in 1573 would be most readily explicable if there was little interruption in paternal role between Leonard Digges and Dee. Given this probability that Thomas had first studied with Dee at the end of the 1550s, we therefore cannot be sure that Dee's *Praeface* to the 1570 Euclid is the most appropriate or relevant text for understanding Digges's early work. Rather than Dee, Digges himself can serve more securely as our starting point.

Thomas Digges (c.1546-1595) is most familiar within the history of science as the first advocate of Copernicanism in England.⁵ However he appears in many more narratives than that of Renaissance astronomy and cosmology. He is to be found in accounts of navigation, ballistics, surveying and harbour engineering, as well as military strategy and administration, and parliamentary politics.⁶ In many of these accounts he is portrayed as a key figure in the development of the tradition of mathematical practice in England.

Digges's first publication was *Pantometria* (1571). At first sight this text appears to link him more closely with the outlook of his natural father rather than his "second mathematical father". *Pantometria* was actually written by Leonard Digges as a "geometrical practise" divided into three books, dealing respectively with the reckoning of heights and distances, areas, and volumes. This treatment of instrumental and computational techniques for surveying and mensuration was justified in terms of civic and military utility as well as personal pleasure. In securing the posthumous publication of his father's most important extant work, Thomas was undoubtedly exercising the duties of filial responsibility. But he did more than rescue his father's practical geometry from oblivion. At the end of *Pantometria*, Thomas appended a vernacular text of his own, a *Mathematicall Discourse of Geometricall Solids*.

Digges's *Mathematicall Discourse* provides us with the best witness to his earliest mathematical commitments and values. Although his editorial work saved Leonard's *Pantometria* from obscurity, Thomas's own contribution to the volume has been entirely forgotten. Yet it is a remarkable text, with a range and ambition quite unlike any other English mathematical work published in the sixteenth century. The *Mathematicall Discourse* proclaims the value of advanced mathematical study not just in the realm of lofty rhetoric but through the disciplined endeavour of elaborating hundreds of new theorems. There is no evidence that Leonard Digges had grappled with the kind of mathematical material that here engaged his son; we should look instead to John Dee for the origins and motivation of Thomas Digges's efforts.

The *Mathematicall Discourse* is primarily concerned with the properties, dimensions, and interrelations of the five regular (Platonic) solids. Its text gives several hundred theorems dealing with such topics as the mutual inscription and

circumscription of these solids. The final section of the text investigates similar questions but does so by studying five ‘transformed’ bodies – semi-regular Archimedean solids generated by the metamorphosis of each of the five Platonic solids. The *Mathematicall Discourse* covers its subject in just over one hundred pages, but its brevity is deceptive. The amount of labour invested in its preparation is disguised by Digges’s decision to omit proofs of his mass of theorems for the sake of brevity.⁷

John Dee was one of the few people – if not indeed the only person – in Elizabethan England who could have helped to set the agenda of this work and inform its detailed choices. Although Dee is nowhere named or referred to (Digges cites only Euclid), there are a number of significant points of overlap with his mathematical interests and style. Firstly, there is Digges’s principal concern with solid geometry; this was the area of Euclid’s *Elements* on which Dee focused his published annotations.⁸ Digges does however begin with some preparatory material on the plane geometry of polygons and circles, and their mutual inscription and circumscription. Dee had already taken up this topic, as well as having given specific attention to the solid geometry of inscribing the Platonic solids in a sphere.⁹

Although both Dee and Digges tackled and sought to extend the Euclidean corpus, neither was bound by the demonstrative form of the *Elements*. Dee was often interested in finding ‘useful’ mechanical techniques rather than rigorous proofs.¹⁰ Even in his more formal mathematical work he rarely sought to prove geometrical properties; rather, as Marshall Clagett has characterised Dee’s work on conics, he typically propounded his propositions as problems in which a given magnitude is the starting point from which another magnitude is sought.¹¹ Such numerically formulated ‘data problems’ also make up the staple content of Digges’s *Mathematical Discourse*. Moreover, this stylistic affinity is complemented by a parallel concern with identifying and classifying irrational magnitudes in the terms of Euclid’s *Elements* book X.¹²

These detailed connections strongly suggest the extent to which Digges’s early mathematical endeavours were rooted in Dee’s prior concerns, and probably derive from problems which had occupied Dee at the end of the 1550s. Only through the support of a figure such as Dee could Digges have believed that there was in England an audience for his studies of polyhedra, which were expressly intended for “the satisfaction also of such as delighting in matters only new, rare and difficult, seek to reach above the common sort”.¹³

If the content and character of Digges’s *Mathematicall Discourse* indicates the significance of his formative period with Dee at the end of the 1550s, so does a consideration of his early role as a mathematician. Digges differed from Dee in both birth and upbringing: he appears not to have attended university and, rather than a scholar, was a gentleman who inherited substantial holdings of land and property.¹⁴ Though he had no need to seek preferment to a living or court office, his relationships with patrons in the early 1570s nevertheless echo the noble and courtly service of Dee’s early career.

Dee acted as tutor and consultant to a succession of patrons in the late 1540s and 1550s, with mathematics as his key vehicle for credit. While at Louvain, Dee tutored Sir William Pickering in arithmetic and mathematical instruments. Back in England, he successfully dedicated texts of 1550 and 1551 on the celestial globe and on the distances and magnitudes of planets and stars to Edward VI. When Dee entered household service with William Herbert, the Earl of Pembroke, in February 1552 it was presumably as a *mathematicus*. Certainly, the basis of Dee's subsequent service with the Northumberland family was mathematical. Dee gave advice on the voyage to Cathay of 1553, an enterprise in which the Duke of Northumberland was heavily involved. Dee also wrote vernacular tracts on mathematical topics for the Duchess, one on "The Philosophicall and Poeticall Original occasions, of the Configurations, and names of the heavenly Asterismes" and the other on "The true cause, and account (not vulgar) of Fluds and Ebbs", a title whose emphasis presages Digges's early concern to reach beyond the common sort.¹⁵ These poetic and philosophical considerations were balanced by the tuition in military mathematics that was offered to Northumberland's son John, Duke of Warwick and which Dee would subsequently mention in the *Mathematicall Praeface*.¹⁶

Digges's principal patron of the early 1570s was William Cecil, elevated to the title of Lord Burghley in 1571 and created Lord Treasurer in 1572. Burghley received the dedication of *Alae seu scalae mathematicae* and he had also privately solicited advice from Digges about the new star. But while Digges's published work dealt with the mathematical determination of place, distance, and magnitude, Burghley's concern was with the astrological meaning of the exceptional event.¹⁷ In 1574 Digges designed a polyhedral garden sundial for Burghley and also presented him with a manuscript text to accompany his "Frame Astronomical", a celestial ceiling with mechanical sun installed in Burghley's newly built house of Theobalds.¹⁸ Digges's lost treatise included tables to determine the positions of stars in relation to the horizon, meridian, sun, and moon, "whereupon sundry conclusions both pleasant for variety of knowledge and necessary for common use are grounded. Whereof I have in 50 conclusions digested the greater part, with their Histories Poetical and Judgements Astronomical." This work was clearly similar in genre and style to Dee's 1553 text on the constellations for the Duchess of Northumberland.

A generation apart, both Dee and Digges studied and published on deliberately elevated and novel mathematical matters, far exceeding the reach of 'the common sort'. But Digges recapitulated broader elements of Dee's early mathematical role. Just as Dee served the Northumberland family and other patrons in the 1550s, so Digges provided mathematical services for Lord Burghley in the early 1570s. Noble service revolved around advice on the patron's interests, the provision of texts and ingenious devices, and probably some household tutoring. Dee thus seems to stand behind not only the topic and detailed form of Digges's earliest mathematical work but also Digges's earliest fashioning of his identity as a mathematician.

Dee may also have prompted Digges to investigate matters beyond the purely mathematical. For example, an alchemical manuscript passed through Digges's hands in which he wrote out Walter Haddon's poem in praise of Thomas Norton and digested or copied alchemical schemata and classifications.¹⁹ Digges displayed no

other sign of interest in alchemy and this otherwise puzzling evidence may be a trace of his close relationship with Dee.

When presenting the *Mathematicall Discourse* in 1571 Digges clearly expressed the values which sustained his investigation of polyhedra. While the edition of his father's *Pantometria* was portrayed as a work embodying the practical virtues of utility, the defence of the *Mathematicall Discourse* was rhetorically constructed around intellectual elevation. Digges feigned to ignore those who might castigate his advanced study of polyhedra as "a fond toy, a mere curious trifle, serving to no use or commodity". Unless a detractor genuinely valued the study of "hard and difficult" matters, persuasion would be useless. Digges rounded on potential critics as "two-footed moles and toads whom destiny and nature hath ordained to crawl within the earth, and suck upon the muck"; such men "may not possibly by any vehement exhortation be reduced or moved to taste or savour any whit of virtue, science, or any such celestial influence".²⁰ Digges's robust language enforced a stark division of men into either virtuous followers of Euclid, Archimedes, and Apollonius or ignorant acolytes of Epicurus and Midas, content with the realm of lucre and mere worldly pleasure. The *Mathematicall Discourse* embodied mathematics not as a useful or vocational pursuit adapted to military or civic ends but as the work of a gentleman who primarily prized intellectual nobility.

Yet the terms of this seemingly forceful apology for advanced mathematics were not to be sustained by Digges. In his later career he substantially redefined his identity and public persona as a mathematician. This self-conscious shift is most vividly displayed in *Stratoticos* (1579), a text on military mathematics. Digges there offered some autobiographical reflections on his work of the early 1570s and confessed that "the strange variety of inventions in the more subtle part of these mathematical demonstrations did breed in me for a time a singular delectation". However, with maturer judgement, he had turned from subtlety and delight to practicality and utility. Digges stated that he had latterly "spent many of my years in reducing the Sciences Mathematical from Demonstrative Contemplations to Experimental Actions, for the Service of my Prince and Country".²¹

This advertisement of reformed commitments was no mere rhetorical flourish; Digges's subsequent activities show him immersed in the *vita activa* – as a so-called 'man of business' in the House of Commons, as an engineering advisor, and as an administrator in the Earl of Leicester's 1585 expeditionary force to the Netherlands. Yet these civic and military commitments did not represent an abandonment of mathematics by Digges: in the early 1590s he was still advocating the study of ballistics and artillery as a high mathematical art with immediate relevance to the nation's security.²²

Was this a turn away from the example of Dee? Certainly, Dee did not actively pursue the particular forms of military and technical service in which Digges distinguished himself. But there are nevertheless significant resonances between the new values of mathematical practice espoused by Digges and those of his erstwhile mentor. Digges's efforts to articulate an identity more as mathematical practitioner than *mathematicus* direct us towards the civic turn in Dee's own career. Rather than

a shift away from Dee, Digges's later work can be interpreted as a move in the same direction, for the 1570s were the crucial decade for Dee's promotion of the civic values of mathematics.

During this decade, Dee's published claims for the value of mathematics were expanded to embrace a new rhetoric beyond that of its philosophical significance and demonstrative certainty. In both the *Mathematicall Praeface* (1570) and the *General and Rare Memorials* (1577) Dee presented himself in vernacular form as a benefactor of the commonwealth through the medium of useful mathematics.

Dee's two main publications before 1570 were the *Propaedeumata Aphoristica* (1558 and 1568) and the *Monas Hieroglyphica* (1564); both were Latin texts dealing with relatively recondite topics and expressed in often obscure aphoristic form. Dee had of course been involved in a range of practical activities prior to the 1570s, his navigational consultations of the 1550s being perhaps the most prominent instance. But these were private transactions and it was only in the 1570s that Dee articulated such activity in a self-conscious effort to shape his public image. Much of this self-fashioning was conducted through his personal apologetics, where Dee sought to defend himself firstly from the charge of conjuring and latterly from the accusation that he was unwilling to share the results of his labours with his countrymen.²³

Though his name was removed from subsequent editions, the branding of Dee as a conjuror in Foxe's *Book of Martyrs* permanently marked him as a suspect figure.²⁴ Moreover, his protestations of legitimacy and innocence are not merely symptoms of over-sensitivity or paranoia; it is possible to identify a surprising number of individuals whom Dee considered had slandered or falsely accused him.²⁵ Dee had a well-rehearsed defence against such adversaries for, prior to his own 'Digression Apologeticall' in the *Mathematicall Praeface*, he had composed an *apologia* for Roger Bacon in the 1550s, in which he defended Bacon from the vulgar sort who believed that he had acted with the help of demons.²⁶ Dee himself sought to shake off the charge of conjuror by asserting that he proceeded only by natural and lawful means. The lengthy recitation of the mathematical arts which occupies so much of the *Mathematicall Praeface* bolsters this claim by displaying the wide-ranging powers and effectiveness of mathematics. Yet though the manifold benefits of practical mathematics served the commonwealth, Dee's role was to furnish the 'groundplat' for the work of others rather than to personally devote himself to that end. Rather than duty to the commonwealth, Dee assigned himself prime responsibility to God and the attainment of divine wisdom. His self-defence in 1570 therefore declared his Christian piety and ardent desire for truth as a means of rebutting the slanders that had impugned his good name.²⁷

By the time Dee published the *General and Rare Memorials* in 1577 a second charge also required his urgent attention, namely that he had deliberately withheld material from his countrymen. Dee had genuine work to do here to clear his reputation. Although he had listed the names of various of his works in the *Propaedeumata Aphoristica*, twenty years later none of these had yet been published.²⁸ Moreover, Dee had openly doubted the wisdom of spreading his ideas too widely. The second edition of the *Propaedeumata Aphoristica* cautioned the reader

against letting the work fall into the wrong hands: “you must not reveal [it] openly to unworthy and profane persons [...] lest, to your shame and mine, it should be turned to great harm”. Dee expressed similarly wary sentiments in his letter to the printer Sylvius at the beginning of the *Monas Hieroglyphica*.²⁹

Dee’s supposed reticence was not just the object of anonymous carping but of specific accusations and incitements. In the *General and Rare Memorials* Dee cited the case of an unnamed scholar who had apparently agitated for Dee’s banishment on the grounds that “to no Man of this Realm, he did at any tyme, or yet doth, or will, communicate any part, of his learned Talent, by word or writing: But is wholly addicted, to his priuate commodity only avancing, by his own Studies and practises very secret”.³⁰ Although he had subsequently secured a recantation from his accuser, Dee used the opportunity of publication to proclaim his status as a dutiful citizen.

Dee now made it clear that he served more than only a divine calling to knowledge, when he referred to his “faythfull enterprises: vndertaken chiefly, for the Advancement of the wonderfull Veritie Philosophicall: And also, for the State Publik of this Brytish Monarchie, to become flourishing, in Honor, Wealth, and Strength”.³¹ Indeed, if it were not for the parenthetical restriction of his comments to worldly matters, Dee would seem to be claiming that all endeavours should be subordinate to the needs of the commonwealth: “All true Subjects, their Chief Intent, and principall purpose, (in all their worldly affayres, Artes, Sciences, and Studyes, &c.) ought to be, the procuring, furthering, mainteyning and encreasing of the weal and Commodity Publik, so much as in them lyeth, and as, they decently and dutifully may”.³² This theme was elaborated and reiterated, as Dee sought to reinterpret all of his prior labours under the heading of public service. Dee considered that he should “receyve great publick thanks, comfort, and ayde of the whole Brytish state, to the honour, welfare, and preservation wherof (next unto his duty doing unto God) he hath directed all the course of his manifold studies, great travailes, and incredible costs”.³³ Whatever the plausibility of this highly charged retrospective verdict, Dee’s memorandum on the navy and his proposed volumes on navigation were meant as further proof of his earnest service.³⁴

Dee’s civic turn may have been motivated by highly personal circumstances, but the resulting texts expressed not merely a personal *apologia* but a general programme for the development of the mathematical arts. Moreover, Dee’s commitment to active service was not restricted to the realm of print. It was during the later 1570s and early 1580s that Dee achieved his greatest influence and standing in and around the court.³⁵ He was frequently consulted for advice on political, geographical and historical matters and, whether supplying navigational instruction or mustering historical and cartographic sources to support Elizabeth’s legal claims to foreign territories, Dee presented himself as a faithful servant of the commonwealth.

There is therefore a strong parallel between the mathematical careers and shifting identities of Dee and Digges through the 1570s and into the early 1580s. Yet their paths were to diverge: while Digges fulfilled military and civil duties within the Elizabethan state and journeyed to the Netherlands as part of a military intervention

in support of Protestantism, Dee secured access to the spiritual realm through the agency of Edward Kelley, leaving England in 1583 with Albert Laski. Dee's departure has often been interpreted as the beginning of a sad decline, a retreat into mysticism and delusion. Yet there can be little doubt that Dee himself believed that through these spiritual conferences he was able to achieve the most potent and universal forms of action and intelligence. The angelic conversations, with their political and irenic dimensions, were surely for Dee not only a culmination and transformation of his philosophical concerns, but a prolongation and deepening of the civic and worldly activism which he had developed in the 1570s. However, Dee's horizons expanded beyond those of service only to the British commonwealth. For Dee, the existence of spirits was not only literally interpreted and routinely granted, but access to spiritual intelligences was philosophically justified within a metaphysics linking human nature and the supercelestial realm. His conversations with angels were a means to achieve closer contact with the God who provided the basis and authority for all mortals, including temporal rulers.³⁶

Yet however we might interpret the angelic conversations – and it is striking that Dee refers to them not just as dialogues but as actions – Digges provides a contemporary vantage point from which Dee's distinctive choices are thrown into relief. While mathematics allows us to identify the substantial areas of common ground between Dee and Digges, I suggest that it can also provide a window onto the differences that are most vividly highlighted by their divergent paths in the mid-1580s. The case of astronomy illustrates the points where their conceptions of the proper terrain and status of mathematics conflicted rather than converged.

Mathematical astronomers of the sixteenth century adopted a variety of strategies to minimise and defuse potential conflict with natural philosophers. While the hybrid Ptolemaic-Aristotelian scheme of the medieval tradition of *Theorica planetarum* remained current, mathematical astronomers increasingly resorted to what Nicholas Jardine has termed the “pragmatic compromise”. This compromise gave the mathematician the liberty to use whatever mathematical means were deemed necessary to “save the phenomena”, in the classic phrase, while questions of the physical reality and character of the heavens fell under the gaze of the philosopher.³⁷ Dee presents an interesting case for the operation of these interrelations because he had both mathematical *and* philosophical ambitions. Yet he did distinguish between mathematical astronomy and a more philosophically based account of the cosmos, and he placed them on distinct epistemic levels. In the *Mathematicall Praeface*, Dee first charged astronomy with determining the sizes and distances of the earth, sun, moon, and fixed stars. As is clear from the *Propaedeumata Aphoristica* this information was of primary use in Dee's vision of a reformed astrology based on perspective.³⁸ However, Dee used biblical authority to determine the principal remit of the astronomical art: God “made the Sonne, Mone, and Sterres, to be to us, for Signes, and knowledge of Seasons, and for Distinctions of Dayes, and yeares”.³⁹ Although Dee enigmatically asks his readers to weigh the significance of the word “signs”, it is clear that a principal duty of the astronomer is to the calendar; he continues by saying that only through diligent observation and calculation of the celestial motions can there be

the distinct Course of Times, dayes, yeares, and Ages: as well for Consideration of Sacred Prophetesies, accomplished in due time, foretold: as for high Mystically Solemnities holding: And for all other humane affaires, Conditions, and covenantes, upon certaine time, betweene man and man: with many other great uses.⁴⁰

Thus, although the title *John Dee on Astronomy* has been given to the modern edition and translation of the *Propaedeumata Aphoristica*, Dee's major work on astronomy is actually his treatise on calendar reform of 1583 rather than his optically-based theory of astrological influence.

That the mathematical sciences could contribute to natural philosophy is evident from the *Propaedeumata Aphoristica*. But, for Dee, the mathematical astronomer did not have the sole or even primary authority to pronounce philosophically on the heavens. Dee's cosmology was based on much more than just mathematical astronomy. Astrology and, indeed, alchemy were equally at stake in questions concerning the cosmos. Alchemy as "inferior astronomy" presupposed not just an identification of the metals with the planets, but also the conventional order of the planets. Moreover, as Clulee has made particularly clear, in the *Monas Hieroglyphica* Dee went well beyond such standard doctrines and correspondences, not only integrating astronomy with disciplines such as alchemy but subsuming it within a wider programme which sought deeper and more primordial truths about the world and its God-given structure.⁴¹ When juxtaposed with his programme of hieroglyphic writing and "real cabala", the specifically *mathematical* art of astronomy was for Dee a limited and partial enterprise in its determination of celestial dimensions, positions and motions.

The significance of Dee's conception of the limited status of mathematical astronomy can be highlighted by contrast with Digges's vision, and is particularly evident in their respective responses to Copernicus. Both Dee and Digges were fulsome in their praise for his work, but Dee lauded Copernicus as a restorer of mathematical astronomy without discussing the physical reality of the heliocentric hypothesis, whereas Digges adopted the Copernican theory of the planetary order on mathematical grounds.

The topic of Dee and Copernicanism has been repeatedly examined, since it has provided a test case for those who wish to argue either that Dee was one of those working towards modern science or, conversely, that his mystical interests precluded any significant affiliation with progressive developments. The majority of recent studies have denied Dee's belief in the heliocentric theory and used this conclusion to undermine the Yates thesis that Hermeticism contributed to the adoption of Copernicus's world-system.⁴² Here I want to move beyond the terms of this debate – sufficiently discussed by now – and to look instead at what Dee's astronomical work tells us about the identity of the mathematician and the relation of mathematics to philosophy and other areas of learning.

Dee saw Copernicus as the most recent in a long line of major mathematical astronomers, restoring a science whose predictions and parameters were manifestly inaccurate. Copernicus's work was valuable because it provided the basis for new and improved tables which better predicted celestial motions. Dee was unstinting in

his praise of Copernicus in this role. In his preface to John Feild's ephemeris of 1556 Dee referred to Copernicus's dazzling brilliance, his divine studies and his Herculean labours in restoring the celestial discipline.⁴³ Likewise, Copernicus figures prominently in Dee's treatise on calendar reform, where Dee places him as the most recent and notable astronomer in his historical review aimed at establishing values for the most slowly changing of astronomical parameters.⁴⁴ Both these texts fall within the domain of mathematical astronomy and Dee makes it clear that this terrain is not the appropriate one on which to consider the reality of Copernicus's proposals. In the preface to Feild's tables, Dee comments simply that "this is not now the place to discuss [Copernicus's] hypotheses". The calendar proposal refers to the "newe paradoxall Hypotheses" of Copernicus and Dee says that his account depends "chiefly upon the said Copernicus his Calculation, and Phaenomenies: excepting his Hypotheses Theoricall; not here to be brought in question".⁴⁵

It is not clear to what place Dee thought a consideration of Copernicus's physical and philosophical claims could be deferred. In the *Monas Hieroglyphica*, Dee did discuss celestial order beyond the delimited domain of mathematical astronomy, but there he sought to transcend the detailed concerns of astronomy. In that text, rather than observation as the prime means of determining the underlying arrangement of the heavens, Dee was tempted by the prospect of deriving superior truth from his reconstitution of primordial symbols:

Will not the astronomer be very sorry for the cold he suffered under the open sky, for [all his] vigils and labours, when here, with no discomfort to be suffered from the air, he may most exactly observe with his eyes the orbits of the heavenly bodies under [his own] roof, with windows and doors shut on all sides, at any given time, and without any mechanical instruments made of wood or brass?⁴⁶

Yet Dee did not despise astronomical observation, or believe that it was entirely redundant. He had carried out programmes of observation with large-scale instruments in the mid-1550s and also at the time of the new star.⁴⁷ But precise observation delivered accurate parameters rather than establishing principles; cosmological principles were for Dee rooted in a wider disciplinary constellation than mathematics alone.

Digges on the other hand adopted and advocated the Copernican world system as the best representation of the actual order of the planets. In his *Alae* of 1573 he already expressed a preference for Copernicus, repeatedly echoing Copernicus's condemnation of the "monstrous", botched arrangement of the Ptolemaic spheres.⁴⁸ However, he withheld an absolute acceptance that Copernicus had restored the perfect anatomy of the heavens, wondering whether some adjustments were still required and whether the new star might indeed provide evidence that would prove Copernicus's case. Digges returned to the issue of Copernicanism in his *Perfit Description of the Caelestiall Orbes*, appended to the 1576 edition of his father's popular almanac, the *Prognostication Everlasting*. The *Perfit Description* provided an augmented translation of the major chapters in the first book of Copernicus's *De revolutionibus* and was preceded by Digges's much-reproduced image of the cosmos in which the stars extend infinitely outwards from the solar-centred planetary system. Although his earlier hopes for the new star as a cosmological arbiter had

remained unfulfilled, he now nevertheless expressed his views more emphatically in favour of the heliocentric doctrine.

Digges's advocacy of Copernicanism rested on an extraordinary elevation of the power of mathematics. Not only were mathematical techniques of investigation and argument to be accounted the best available for the domain of astronomy, but mathematics was to be considered as a means to arrive at the truth rather than just a tool to save the phenomena. Mathematics could demonstratively restore the perfect order of the celestial spheres without deferring to philosophy, traditionally placed above it in disciplinary hierarchies. Digges considered that, in contrast to the demonstrative certainty of mathematics, philosophy could offer only plausible or probable arguments.⁴⁹ This relative evaluation of mathematics and philosophy helps to explain the structure and sequence of the *Perfit Description*. Digges inverted the order of presentation which Copernicus had adopted for *De revolutionibus* and began his adapted translation with Book I, chapter 10: "On the order of the celestial spheres". Here Copernicus had presented his new arrangement of the planets and given a mathematical justification for his scheme. Only after reading this principal (and, for Digges, self-sufficient) argument was the reader then taken back to *De revolutionibus* I, 7-9 where Copernicus had stated and then disputed the standard philosophical reasons against the motion of the earth. Digges made his expository strategy quite clear:

because the world hath so long a time been carried with an opinion of the earth's stability, as the contrary cannot now be very impersuasible, I have thought good out of Copernicus also to give a taste of the reasons philosophical alleged for the earth's stability, and their solutions, [so] that such as are not able with geometrical eyes to behold the secret perfection of Copernicus's Theoric may yet by these familiar, natural reasons be induced to search further, and not rashly to condemn for fantastical so ancient doctrine revived and by Copernicus so demonstratively approved.⁵⁰

The realm of philosophy is only for those who lack "geometrical eyes" and remain stuck with probable argument and the deceptive evidence of the senses.⁵¹ Digges's conception of a geometrical vision sufficient in itself to overturn traditional geocentric doctrines endowed mathematical astronomy with independent authority and freed it from subjection or subordination to philosophy or, indeed, any other discipline. Dee had opted for a differently instructed vision to uncover celestial truth:

Raising toward heaven our cabbalistic eyes (that have been illuminated by speculation on these mysteries) we shall behold an anatomy precisely corresponding to that of our monad, which, in the light of Nature and life, will at all time reveal to us as is here shown, and will, by its pleasures, quite openly discover the most secret mysteries of this analysis of the physical world.⁵²

The contrast between Dee's "cabbalistic" and Digges's geometric eyes neatly encapsulates their differing visions of the scope and competence of mathematics. However, the contrast should not be overdrawn. Digges's geometric enterprise could scarcely be self-founding: inevitably it drew on moral resources and intellectual assumptions from beyond the strict realm of geometrical demonstration. Digges took as axiomatic the simplicity and order of the heavens, and accepted a fundamental opposition between the celestial and sublunary realms.⁵³ In both *Alae seu scalae mathematicae* and the *Perfit Description* he contrasted the perfection and regularity

of the heavens with the terrestrial world of generation and corruption. Above, there is the immutable empire of uniform, eternal, and pure substance, equated with the sacred temple for the Calvinist elect, while below, mortal sinners live out their days on the dark star of the earth. The celestial spheres attract the mind upwards away from the dregs of the body and their resplendent beauty entices noble reason with the prospect of joy and felicity, removed from all worldly troubles. All that is blessed finds its true home above, while mutability and decay are the destiny of the profane beings who dwell here below. Celestial order, simplicity, and harmony are opposed to sublunary irregularity and the uncertain, base, and brutish cares of humanity.⁵⁴ Digges's geometrical vision was thus grounded in a rich stratum of metaphor, moral evaluation and religious commitment. But he did not seek to provide a firm disciplinary foundation for his mathematical astronomy through a systematic philosophical or theological justification of these assumptions.

Dee on the contrary did attempt to elaborate a comprehensive philosophical position, within which mathematics could be situated. In the *Mathematicall Praeface*, he presented mathematics as just one division of a tripartite ontology and epistemology. Dee drew particularly on Proclus to present mathematical objects as an intermediate level of being between matter and spirit, the human and divine, sense and pure intellect.⁵⁵ For Dee, mathematics was thus always placed in explicit relation with other learned disciplines, as part of a larger hierarchy of knowledge. While distinguishing different realms of being and understanding, Dee did not see each as being sealed off from the others. He sought to connect and integrate disciplines in order to straddle the boundaries between natural, mathematical and esoteric knowledge. His objectives in mathematics were not inwardly self-referential, but were continuous with his other intellectual ambitions. By emphasising the practical, philosophical and spiritual virtues of various mathematical arts, Dee could move from the mathematics of the calendar or of navigation through to considerations of supercelestial intelligences without a break, as part of the same enterprise.

Hence while Dee placed each limited mathematical art within the broad horizons of Renaissance scholarship, Digges restricted the mathematical arts to a narrower intellectual terrain. Dee moved freely within a self-assigned sphere of learning which incorporated mathematics, magic and natural philosophy. Digges did not accept the values underlying this continuum but elevated mathematics above other disciplines. Digges expressed this sense of segregation from the beginning of his career. He wished that nothing be allowed to sully the purity of his *Mathematicall Discourse* of 1571. Not just vulgar concerns with utility and profit were excluded by this prescription. Digges would not even allow any philosophical "pollution" of the certain and separate domain of mathematics. In the preface to his treatise Digges noted that he would not "discourse of [the regular solids'] secret or mystical appliances to the elemental regions and frame of the celestial spheres, as things remote and far distant from the method, nature and certainty of geometrical demonstration".⁵⁶ The most obvious object of this implied reproach was the Platonic theory of the elements, as expounded in *Timaeus*. But Digges may have had a much more contemporary target in mind: the astrological *De divina astrorum facultate* (1570) of Dee's former associate Offusius, in which the regular solids were used to

determine cosmic and elemental proportions.⁵⁷ Evidently Digges had no wish to meddle with uncertain areas of natural or astrological philosophy. Yet whoever Digges meant to censure, his comments serve chiefly to highlight his contrasting image of geometry and his distinct identity as a mathematician.

Digges's deliberately limited conception of the legitimate terrain of the mathematician did not of course sever his ambitions entirely from the realm of philosophy. The case of Copernicanism shows that mathematics could, when secure on its own territory, challenge established philosophical conclusions. Dee however had a more expansive and positive conception of philosophy, and frequently identified himself as a philosopher rather than a mathematician. Mathematics was central to his programme but achieved much of its significance when brought to bear on philosophical issues: mathematically-informed natural philosophy provided insight into God's creation while metaphysics carried the philosopher into supercelestial realms, offering ascent towards the divine.

Much of the contrast between the identities of Dee and Digges as mathematicians therefore turns on their respective conceptions of philosophy. Whatever they shared in mathematics, Dee and Digges evidently had quite a different exposure to philosophy. From his time at Trinity College, it is clear that Dee was steeped in philosophical literature, and particularly in the familiar and conventional terrain of Aristotelian natural philosophy. Nicholas Clulee has indeed interpreted the *Propaedeutumata Aphoristica* as the outcome of an early naturalistic and Aristotelian phase of Dee's intellectual career.⁵⁸ The product of a mainstream academic education, Dee could almost take familiarity with Aristotelian natural philosophy for granted.

Digges's intellectual upbringing was quite different. There is no evidence that he attended university and the only references to his education are to the mathematical instruction of his father and Dee. It may be that Digges saw so little through philosophical eyes because he had received no systematic grounding in academic philosophy. Digges's distinctively different evaluation of philosophy certainly suggests that Dee's instruction of the youthful Digges was largely limited to mathematical matters. Trained up in mathematics, it was therefore on mathematics that Digges rested his criteria of intelligibility and evidence.

I began this account of Dee and Digges with their texts prompted by the new star of 1572. Their conclusions on the star exemplify both the common elements in their mathematical work, and also the extent to which their visions of mathematics diverged. The published works provided demonstrative treatments of parallax as a means of establishing the distance and thus location of the new phenomenon. The texts were issued as soon as possible in order to encourage other European astronomers to make the necessary measurements. Digges's volume also dealt extensively with observational practice, discussing the correction of instrumental errors and the judicious choice of computational procedures.⁵⁹

The two texts were published before either Dee or Digges had arrived at definitive verdicts on the nature of the new star, though Digges was clearest in identifying it as a genuinely celestial phenomenon and recording its position in the

constellation of Cassiopeia. The similarities between their investigative strategies and chosen expository forms also appear to have been matched by the conclusions they reached after the star had finally disappeared from view. Although neither published their final judgements, Dee's conclusion that the star had been let down and then withdrawn is evident from the title of his lost work on the star: *De stella admiranda in Cassiopeiae Asterismo, coelitus demissa ad orbem usque Veneris, iterumque in coeli penetralia perpendiculariter retracta lib. 3*.⁶⁰ That this conclusion was shared by Digges is suggested by the evidence of the antiquary William Camden, who recorded in his *Annales* that both Dee and Digges believed the star to have gradually faded as it disappeared further from the earth.⁶¹

Yet despite the extent of their agreement, Dee and Digges made quite different uses of the new star. As we have seen, for Digges it was a first occasion for Copernican reflections as well as potential evidence for the superiority of the heliocentric world-system. Dee likewise considered the star to be of great significance but, with his quite different conception of the purpose and scope of mathematical astronomy, he interpreted it not as a cosmological but as a calendrical revelation. For Dee, the new star was literally an epoch-making event: he used its appearance to mark a new year zero of the same status as the birth of Christ and the creation of the world. He dated the "Necessary Advertisement" to the *General and Rare Memorials* as "Anno, Stellae (Coelo Demissae, rectaque Reversae) Quinto: Julij vero, Die 4 et Anno Mundi 5540".⁶² Dee also interpreted the new star as a sign or portent, just as the *Mathematicall Praeface* had hinted. In his copy of Manilius's *Astronomica* he noted:

I did coniecture the blasing star in Cassiopeia appering a° 1572, to signify the fynding of some great Thresor or the philosophers stone ... This I told to Mr. Ed. Dier. at the same tyme. How truly it fell out in a° 1582. Martij 10 it may appere in tyme to come ad stuporem Mundi.⁶³

For Dee, the new star was enrolled in his conception of mathematical astronomy as a calendrical and chronological art which also revealed portents; for Digges, the new star announced a celestial reformation in which mathematics triumphed as the key to heavenly truth.

My title posed the formulaic question "like father, like son?" for Dee and Digges. Despite Dee's evident importance for the content and direction of Digges's mathematical career, it is clear that he did not foster a mathematical son altogether in his own image. Digges emerged from Dee's tutelage with a vision of mathematics and its legitimate ambitions markedly different from that of his mentor. In this mathematical relationship, father and son ultimately followed different paths. Dee either did not try to instruct Digges in the more philosophical and recondite dimensions of his own work or, if he did, his teaching was ineffective. Dee had greater long-term impact, both on Digges and on other more humble contemporaries, through his prescription for the role of the mathematical practitioner set out in the *Mathematicall Praeface*. Yet Dee himself sought a more profound and prestigious identity beyond that of the mathematical practitioner and, even in the vernacular and outwardly practical *Mathematicall Praeface*, he hinted at the more potent and esoteric arts which only the adept might practise. Ironically, just as Dee was forsaking earthly avenues to wisdom in favour of spiritual access to more

“radicall truthes” in the 1580s, the prosaic part of his public programme was being successfully adapted by figures such as Digges who refashioned their identities as mathematical practitioners.⁶⁴

Digges thus helps to clarify the thorny problem of Dee’s contemporary significance and influence. The scale of that problem is perhaps most vividly illustrated by Peter French’s deeply ambivalent response to the issue. In his intellectual biography of Dee, French wrote that Dee “was decidedly out of place in sixteenth-century England”. Yet only three pages before he had decided that “Dee and the diverse contemporary attitudes towards him epitomize the English Renaissance”.⁶⁵ Rather remarkably, Dee was meant to be both awkwardly isolated and yet also representative. The uniquely privileged perspective on Dee provided by a detailed examination of his relations with Digges indicates how Dee could be both close to and distant from his contemporaries. Yet, however suggestive, an account which uses Digges as an exclusive vehicle for approaching Dee is obviously too narrowly limited to carry complete conviction. I therefore want to conclude by showing how Digges’s ultimately double-edged relationship to Dee is matched by the ironies of the latter’s reputation among more humble mathematical practitioners.

The most sensitive of recent interpretations of Dee have sought to recover his own self-understanding and intellectual practice. As a result we can better appreciate the coherence of Dee’s work and the rich interconnections between texts and plans which were often avowedly composed in haste and for highly specific occasions. Yet, given this historiographical finesse, we are apt to lose sight of the often less sophisticated readings that Dee’s contemporaries brought to bear. Certainly, the veiled projects and philosophical schemes excavated by modern scholarship were less noticeable (indeed usually invisible) to sixteenth-century vernacular authors on mathematics.

Dee’s *Mathematicall Praeface* was indeed read and admired by such mathematical contemporaries as William Bourne and Edward Worsop. But their reading of his text stripped it of its philosophical and magical ambitions. Dee instead became a useful ally and a quarry for information. Taken as authoritative in his presentation of the range of mathematical arts, Dee’s *Praeface* provided a framework within which narrower and more specific work could be carried out. Bourne, in his *Treasure for Travellers* (1578), abbreviated Dee’s discussion of the mathematical sciences while acknowledging that his own acquaintance with statics was based solely on the account given in the *Praeface*.⁶⁶ Likewise, Edward Worsop, in writing on surveying, relied on Dee as a point of reference for the character of mathematics, making extensive use of his discussion of astrology and astronomy. Worsop indeed called for the *Mathematicall Praeface* to be printed as a manual, assimilating Dee to the world of cheap print rather than the abstruse realm of occult doctrine. Neither Bourne nor Worsop mentioned Dee’s other (Latin) publications.⁶⁷

If mathematical practitioners such as Bourne and Worsop failed to fathom the depth of Dee’s studies, they nevertheless demonstrate Dee’s importance for the development of practical mathematics. Whereas Dee sought for himself an elevated role as a philosopher – in one instance, even, as a Christian Aristotle – he was a key

figure in establishing the identity of the mathematical practitioner and in promoting mathematics as worldly, instrumental, practical, vernacular and public.⁶⁸

Dee cannot of course be assigned exclusive paternity for the creation and growth of the tradition of mathematical practice in England. Yet he was clearly not averse to casting himself in a paternal role; whether he would have extended it beyond the specific case of Digges is however uncertain. But what of Dee's own parentage? If every father was once a child, how did Dee portray himself as offspring rather than as parent, and what did he make of his own intellectual genealogy?

As Sherman has stressed, Dee was passionately concerned to establish and display his genealogy.⁶⁹ Among the remarkable features of these endeavours were his attempts to link himself with Arthur and the early Welsh kings and to connect his lineage with that of Elizabeth. Yet perhaps the most extraordinary element in his genealogy was Dee's effort to forge a connection with Roger Bacon. Dee may have recognised many intellectual authorities but, as Clulee has persuasively argued, Bacon was the figure to whom Dee evidently felt closest.⁷⁰ Bacon provided Dee with a role model who advocated the centrality of mathematics within a broadly-based philosophical programme. Dee's composition of an *apologia* for Bacon in 1557 gives a hint of his sense of personal identification. But Dee set out not only to style himself on the intellectual example of Bacon but to actively construct a descent through which he could count Bacon as a blood relation. A substantial section of Dee's calendar proposal is devoted to proclaiming the merits of Bacon's own work on the topic and Dee wrote that no-one had made a better diagnosis and case for reform than this other British subject, "named (as some thincke) David Dee of Radik: But otherwise, and most commonly, (upon his name altered, at the alteration of his state, into the Fryerly profession) called Roger Bachon".⁷¹ Not content to magnify the achievement of his thirteenth-century predecessor, Dee was suggesting that he and Bacon actually belonged to the same family, for David Dee features in Dee's own genealogical constructions.⁷² Whatever the ultimate rationale for this identification it powerfully demonstrates Dee's sense of pedigree and suggests how much was at stake in his acceptance of Digges as his mathematical heir.

NOTES

¹ *Parallatice*, sig. A2^v and *Alae*, sig. A2^r. Digges repeats the sentiment in his preface to Dee's *Parallatice* at sig. A2^r.

² For example, Peter J. French, *John Dee: the World of an Elizabethan Magus* (London: Routledge and Kegan Paul, 1972), 98-9.

³ Digges comments on his mathematical education and associations in *Alae*, sigs. A2^r, B3^r and in *An Arithmeticall Militaire Treatise, named Stratoticos* (London, 1579), 190. On Leonard Digges, see Joy B. Easton, "Leonard Digges", in Charles Coulston Gillispie, ed., *Dictionary of Scientific Biography*, 16 vols. (New York: Charles Scribner's, 1970-80), IV, 97.

⁴ *R&W*, 43 and 82, n.68.

⁵ Francis R. Johnson made the first serious study of Digges's Copernican text and the bulk of his careful account still stands; see Francis R. Johnson and Sanford V. Larkey, "Thomas Digges, the Copernican system, and the idea of the infinity of the universe in 1576", *Huntington Library Bulletin*, 5 (1934): 69-117 and Francis R. Johnson, *Astronomical Thought in Renaissance England: a Study of the English Scientific Writings from 1500 to 1645* (Baltimore: Johns Hopkins University Press, 1937), esp. chapters 5 and 6. For another classic

but skewed interpretation see Alexandre Koyré, *From the Closed World to the Infinite Universe* (Baltimore: Johns Hopkins University Press, 1957), 34-9. For a more recent example of Digges's place within the story of astronomy, see René Taton and Curtis Wilson, eds., *General History of Astronomy, Vol. 2: Planetary Astronomy from the Renaissance to the Rise of Astrophysics, Part A: Tycho Brahe to Newton* (Cambridge: Cambridge University Press, 1989), 22-3. For an example of Digges's place in an account of the Scientific Revolution see Alfred Rupert Hall, *The Scientific Revolution* (London: Longmans, Green & Co., 1954), 104.

⁶ David Watkin Waters, *The Art of Navigation in Elizabethan and Early Stuart Times* (London: Hollos & Carter, 1958); Alfred Rupert Hall, *Ballistics in the Seventeenth Century* (Cambridge: Cambridge University Press, 1952); Allie Wilson Richeson, *English Land Measuring to 1800: Instruments and Practices* (Cambridge, Mass.: M.I.T. Press, 1966); John Summerson in Howard M. Colvin, ed., *History of the King's Works*, 6 vols (London: H.M.S.O., 1963-82), IV, 755-764; Henry Jameson Webb, *Elizabethan Military Science: the Books and the Practice* (Madison: University of Wisconsin Press, 1965). For the political career, see his entry in vol. 2 of P.W. Hasler, ed., *The House of Commons 1558-1603*, 3 vols (London: H.M.S.O. for the History of Parliament Trust, 1981) and, for more recent work, Michael Graves, "Managing Elizabethan Parliaments" in David M. Dean and Norman Leslie Jones, eds., *The Parliaments of Elizabethan England* (Oxford: Basil Blackwell, 1990): 37-63 and Patrick Collinson, "Puritans, Men of Business and Elizabethan Parliaments," *Parliamentary History*, 7 (1988): 187-211.

⁷ Leonard and Thomas Digges, *A Geometrical Practise, named Pantometria* (London, 1571), sig. Aa1^r.

⁸ Dee's additions to the Euclidean text appear in books X-XIII. For the character and content of these additions, see John Heilbron's introduction to his edition of the *Propaedeumata aphoristica* (PA, 22-27).

⁹ British Library, Cotton MS Vitellius C.VII, fols. 270^r-273^r, 278^v-279^f.

¹⁰ Note especially the mechanical methods presented in the *Mathematicall Praeface* in the section on "Statike" (MP, sigs. cj^r-cij^v), as well as the general rationale for his additions to Euclid at fol. 371^{r-v} of the 1570 edition. Corpus Christi College, Oxford, MS 254, fol.188^r preserves another mechanico-mathematical "Inventum Johannis Dee".

¹¹ Marshall Clagett, *Archimedes in the Middle Ages*, 5 vols (Madison: University of Wisconsin Press and Philadelphia: American Philosophical Society, 1964-84), V, part 4, appendix 2, 493.

¹² Dee's lost *Tyrocinium Mathematicum* was largely concerned with the theory of irrational magnitudes: see MP, fol. 268^v. There are some surviving fragmentary notes on the topic in British Library, Cotton MS Vitellius C.VII, fol. 274 onwards. The terminology of irrational majors, binomials and apotomes of various orders recurs throughout Digges's *Mathematicall Discourse*.

¹³ Preface to Digges, *Mathematicall Discourse* in *A Geometrical Practise*, sig. S4^v.

¹⁴ For Digges's inherited land, see the list of his father's lands in *Calendar of the Patent Rolls, Philip and Mary, Vol. 2, 1554-1555* (London, 1936), 270 and also note the wealth indicated by his will, PRO PROB11/86, fols.164^r-166^v.

¹⁵ NP, 27, 29-32 provides a convenient resume of the material of this paragraph. For Dee and Pembroke, see the fuller discussion in R&W, 3-4. The titles of the texts for the Duchess of Northumberland appear in Dee's *Letter Containing a most briefe Discourse Apologeticall* in James Crossley, ed., *Autobiographical Tracts of Dr. John Dee*, Chetham Society, 24 (1851), 75. Note that Dee may not have provided exclusively mathematical service at this time; Roberts and Watson note that Dee seems to have served as chaplain in Bishop Bonner's household.

¹⁶ MP, sigs. *iiij^v-aj^r.

¹⁷ Public Record Office, SP12/90/12, letter of Thomas Digges to Lord Burghley, 11 December 1572.

¹⁸ British Library, Lansdowne MS 19/30, printed in James Orchard Halliwell, ed., *A Collection of Letters Illustrative of the Progress of Science in England* (London, 1841), 6-7. The precise form of Burghley's "frame" is not known. It is mentioned by Jacob Rathgeb, who recorded the 1592 visit to England by Frederick, Duke of Wurttemberg: Jacob Rathgeb, *Kurtze und Warhafft Beschreibung der Badenfahrt* (Tübingen, 1602), fols. 32^v-33^r, translated in William Brenchley Rye, *England as seen by Foreigners in the Days of Elizabeth and James the First* (London, 1865), 44. For Theobalds, John Summerson, "The building of Theobalds, 1564-1585", *Archaeologia*, 97 (1959): 107-26.

¹⁹ Bodleian Library, Ashmole MS 1478, fols.1-60. Digges did not retain the manuscript, which was acquired by Simon Forman in 1594. In addition to inserting alchemical material, Digges repeatedly signed his name and added a 'questio geographica', some algebraic workings, and a list of books which are almost exclusively mathematical.

²⁰ Digges, *A Geometrical Practise*, sig. A4^r.

²¹ Digges, *An Arithmeticall Militare Treatise*, sigs. A3^r, A2^r.

²² For a fuller account of Digges's changing priorities and his later activities, see Stephen Johnston, "Making Mathematical Practice: Gentlemen, Practitioners and Artisans in Elizabethan England" (Unpublished PhD thesis, Cambridge, 1994), chapter 2.

²³ William H. Sherman, *John Dee: the Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995), 10-12, 22-3 has recently emphasized the importance of Dee's personal apologetics for an interpretation of his role.

²⁴ *NP*, 35.

²⁵ See David Gwyn, "John Dee's *Arte of Navigation*", *The Book Collector*, 34 (1985): 309-322, 312, 314-5 and *NP*, 193-4.

²⁶ For the full title of the "Speculum unitatis: sive Apologia pro Fratre Rogero Bachone Anglo", see Dee's dedicatory letter to Mercator in *PA*, 116-7.

²⁷ *MP*, especially sigs. A^j and A^{ij}^{v-v}.

²⁸ *PA*, 116-7. Both editions listed 11 unpublished works, though Dee revised the list to include some different texts in the second edition. None of the works was ever published.

²⁹ *PA*, 120-1; *MH*, 150-3.

³⁰ John Dee, *General and Rare Memorials pertayning to the Perfect Arte of Navigation* (London, 1577), sig. e^{ij}.

³¹ *General and Rare Memorials*, sig. A^{iiij}.

³² *General and Rare Memorials*, 11.

³³ *General and Rare Memorials*, sig. e^{*ij}^v; see also sig. e^{*j}^r and 65.

³⁴ *R&W*, 10 seem too charitable in accepting that, from early in his career, Dee believed mathematics and navigation should "be made known as widely as possible for the good of the state". As an explicit theme this seems to belong only to the 1570s.

³⁵ Sherman, 4, 150, 152, 173-5.

³⁶ Christopher. L. Whitby, "John Dee and Renaissance scrying", *Bulletin of the Society for Renaissance Studies*, 3:2 (1985): 25-36 and *NP*, Ch.8, esp. 220 onwards.

³⁷ Nicholas Jardine, *The Birth of the History and Philosophy of Science: Kepler's 'A Defence of Tycho against Ursus' with essays on its provenance and significance* (Cambridge: Cambridge University Press, 1984), esp. Ch. 7.

³⁸ For Dee's astrology, see *NP*, Chapter 3. See also Richard Dunn's chapter in this volume.

³⁹ *MP*, sig. b^{ij}^v. The reference is to Genesis I, 14.

⁴⁰ *MP*, sig. b^{ij}^v.

⁴¹ *NP*, Chapter 4.

⁴² In addition to Clulee's *John Dee's Natural Philosophy*, and Heilbron's introduction to the *Propaedeutica aphoristica* (*PA*, 34-49), see Robert S. Westman, "Magical reform and astronomical reform: the Yates thesis reconsidered" in Robert S. Westman and James Edward McGuire, *Hermeticism and the Scientific Revolution* (Los Angeles: William Andrews Clark Memorial Library, 1977) and J. Peter Zetterberg, "Hermetic geocentricity: John Dee's celestial egg", *Isis*, 70 (1979): 385-93.

⁴³ John Feild, *Ephemeris anni 1557 currentis iuxta Copernici et Rheinholdi canones* (London, 1556), sig. Aⁱ.

⁴⁴ Bodleian Library, Ashmole MS 1789; see, for example, fol.6^v for "Nicolaus Copernicus, the sixth, and most notable lyne of our Astronomical Dyall".

⁴⁵ Bodleian Library, Ashmole MS 1789, fols.6^v, 31^r, and note also fol.8^r: "Copernicus imagineth the Theoricall cause hereof [...] whereof, here, is no place to reason".

⁴⁶ *MH*, 130-1.

⁴⁷ For the work of the 1550s, see the *Compendious Rehearsall* in Crossley, 28 and Bodleian Library, Ashmole MS 1789, fol.10^r; Digges reports on Dee's observations of the new star in *Alae*, sig. B3^r.

⁴⁸ *Alae*, sigs. A4^v, 2A3^r, 2A4^v, L2^v.

⁴⁹ Cf. Digges, *An Arithmeticall Militare Treatise* sig. a1^r. This high evaluation of the status of mathematics, particularly in relation to astronomy, has ancient precedent in the opening section of Ptolemy's *Almagest*.

⁵⁰ Thomas Digges, *Perfit Description* in Leonard Digges, *Prognostication Everlasting* (London, 1576), sig. N4^r; also sig. N2^r for the persuasiveness of Copernicus to "any reasonable man that hath his understanding ripened with Mathematicall demonstration".

⁵¹ While Digges frequently vaunted (mathematical) reason at the expense of the senses (for example, in the *Perfit Description*, sig. M1^{r-v}), in *Alae*, sig. H.4^r he nevertheless acknowledged that the proper practice of astronomy depended on two complementary components: disciplined sensible experience as well as mathematical demonstration.

⁵² *MH*, 174-7.

⁵³ In *Alae*, sigs. A3^v, B1^v, Digges referred to extra-geometrical starting points as physical foundations. In stressing Digges's conviction of the radical divide between the terrestrial and celestial, I differ from Johnson and Larkey's interpretation ("Thomas Digges", 101-2). Wishing to present Digges as an exemplary anti-Aristotelian, they attempted to explain away his use of the distinction, seeing it as no more than a sop to his readers. This is to misconceive an essential element of Digges's intellectual order.

⁵⁴ I have run together the characterisation in this paragraph from various passages in *Alae* and Digges, *Perfit Description*. *Alae*, sig. A1^v (the beautiful order of the heavenly bodies), sig. A2^r (the unchanging pure aether), sig. A3^v (no substantial change in the heavens), and sig. L2^v (our troubled life on this dark and obscure terrestrial star). *Perfit Description*: the diagram and its captions (the earth as the globe of mortality compared to the perfect joy of the habitacle for the elect), sig. M2^r (quotations from Palingenius's *Zodiacus Vitae*), N4^r ("our Elementare corruptible world" matched against "the glorious court of the great god"). Note that, in the preface to *A Geometrical Practise*, Digges had earlier contrasted Atlas's imprisonment in a mortal carcass here in this most inferior and vile part of the universal world with the pleasant and beautiful frame of celestial orbs (sig. A3^r).

⁵⁵ For Dee's reading of Proclus, see *NP*, Chapter 6.

⁵⁶ Digges, *A Geometrical Practise*, sig. S4^v.

⁵⁷ Jofrancus Offusius, *De divina astrorum facultate in larvatam astrologiam*. (Paris, 1570), fols.3^r-5^r. For Offusius's connection with Dee, see Owen Gingerich and Jerzy Dobrzycki, "The master of the 1550 radices: Jofrancus Offusius", *Journal of the History of Astronomy*, 24 (1993): 235-254.

⁵⁸ See *NP*, Chapters 2-3.

⁵⁹ John Roche discusses Digges's reformation of the astronomical cross-staff in "The radius astronomicus in England", *Annals of Science*, 38 (1981): 1-32.

⁶⁰ *Compendious Rehearsall* in Crossley, 25.

⁶¹ William Camden, *Annales rerum Anglicarum, et Hibernicarum, regnante Elizabetha, ad annum salutis MDLXXXIX* (London, 1615), 232. In the text to his frontispiece in *Alae*, Digges says that he has recorded the position of the new star in case it retreats back again by divine command before the end of the world.

⁶² *General and Rare Memorials*, sig. ε*iiiij^r.

⁶³ *R&W*, 85 (*R&W*, no. 251). 10 March 1582 was the date of Dee's first session with Kelley. For Dee on the significance of the anniversaries of the new star, see *R&W*, 157 (*R&W*, no.D20).

⁶⁴ The term "radicall truthes" comes from Dee's *Liber Mysteriorum*, Sloane MS 3188, fol.7^r, cit. *NP*, 209.

⁶⁵ French, 22, 19.

⁶⁶ William Bourne, *A Book called the Treasure for Travellers* (London, 1578), sigs. ***2-3 and introduction to book IV.

⁶⁷ Edward Worsop, *A Discoverie of Sundrie Errours and Faults Daily Committed by Landemeaters* (London, 1582), sig. G3^v. The examples of Worsop and Bourne confirm Clulee's suggestions on the significance of the *Mathematicall Praeface*; "It may have been Dee's ironic fate to have contributed to the progress of science among those who were ignorant of the magical direction which Dee thought was the highest level of science." *NP*, 175. See also French, 173-4 for further contemporary references to the *Mathematicall Praeface* in the same vein.

⁶⁸ For Dee's self-identification as a Christian Aristotle, see *General and Rare Memorials*, sig. ε*j^v. On the formation of the culture of mathematical practice, see Stephen Johnston, "The identity of the mathematical practitioner in 16th-century England" in Irmgard Hantsche, ed., *Der "mathematicus": zur Entwicklung und Bedeutung einer neuen Berufsgruppe in der Zeit Gerhard Mercators* (Bochum: Universitätsverlag Dr. N. Brockmeyer, 1996), 93-120.

⁶⁹ Sherman, especially 10, 87.

⁷⁰ The theme recurs throughout *NP*, but see the summary statement at 232-4.

⁷¹ Bodleian Library, Ashmole MS 1789, fol.26^v.

⁷² See, for example, the abbreviated lineage added in the margin of Dee's copy of *The Laws of Hywel Dda*, reproduced in Sherman, 108.

RICHARD DUNN

JOHN DEE AND ASTROLOGY IN ELIZABETHAN ENGLAND

Without doubt, John Dee was a learned and expert astrologer. He has also gained a reputation as a unique and revolutionary thinker in this area of knowledge. However, by looking at his published and unpublished writings and at the relationship of his theories and practices to those of his contemporaries, this chapter will seek to show that a dichotomy existed in Dee's approach to astrology. This will reveal that, in different contexts, he was both revolutionary and reactionary.

ELIZABETHAN ASTROLOGY

To appreciate Dee's writings on astrology, it is necessary to look at the general background for astrology in the period and at some of its basic principles. From the start, it should be realised that although previous treatments have used the term "astrology" as unproblematic and simply defined, this has never been the case and was not so in Elizabethan times. Rather, there existed a wide range of beliefs concerning the influences of the heavenly bodies.¹

Almost everyone, even opponents of astrological prediction, accepted at least a basic notion, that the planetary bodies had some influence, although this did not necessarily go so far as to suggest that the influences were either significantly potent or predictable. Henry Howard, a vociferous opponent of astrology, wrote, for instance:

There may bee secrete influence of the Planets I confesse [...] Diverse of these great secrete properties are founde, to further or impeach the growth or comming forward of such things as are: but not to figure or fortel, the course of any future accident [...].²

Beyond this, however, a widespread notion of a "natural astrology" existed. This held that the stars had a discernible and foreseeable effect on things below, and considered the celestial influences as inclinations towards, rather than absolute determinants of, actions and events. Moreover, these were applied over wide areas (regions or populations) rather than to individuals. The predictions of natural astrology, therefore, often concerned phenomena such as the weather. Indeed, weather forecasting was the most acceptable and widespread form of astrological prediction in this period and some opponents of astrology wished this to be its limit:

Let us conclude (following the common opinion) that Astrologie generally cannot foretell any other thing by the knowledge of their art, but that which concerneth the

constitution of the ayre, and the particular change of that, according to the demonstration of the coelestiall signes.³

These beliefs could be extended still further, however, to the view that the celestial influences were sufficiently potent to determine the course of events at the personal level and were highly predictable. This strongest notion of astrology, judicial astrology, held that the state of the heavens influenced each and every moment of one's life. Naturally, judicial astrology was highly controversial.⁴

It is worth elucidating some of the basic rules of judicial astrology at this stage, since this relates to Dee's astrology. The key to any prediction was the astrological figure (Figure 1). This scheme represented the positions of the heavenly bodies at a particular time – in this case at the birth of Sir Thomas Smith's son in 1547 – as seen from the place concerned. The sky at this instant was divided into a number of regions, called houses. These were not the same as the signs of the zodiac (Aries, Taurus, etc.) but ran across them and were not usually of equal sizes (i.e. angular width). Most commonly, as in Figure 1, the chart was divided into twelve houses, although eight and sixteen house systems had also been used. Each of the houses was thought to govern a different part of one's life; for instance, the first house governed life, the second riches, the third siblings and so on.

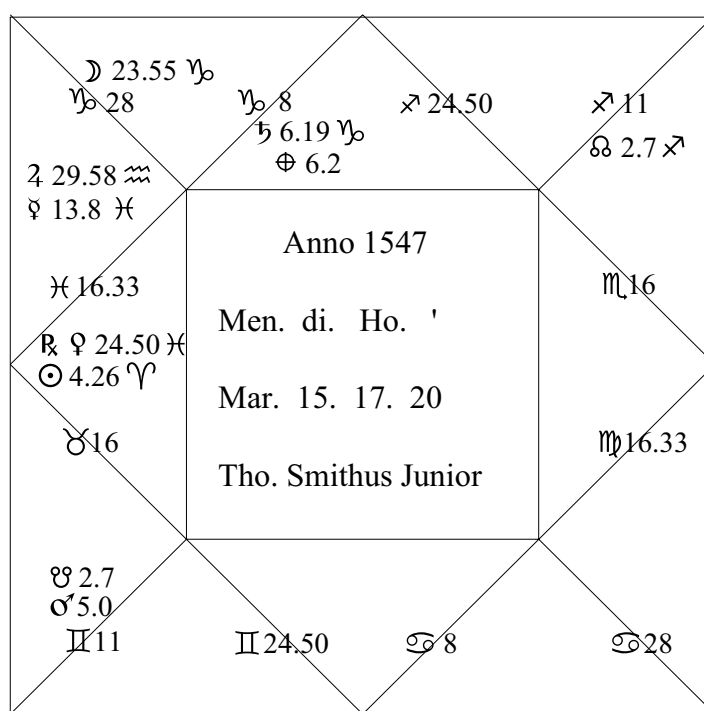


Figure 1. A traditional nativity chart, calculated for the birth of the son of Thomas Smith. MS Sloane 325, fol. 82^v.

The positions of the planets were also plotted on the chart. The planets also influenced different areas of one's life, as did the zodiacal signs. It was the interaction between these factors that formed the basis of the interpretation of the figure, according to a complex set of rules, which could vary enormously between practitioners.⁵ One key element in the interpretation was the doctrine of aspects. This held that only certain angular relationships between the planets were significant. In this period, the five major aspects were conjunction (0° between the two bodies concerned), opposition (180°), trine (120°), quartile (90°) and sextile (60°).⁶ The astrological significance of any aspect depended on the planets involved.

Thus the figure gave a representation of the position of the planets relative to the observer's local horizon. It did not, however, give any indication of the size, distance from earth or speed of motion of the planets. These were not necessary for the interpretation of a traditional chart and it was rare for any major consideration of the physical characteristics of the planetary bodies or of their motions to appear in astrological writings. The relevance of this point will become clear in the comparison with Dee's astrology.

A number of uses for the astrological figure existed. The most obvious was the nativity, from which the astrologer made predictions about the subject's future life based on the positions of the heavenly bodies at the time of birth. Other uses included mundane astrology – casting a figure in order to predict changes for a region or nation – and electoral astrology – using a chart to determine the likely success of an action taken at a particular time; for example, a sea voyage. The most controversial use was the horary question. This was an application in which the astrologer cast a figure for the moment at which a query was put to him, and interpreted the figure in order to answer that query. Horary figures were used extensively by astrologers like Simon Forman, the foremost London consultant by the end of the sixteenth century (Figure 2), and Richard Napier, rector of Great Linford in Buckinghamshire.⁷

DEE'S ASTROLOGY

If we turn now to Dee's astrology, there are two types of evidence available – published texts and personal manuscripts. Of his published works, three are important: the *Propaedeumata Aphoristica* (1558, 1568), the *Monas Hieroglyphica* (1564), and *The Mathematicall Praeface* (1570).

In the *Propaedeumata Aphoristica* Dee set down 120 aphorisms outlining a new astrological system. The text drew two telling analogies for astrological influence: with light and with magnetism. The analogy with light was crucial. By assuming that the celestial influences obeyed the same laws as light – in particular, reflection and refraction – Dee provided a natural philosophically based mechanism for their operation in the terrestrial realm and a mathematical method for their analysis.⁸ The

Another example 1596 Maii: 9 ant: mer:
at 40 m. p. 7 where the cosen sent the urine
of the sick without the consent of the sicke
to know the disease & of life & death: of 26 yeares:

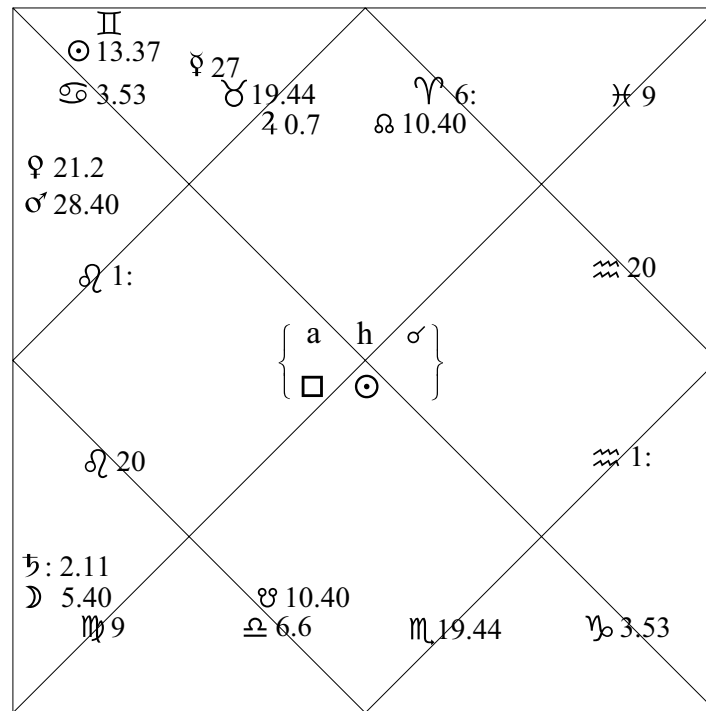


Figure 2. An horary figure by Simon Forman. The figure has been cast for the time at which Forman was presented with a sample of urine by a cousin of the patient, in order to determine what would happen to them.
MS Sloane 99, fol. 9^r.

analogy with magnetism was used to show how, in addition, rays of celestial influence could have different effects in different receivers, and that, unlike light, they could penetrate solid matter.⁹

Ultimately, Dee sought to show that astrological influences existed as occult rays which originated in the heavenly bodies, propagated through space according to the theory of the multiplication of species (a medieval concept), and had effects in the terrestrial realm dependent upon both their nature and that of the absorber.¹⁰ On this last point he stated, for instance, that: "The stars and celestial powers are like seals whose characters are imprinted differently by reason of differences in the elemental matter".¹¹

For the purposes of prediction using this new astrology, a different set of parameters was brought into play. In traditional systems, the key indicators of the influences were the positions of the planets relative to the astrological signs, to the houses of the astrological figure and to each other. According to Dee's system, the important factors in the heavenly region were now the occult natures of the planets, their distances from earth, and the duration of their time above the horizon, combined with the physical interactions between the rays of different planets. These interactions were crucial, and Dee identified over 25,000 different combinations, the effects of each of which would have to be discovered and learned. This new set of possible interactions replaced the five major aspects of traditional astrology.

So Dee set the astrologer the daunting task of determining a mountain of information before an astrological forecast would be possible. He did, however, suggest a means by which the influences and interactions could be studied and accurately predicted. Several aphorisms described the determination of the natures and strengths of the influences of the heavenly bodies through the application of "catoptrics" – the use of lenses and mirrors to isolate and magnify the rays.¹² This investigation of the influences also relied on an accurate knowledge of the sizes, distances from earth and motions of the heavenly bodies. Consequently, there appeared throughout the work calls for concerted efforts in the improvement of observational and mathematical astronomy.¹³ This task was compounded still further, since the astrologer was also required to determine how the nature of different absorbers altered the effects of the rays of astrological influence.

We can summarise, then, which elements of the *Propaedeumata* differed radically from those of traditional astrology. Firstly, Dee provided a physical mechanism for celestial influence, something which other treatments failed to address. Secondly, this mechanism implied new ways of making astrological predictions. Dee's system seemed to do away with many elements of traditional astrology, although it was not clear from the text precisely what the method and graphic form of a prediction would now be. Thirdly, Dee demonstrated that the foundations of astrology were safe and certain by virtue of their basis in mathematics, and provided a means by which the influences could be discerned and predicted through the combination of mathematical theory with observation. In other words, he provided a research method for the new astrology. Lastly, Dee's theories showed how the celestial powers could be actively used. While traditional systems allowed only passivity on the part of mankind, Dee claimed that it would be possible to manipulate the celestial influences and actively bring about wonderful transformations in the terrestrial realm.¹⁴ Thus he stated that: "If you were skilled in 'catoptrics', you would be able, by art, to imprint the rays of any star much more strongly upon any matter subjected to it than nature itself does".¹⁵

This is not to say that this system was produced out of thin air. Recent authors, notably Nicholas Clulee, have shown Dee's debt to medieval, Arabic and contemporary authors, whose works were found in great numbers in his library. It was Dee's combination of and additions to their theories that was novel, rather than the

theories themselves.¹⁶ Moreover, a significant amount of traditional astrological theory and terminology also remained. In particular, although Dee seemed to do away with the need for a traditional house-based system as described earlier, there were references to houses and to the question of house division in the *Propaedeumata*.¹⁷ Similarly, Dee retained the notion of the significator, another key element of house-based systems.¹⁸

But what was the extent of Dee's reliance on the house-based system? Clearly, he still required a system which would allow the mapping of the positions of the planets relative to the observer's local horizon. He would, for instance, still have needed to calculate the position of the ascendant (that part of the sky rising at the observer's local horizon) as a point of origin. But the sort of chart required by Dee's system would also have to include information on the distance of each planet from the earth, its size and time spent above the local horizon. This sort of information was not included in a traditional astrological figure. A figure produced using Dee's system would have appeared quite different from one produced in a traditional way, therefore, although no such figure has yet been identified.

Among Dee's other published works, the *Mathematicall Praeface* related quite closely to the *Propaedeumata*. In particular, the section on astrology in the *Praeface* formed a companion piece to the previous work by providing a general context for Dee's new astrological system. In it Dee explored astrology's place among the mathematical arts, giving it a place in his Groundplat as an "arte derivative" from geometry and arithmetic. More specifically, in the main text he stated that astrology was allied closely to "Perspective, Astronomie, Cosmographie, Naturall Philosophie of the 4 Elementes, the Arte of Graduation, and [...] Musike".¹⁹ This echoed what Dee had written in the *Propaedeumata*, where mathematics subsumed astrology through the association of the rays of celestial influence with the behaviour of light (allowing their analysis through the laws of optics). Accordingly, Dee referred in the *Praeface* to "my Propaedeumes" in which "I have Mathematically furnished up the whole Method" of astrology.²⁰

So the *Propaedeumata* and the *Praeface* complemented each other. The *Propaedeumata* showed how astrology was founded in optics, allowing mathematical (specifically geometrical) principles to be applied to its workings and transforming it into a demonstrative science. The *Praeface* provided a full context for this astrology, one which guaranteed its status as safe and certain, as an art aligned with the more generally acceptable practical mathematical arts.²¹

In the third text, the *Monas Hieroglyphica*, we find a more complex situation. Clearly the monad of the title related to Dee's astrology since it appeared on the title page of the *Propaedeumata* and was referred to in the main text of that work.²² Conversely, the *Monas* contained references to and quotes from the *Propaedeumata*.²³ The two works were further linked in that they both discussed superior and inferior astronomy, i.e. astrology and alchemy.

A more telling link exists, however. According to Clulee's analysis of the monad as a form of universal writing, it was capable of radically improving astrology. The generation of the planetary symbols from the monad restored them to their true proportions and symmetry and literally imbued them with power. This was power that the magus could control. The thrust of the two works thus coincided in their implication that the practitioner was able to manipulate the celestial influences and so procure great changes in his surroundings and in himself.

On the other hand, by reducing astrological prediction and manipulation to the application of this new universal writing, the *Monas* seemed to do away with the need for astronomical observation and calculation, which was, after all, an area of activity explicitly highlighted in the *Propaedeumata*. This also ran counter to Dee's placement of astrology within the domain of the practical mathematical arts in the *Praeface*.²⁴

In these three works, then, Dee made public his plans for a radical new astrology susceptible both to accurate prediction and to active manipulation. By looking at his personal writings, it is possible to compare his private practices with these public proclamations and so assess whether he was able to carry out the revolution he proposed.

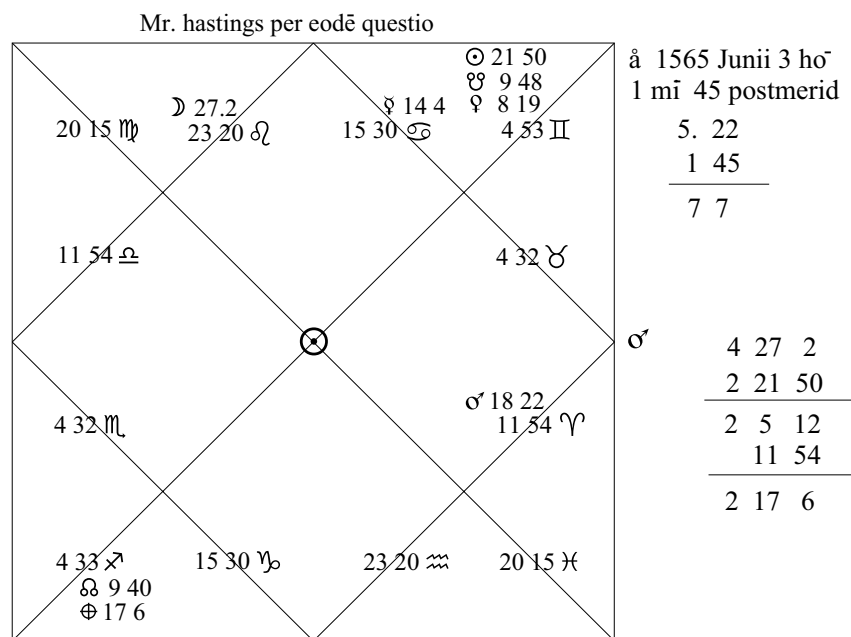


Figure 3. An horary figure by John Dee. The figure includes the 'pars fortuna' (⊕) and the head and tail of the dragon (⊗ and ☿). These elements, which do not represent physical bodies, also appear in Figures 1 and 2. The lower calculation to the right of the figure is of the position of the 'pars fortuna' (2 17 6), using the positions of the moon (☾ at 4 27 2), sun (☉ at 2 21 50) and ascendant or cusp of the first house (11 54).

MS Ashmole 337, fol. 41^r.

Dee's private writings included many astrological notes and figures, including calculations of birth charts, and it is worth noting that Dee was arrested during Queen Mary's reign on charges relating to the calculation of the nativities of the royal family.²⁵ Horary figures also appear in his notes; for instance Ashmole MS 337, now in the Bodleian Library in Oxford, contains a series of such charts from the 1560s (Figure 3, for example). These indicate that Dee was acting as an astrological consultant in the same manner as Simon Forman later in the century. Significantly, in his birth charts and horary figures, Dee employed the conventional methods and figures of judicial astrology, including elements such as the "pars fortuna" and the head and tail of the dragon. These elements are crucial in demonstrating the conventional nature of Dee's charts. Both the "pars fortuna" and the head and tail of the dragon were calculated from the relative positions of the planets in the astrological chart and did not in themselves represent physical entities. The position of the "pars fortuna", for example, was calculated from the relative positions of the sun, moon and ascendant.²⁶ Elements such as the "pars fortuna" would not have been expected if Dee had been using the system proposed in the *Propaedeumata*, with its strong emphasis on a physical mechanism of influence emanating from actual physical bodies. Conversely, if these charts had been produced using Dee's new system, information on sizes, distances and time above the horizon should also appear. They do not. Clearly, therefore, Dee was applying traditional doctrines in his private astrological practices and his charts resembled those of other astrological consultants of this time.

Dee's "diary" entries, which appeared as jottings in the margins of the ephemerides that he owned, provide more ambiguous evidence.²⁷ On the one hand, they contained numerous notes of the time and place of birth of different people, the basic information required for the calculation of a conventional birth chart. For example, on 28 February 1588, he noted the birth of his son Theodorus, pointing out that Sirius was in the ascendant (i.e. in the first house).²⁸ On the other hand, the same entries also contained notes on the weather on particular days, potentially the basis of a systematic programme of observations linking weather patterns with planetary positions, the sort of programme called for in the *Propaedeumata*.

Lastly, anecdotal evidence comes from the *Compendious Rehearsall* of 1592,²⁹ in which Dee brought attention to the occasion on which he had been requested by Robert Dudley (later the Earl of Leicester) "what in my judgement the ancient astrologers would determine of the election day of such a tyme, as was appointed for her Majestie to be crowned in".³⁰ In asking Dee to consider an election for the Queen's coronation, Dudley expected him to adopt a traditional astrological technique.

CONCLUSIONS

The comparison of Dee's published and unpublished writings provides an ambiguous account of his thoughts and practices in astrology. This uncertainty was shared by his contemporaries. Dudley's request and the services that Dee provided as an astrological consultant showed him applying traditional techniques. Similarly,

references to Dee in contemporary works made no mention of his revolutionary ideas. Rather, his name was produced as one among a number of authorities whose support of traditional astrology served to legitimise it. In a defence of astrology in Richard Harvey's analysis of the 1583 conjunction of Saturn and Jupiter, for instance, Dee's name appeared alongside those of other English scholars – including Robert Recorde, both the Digges and Sir Thomas Smith – who rightly considered astrology a safe and legitimate study. Besides contemporary English authors, Harvey's list of worthies also drew on classical, medieval and contemporary Continental authors, including Alboazen Haly, Melanchthon, Cardano and Bonatus. The context here was traditional astrology and Dee's rightful place within this tradition was emphasised.³¹

Perhaps the explanation for this ignorance of Dee's radical ideas among English authors lies in the fact that his more innovative works, the *Propaedeumata* and the *Monas Hieroglyphica* were in Latin and may not have been widely disseminated in England. His one vernacular work covering astrology, the *Mathematicall Praeface*, discussed a general context for astrology without revealing his plans for astrological reform.

Furthermore, in Dee's private writings and in his role as unofficial court astrologer, we see a conventional approach to astrology, in the calculation of birth charts, elections and horary questions, which seems to be at odds with his radical statements in his published material. Two explanations for this spring to mind: firstly, Dee was acting as an astrological consultant, and so was meeting the market requirements for recognisable (therefore traditional) techniques. This would fit in with the pattern of Dee's life, where issues of money and patronage were of overriding importance. Secondly, the new system of the *Propaedeumata* was only an outline and still required a huge amount of both accurate astronomical study and terrestrial observation (through the application of "catoptrics", for instance) before it could become an effective predictive system. Consequently, the only working techniques available to Dee were those of conventional judicial astrology.

This account of John Dee as an astrologer shows two sides, therefore. On the one hand, he was a radical author with high hopes for an astrological system based on natural philosophy that would allow accurate determination and manipulation of the celestial powers. On the other, he was a conventional, albeit adept, practitioner, held in high esteem by his contemporaries as, in his own words, a "perfect and circumspecte Astrologien"³² and as a renowned authority in the ancient astrological tradition

NOTES

¹ Richard Dunn, "The Status of Astrology in Elizabethan England" (Unpublished PhD thesis, University of Cambridge, 1992), Ch.2.

² Henry Howard, *A defensative against the payson of supposed prophecies* (London, 1583), sig. Di^v.

³ William C(ovell), *Polimanteia, or the Meanes lawfull and unlawfull to judge the fall of a commonwealth, against the frivolous and foolish conjectures of theis age* (Cambridge, 1595), sig. H1^v. For more on weather forecasting, see S.K. Heninger, *A Handbook of Renaissance Meteorology* (Durham, North Carolina: Duke University Press, 1960).

⁴ Dunn, *Status of Astrology*, Ch.3.

⁵ For more information on casting and interpreting the astrological figure, see Patrick Curry, *Prophecy and Power* (Cambridge: Polity Press, 1989), Ch.1; John Christopher Eade, *The Forgotten Sky: a guide to astrology in English Literature* (Oxford: Clarendon Press, 1984); Ann Geneva, *Astrology and the Seventeenth Century Mind: William Lilly and the Language of the Stars* (Manchester and New York: Manchester University Press, 1995), Ch.5; John David North, *Horoscopes and History* (London: Warburg Institute, 1986) and other sources on astrological practice.

⁶ Some systems also allowed for minor aspects, such as quintile (72°) and semi-sextile (30°).

⁷ For more on Forman, see Alfred Leslie Rowse, *Simon Forman: Sex and Society in Shakespeare's age* (London: Weidenfeld & Nicolson, 1974); for Napier, see M. MacDonald, *Mystical Bedlam* (Cambridge: Cambridge University Press, 1981); see also Keith Thomas, *Religion and the Decline of Magic* (London: Weidenfeld & Nicolson, 1971), Ch.10.

⁸ *PA*, Aphorisms XV, XXVIII-XXVIII, XLVI, XLVIII and LIII. It should be noted, however, that the analogy with light was already widely accepted by other authors on astrology.

⁹ *PA*, 132-3, Aphorisms XXIII-XXV.

¹⁰ *PA*, 122-7, 134-5, Aphorisms V-X and XXVI.

¹¹ *PA*, 134-5, Aphorism XXVI: 'Stellae & vires caelestes, sunt instar Sigillorum, quorum characteres pro varietate materiae elementaris, varie imprimuntur'.

¹² *PA*, 148-9, 174-5, Aphorisms LII-LIII and LXXXIX. This, of course, followed on from the analogy with light.

¹³ *PA*, 136-7, 152-3, 168-9, 240-1, Aphorisms XXX-XXXII, LXI, LXXXIII and CXVIII.

¹⁴ The nearest comparison to this came in systems of natural magic such as that of Ficino. Relying on a Neoplatonic notion of planetary souls, however, Ficino's method of augmenting the planetary powers relied on the use of incantations and incense, rather than on direct manipulation. See Daniel Pickering Walker, *Spiritual and Demonic Magic from Ficino to Campanella* (London: Warburg Institute, 1958).

¹⁵ *PA*, 148-9, Aphorism LII: 'Κατοπτρικῆς si fueris peritus, cuiuscunque Stellae radios in quacunque propositam materiam fortius tu multo per artem imprimere potes, quam ipsa per se Natura facit.' This linked back to the idea that by magnifying the powers it would be simpler to discern their effects.

¹⁶ On Dee's library see *R&W*, esp. 26 onwards, and *NP*, esp. Ch.3. See also *PA*, 50-99.

¹⁷ *PA*, 158-161, 178-9, Aphorisms LXXIII and XCIII.

¹⁸ *PA*, 174-5, Aphorism LXXXIX.

¹⁹ *MP*, sig. Bii i^v.

²⁰ *MP*, sig. biii^v.

²¹ See also Richard Dunn, "The True Place of Astrology among the Mathematical Arts of Late Tudor England", *Annals of Science*, 51 (1994): 151-163.

²² *PA*, 148-9, Aphorism LII.

²³ *MH*, Theorem XIX quotes Aphorism CVI of the *Propaedeumata* (*PA*, 236-7).

²⁴ *NP*, 109-110, 116-121.

²⁵ *Calendar of State Papers, Domestic Series, of the Reigns of Edward VI, Mary, Elizabeth, (James I) 1547-1580 (1581-1625)*, 12 vols (London, 1856-1872), V, 67.

²⁶ In the astrological chart, the "pars fortuna" is the same distance of zodiacal arc from the ascendant as the moon is from the sun. A number of methods for calculating its position existed. Dee used the method attributed to Manilius. See F. Gettings, *Dictionary of Astrology* (London: Routledge & Kegan Paul, 1985), 233.

²⁷ See, for example, Ashmole MS 488, a copy of Magini's *Ephemerides* of 1582. These entries were later compiled as *Private Diary*.

²⁸ *Private Diary*, 26.

²⁹ *The Compendious Rehearsall* appears in James Crossley, ed., *Autobiographical Tracts of Dr. John Dee* (Manchester, 1851).

³⁰ Crossley, 21.

³¹ Richard Harvey, *An Astrological Discourse upon the great and notable conjunction of the two superior Planets, Saturne & Jupiter* (London, 1583), 4 et seq.

³² *MP*, sig. biii^v.

PART TWO: DEE AND MARITIME AFFAIRS

ROBERT BALDWIN

JOHN DEE'S INTEREST IN THE APPLICATION OF NAUTICAL SCIENCE, MATHEMATICS AND LAW TO ENGLISH NAVAL AFFAIRS

INTRODUCTION

Although John Dee's first teaching appointment was in classics at the new Trinity College, Cambridge in 1547, he was soon off abroad to buy books later that year, and going on extended trips to the Universities of Louvain and Paris in 1549 and 1550 to study the practical application of mathematics to navigational problems. He learned much there about the relationship of these matters with geography, politics and international law, as well as acquiring a number of instruments. Dee had returned by 1551, taking service in February 1552 with William Herbert, the Earl of Pembroke, who through his marriage to Anne Parr remained very influential at Court until his death in 1570. Dee would share many of the same interests with the Welsh-speaking Earl and his sons, from Welsh history, to the law on mineralogy and prospecting, metallurgy, to cartography and exploration. Those shared interests shaped the Herbert family's investment decisions in respect of their estates in Wales and Gloucestershire, where they successfully exploited coal, iron and copper deposits, and the losses they incurred due to over-confidence in the American ores found on Martin Frobisher's northern voyages to "Meta Incognita" between 1576 and 1578.

Dee claimed to have been offered a mathematics lectureship at Oxford in 1553-4. His purchase of Ptolemy's *Mathematica constructionis liber primus* in Oxford on 16 April 1554 attests to his new need for mathematics textbooks. Another surviving mathematics textbook from his library, acquired in 1551 and subsequently annotated in 1555, suggests a friendship with Edward Bonner, Bishop of London.¹

Although Dee retained many friendships made in that formative decade from 1545 to 1555, the navigational instruments and globes which he had bought while abroad were tentatively offered to Trinity College and St. John's College in 1550. There is real doubt over whether the newly established colleges retained them, for they were certainly in Dee's house at Mortlake by 1568. They included a treasured

variation compass, several ordinary sea compasses, a “most excellent clock by Dibbley”, two Mercator globes heavily amended in his own hand, a “magne[t] stone” (i.e. a lodestone), a “radius astronomicus” and a ring dial sold to him by Gemma Frisius in Louvain. Dee certainly taught their use in his own library at Mortlake and added to this collection a large astronomical quadrant made in 1551 by his ill-fated but distinguished sea-going pupil, Richard Chancellor.²

In 1551 Dee had worked under the patronage of the Duke of Northumberland with Richard Chancellor, Hugh Willoughby and Sebastian Cabot in preparing various Atlantic ventures and the 1553 expedition to Russia. He certainly formed a close friendship with Richard Chancellor as they evaluated together the viability of the Duke’s various schemes.

As a result Dee possessed a version of Chancellor’s manuscript account of his exploration past the North Cape along with another version by Hugh Smith which included a small sketch map of their discoveries near Novaya Zemlya. He also retained one of Chancellor’s quadrants, and Chancellor’s work on a diagonal scale. In 1557-1558 Dee worked with Stephen Borough through the technical problems of preparing a chart of the far northern waters explored by the latter in 1556. He would engage in related correspondence with Gerard Mercator and Abraham Ortelius from the time that Ortelius’s cordiform world map appeared in 1564. Dee compared Mercator’s maps with “my friend Stephen Borough, his platt”, a chart of the North East Atlantic now known through the survival of part of it copied by William Borough and now in Trinity College Dublin.³

From about that time Dee took to heart much of the practical navigational advice of Martin Cortes’s *Breve Compendio de la sphere y arte de navegar*,⁴ translated between 1558 and 1561, as the *Arte of Navigation* through the initiative of Stephen Borough and Richard Eden. In particular Dee followed Cortes’s earlier educational advice that subjects that were difficult to convey in writing should be presented as platts or charts. Dee can be seen working on this proposition both as the “paradoxall compass” (or circumpolar chart) in 1557-8, and in other navigational charts, but also exploiting it as “the Groundplat of my MATHEMATICALL Preface annexed to Euclid (now first) published in our Englishe toung”, published by Henry Billingsley in 1570 as *The Elements of Geometry*.⁵ He used the same device as a “Platt of a Petty Navy Royall”, and as a “platt politicall” when setting out his case for an imperial strategy published as *The General and Rare Memorials pertayning to the Perfect Arte of Navigation* in 1577.⁶ In the manuscript of the next but one part of the work, *The Great Volume of famous and Riche Discoveries*, Dee shows misplaced confidence that he would soon be vindicated by the exploration of his pupils Martin Frobisher and Christopher Hall. This comes out in the following remark which also hints that Dee himself considered making a voyage to the Far North as it asserts:

I trust with one or two complete surveys, after this to be performed by my travail [...] that all the northern part of Asia, with the two principall cities thereof, Cambaia and Quinsay, will become to the British natural inhabitants of this Monarchy so well known as are the coasts of Denmark and Norway and their periplus.⁷

Teasing Ortelius on account of his earlier correspondence and fully aware that Humphrey Gilbert had only copied Ortelius in making his map in 1566 (published in 1576 showing the most northerly point as “C. de Paramantia”), Dee wrote on 16 January 1577 to ask:

on what authority you have placed the Cape Paramantia and Los Jardines on the northern coast of the Atlantic, and of all the other things, which you are the first and only one to place in that region.⁸

This in turn provoked Ortelius to visit his cousin in London in March 1577. After discursive meetings with William Camden and Richard Hakluyt, Ortelius visited Dee on 12 March 1577. Dee then helped Burghley to finalise instructions for Frobisher’s second voyage, using ideas derived from Mercator’s letter of 20 April 1577.⁹

DEE’S TEACHING

Dee’s navigational teaching had initially followed the largely mathematical syllabus taught in London from 1547 by a fellow Welshman, Robert Recorde. From 1560 onwards Dee set about correcting some of Recorde’s textbooks for re-issue after Recorde’s death in 1558 because those texts were used to instruct the Muscovy Company’s pilots.¹⁰ Recorde’s *Castle of Knowledge*, as published by Reyner Wolfe, was re-issued in London in 1561 in an edition reflecting more of Dee’s tuition. This edition was taken by Frobisher to the North West in 1576 along with four other works – all obviously taken because of Dee’s recommendation as to their geographical and mathematical content. They were Dr William Cunningham’s *Cosmographicall Glasse, conteyning the pleasant principles of Cosmographie, Geographie, Hydrographie, or Navigation* (London: John Daye, 1559), Pedro de Medina’s, *Regimento de Navigacio* (Seville: Simon Carpintero, 1543) – more than likely in one of the revised formats issued in 1552, 1562 or 1563 – plus two works by André Thevet; one possibly *La Singularitez de la France Antarctique, autrement nominee Amerique* (Paris, 1558) or a manuscript version collected by Thevet about 1563; the other certainly was the much larger volume, *Cosmographie Universelle*, just published by Pierre Hullier in Paris in 1575 and replete with useful maps, especially a recent and detailed one of North America.¹¹

One of Dee’s library catalogues shows the items that John Davis and Nicholas Saunder had stolen from it in 1584 as “Jo. Davis spoyle”. On 30 March 1592 Dee’s diary recorded that “Mr. Saunder[s] of Ewell sent home my great sea cumpass: but without a needle: it came in the night by water.” In 1592 these items, and the unrecovered books in particular, were cited in evidence to the inquiry conducted into Dee’s losses. In the same context Dee described his house at Mortlake as “Mortlacensi Hospitali Philosophorum peregrinatum” revealing the open way in which he ran his library.¹²

Within the opportunity that his Mortlake home offered he nurtured an interdisciplinary approach which took his pupils’ understanding far beyond the theorems so ably advanced by Robert Recorde and Henry Billingsley. This became particularly clear in February 1570 when he set out definitions of those navigational

sciences which were still new to many English readers in his preface to Billingsley's *The Elements of Geometry*. He also defined navigation as the demonstration of the shortest (and therefore cheapest) safe and convenient route for a ship between two accurately defined locations.

Revealingly, he defined the science of hydrography, which:

delivereth to our knowledge, on Globe or in Plaine, the perfect Analogicall description of the Ocean Sea coastes, through the whole world: or in their chiefe and principall partes thereof: with the Iles and chiefe particular places of daungers, conteyned within the boundes, and Sea coastes described: as of Quicksandes, Bankes, Pittes, Rockes, Races, Countertides, Whorlepooles. &c. [...]. And besides thys, *Hydrographie*, requireth a particular Register of certaine Landmarkes [...] and what way, the Tides and Ebbes, come and go, the *Hydrographer* ought to recorde. The Soundings likewise: and the Channels wayes: their number, and depthes ordinarily, at ebb and flud, ought the *Hydrographer* by obseruation and diligence of *Measuring*, to haue certainly knowen. And many other pointes, are belonging to perfect *Hydrographie*, and for to make a *Rutter* [...]: as of the describing, in any place, vpon Globe or Plaine [chart], the 32. pointes of the Compase, truly: (wherof, scarsly foure, in England, haue right knowledge: bycause, the lines therof, are no straight lines nor Circles). Of making due projection of a Sphere in plaine. Of the Variacion of the Compas, from true Northe [...].¹³

In 1570 Dee declared the spirit in which he entered into such teaching as “To stirre the imagination mathematicall: and to inform ye practice mechanicall.”¹⁴ In this spirit, and in his consideration of geography, Dee gave much thought to means of putting theoretical geometrical projections to practical use in navigation. In August 1576 Dee wrote to John Daye saying that he had invented the circumpolar chart or “Paradoxall Compass in playne” in 1557, and describing his realisation that a circumpolar sea chart could be of very considerable help in the assessment of real distance across the icy waters of the latitudes that Stephen and William Borough had been required to explore between 1556 and 1576.¹⁵

To Dee, the navigator's precision was just one part of the complex concept of place which he applied to overseas opportunity. He probably vested extra characteristics in it beyond those discussed in Ptolemaic texts because he realised that, while one could define a place by means of latitude and longitude, he could offer the sailor no convenient means to determine longitude at sea where it mattered most. Dee was not a natural sailor but his own experience of seagoing would serve to focus his mind on how his skill in spherical geometry and his knowledge of terrestrial variation might be put to practical use. As his mind turned over those problems in later years, he began defining the location of some lesser known contexts by means of antiquarian research. This features in his work on Wales compiled in 1574,¹⁶ but most dramatically in the text of four out of the five claims of prior discovery he asserted on verso of his chart of the North Atlantic clearly ruled and drawn up in 1578, although not finished and dated until 1580.¹⁷ This was expressed as ‘A brief remembrance of sundry forein regions, discovered, inhabited and partly conquered by subjects of this Brytish Monarchie’.

This map contains by far the most accurate data on the south-eastern part of Frobisher Bay, Baffin Island, of any contemporary map of Frobisher's discoveries. It must derive from his privileged access to the voyager's charts and journals between 1576 and 1580. However, its ruled graticule suggests Dee was as concerned with other related problems, such as the convergence of meridians, and how to present a navigator with the cartographic and toponomic realities. In doing this he thought not in the time-honoured manner of the land lawyer, nor in compliance with the Privy Council's instructions that Frobisher's discoveries be kept secret, but more practically about how to present visually the problems of what compass course to steer, and how far along the North West passage were the newly discovered mines.

Clearly Dee's regular cross-channel trips had helped him grasp the practical navigational value of the coastal view to the sailor – views such as those that accompanied Pierre Garcie's popular printed rutters for the French and English shores. In consequence Dee counselled Hall to prepare similar views of Iceland and Meta Incognita. Hall duly named the first new view of mountains in Iceland which he had time and visibility to draw in his journal, "Dee's Pinnacles".¹⁸

Another crude manuscript near polar chart drawn at sea in 1580 for Dee is to be found in British Library, Cotton MS Otho EVIII, Art 16, fol. 77. Its data on the Viagatz passage south of Nova Zembla was a corrective to Dee's chart drawn some months before that sketchy survey. Dee's instructions to Charles Jackman and Arthur Pet for the voyage to Cathay and Japan reveal Dee's huge confidence in his own charts as the latter part of the title states: "With which instructions a new chart (made by Hand) now given allso to eche of the sayd two masters, expressing their Cathay voyage more exactly than any other yett published."¹⁹

That same fire-damaged text clearly relates to a signed circumpolar chart which Dee drew for Pet before his departure in 1580, and which survives in an atlas in the library at Burghley House, Stamford. A text written below it (thus on the back of a printed world map) is in Burghley's hand and describes Frobisher's voyages of 1577. It captures the strategic concern of Burghley and Dee about such northern passages about Latitude 64 degrees North.²⁰ Dee's chart (Plate 1), but not the appended comment in Lord Burghley's hand, once accompanied a copy of the explorers' instructions dated 17 May 1580. That chart illustrates the importance that Dee also attached to gathering and studying Oriental cartography, for the Far Eastern part of the map at Burghley House suggests that Dee already had access to a Chinese map printed in 1536.²¹ Nonetheless, at Dee's instance, Jackman and Pet were instructed to procure any new maps and charts drawn or published in China and Japan.²²

Finding the theoretical North Easterly route impassable, Pet returned home in March 1581. Jackman's ship was only lost after he parted company with Pet in February 1581 to re-explore the North West passage and perhaps the mines and supplies which he knew from personal experience had been abandoned by Frobisher in 1578. Indeed, a tiny part of Jackman's logbook from William Borough's former ship, the *Judith*, described his encounter with the coast of Meta Incognita (i.e. Baffin Island) which he explored with Frobisher in 1578. This fragment survived in Dee's

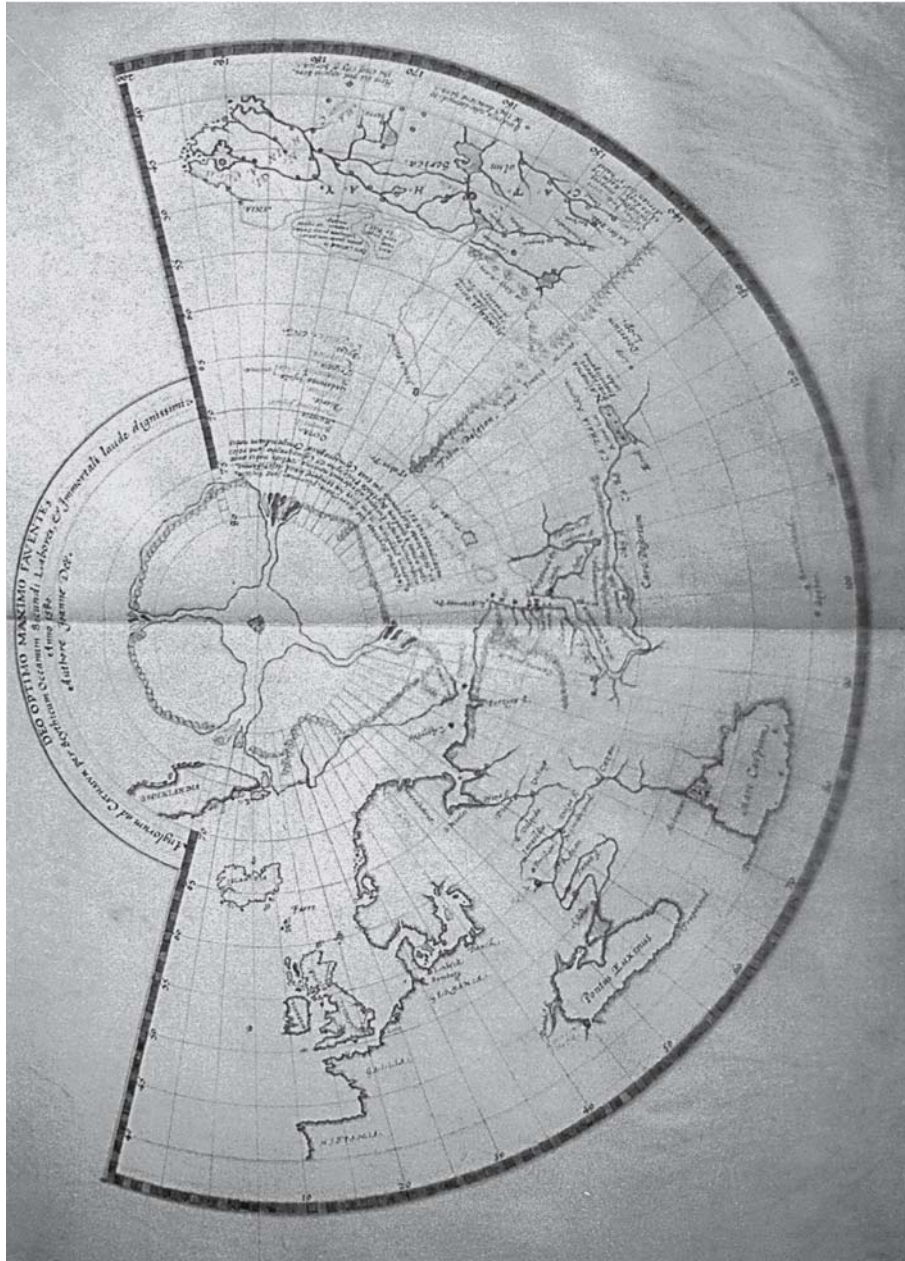


Plate 1: John Dee's circumpolar chart, drawn in 1580. Reproduced by courtesy of the Burghley House Collection.

library and is now in the British Library.²³ In 1581 Jackman lost his life in enthusiastic pursuit of that other chimera, the northern route that had brought about the association of Dee and Jackman with Michael Lok, William Borough and Lord Burghley, and all as a result of Frobisher's limited grasp of the severe challenge of near Arctic exploration even in the months of July and August.

Dee's conviction about the value of the "Paradoxall compass" (or circumpolar sea chart) in illuminating the theoretically shorter northern ways to Cathay and Japan seems to have remained largely intact despite disappointments and lives lost by his pupils like Chancellor and Jackman in search of it. The disappointments in this respect which stung Dee more began with John Daye's refusal in 1577 to publish the large "Paradoxall chart" and associated tables that had figured in Dee's manuscript as completed the previous year.²⁴

That disappointment had been assuaged by Daye's publication in 1577 of the massive first part of Dee's *General and Rare Memorials pertayning to the Perfect Arte of Navigation*, and by a general enthusiasm surrounding Martin Frobisher's voyages of 1576 and 1577, based on the hope that gold-bearing ores had been discovered midway along the North West passage. Gold seemed in turn to offer a commercial underpin and a reason to proceed to the establishment of a colony. Thus in 1578 an expedition with fifteen ships was sent to establish a permanent mining colony where Fenton intended to winter with a party of miners.²⁵ This investment was justified by doubtful assays and sustained by unproven theories about the circulation of water underground and the formation of metals which had clearly informed Dee's review of the same subjects published in his *Monas Hieroglyphica* in 1564 and which re-appear in his preface to Billingsley's work in 1570.²⁶ But through 1578-83 virtually all the justification for the venture was unravelled by discord, huge financial losses and by disillusion over the metallurgists' skills. Had Frobisher's voyages been successful commercially, Dee's reputation as an advisor and shareholder would have risen. As it was, Dee's reputation and self-esteem in those marine and metallurgical circles suffered severely.

Except insofar as he had had some practical knowledge derived from experiments and from officially watching some of the hot assays of the Frobisher ores, Dee's competence was more that of the well-read theorist rather than the practitioner. His skills were no match for the status he was accorded by the Privy Council as a Commissioner for the Assaying of ore from the North West. His status as a navigational tutor and experimental metallurgist was largely advanced before 1583 through his own theoretical advocacy of both and the reading his own large library of mathematical, navigational, metallurgical and alchemical works allowed.

His practical experience of some of the ideas he advocated comprised no more than some small-scale alchemical experiments in the laboratory adjacent to his library. Having seen the larger-scale work done by Jonas Schutz and other metallurgists at first hand in London and Dartford, and having discussed its theoretical basis with them, John Dee must also have realised during the winter of 1578-79 that Schutz had fundamentally failed the Adventurers. In this context it is significant that

after the Cathay Company's erstwhile Treasurer, Michael Lok, had been cast into London's debtors' prison, John Dee began his own programme of alchemical experiment on "marcasite" at Mortlake. His activity is recorded in some detail in a text which shows he had framed his questions in a quasi-scientific way, and then tried to test them. Dee's own records of all this appear in the Bodleian Library's MS Rawlinson D241, entitled "An autograph of Dr John Dee containing a Diary of some Chemical Triels", which records experiments conducted by Dee between June and December 1581. At folios 1-8 Dee was concerned to explore the properties of rocks identified as "Marcasite", which was the identification given by contemporaries and the sailors who wrote accounts of the rocks brought from the Arctic by Frobisher's fleets. He too found that it held no gold.

Dee's status in such matters was not totally destroyed by this because he had another specialised body of knowledge about mining and mining law which could not be devalued by the assayers of Frobisher's ores who continued their activity up to the end of March 1583. This legal knowledge was derived from his collection of historical works, law books and sets of bylaws produced in south German, Bohemian and Hungarian mining communities.²⁷ His geographical reading, especially in theoretical and economic geography, was wide but no less thorough. Although his lack of knowledge of how such practitioners and artificers operated day by day let him down, was Dee justified in looking for some intellectual and economic coherence in the application of mathematics, navigation, geography, geology and metallurgy?

Dee did not realise that his "paradoxall compass" was virtually the same thing that some Spanish navigational instructors in the Casa de Contratación had adopted in 1522 after Sebastian del Cano's circumnavigation.²⁸ Dee may simply have advanced the idea in 1557 on seeing how Mercator's terrestrial globe was completed with a small circumpolar gore.²⁹ English Atlantic voyages to the gold-rich Guinea shore from 1554 onwards gave firmer encouragement for English mariners to turn to him for instruction in the skills of celestial navigation and mathematical correction to observations taken far out in the Atlantic. But Dee almost certainly did not have that first-hand experience of voyaging to St Helena in 1562-63 which Coote suggested in his entry for the *Dictionary of National Biography*. In 1562-63 Dee was actually travelling about Europe from Antwerp visiting various Italian cities and going as far as Bratislava and its nearby mines in 1563.³⁰ Was that European tour devised to collect books of reference and atlases and so test the coherence of a grander intellectual theory?

Dee's reading and travels ensured that many others consulted him on what trades and what geographical ideas to develop, while he himself continued to correspond with overseas mathematicians and cartographers.³¹ Dee's circle of visitors included men who brought him new knowledge about the Atlantic; some deposited items with him ranging from logbooks, such as Christopher Hall and Charles Jackman entrusted to him, to large and detailed plane charts of the Atlantic such as one by the exiled Simão Fernandes which was copied in Mortlake on 20 November 1580 as: "The counterfet of Mr Fernando Simon's, his sea carte which I lent unto my Master at

Mortlake, A[nno] 1580 November 20. The same Fernando Simon is a Portugale born in Tercera being one of the Isles called Azores.”³²

For these and closely-related reasons, Dee’s charts were thought of as state-of-the-art geographical and political statements. Thus Dee’s large Atlantic chart drawn in 1578 shows the growing seaborne contact England enjoyed with her new ally in Morocco, as clearly as the new discoveries in *Meta Incognita* “presently by our people to be inhabited”.³³ That map was also a way of illustrating the strategic importance of the Azores and the campaign of 1578 to 1582 fought between Philip II’s Armada and Dom Antonio’s rival forces which were operating with English naval support. The latter were co-ordinated in London through Dr Hector Nunez and other Portuguese religious and piratical exiles known to Dee and Burghley.

Upon that uniquely scholarly exchange of knowledge, and a complex history of claims and counter claims to the North American shore exchanged with Sir Humfrey Gilbert beginning on 6 November 1577, Dee developed another odd relationship. It was mutual respect which led Dee to give Sir Humfrey Gilbert a circumpolar chart showing much more of the Americas in 1582. This famous chart is now in the Free Library of Philadelphia.³⁴ It informed Sir Humfrey Gilbert’s fatal voyage in the *Squirrel* in 1583 and his formal claim to Newfoundland.

Rather similar matters were discussed with John Davis and Adrian Gilbert (another of Dee’s pupils) in Dee’s presence from 23 January to 6 March 1583. These led to a formal proposal submitted as “A brief collection of the substance of the grant desired by the discoverers of the North West partes”.³⁵ Under this a fifth part of all discoveries of gold, silver and pearls would be due the Queen but power to make laws there would be surrendered to the “Fellowship of New Navigations Atlantical and Septentrional” in which Adrian Gilbert, John Dee and John Davis were to be exempted forever from payment of customs “having been the chiefest travellers to find out this northerly voyage, and being of that company.” Dee’s advocacy of the spatial realities conveyed by the circumpolar chart not only seemed to qualify him as one of the chief armchair travellers, it also led a desperate Michael Lok to produce a similar one in 1582 engraved on copper for Richard Hakluyt, showing the form and location of Frobisher’s discoveries.³⁶

THE SPECULATIVE CLIMATE

It is significant that both Lok and Dee produced their charts amidst other work on vastly detailed assemblages of supporting data and advice exactly as if they had something to prove. They had. Both mens’ reputations had been badly damaged by the catastrophic failure of the Cathay Company’s speculative attempt to colonise and extract the ores of Kodlunarn Island and other sites in *Meta Incognita* in 1578.³⁷ Until 1583 Dee also harboured the hope of locating a copper mine in the project to colonise Newfoundland.

It is evident that both Dee and Sir Francis Walsingham struggled to recover from their serious losses following the Cathay Company’s voyage to the South Atlantic in

1582. But Dee could not afford to await the outcome of that voyage to re-establish his position. It was as well that he did not, even though briefly he considered embarking for Newfoundland early in 1583. Considering the interests of his wife and family he chose Cracow and Prague instead, embarking from Sheerness on 20 September 1583 for Bremen, Lubeck and Rostock, and thence through Poland to Cracow. In preceding this with a careful catalogue of his books, before packing carefully selected ones, he shows his choice was a well-considered risk, and one made with the promise of funding from Prince Laski. Edward Kelley's advice, however derived, alighted on the main chance too. So it was Dee's choice to immerse himself in central Europe which he hoped would help make a greater success out of his metallurgical and astronomical knowledge. Consequently he took only a few of his reference books and metallurgical texts to Europe.³⁸

In some ways Dee was correct in his assessments of his economic prospects in 1583. English investors were not in a position to make an immediate success from exploration and metallurgical discoveries in America. Only Drake's spectacular captures of rich Spanish cargoes during his circumnavigation in 1577-80 saved the Crown and many of the Privy Council from severe financial embarrassment.³⁹

It was nearly four months after Dee left that the next step was taken to organise further English colonial enterprise. On 6 February 1584 Adrian Gilbert, John Davis and Sir Walter Raleigh (a name entered in Dee's stead) gained the letters patent they had sought with Dee in 1583. But in 1584 they only just managed to fund another exploratory voyage to North America's shores, with Simão Fernandes acting as pilot. Further settlement was not attempted until May 1585. Under Governor Lane, the first Virginian settlement contained a comparable mathematical intellect in Thomas Harriot, and in Joachim Gansz a brilliant Czech metallurgist who would successfully operate a furnace at Roanoke.⁴⁰

Dee did not return to England until after Thomas Harriot's *Briefe and True Report of the Newfoundland of Virginia* had been published in 1588, with just a few hints about the presence of copper resources inland. John White's belated attempt at resupply in 1590 marked the failed end of that venture and it was becoming clear that Dee had little new to offer the maritime community except perhaps for some legal ideas that would appear in his *Thalattokratia Bretanniki* in 1597 to justify British claims to St George's Channel and the North Sea.⁴¹

Deacon's hypothesis that Dee's time in central Europe reflects his employment by Walsingham as a secret agent or technological spy is only partially substantiated by his evident knowledge of ciphers and the evidence of one of Dee's letters to Walsingham written from Trebona.⁴² But that he was sufficiently embarrassed financially in 1583 to take virtually any paid employment is also clear. The circumstances of Dee's return in 1589 serve only to suggest that in 1583 he had faced a personal and financial crisis in choosing whether to exploit his knowledge of navigation or metallurgy. Another man with a keen interest in metallurgy, and who played a pivotal role observing the assays from 1577 to 1579, was Richard Young, a Commissioner appointed by the Privy Council, who lived in Stratford to the east of London, and

with whom John Dee would stay for about three weeks on his return from Europe, having travelled via Bremen to arrive on 23 November 1589, as Dee's own diary entries attest. Dee had written to him as "Justice Young" on 20 August 1589, describing the state of the Netherlands, and advising him of his intended return, but it was a document that found its way to Walsingham and so into the State Papers.⁴³ It suggests Walsingham was suspicious of Dee's plans and the use of his library, as Dee had been a commissioner for the North West Parts and their Ores since 1577, and therefore had retained some vital documents.

Young must have taken time in November 1589 to brief Dee on all that had happened, and vice versa. The fact that Dee's first visitor on 19 December 1589 at Mortlake was Adrian Gilbert, a difficult protégé now aged 45, offering recompense for the Coombe Martin mines and for goods carried away, can be no coincidence. That Richard Young was the man who finally sorted out Dee's debts in late 1589 by persuading Adrian Gilbert to make Dee significant compensation, and so allowed for his re-entry as Nicholas Fromond's tenant to his Mortlake home and library on 10 December 1589, is almost certain.

Richard Young was first present with Dee at the assays of Frobisher's ores on 8 March 1577 in London. The Commissioners appointed to view the assays were John Dee, Edward Dyer, William Wynter, Edward Hogan, Thomas Randolph and Sir William Pelham, and Andrew Palmer knew of the offers that Michael Lok made for the Meta Incognita ores.⁴⁴ It may give more idea as to how closely the Commissioners were bonded by their experience from 1577 to 1583 that Dee's diary hints at a rather closer relationship with Richard Young, calling him his brother. Dee perhaps meant a brother in law by his first wife Katherine Constable. Dee had had another reason to keep close to Richard Young, for both were tardy over a freighting liability to Thomas Alleyn for the 1578 voyage and both were subscribers to the Frobishers' voyages, Young for £50 to the second and £50 promptly paid for the third.⁴⁵

Dee's relationship with a newly wealthy Adrian Gilbert, renewed at Young's instance in December 1589, provides one key to Dee's new confidence that he could satisfy his creditors. Gilbert's largesse, arising from his usurping Dee's interest in Coombe Martin's mines, was then put at the disposal of Dee, meeting debts to the Birckman's executors and others. Until then Dee was evidently fearful of the consequences of the resentment in court circles about the failure of the Cathay Company and the Commissioners like himself, Richard Young, and Edward Dyer, all appointed by the Privy Council to oversee smelting operations but without the means to meet the large debts consequential upon its failure to trade as an incorporated body.

From 1574 to 1583 Dee had found himself trapped by his enthusiasm for metallurgical investment, making both right and wrong choices, but seeing no real benefits for himself until 1589, despite the fact that Frobisher's metallurgists could draw on their successful regional experiences throughout England and Wales to

exculpate themselves from the worst of their misjudgements on the *Meta Incognita* ores.

Some of the most important practitioners were denizens from central Europe, and brought their ideas directly from European practice. By 1576-77 their industry could be seen as enjoying unprecedented growth, for the number of men employed in it in England and Wales grew hugely between 1566 and 1576. It has been estimated that the Company of Mines Royal and the Company of Mineral and Battery Works together created new employment for 10,000 men over that decade.⁴⁶ This success contrasts starkly with the otherwise lacklustre performance of the English economy from 1561 to 1574. This contrast underlies the misplaced confidence of speculative investors in 1576, 1577 and 1578. Frobisher's attempt to meld in one venture new navigational and metallurgical skills along with a new legal claim of sovereignty owed much to Dee's vision. However, it was intrinsically flawed.

Between 23 January and 6 March 1583 Dee was in two minds as to how he would meet any consequential claims, and where to direct his resources and energies. His decision to invest in the Coombe Martin lease shows the same self-confidence as was evident when he concurrently helped formulate fresh plans for a return to the North West of America with Adrian Gilbert and John Davis.⁴⁷ But his confidence collapsed in August and September 1583. Acting on Kelley's advice and obviously for his family's sake, Dee chose the lesser of two speculative risks by concentrating on his metallurgical and alchemical opportunities, rather than the seaborne risks associated with sub-Arctic exploration – risks which were more appropriate to younger men and seasoned mariners. It was a decision that would effectually cut him adrift from England's seafaring community and lose him valuable assigned incomes such as that from the Deanery of Gloucester. In the years after 1589 he would only have a Doctorate in medicine from Prague University to show for his choices taken in September 1583.

INDIVIDUAL CONTRIBUTIONS TO DEE'S THOUGHT

Dee's actions have to be viewed as determined by his own version of an interdisciplinary, technological and mathematical vision of the Habsburg Empires. He first encountered that vision in the University at Louvain. There at first hand he met the Professor of Mathematics, Gemma Frisius and his talented pupil Gerhard Mercator developing a co-ordinated geo-political vision of the benefits of navigational theory, mathematics, geography, metallurgy and hydrography. Dee met this again in Paris University in 1549-50 in the teaching of Oronce Fine and Pierre Ramus. It was a structured system of quasi-colonial thought developed initially in the *Armazéns da Guiné, Mina é India* in Lisbon, attended with success because gold was found in Guinea (hence the Gold Coast) and at Sofala in East Africa in 1505. The whole notion was brought to its academic apogee by his great friend and fellow mathematician, Pedro Nuñez.

Dee returned to England in 1551 but not before acting as some kind of encouraging go-between in Antwerp in 1550 for Joachim Gundelfinger who was

seeking through diplomatic channels to place under young Edward VI's patronage a skilled team of central European miners, prospectors, assayers, charcoal-burners and furnacemen.⁴⁸ They eventually settled in Ireland at the charge of Edward VI to be supervised rather ineffectually by Robert Recorde as Master of the Mint and Mines in Ireland. Gundelfinger's team were probably Protestant or Lutheran in sympathy as they formally approached Edward VI's Council with their proposals. By 1551 William Williams thought their work as lead and silver smelters at Clonmines was no more effective than that of their English and Irish associates.⁴⁹ It was another ten years before Daniel Hechstetter was able to bring such a team of Germans to Cumberland with William Cecil's help.⁵⁰ It remained rare for their practices to be written down in any detail in England, albeit Hechstetter's son did make the attempt to write up all their established "recipes".⁵¹

However, best central-European practice was manifest in the form of local printed bylaws about assaying described as "Probierbuchlein". An early model of their form was one produced at Magdeburg in 1524. From 1564 to 1581 John Dee made a large collection of these localised assaying treatises, such as Zimmerman's *Probirbuchlin*, published in Augsburg in 1573 which advocated wet assays using acids. Other "Bergwerkbuchlein" in Dee's Library covered mining bylaws current when they were printed.⁵² In those formative years Dee made a special point of collating all such metallurgical advice and German law-books on mining practice, much of which he obviously shared with the Herbert and Sidney families during his lifetime. Dee certainly used his own copies of *probierbuchlein* such as Lochner's, for his library held the 1564 and 1574 versions, several of Agricola's works, and Zimmerman's *Probirbuchlin Germanici* as published at Augsburg in 1573 in shaping his advice.⁵³ In 1574 Dee's strategic conclusions from this reading and academic learning were brought to new focus by Richard Grenville's proposals, and later in May by Michael Lok's which resulted in the dispatch of Frobisher to search for the North West passage.⁵⁴ Dee compounded his mistakes with over-confidence on 3 October 1574 in writing to Lord Burghley offering to discover a mine of gold or silver within the Queen's dominions.⁵⁵ Late in 1574 Frobisher gained a derogation from the Muscovy Company's monopoly (which must have been known to Lok and probably Dee) to pursue exploration of a north-western passage to Cathay and Japan, and to evaluate any mine-sites that might be found along the way. Lok later implied that Dee first became involved in May 1574 saying just that Dee became interested 'on hearing the common [gossip] of the new enterprise'.⁵⁶ By 1576-77 Dee's related ideas on the sea transport and navigational skills needed to transport mineral wealth were consolidated for limited publication as a vast tract called rather misleadingly, the *General and Rare Memorials pertayning to the Perfect Arte of Navigation*. (Plate 2)⁵⁷

Another major contribution to Dee's thinking came from the circumstances of his patron, William Herbert, Earl of Pembroke, who was made President of the Council of Wales and the Marches in 1550 and had taken Dee into his service in February 1552. The Earl was personally very interested in augmenting his estate incomes from mines and metallurgy, particularly in the great swathe of new family lands in the Forest of Dean, and ex-monastic lands in the Black Mountains and down towards the



Plate 2: The Frontispiece of Dee's *General and Rare Memorials pertayning to the Perfect Arte of Navigation* (London, 1577). Reproduced courtesy of Durham University Library.

sea near Swansea acquired in 1546. To exploit this effectively he and his sons needed both mineralogical and legal advice, and some of the newer technical skills like cartography and men with metallurgical experience in the development of water-powered blast furnaces. In 1559 the Earl acquired in fee simple the ex-monastic land of Neath Abbey and the Manor of Neath and Cadoxton for £3200.

Just as the Earl's activities followed up Richard Eden's ideas so Dee found two role models on which to base his new technologically advanced naval strategy. One was the Earl, the other his newly wealthy naval neighbour at Lydney, Sir William Wynter, who became a shareholder in the Company of Mines Royal in November 1567. Following some major legal decisions in 1569 and 1581, the Earl's son, who had been quite closely associated with Philip II's metallurgical advisors in 1554-56, saw the way open to encourage the building of a major copper smelter completed by Joachim Gansz in 1582. Located beside the river at Neath, that smelter was ideally placed to smelt both Welsh ore, and those found in Cornwall and North Devon. The Coombe Martin mine with its seaside location was to be Dee's way of entering the same league after William Wynter, the Earl of Pembroke, Sir Thomas Gresham, and Dee's closer friends Edward Dyer and Richard Young had all lost money and reputations in the Cathay Company debacle. Dee sought a formal lease on the seaside mine from 1583 knowing that if it were to be successful much of the ores could be smelted in the Neath smelter for it was easily shipped from the hard standing of Coombe Martin's harbour.⁵⁸

John Dee signed and sealed a lease on the Coombe Martin and nearby Knap Down mines in Sir Lionel Duckett's London house on 13 March 1583, but his interest presumably was usurped by John Poppler and Adrian Gilbert in 1587. Nonetheless on 19 December 1589, about a decade after an earlier reconciliation with his ambitious pupil, Dee was offered generous compensation for his Coombe Martin mining lease by Adrian Gilbert.⁵⁹

If the idea of a seaside mine was a failure in *Meta Incognita*, and pursuit of the consequential debts a major factor in determining the timing of Dee's flight, the harsh cliffs of North Devon were to confer commercial success on the concept by the late 1580s. By 1587 Adrian Gilbert and John Poppler had successfully obtained a lease to work the discovery near Coombe Martin, known as Fayes Mine, which would yield £10,000 to each partner in it in 1587-8 and 1588-9.⁶⁰ Subsequently, two famous silver bowls were made from the silver of Fayes Mine.⁶¹ Long after Dee's death, and well after Bevis Bulmer had received a knighthood and succession to the title of 'Master of Metals' for his work in Scotland, the economic geography foreshadowed in Dee's interdisciplinary thinking cohered within a wider industrial revolution. Mining developments by the seashore between 1579 to 1588 showed the way.⁶²

THE ROOTS OF DEE'S INTEREST IN COASTAL MINES AND METAL TRANSPORT

Dee's interest in mines and metallurgy was less in the detailed engineering than in the legal, strategic and practical circumstances of the marine movement of lucrative non-ferrous ores. The common technical root in this thinking can be traced back to the accumulating influence of John Dudley, Duke of Northumberland, and his advisors John Dee and Sebastian Cabot and Richard Eden who from 1547 onwards successfully transplanted to England some of the interdisciplinary thinking developed earlier in Iberian ports. But it was just a one-way shift, for Cabot himself leaked the essence of the plan for a sea borne raid on Peru's new silver mines to Charles V in November 1553 if not a year earlier.⁶³

Through this time, and in particular as a result of Queen Mary's marriage to Philip II of Spain, English attention became concentrated on developments within the Spanish Empire. Among the consequences were some translations by Richard Eden initiated from texts that had become known to the Duke of Northumberland. They were dedicated by Eden to the Duke in 1553 as *A Treatise of the Newe India*. Two years later Eden translated further foreign texts including *The Decades of Newe Worlde or West India Conteyning the navigations and conquests of the Spanyardes*, Sebastian Munster's *Cosmographie*, Antonio Pigafetta's account of Magellan's circumnavigation in 1519-1522, Lopez de Gomara's work the *The debate and stryfe betwene the Spanyardes and Portugales*, Amerigo Vespucci's text *Of the Pole Antarticke and the Starres abowt the same* and a most important text, Biringuccio's *Pyrotechnia, or Booke of Metals*. In his preface to the *Booke of Metals*, Eden gives three reasons for translating it, suggesting there was an obvious need for further guidance among both sailors and the propagandists of Empire in both metallurgy and navigation. He wrote:

It seemeth to me a thing indecent to read so much of golde and sylver to knowe lyttle or nothing of the naturall generation thereof [...] and secondly that [...] if in trauallyng in straung[e] and unknowen countreys he may knowe by the information of th[e] inhabitaynts or otherwyse, that such regions are fruitful of the riche metals he may make further searche for the same. The third cause is, that although this oure realme of Englande be ful of metals [...] yet there is fewe or none in England that have any great skill thereof, or anything written in oure owne tounge, whereby men may be well instructed of that generation and finding of the same: as the lyke ignorance hath been among us touching Cosmographie and Navigation until I attempted according to the portion of my talent and simple learning to open the first doore to the entrance of this knowledge into owre language.⁶⁴

The speculative climate which so boosted mining investments in England and Wales was the direct result of a case heard before the Court of Exchequer in 1569, *Regina v. the Earl of Northumberland*. The vital conclusion was that the contents of mines containing precious metals were not necessarily bespoke for the sovereign under English law. If less than 50% by value of the output of a mine were gold and silver it was available for general sale. The monarch might then have just a share of those proceeds, say 20%. This in turn gave hope of a wave of overseas finds of gold and silver similar to the Mexican gold rush of the 1520s.⁶⁵

Those who put such a strategic vision before Edward VI and later Elizabeth I, included William Cecil and William Wynter who, like Dee, were greatly attracted by the new confidence of technical practitioners in navigation, geography, mathematics and metallurgy, and by their misleading theory that in certain places water could help deposits of minerals to grow. The same enthusiasms were shared by two more of Dee's friends who held potentially lucrative office as Customers of London, Henry Billingsley and Sir Thomas Smith. While Dee's connection with Billingsley has already been described, the investments of Sir Thomas Smith in the Company of Mines Royal and the Company of Mines and Battery Works, and the unincorporated Cathay Company, also mirrored Dee's interests and extensive reading in metallurgy and the organisation of mines.⁶⁶ The influence of Burghley and Wynter ensured that in 1577 Dee and some officials of the Royal Mint and Armouries were appointed as Commissioners charged by the Privy Council with investigating and appraising the methods used to smelt the rocks brought back from Kodlunarn Island by Frobisher's ships.⁶⁷

By 1578 the disreputable smelting practice of Battista Agnello and Burchard Kranich had been exposed by Robert Denham; and Dee was among the first to know, as Lok would show. But Jonas Schutz's reputation was not so quickly destroyed. Dee had taken out two Cathay Company subscriptions or options that he could not afford. Up to November 1578 he avoided paying up his £100 to the Treasurer, Michael Lok.⁶⁸ By then the Treasurer had spent huge sums on building a special water-powered blast furnace at Dartford to Schutz's specifications, confident it would perform as well as the new furnace, construction of which he had supervised at Keswick during 1576. But during the winter of 1578-79 Schutz, like Robert Denham and Roger Williams after him, was subject to inevitable failure as the surviving hornblende feed stocks from the Baffin Island sites were found to contain virtually no gold.⁶⁹

It was Schutz's failures at Dartford which finally pricked the speculative bubble despite talk of defects in the design of the furnace.⁷⁰ Thereafter Dee's debts arising from book purchases and his unwise speculation in the Cathay Company began to loom large in appraisals of his position, and determined his flight in September 1583.

THE NAVIGATIONAL CONTEXT OF DEE'S TEACHING

Dee had long realised that in order to bring home the proceeds of overseas mines reliably (as the economic underpin to envision a future British Empire) the techniques of oceanic navigation would have to be mastered too. Thus it is no surprise that it is from the era 1557 to 1583 that much of our knowledge of Dee's navigational understanding derives.

By this time Dee himself was in possession of Robert Thorne's papers about the basic proposition of a passage to Asia north of the Americas and of maps and data assembled for Cardinal Wolsey about 1527.⁷¹ The basic concepts must also have been well known to Dee as a regular user of the Royal Library in Whitehall where charts by Girolamo Verrazano and Sebastian Cabot hung in the Royal Privy Gallery. Both were remarkable for their lack of detail on the far north east and north west.⁷²

Dee's account of his involvement in Frobisher's voyages suggests he became involved early in 1576.⁷³ Lok's account says that Dee became formally involved in Frobisher's project on 20 May 1576 when, along with William Borough and Christopher Hall, he attended Lok's London home.⁷⁴ Lok wrote that he then laid before them books, charts and instruments and "my notes thereof made in writing as I had made them of many yeres Study before".⁷⁵

Dee seemed convinced and expressed his willingness to help. Soon afterwards, a former Lord Mayor, Sir Lionel Duckett of the Company of Mines Royal and the Muscovy Company invited Dee to Muscovy House, specifically to instruct Frobisher, Hall and Owen Griffin for a few days before their departure. Dee gave them an intensive course in celestial navigation and cosmography and related subjects so that they could also survey the land they might encounter. Dee retrospectively recorded instructing the expedition's "Masters and Mariners in the use of [in]struments for Navigation in their voyage [...] whereby he deserveth just commendation."⁷⁶ That commendation he duly got in the form of a letter sent from Shetland by Frobisher and Hall in 1576 acknowledging his 'friendly instructions' and adding, to what were probably their written notes, "we doo remember you and hold ourselves bound to you as youre poor disciples". But the rest of their letter suggests Dee's teaching was far too advanced mathematically for them to use regularly.⁷⁷

Dee nonetheless had faith in Hall and may well have lent him his own variation compass for the first voyage. Dee probably also had a direct hand in formulating the list of instruments bought for the first voyage. The surviving account shows that to a great extent they replicate the items known to be in Dee's library and that the purchases made in 1576 were largely from Humfrey Cole. But those who have commented on this to date have all relied upon the Record Commissioners' transcripts made in 1833 which were incomplete. In consequence they have failed to see some vital innovations. The "great globe of metal in blancke" came in a "case of leather" so that it could be taken to sea alongside the armillary sphere correctly named "armilla Ptolomaei, or hemispherium".⁷⁸

More particularly the few who have commented on that list have missed the significance of the print of Ortelius's chart for which the cost was deliberately omitted by Lok, and which was consequently also omitted by the Record Commissioners in 1833. Lok's deliberate omission was probably because the map and other instruments were borrowed from Dee. Support for this comes from the fact that the inventory of purchases was not sufficient for the first voyage's two ships as in many cases only one instrument was purchased in 1576 by Lok.⁷⁹ So in addition to the data which the Record Commissioners failed to cite, the original accounts show payment of £3. 3 shillings to "William Thomas, Compasse maker for twenty compasses of divers sorts" and 17 shillings "for 18 hower glasses, some paid to him £4"; and "paid for an Astrolabium of William Burowe, £3. 10 shillings". That astrolabe was unlikely to be Dee's planispheric astrolabe as had been suggested by some commentators who had relied on the Record Commissioners' transcripts, and is

much more likely to be Borough's own mariner's astrolabe.⁸⁰ Furthermore that astrolabe does not correspond readily with the one kept in Dee's library, the history of which has been traced by Julian Roberts.⁸¹

William Borough's astrolabe (also unduplicated in the inventory) had been made to the standard form of the mariner's astrolabe, so well described in Martin Cortes's manual which his father, Stephen Borough, had brought from Seville in 1558 and which Eden translated as *The Art of Navigation* in 1561. That text described in precise detail how to make a mariner's astrolabe but not how to make a planispheric astrolabe.⁸²

William Borough had himself made many voyages to Russia, via the North Cape in 1553, 1556 and 1567 and through the Baltic in 1558-67 and 1569-70 and 1574-75. When acting in an official capacity after 1576 William Borough was usually described by Lok as "my Lord Admiral", but this cannot refer to his later naval status as Treasurer of the Navy, a post carrying the nominal rank of Vice Admiral which he held from 1582; or as Comptroller of the Navy, a post he held from 1587 to 1598. Thus Lok must be referring to his status within the Muscovy Company, where after due instruction from Dee from the 1550s onwards he rose to and through the rank of Chief Pilot. By 1585 Borough had become Master of Trinity House on account of his established navigational skills.⁸³

Dee had by 1576 assembled a collection of sea compasses in his library.⁸⁴ The reason for this was probably his interest in using those compasses to investigate magnetic variation. The assumption then widely made was that on completion most compasses varied slightly in the amount of variation from true north shown for the place of manufacture. But if variation were to be determined either by local anomalies (or by changes in longitude as was then postulated) all the compasses should record the same differential in degrees or points of the compass, even though the actual measurements might differ. Indeed an English rutter which can be dated from internal evidence to 1578 contains an element entitled "William Borough's rules" recording changes in latitude and just such compass variation, expressed as points of the compass for the voyage from Orfordness past the North Cape to Russia.⁸⁵ Other notes in a different hand at the end of the document may also refer to large-scale compass variation calibrated in degrees and on a scale which would only be encountered near the north Magnetic Pole. Borough's curiosity over terrestrial magnetism and its application to navigation can be traced through Dee's tuition and thence into Hall's detailed interest in terrestrial magnetism. Richard Madox during the Cathay Company's voyage to the South Atlantic, on 15 November 1582 wrote of Dee's pupil, Hall [alias Pallinurus], stating:

Pallinurus told me as a certainty that when they were in the North West, they passed close to the coast commonly called Labrador, in Lat. 63 they found the noon sun two points from the compass, whence I gather that the needle deviates 22 degrees to the west which if it is true that it is so suggests to me that the rule is the nearer the pole the greater the deviation of the needle, etc. I do not know, however, by what hidden force it is impelled.⁸⁶

Yet, 20 years before the Spanish king offered a large prize for such a solution in 1598, George Best would reveal that Dee had already put the pilots of Frobisher's Arctic voyages onto the same opportunity. We now know this was a false hope, but it was one which would nonetheless result in useful and helpful increments to the data appearing on charts. In so doing, Best overstated the competence of most English masters in celestial observation and navigation even as he hoped that endeavour might enable true North to be compared with a localised reading for magnetic north, and that in due course such measurements could be reduced to a predictable table or chart. Best wrote of this challenge that:

in these dayes it is likely to receive his perfection, concerning his Northeasting and Northwesting to be brought into rule, and particularly in this noble voyage of Captain Martine Frobisher, who as you shall understande in the discourse, hath diligentlye observed the variation of the Needle. And such observations of skilfull Pylots, is the onely way to bring it in rule, for it passeth Natural Philosophy. The making and pricking of Cardes, the shifting of Sunne and Moone, the use of the compasse, the hour glass for observing time, instruments of Astronomie for taking longitudes and latitudes of Countreys, are so commonly knowen of every Mariner now adayes, that he hathe bin twice to sea, is ashamed to come home, if he is not able to render account of all those particularities.⁸⁷

Dee was also intrigued by other navigational problems which might be tackled by the application of mathematics and geometry. Dee's library contained works which reflected his concern to solve the problem of the nautical or spherical triangle. To this end he acquired Peter Apian's *Instrumentum Sinuum primi mobilis* in both its 1534 and 1541 versions, and Rheticus's tabular version of 1551. He also retained Richard Chancellor's notebooks after his death at sea in 1556. This may have served to concentrate his mind on this, for he could then see the value of knowing the shortest way (and therefore the great circle distance) between two places. Arbitrary as this was for land sites because such a route could not be followed due to the terrain, it seemed of great potential value to the long distance oceanic navigator, and a natural question for anyone like Dee with access to globes to postulate. Dee's progress with this can be seen in his "Canon Gubernauticus" or "An arithmetical Resolution of the paradoxall compass". His 28 pages of manuscript tables therein show how he tried as early as 1557 to set this understanding down in a two-dimensional "paradoxall compass" or chart.⁸⁸

As he also suggests there that the circumpolar chart he described should be drawn up on paper with "the diameter fifty inches", it becomes clear this was asking too much of the engraver and printer to capitalise for publication. Thus this material probably represents what John Daye wisely encouraged Dee to discard as inconsequential between mid August 1576 and September 1577. Something of the flavour of that editorial process nonetheless survives in the only volume of the four intended volumes of Dee's *General and Rare Memorials pertayning to the Perfect Arte of Navigation*, for there Dee states "The second book or volume [...] will be of more than hundred pound charges to be prepared for the print (in respect of the Tables and figures thereto requisite)."⁸⁹

At the same time as rather ineffectually proofing that text for printing, Dee attempted to collate his notes on antiquarian and geographical accounts of many

voyages via the South Atlantic as far as Cathay and other parts of the Pacific Rim. He ordered the 250 folios of that manuscript into twenty-eight chapters between 24 March and 8 June 1577. That manuscript, entitled *Of Further and Rich Discoveries*, was assembled in expectation of a favourable outcome to Frobisher's second voyage and a surge of public interest. That publication was aborted by Daye, who as early as November 1577 got cold feet about the project in the light of the first reports on the Frobishers' second trip to the North West. Dee himself lacked the means to fund it alone.

But Dee had another distinct strand to add to his status in these matters. This was not prejudiced, but indeed advanced over the next year as fifteen ships under Frobisher's command were sent to the North West in 1578 to settle a mining colony on the Countess of Warwick's Island, now called Kodlunarn Island. Dee's confidence stemmed not from the assays of early 1577, but from a quintessentially geographical and legal view derived from his reading. This bore fruit as a five-point presentation of Elizabeth I's claim.⁹⁰ The fifth point was:

Anno 1576 et 1577. 5. The Ilands, and Broken land Easterly: and somewhat south of Labrador were more particularly discovered and possessed A[n]no 1576, and the last year by Martin Frobiysher Esquier: and presently is by our People to be inhabited: The Totall Content of which lands thereabowt by our Sovereigne queene Elizabeth is lately named Meta Incognita.

This was expressed on the other side in the form of a chart of the North Atlantic which Dee revised in 1580.

THE POLITICAL CONTENT WITHIN DEE'S NAVIGATIONAL TUITION

Dee's appreciation of England's potential place in international affairs revolved around his vision of a "British" Empire. In this Dee was acting in pursuit of an interdisciplinary, technocratic and mathematically informed vision of the Iberian overseas empires which he had encountered at first hand in Louvain in 1547. His ideas involved keeping a fleet of 60 large warships on constant patrol and able to extend their influence into the Atlantic. As such it bears some similarity to the contemporary ideas advanced by Pedro Menendez d'Aviles to protect Spanish trans-Atlantic interests.

A survey of the shipping of Queen Elizabeth's realm made in 1560 suggests there were 79 large English ships operating commercially and that the Queen owned 30 more specialised fighting vessels. The corresponding list for 1577 shows that 136 ships over 100 tons were available but most of them were built as merchantmen.⁹¹ The Queen certainly could not afford the cost of about £200,000 in order to keep 60 large ships at sea and even had to hire out some of her ships.

Dee's scheme for "A Petty Navy Royall" was advanced early in his great text on navigation, showing its central importance in his thinking. Beginning on page 3 of the *General and Rare Memorials pertayning to the Perfect Arte of Navigation* he defines its function as to deter France, Denmark, Scotland and Spain from invasion

or naval threats designed “to annoy the blessed state of our Tranquillitie”. Even today, Dee achieves resonance in proposing strategic deterrence, and to finance his proposals with a 10% tax on foreign fishing vessels.⁹²

The strategic purpose of Dee’s Petty Navy Royall was the case that Fortescue had advocated a century earlier. The strategic perceptions about an overseas empire, and the possibility of conquering Scotland and Ireland by permanent naval and military forces were no more than an echo of the basic propositions in Thomas Elyot’s book, *The Governour*, published in 1531 and well known and read in Court circles by royal advisors from Thomas Cromwell to Lord Burghley. Elyot also saw the strategic role of maps, a subject dear to Dee’s heart, writing in 1531 that a ruler needed to see his realm “in figure” to determine “where he shall employ his study and treasure, as well for the safeguard of his country as for the commodity and honour thereof.”⁹³

Dee’s considered thoughts about applying navigational know-how in political contexts were set down in his manuscript “Brytanici Imperii Limites” in 1576-78 and in “Thalattokratia Bretanniki” (British Sea Sovereignty). Sherman has shown they relate more to international power politics and law than to navigational science.⁹⁴

Dee’s strategic naval ideas circulated narrowly.⁹⁵ He still had in his library in 1583 sixty corrected copies from a print run of no more than one hundred copies of the *General and Rare Memorials pertayning to the Perfect Arte of Navigation*. Thus it is difficult to suggest that Dee was better attuned to the strategic naval issues through unofficial briefing, or as a secret agent of Walsingham’s, than his learning and experience might sustain alone. Although Dee had a hundred copies of his *General and Rare Memorials pertayning to the Perfect Arte of Navigation* printed by Daye, he retained sixty in his own library, suggesting that his circulation was exactly the same as the number of investors in Frobisher’s third voyage, less himself. It would thus have reached the Queen, her principal advisors, her courtiers and Lok’s London associates. Its ideas may well have helped sell to those investors the strategic points and synergies embodied in the hopes for settlement at Kodlunarn, and for English trade revival based on using the North West passage. When Davis and Saunder stole so many of his texts in a raid on his library in 1584 they probably thought that he knew much more about Polar navigation and geography than he had published. On 26 March 1591 the cartographically astute Robert Beale returned his manuscript, *Of Rich and Famous Discoveries*. Although 1592 saw Dee accounting for his losses and trying to recover his navigational texts from Davis and Saunder, he was only partially successful. Perhaps the depletion of his library and the fact of a continuing state of war with Spain gave rise to new emphasis in Dee’s final marine work *Thalattokratia Bretanniki* as finished in September 1597. This asserted British claims to St. George’s Channel and the North Sea and the value of actively patrolling on that basis given persistent Spanish naval threats. Perhaps as a result of earlier disillusionments Dee now chose not to develop any more navigational or geographical theories but to use his legal reading more intensively instead. By then he was immersed in the Wardenship of Manchester College, as an armchair lawyer and Paracelsian doctor, enjoying occasional visits from surveyors such as Saxton, and

teaching the mathematical principles he had learned in Louvain fifty years earlier only when the occasion served.

Nonetheless something of Dee's legalistic and imperialist teaching certainly had an impact on some of his other pupils; notably on George Best, described variously as a gentleman, captain, lieutenant, and the sailing master who accompanied Frobisher to the North West in 1577 and 1578. Best's considerable literary skill and navigational knowledge contributed to speculative propaganda and the new legal claim that had stimulated such vast over-investment by members of Elizabeth's Court.

Apart from Michael Lok and his family nominees, and Martin Frobisher who had direct access to Dee's tuition, the major investors in Frobisher's voyages came from the Elizabethan Court. They included Elizabeth herself, her trusty Lord Treasurer, Burghley, the Lord Admiral, Clinton, the Earl of Sussex, Henry, Earl of Pembroke, Francis Walsingham, the Earl of Warwick, Lord Hunsdon (Henry Carey), Sir Thomas Gresham, Sir Francis Knollys, William Wynter, and the Countesses of Warwick and Pembroke. Other investments of a smaller order were made by many members of Elizabeth's Court and by several city associates of Michael Lok. All presupposed success. Some may have invested at the instance of Dee himself. Many must have thought that the Privy Council's clear regulation of all aspects of the venture would ensure that their involvement was a safe investment. It was far from safe; indeed the Privy Council's instructions, and their omissions such as the failure to have the Cathay Company formally incorporated, probably worsened the prospects of success.

However, it was another aspect of Privy Council involvement which touched Dee most directly. None but their appointed commissioners could keep the ship's detailed journals, rutters and charts from Frobisher's voyages.⁹⁶ Yet Dee was clearly so interested in their content, that he was tempted to exploit his status as a Commissioner to ensure that some of the prime elements prepared by his pupils ended up in his own library. He certainly retained Hall's journal of Frobisher's Third Voyage and part of Jackman's to both of which he added titles; also Sellman's manuscript, which was formally handed in to Lok on 2 October 1578, but which Dee himself transcribed in full and subsequently annotated.⁹⁷ The Privy Council's intention was not that Dee should have retained such data for his own library.

In the event, the Privy Council's controls which aimed at official custody for all maps, journals and logbooks were even more ineffective than Dee's actions suggest. Important details of ore samples and a chart had reached Madrid by March 1579.⁹⁸ While the content of the official journals and charts were quite properly known to Dee, they were also commented upon improperly by George Best who accepted that neither the charts, nor the journals, nor the assay results could be transcribed because of the Privy Council's instructions. The instructions were designed to stop foreigners examining the expedition's work. Sellman observed the restriction by handing Lok his account on 2 October 1578. But late in 1578 Settle and Best got away with it lest the attempt to stop them should cause the financial bubble to burst. Nonetheless, by

including what was by his own admission poor quality mapping, “roughly framed, without degrees of Longitude or Latitude”, Best was able to show how effectual Dee’s thinking had been without explicitly breaking the rules for participants and copying the officially issued charts drawn by James Beare. Best felt his crude world map showed how:

my minde was to make knowne to the eye what countries have beene discovered of late yeares, and what before of olde time. The olde knowne partes have their boundes traced and drawn with whole lines, the newe discovered Countries have theyr bounds drawn wyth points or broken lines, whereby the reader shall at the first sight see [...] within these 80 yeares, that have so muche enlarged the boundes of the Worlde, that nowe we have twice and thrice so much scope for our earthlie peregrination, as we have had in times past, so that nowe men may no more contentiously strive for roome to build a house on, or for a little turffe of one acre or two, when greate Countries, and whole Worlde, offer and reach out themselves, to them that will first vouchsafe to possesse, inhabite, and till them. Yet there are great countreys yet remaining withoute Maysters and possessors, which are fertile and bring forth all manner of corne and grayne [...] straunge beastes and fishes, both in sea and fresh waters. Mountains bringing forth all manner of Mettals as gold, silver, yron, &c.⁹⁹

CONCLUSIONS

The publication of Dee’s first volume of his *General and Rare Memorials per-tayning to the Perfect Arte of Navigation* in 1577 came as the Queen, the Court and Lok showed appreciation of points Dee had been making for over twenty years to the trainee pilots of the Muscovy Company and to their predecessors. Dee’s practical contribution to an emergent European tradition of exploiting mathematical ideas in the service of navigation would be taken further by other navigational instructors. One of them was Thomas Harriot who embarked for Virginia in 1585. There is evidence that thereafter Harriot and Dee maintained a friendly relationship.¹⁰⁰ Furthermore the fact Dee took firm steps to recover those texts comprising “Jo. Davis’s spoyle” during the early 1590s shows that he never lost interest in nautical science even if he hardly advanced it any further through his writings after 1583.

Another person to make very similar speculative mistakes to Dee, and yet to have great faith in technological and mathematical advances was Sir Thomas Gresham. His will of 1575, proved in 1579, effectively founded the Gresham College Professorships in Law, Astronomy, and Geometry and four other subjects on Lady Gresham’s death in December 1596. This illustrates his commitment to the same body of technologies that Dee had helped to develop before 1583. Unlike Dee, Sir Thomas Gresham could well afford to gamble in subscribing to the Cathay Company ventures after he had retired from acting as the Crown’s principal financial agent in 1574.¹⁰¹ In fact Gresham was determined right up to 1579 to keep faith with the ideas developed by Dee and Borough despite the failures associated with the Frobisher voyages of 1576-78.

When considering navigational instruments like the globes and the armillary sphere bought for Frobisher from Humfrey Cole in 1576, alongside the plainer cross staff, and a mariner’s astrolabe bought second hand from William Borough, as Lok records, we have to remember that the purchases of globes and compasses for

Frobisher's voyages reflected Dee's own collection, and his tuition in the use the variation compass in particular.

It remains a good measure of the scientific advances that Dee prompted between 1576 and 1580 that the Hatfield House chart, formerly No. 98 (Plate 3) drawn by William Borough and marked up by Christopher Hall, informed the subsequent publications of Robert Norman and William Borough on terrestrial magnetism.¹⁰² It thus anticipated by 120 years the assemblage of the magnetic data that Edmund Halley published in 1700 for the whole Atlantic.¹⁰³ Likewise, the purchases made in 1576 by Michael Lok even as Gresham and Sir Lionel Duckett were talking about the precise skills that were needed by Frobisher, Hall and Griffin, illustrate the impact of Dee's tuition. This wider competence was why in 1576 Dee had been chosen by Duckett to teach those particular skills and set them in a practical context for his pupils' sake.

A subsequent result of those conversations among the most concerned of the investors was one made only after more political lobbying and interference, including some from the Rev. Richard Hakluyt, as he alludes to the matter in 1598.¹⁰⁴ Their mutual concern was that Sir Thomas Gresham had posthumously endowed a Professorship of Astronomy to teach "the principles of the spheres and theoriques of the planets and to explain the use of common instruments for the capacity of mariners, which being read and opened, he shall apply to use by reading geography and the art of navigation in some one term of every year."¹⁰⁵

Under Sir Thomas Gresham's will the Professor of Geometry was to teach arithmetic, and theoretical and practical geometry including the use of globes. Concurrently, also under the terms of Sir Thomas's will, the Mercers Company were jointly to sponsor the lectures in "law". One measure of Dee's strategic influence is the change he promoted in the associated legal, financial and political climate as he sought to foster a maritime strategy with associated overseas settlement and colonisation. The breadth of Sir Thomas Gresham's endowment was very much the product of Dee's advocacy of these subjects as inherently inter-related.

Dee's charts, showing that all these factors were considered at once, are still important to the assertion of Canadian sovereignty in the Arctic; in particular there is one we have examined which bore a five-point claim to sovereignty on the reverse. Quite as useful is William Borough's chart as supplemented with Hall's magnetic data for the locations mentioned in his journal of the third voyage. Dee's advice as given in 1576 shaped how Hall's log and chart recorded the places where the ceremonies of taking possession in the name of Elizabeth I took place. Those ceremonies themselves were influenced by Dee's tuition of Frobisher and Hall and his extensive reading on the assertion of legal sovereignty by the European powers. However, Dee's *General and Rare Memorials pertayning to the Perfect Arte of Navigation* makes the equally important point about his endeavour that "the End of Ends, and the uttermost scope of the said Arte of Navigation, is such Publick Commodity."¹⁰⁶ Dee's understanding of "Publick Commodity" necessarily evokes his almost mystical vision of the usefulness of a mathematical approach. He defined

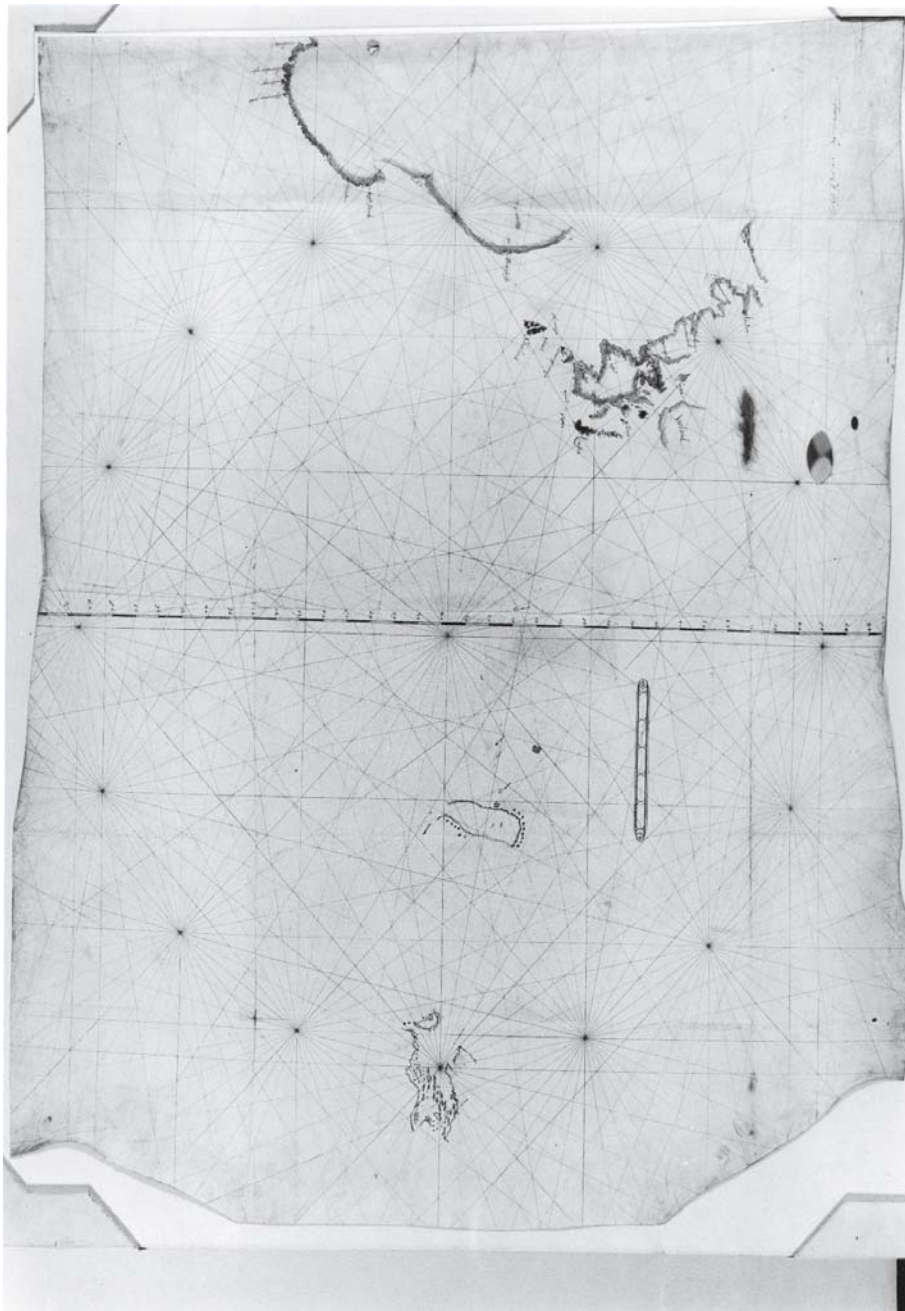


Plate 3: A navigational chart of the North Atlantic, 1578. Drawn by William Borough, revised by Christopher Hall. Hatfield House CPM1/69. Reproduced by courtesy of the Marquess of Salisbury.

“Publick Commoditie” as early as 1570 in the last paragraph of his famous preface to Billingsley’s *Elements of Geometrie*, where he wrote:

Besides this, how many a Common Artificer, is there, in these Realmes of England and Ireland, that dealeth with Numbers, Rule and Cumpasse: Who, with their owne Skill and experience, already had, will [...] finde out, and deuise, new workes, straunge Engines and Instrumentes for sundry purposes in the Common Wealth? or for priuate pleasure? and for the better maintayning of their owne estate? [...] For, no man (I am sure) will open his mouth against this Enterprise [... nor any] that hath any care & zeale for the bettering of the Common state of this Realme.¹⁰⁷

NOTES

¹ *R&W*, 4.

² British Library, Cotton MS Vitellus C.VII, fol. 9^{r-v} is the part of the description of his library which describes his instruments. See too a transcript in *R&W*, 194-5 and the supplement prepared for the John Dee Conference in April 1995. See also *R&W*, 35 and John Roche, “The Radius Astronomicus in England”, *Annals of Science*, 38 (1981): 1-32.

³ John Dee, *Of Riche and Famous Discoveries*, British Library, Cotton MS Vitellus C.VII, fol. 60^v. The cartouche of William Borough’s chart at Trinity College, Dublin, (MS 1209) says:

Sith Tullie sayeth that each man ought his travaile to applie,
to other men’s commoditys: This counsell follow I.
For perfectlie in this my khart the coastes where I have passed
I have set forth: that others may thereby som knowledege fayn.
Great profit maye it bring to them that by these coastes sayle,
for it of instruments is chief that maye them most availle;
which if it doo such favour fynde, as trayayle hath deserved,
it shall procure me to expresse, that which I have safe read.
W. Borough.

⁴ Martin Cortes, *Breve Compendio de la sphere y de la arte de nauegar con nuevos instrumentos y reglas*. (Seville, 1551), trans. by Richard Eden, *The Arte of Navigation, Conteyning a compendious description of the sphere* (London, 1561) and nine subsequent editions between 1572 and 1630. Its origins lay in the official visit which in 1558 Philip II arranged for Stephen Borough to make to Seville, presumably to share his knowledge of the icy waters off the North Coast of Russia explored two years earlier.

⁵ *MP*. Dee’s preface is entitled “A first fruit full Preface specifying the Chiefe Mathematicall Sciences”.

⁶ John Dee, *General and Rare Memorials pertayning to the Perfect Arte of Navigation* (London, 1577), sig. Biii. See also Christopher Lewis Oastler, *John Day, The Elizabethan Printer*, Oxford Bibliographical Society Occasional Publication 10 (Oxford: Oxford Bibliographical Society, 1975).

⁷ British Library, Cotton MS Vitellus C.VII, fol. 79. While this ‘periplus’ may refer to various Dutch rutters published from the 1540s onwards, there is far more detail about Norway’s coast in an English text that seems more closely related to both William Borough and Dee, namely British Library, Harley MS 167, fols. 39-72 which contains “Borough’s Rules” relating to a passage along Norway’s coast and past the North Cape.

⁸ Pierpont Morgan Library, MS MA 2637 (R-V Autogr. Misc, English). Dee’s letter of 16 January 1577, written from Mortlake, covered cartographic and navigational issues and the politics of the Netherlands. See *Abrahami Ortelii, geographi antverpensis et virorum eruditorum ad eundem et ad Jacobum Collum Ortelianum, Abraham Ortelii Sororis filium, epistolae*, ed. John Henry Hessels (Cambridge, 1887), 157-160 (158). Dee had realised that these two names on America’s northern shore (as shown on Ortelius’s 1564 world map engraved in Antwerp) were omitted from his much smaller 1570 world map. By contrast with the rather numerous 1570 map, only three copies of the large 1564 world map on eight sheet are known, one in the Rotterdam Maritime Museum, one in the University Library, Basle, and the last in the British Library’s Map Room. See Rodney W. Shirley, *The mapping of the world: early printed*

maps, 1472-1700 (London: Holland Press, 1983), Entry 144, plate 97, 129-133; Helen Wallis, "Across the Narrow Seas" in Susan Roche, ed., *Studies in the History and Bibliography of Britain and the Low Countries presented to Anna E. Simoni* (London: British Library, 1991), 31-54.

⁹ British Library, Cotton MS Vitellus C.VII, fols. 264-269. *Of Great and Rich Discoveries*, incorporates Mercator's letter and Dee's translation of 1577. See also: E.G.R. Taylor, "A letter dated 1577 from Mercator to John Dee", *Imago Mundi*, 13 (1956): 56-68. Frobisher had already used both Ortelius's world map, probably the larger 1564 edition (880 x 1500 mm), and Mercator's even larger world map of 1569, (1340 x 2120 mm), as the inventory of the items supplied for the 1576 voyage shows. See Public Record Office, Exchequer, King's Remembrancer, E164/35, fol. 17. A full transcript of this can be found in James McDermott, "Humphrey Cole and the Frobisher Voyages" in Silke Ackermann, ed., *Humphrey Cole: Mint, Measurement and Maps in Elizabethan England* (London: British Museum Publications, 1998), 15-16. The fact Ortelius's map was supplied at no cost in Lok's account suggests Dee had lent it to his erstwhile pupils in 1576, but had it back in time to discuss it in detail with Abraham Ortelius in March 1577. Ortelius's world map "Typis Orbis Terrarum" drawn about 1569 and published in Antwerp in 1570 (335 x 495 mm) was not detailed enough to have sustained such usage, or to have been much help to Frobisher and Hall in 1576. For further recent discussion, see James McDermott, "The Navigation of the Frobisher Voyages", *Hakluyt Society's Annual Talk*, 1997, published in 1998, 3-24. McDermott and Waters express their doubts that the brass globes and the brass "Sphaera Nautica" ordered were ever taken to sea. They do not consider the sturdy nature of the large surviving examples of Cole's work at St Andrews University, nor the possible utility and durability of Cole's preparing a suitably cased brass engraved version of the very large Italian globe published in 1574. This made up a globe of 71 centimetres in diameter. That Italian globe carried lots of data on the vicinity of Greenland, Labrador and the western end of a NW passage, probably largely derived from Basque whalers through their Italian bankers. Its gores carried the best commercially available data on the region, a fact Dee was well connected enough to know. Perhaps made by the Sanuto brothers, its gores were intended for a market among affluent seamen. In 1578 Cornelius Ketel painted a portrait of Frobisher alongside a globe, probably a new one made up from gores supplied by Sanuto or Cartaro but undoubtedly simplified and scaled down by the painter to show only the regions of concern to Frobisher. That portrait survives in the Bodleian Library. See too Raleigh Ashton Skelton, *A Venetian Terrestrial Globe, represented by the largest surviving printed gores of the 16th century* (Bologna: Garisenda Antiquariato Libri e Stampe, 1969).

¹⁰ Robert Recorde, *The Castle of Knowledge* (London, 1556), preface. The rare second edition (B.L. C.31.622) and another of Recorde's textbooks, the *The Grounde of Arts* (London, 1540), were extensively edited by Dee (referred to as "I.D.") and appeared in 1561 under the title *The Ground of Artes teachyng the worke and practise of Arithmetike and now of late overseen and augmented with newe and necessarie additions by I.D.* (British Library, C.1.1022). Recorde was until his death Surveyor of the Mines to Queen Mary, and shared with John Dee interest in antiquarian matters, in Wales, and in mining, as well as in thirteenth- and fourteenth-century mathematical texts such as that on the *navicula* that might have been of use to astronomers and navigators. In 1557 while Recorde was working up theorems for his unfinished "Treasure of Knowledge", Dee also formulated his ideas for the manuscripts, *De Nova Navigationis Ratione*, and *Euclidis elementorum, libri XV*. See Robert William Theodore Gunther, *Early Science in Oxford*, 15 vols (Oxford, 1923), I, 107.

¹¹ Public Record Office, E 164/35, fol. 17. It is possible that Lok's account here refers to a manuscript set of sailing directions for India that bears two of Thevet's signatures, one dated 1563, another 1567. This suggests it might have been lent by Thevet to someone like Dee to transcribe. Dee certainly credits Thevet as a source in his text *Of Rich and Famous Discoveries*, (British Library, Cotton MS Vitellus C VII fol. 125) completed in 1577. Dee's Library contained three works by Thevet (*R&W*, Nos. 238, 346 and 1096). Two of those works, both heavily annotated in respect of Cathay, survive in The Royal College of Physicians' Library, London. The third work has not been identified but might be Thevet's own copy of a rutter by Emmanuel Alvares, *Roteiro de Navegacam Da qui pera ay india*. This was certainly widely transcribed in the mid-sixteenth century, see Bibliothèque Nationale (Fonds Portugais ancien, No 48). A possible master copy in 92 folios, autographed back and front by Thevet, is in the National Maritime Museum, Greenwich, (MS 35-013c/P31). Prior to 1935 it was in Professor Charles Boxer's library and is described in Charles Ralph Boxer, *Mariners Mirror*, 20 (1934): 176-77.

¹² British Library, Cotton MS Vitellus C.VII. fols. 1-13.

¹³ *MP*, sig. a.iiij^{r-v}.

¹⁴ Ibid.

¹⁵ Bodleian Library, Ashmole 242, no. 83. "Canon Gubernauticus" or "A great volume, in which are contained our [*sic*] Queen Elizabeth her Arithmetical Tables Gubernatick: for Navigation by Paradoxall Compass (by me invented anno 1557) and Navigation by Great Circles, and for longitudes and latitudes, and the variation of the Compass, finding most easily and speedily etc."; E.G.R. Taylor, *A Regiment for the Sea*, Hakluyt Society Second Series, 121 (Cambridge: Hakluyt Society, 1963), 415-33; Thomas Rundall, ed., *Narratives of Voyages towards the North West in search of a North West Passage to Cathay and India, 1496-1631*, Hakluyt Society First Series, 5 (London, 1849). For more detail on the problems of the Borough's voyage see Richard Eden's preface to his *Arte of Navigation*, 1561.

¹⁶ British Library, Harley MS 473. *Certaines verie rare observations of Chester and some parts of Wales*.

¹⁷ British Library, Cotton MS Augustus I.I.i. verso.

¹⁸ British Library, Harley MS 167, fols. 182-200. *The Account of the Third Voyage to Meta Incognita made by Christopher Hall*. The first page of the report shows that it had belonged in John Dee's Library, and bears a few notes in Dee's hand on Sir Francis Drake and young William Hawkins. Fol. 187 bears a coloured coastal view of the rugged snowy form of "Dee's Pinnacles".

¹⁹ British Library, Cotton MS Otho EVIII, (Article 16) fols. 78-9. One of the circumpolar charts that Dee drew for Pet and Jackman survives in the library at Burghley House, Stamford within a volume of Ortelius's *Theatrum Orbis Terrarum*, annotated in Lord Burghley's hand. Lok's later engraved chart of 1582 owes much to Dee's circumpolar charts, and the Burghley House exemplar in particular.

²⁰ The title page of this collation of charts from Ortelius's *Theatrum Orbis Terrarum* (Antwerp, 1570), bears the manuscript inscription "This book belonged to the L'd Treasurer Burghley" probably written in the hand of his eldest son, Thomas, 1st Earl of Exeter (1542-1622). After the prefatory world chart (the 1570 version) there was bound in Dee's northern hemisphere and below it an inscription in Lord Burghley's hand about Frobisher's second voyage reading thus: "Anno domini 1577 et 19 Eliz. Reginae. Furbisher capitaneus navis appellate ye Ayde, cum 2no aliis navibus discessit en ostio Thamisis 25 Maii et adiit quaedam Insulas in Mare Aglonari in Latitudini 64 et Longitud[ini] [blank] atque 19 July, et ibique mora traxit per diversque ad 24th Augii et terversus est in portuum Plymouth 20th Septembrii."

²¹ A similar Chinese map reached Philip II's Library in the mid-1570s in a diplomatic bundle from the Philippines. See R.C.D. Baldwin, "The Interchange of European and Asian Navigational Information in the Far East before 1620", in Derek Howse ed., *Five Hundred Years of Nautical Science, 1400-1900* (London: National Maritime Museum, 1981), 80-90.

²² British Library, Cotton MS Otho EVIII, (Article 16) fol. 77. British Library, Lansdowne MS 122 Article 5.

²³ Harley MS 167, art 41, fol. 181.

²⁴ Oxford, Bodleian Library, Ashmolean MS 242. No. 83. This is also alluded to on the verso of his map, British Library, Cotton MS Augustus I i.i.

²⁵ Public Record Office, SP15/25/81. Lok's Instructions for the Third Voyage as amended in Lord Burghley's hand (draft circa March 1578). See also: British Library, Lansdowne MS 100/1 fols. 10-12; British Library, Harley MS 167, fols. 165-180 and 182-200; Magdalene College Cambridge, Pepys MS 2133; Walter Andrew Kenyon, "The Canadian Arctic Journal of Captain Edward Fenton, 1578", *Archivaria*, 11 (1980): 171-203.

²⁶ *MH*.

²⁷ *R&W*, 35.

²⁸ Antoine de Smet, "John Dee et sa place dans l'histoire de cartographie" in Helen Wallis and Sarah Tyacke, eds., *My Head is a Map: Essays and memoirs in honour of R.V. Tooley* (London: Francis Edwards, 1973), 107-113.

²⁹ Bodleian Library, Ashmole MS 242. No. 83.

³⁰ Edward Cannan, *Churches of the South Atlantic Islands, 1502-1991* (London: Anthony Nelson, 1992), 25 and 259n which details various searches for Dee's visit to St Helena, concluding that Coote probably mistook Madox's hand and descriptions of Fenton's voyage of 1582-83 for Dee's. See too *DNB*, XIV, 271-279.

³¹ E.G.R. Taylor, *Tudor Geography, 1483-1583* (London: Methuen, 1930), 88-96, 263-265. On page 265 Taylor cites a short part of Dee's library catalogue, cited in evidence for compensation in 1592. This explains the practical value of instruments he had kept in his library (and whose utility must have been known by John Davis) saying, "The instruments necessary for a skillful seaman are the Sea Compasse, a Cross staff, a Quadrant, an Astrolabe, a Chart, an instrument magneticall for finding of the Variacion of the compass, an horizontall plane sphere, a globe and a paradoxall compass [...] but the Sea Compass and

Cross staff are instruments sufficient for a seaman's use: the astrolabe and the Quadrant being instruments very uncertain for sea observations."

³² British Library, Cotton MS Roll XVIII, 48.

³³ British Library, Cotton MS Augustus 1.i.i.

³⁴ Free Library of Philadelphia (William Elkins Collection, 42). "Sir Humphrey Gylbert knight his chart" also bears Dee's own cabalistic symbols identifying him as its author. It was long kept by the Percy and Leconfield families, whose late sixteenth- and early seventeenth-century papers were full of naval, mining and mathematical interest. See *Catalogue of Exceedingly Rare and Valuable Americana, with some important English Books and Manuscripts, largely from the Library of Henry Percy, 9th Earl of Northumberland (1564-1632) at Petworth House. Sold by order of his Descendant, The Right Honoble. Lord Leconfield. Which will be sold by Auction by Messrs Sotheby and Co. [...] On Monday the 23rd day of April, 1928, and the following Day* (London: J. Davy and Sons, for Sotheby & Co, 1928), lot 78.

³⁵ David Beers Quinn, ed., *The Voyages and Colonising Enterprises of Sir Humphrey Gilbert*, Hakluyt Society Second Series, 2 vols (London: Hakluyt Society, 1940), 83-84, illustrates Dee's opportunism over this.

³⁶ Michael Lok's chart was sought for Richard Hakluyt's *Divers Voyages touching the discoverie of America* (London, 1582), where it was published opposite (sig. B4, second count). It is entitled "ILLUSTRI VIRO DOMINO PHILIPPO SIDNAEO MICHAEL LOK CIVIS LONDINENSIS HANC CHARTAM DEDICABAT, 1582."

³⁷ Donald D. Hogarth, Peter W. Boreham, and John G. Mitchell, *Mines, Minerals and Metallurgy: Martin Frobisher's voyages of 1576, 1577 and 1578*, Mercury Series, 7 (Ottawa: Canadian Museum of Civilisation, 1994), 73-99.

³⁸ Dee had two copies of Biringuccio's text and multiple copies of Agricola's study, *De Re Metallica* (Freiburg, 1556) and (Basle, 1558), and copies of major works by Ercker, Munster, Oviedo and de Barros. All were heavily annotated, in those sections dealing with mines in the Iberian empires. Roberts and Watson show that the metallurgical texts and mining regulations that Dee took to Prague in 1583 as those marked with a T in the catalogue. Dee also took important geographical texts like Munster's *Cosmographia* which had an extensive section on mining and smelting in central Europe. Dee's collection of mining texts and mining laws included the bylaws of Kuttenburg (i.e Kutna Hora) in Bohemia, and other mining towns in Alsace and Saxony. See *R&W* nos. 5, 178, 215, 222, 227, 459, 677, 1437, 1453, 1534-5, 1540, 1542-44, 2214. A fuller discussion of those legal texts on mining appears in Herbert Clark and Lou Henry Hoover, *Georgius Agricola, De Re Metallica. Translated from the first Latin edition of 1556 with biographical introduction, annotations and appendices upon the development of mining methods, metallurgical processes, geology, mineralogy and mining laws from the earliest times to the sixteenth century* (London, 1912; repr. New York: Dover Publications, 1950), 609-614.

³⁹ Public Record Office, SP 12/144/17 parts 1 and 2 details Drake's profits and the treasure to be removed to the Tower of London, then estimated at over £250,000. It notes that over £10,000 was retained by Drake.

⁴⁰ David Beers Quinn, *Set Fair for Roanoake, Voyages and Colonies* (Chapel Hill: University of North Carolina Press, 1985), 92. See too: Hatfield House, Cecil MS 276/5: "first written in the high duch by the experte and chiefe M[aste]r of the Emperors mynes in the kingdom of Bohemia, Lazarus Erkerne, nowe translated into English by Joachim Gaunz of Prage." See also Gary C. Grassl, "German Mineral Specialists in Elizabethan England and Early Modern America", *Yearbook of German-American Studies*, 31 (1996): 25-28, 49-52.

⁴¹ British Library, Harley MS 249, fols. 95-105. At the beginning it is dedicated "To my very Honourable Friend Syr Edward Dyer, Knight", and at the end it notes he now sent "this Treatise with a peculiar letter besides Johannem Crocker on Friday 15th last of september 1597." British Library, Royal MS 7, C. XVI fols. 158-165 is another nearly contemporary copy of the same text, dated 8 September 1597. Yet another copy appears in his hand in a copy of his *General and Rare Memorials*, British Library, C21.e.12 as fols. 3-13. It was later given to Captain Hitchcock by Dee.

⁴² Public Record Office, SP12/30/30 dated 17 June 1587. Richard Deacon, *John Dee: Scientist, geographer, astrologer and secret agent to Elizabeth I* (London: Frederick Muller, 1968). See also the Garland and Simkinson request that Dee attend the Court of the Russian Emperor, and Public Record Office, SP12/196/143^r (dated 18 September 1586) later reproduced by Richard Hakluyt, *The Principal Navigations, voyages, traffiques and discoveries of the English Nation* (London, 1598), I, 508.

⁴³ Public Record Office, SP12/31/35.

⁴⁴ British Library, Lansdowne MS 30/4, fols. 10-12; *Acts of the Privy Council of England*, ed. John Roche Dasent, 46 vols (London: HMSO, 1890-1964), X, 147 for January 1577/78.

⁴⁵ Vilhjalmur Stefansson, *The Three Voyages of Martin Frobisher in search of a Passage to Cathay and India by the North-west, A.D. 1576-8: from the original 1578 text of George Best*, 2 vols (London: Argonaut Press, 1938), II, 113, 117, 119, 132, 198, 202, 205, 217.

⁴⁶ William Robert Scott, *The Constitution and Finance of English, Scottish and Irish Joint-Stock Companies to 1720*, 3 vols (Cambridge, 1911, repr. Bristol: Thoemmes Press, 1993), I, 39-44.

⁴⁷ *Private Diary*, 18-19. This is a conflation of selected entries from Bodleian Library, Ashmole MS 487 and 488. See also, Albert Hastings Markham, ed., *The Voyages and Works of John Davis the Navigator*, Hakluyt Society First Series, 59 (London, 1880), Introduction.

⁴⁸ *Calendar of State Papers: Foreign Series, of the reign of Edward VI, 1547-1553*, ed. William Barclay Turnbull, (London, 1861), No. 245: Joachim Gundelfinger to the Privy Council, 18 October 1550.

⁴⁹ *Calendar of State Papers relating to Ireland, of the reigns of Henry VIII, Edward VI, Mary and Elizabeth 1509-1573*, ed. H.C. Hamilton, 5 vols (London, 1860-1890), I, 114, 121-127.

⁵⁰ Maxwell Bruce Donald, *Elizabethan Copper: The History of The Company of Mines Royal, 1568-1605* (London: Pergamon Press, 1955, repr. Whitehaven: Michael Moon, 1989), 124-145.

⁵¹ Cumbria Record Office, (Kendal) Rydal MS 28, fols. 146-169 (sometimes described as Rydal MS R). Other passages on crushing and weighing houses and even furnaces among the Rydal manuscripts lack the operational detail. The international infrastructure of technical and financial resources required can be seen through: William G. Collingwood, *Elizabethan Keswick: Extracts from the original account books 1564-1577 of the German Miners in the archives of Augsburg*, Cumberland and Westmoreland Antiquarian Society, Tract Series, 7 (Kendal, 1912, repr. Whitehaven: R. Moon, 1987). See Ian McNeil, "Blast: From Blowpipe to Blowing Engine", *Newcomen Society Transactions*, 60 (1989): 95-106. Rhys Jenkins, "The Society for the Mines Royall and the German Colony in the Lake District", *Newcomen Society Transactions* (1938): 225-234. Alnwick Castle, MS Y.I, no 6 comprises the Hechstetter's operational data as sent to Henry Percy, 9th Earl of Northumberland, "to informe myselfe of the ystate of the mynes and finding no great alteracion [...]", 23 January 1617/18. Parts of the text are drawn from sixteenth-century recipes, but most of this text is devoted largely to arguments for a reduction in the rent for the Cumberland mines then operating to a loss. It allows for insight into the traditional German methods of mining and smelting then in use. The technology as Dee knew it from Alsace is best shown in H. Groff's illustrated manuscript, in *L'École Supérieure des Beaux Arts*, Paris, published with notes by E. Brugerolles, *La Mine et mode de l'emploi, 1526* (Evreux: Editions Gallimard, 1992).

⁵² Hoover and Hoover, *De Re Metallica*, 609-614.

⁵³ See *R&W*, nos. 177, 178, 215, 1051, 1919, all Agricola's works, plus the Duke of Saxony's mining ordinances, the *Bergordnung* of 1574 (*R&W*, no. 227). Zimmerman's important study, *Probirbuch*, not the title cited by Dee above (*R&W*, no. 1535), may have come to Mortlake a little later, but certainly well before 1583, along with Ciriacus Schreitmunn's *Probierebüchlin Fremde und subtile Künst [...] von Woge und Gewicht auch von allerhandt Probenauft Ertz, Gold, Silber etc* (Frankfurt-am-Main, 1578), *R&W*, no. 1534. The last two probably came as a result of intelligence and help obtained for him by Sir Philip Sidney. Dee records its origin in a meeting involving Lord Leicester, Edward Dyer and Philip Sidney on 16 January 1577. As Roberts and Watson show by reference to Pears's transcripts of Sidney's correspondence with Hubert Languet, Sidney exchanged data derived through Dee about Martin Frobisher's supposed discovery of gold in 1576 and 1577, seeking in return fulfilment of a promise to dispatch the laws of Gutebergica, i.e. the Kutna Hora mines in Bohemia. See Stewart Adolphus Pears, *The correspondence of Sir Philip Sidney and Hubert Languet* (London, 1845), 128, referring to correspondence from Languet dated 28 November 1577 and Sidney's fuller letter of 1 October 1577.

⁵⁴ Public Record Office, SP12/95, nos. 63 and 64, a further copy SP12/229/97, fols. 1-5, and a draft patent at SP 12/235/1. The former was a petition and letter to the Queen for "A discovery of lands beyond the Equinoctial [...]" and to establish the authors and fellowship of this voyage in the nature of a corporation". Lok probably took it as a model for the proposals he worked on with Dee and Frobisher but he too failed to secure incorporation, demanding, as Burghley thought, too much in the form of the charter that he proposed. See too Alison Grant, *Grenville* (Appledore: North Devon Museum Trust, 1991), 14-18. A derivative of Grenville's scheme but expressed in considerable detail was later penned by Richard Hakluyt as "A discourse of the Commodity of taking the Straight of Magellanus". It was probably prepared for Sir Francis Walsingham in 1580.

⁵⁵ British Library, Lansdowne MS 19, (art. 19).

⁵⁶ British Library, Lansdowne MS 100, (art. 1) fol. 4.

⁵⁷ One copy of this work which was to remain in his library for over twenty years (British Library, C.21.e12) bears the text of the *Thalattokratia Bretanniki* on blank leaves at the back in Dee's hand. That copy was sent on to Sir Edward Dyer on 15 September 1597. See note 41 above for more details.

⁵⁸ For a tiny image of the Cadoxton smelter beside the river near Neath see West Glamorgan Record Office, Dynevor Memorial, "The description of the Lordship of Cadoxton juxta Neath now parte of ye possessions of ye Right honourable John Herbert Esquier one of her majestie's Pryvie Counsell and Secreatary of Estate unto her highness." c.1601. "clericus fecit et descripsit."

⁵⁹ Oxford, Bodleian Library, Ashmole MS 488. Dee's diary recorded on 19 December 1589 that Gilbert "Offred me as much as I could require at his hands, both for my goods carryed away, and for the mynes." See *R&W*, 35.

⁶⁰ Peter Cloughton and Neil Parkhouse, *Out of the World and into Coombe Martin* (Coombe Martin: Coombe Martin Local History Group, 1989), 33-37. N. Parkhouse, "Coombe Martin – An Industrial slum?", *The Quarterly Journal for British Industrial and Transport History*, 7 (1995): 5, 10-11.

⁶¹ S.H. Burton, *Walks in North Devon: A Guide to its Scenery, Architecture, History and Antiquities* (London: T. Werner Laurie, 1953), 69-70 gives the full texts of the two inscriptions as originally determined in John Prince, *Danmomii Orientales Illustres, or The Worthies of Devon* (London, 1810).

⁶² Stephen Atkinson, *The Discovery and Historie of the Gold Mines of Scotland, 1619* (Edinburgh, 1825), 52-53; Scott, III, 409.

⁶³ Archivo General Simancas, Ingalterra, leg. 818/72. Sebastian Cabot to Charles V, a transcript clearly misdated 15 November 1554. Presumably the original dated from 1553 or even a year earlier still. As taken forward later to Philip II it also contained a map now lost. It may well have formed part of Cabot's reply to a letter written by Emperor Charles V to the young Queen Mary on 9 September 1553, following the failure of the Duke of Northumberland's plot to put Lady Jane Grey on the throne. The Duke, who was a keen supporter of Dee's ideas, was executed for treason in August 1553.

⁶⁴ Edward Arber, ed., *The First Three English Books on America 1511-1555 A.D.: Being chiefly translation, compilations &c. by Richard Eden* (Birmingham, 1885), 355. This large work incorporates many of Eden's earliest translations.

⁶⁵ Public Record Office, E231/28d and SP 12/40/81-83.

⁶⁶ British Library, Sloane MS 2483. Donald, pp 66-72.

⁶⁷ British Library, Lansdowne MS 30, Art.4. fol. 12.

⁶⁸ Public Record Office, SP 112/119/14; SP 12/126/56; SP 12/130/19, 21 and 35; SP 12/130/21.

⁶⁹ British Library, Lansdowne MS 30, Art 4, fol. 6, and Lansdowne MS 100/1 fols. 4^r-5^v, 10^r, and 12^r. Public Record Office, SP 12/118/56; SP 12/119/46; SP 12/122/3, 4, 9, 10, 61 and 62; SP 12/129/43; SP 12/130/15. Assays by Agnello, Broad, Kranich and Williams are also known: They are to be found in Public Record Office, SP 12/122/62 and 67 and SP 12/161/41. The last two by Williams took place on 28 July 1583. These two failures served to confirm Dee's decision to leave for Prague. See also Lok's accounts as preserved in San Marino, California, Huntington Library, MS 715.

⁷⁰ Public Record Office, SP 12/130/15 and British Library, Lansdowne MS 100/1, fols. 10^r-13^r.

⁷¹ British Library, Cotton MS Vitellus C.VII fols. 329-45. Sometime after 1566, when the originals were shown to Anthony Jenkinson, Cyprian Lucar, son of Robert Thorne's Bristolian associate and executor, Emannual Lucar, who in turn presented a copy to John Dee. Later copies were made available to other people, including Michael Lok, (now British Library, Lansdowne MS 100 fols. 65-80), William Cecil (now Hatfield House, Cecil MS 245/5), and Richard Hakluyt, who published it in as 'A declaration of the Indies' in *Divers Voyages*, sig. B1-B3^r.

⁷² Hakluyt, *Divers Voyages*, Epistle Dedicatorie.

⁷³ British Library, Cotton MS Otho E VII, fol. 44^v.

⁷⁴ British Library, Lansdowne MS 100, Art.1, fol. 4.

⁷⁵ British Library, Cotton MS Otho E VII, fol. 44^v.

⁷⁶ British Library, Cotton MS Otho E VII, fol. 44^v.

⁷⁷ Dee, *General and Rare Memorials*, sig. A2^r.

⁷⁸ Public Record Office, E164/35 fol. 17.

⁷⁹ Dee's loans of equipment and his advice may have been so significant in themselves and for the prestige that they conferred, that Lok himself was prepared to acquiesce to Dee's not paying up his adventurer's shares.

⁸⁰ Stefansson, *Voyages of Martin Frobisher*, II, 77. This gives its sources as the Royal Commission on Historical Manuscripts, 1832 and 1833, pp.74-77, 558-62 and copied directly without reference to the originals in Richard Collinson, ed., *The Three Voyages of Martin Frobisher in Search of a Passage to Cathaia and India by the North West, A.D. 1576-1578*, Hakluyt Society, First Series, 38 (London, 1867). A correct copy appears in J.M. McDermott, "The Account Books of Michael Lok relating to the North West Voyages of Martin Frobisher, 1576-1578" (Unpublished PhD thesis, University of Hull, 1984), 83-84, and as an appendix in the Hakluyt Society publication cited above. The uncorrected form appears in David Watkin Waters, *The Art of Navigation in Elizabethan and Early Stuart Times* (London: Hollis and Carter, 1958), 530-532.

⁸¹ See *R&W*, Introduction.

⁸² *The Art of Navigation*, trans. by Richard Eden (London: R. Jugge, 1561), fols. lxxviii-lxx, Part 3, Ch.7 entitled "The making and use of the Astrolabe with which the mariners take the Altitude of the Sunne."

⁸³ Alwynne A. Ruddock, "The Trinity House at Deptford in the Sixteenth Century", *English Historical Review*, 65 (1950): 458-476. Charles Raymond Booth Barrett, *The Trinity House of Deptford Strond: written and illustrated by C.R.B. Barrett* (London, 1893), 131-134.

⁸⁴ *R&W*, Appendix 3, 196-197.

⁸⁵ British Library, Harley MS 167, fols. 39- 76. Mr Borrough's rule is on fol. 69.

⁸⁶ British Library, Cotton MS Titus BVIII, fol. 199^v. Elizabeth Story Donno, *An Elizabethan in 1582, The Diary of Richard Madox, Fellow of All Souls*, Hakluyt Society Second Series, 147 (London: Hakluyt Society, 1976), 227. Her edition of the text explains that Madox is using Pallinurus as a pseudonym to disguise Hall's identity here as he did on at least six other occasions on the voyage. Madox did this in order to protect him from further humiliation by Fenton, and from identifying his alcoholism.

⁸⁷ George Best, *A True Discourse of the late voyages of discoverie for finding of a passage to Cathay by the North Weast under the conduct of Martin Frobisher* (London, 1578). Reprinted in Stefansson, *Voyages of Martin Frobisher*, I, 16.

⁸⁸ Oxford, Bodleian Library, Ashmole MS 242, no 83. See note 15 above for title.

⁸⁹ Dee, *General and Rare Memorials*, sig. A2^r. E.G.R.Taylor, "John Dee and the Nautical Triangle", *Journal of Navigation*, 8 (1955): 318-325.

⁹⁰ British Library, Cotton MS Augustus I.i.i. verso.

⁹¹ Public Record Office, SP 12/11/27; SP 12/96/267; SP 12/107/68. David Michael Loades, *The Tudor Navy: an Administrative, Political and Military History* (Aldershot: Scolar Press, 1992), 191-193.

⁹² Dee, *General and Rare Memorials*, sigs. A4^{r-v}, B2^{r-v}, D3^v, E2^r and E3^v.

⁹³ Thomas Elyot, *The boke named the Governour* (T. Berthelet, London, 1531; repr. London: Dent, 1962), 23-24.

⁹⁴ William H. Sherman, *John Dee, The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995), 171-189. Sherman dates a text widely presumed lost, British Library, Add MS 59681 *Britannici Imperii limites* to between 1576 and 1578 when final corrections were added. It anticipates in many ways Dee's *Thalattokratia Bretanniki* completed in 1597. See *General and Rare Memorials*, now British Library, C.21.e12. See also British Library, Royal MS 7, C. XVI, fols. 158-165 and Harley MS 249.

⁹⁵ Julian Roberts, "John Dee's Corrections to his Art of Navigation", *The Book Collector*, 24 (1975): 70-75. Dee's 1583 catalogue (now at Trinity College Cambridge) is annotated "I left 60 of these ready corrected". See *R&W*, 104 (entry for *R&W*, no. 1680).

⁹⁶ Dasent, *Acts of the Privy Council*, X, 366.

⁹⁷ These texts are all in British Library, Harley MS 167, fols. 165-200. Dee's transcript of Sellman's text (fols. 165-180) differs markedly in its description of the courses sailed in June 1578 from the printed but incomplete version first produced in 1867 by Collinson in *The Three Voyages*, 290-316. Its errors of transcription were copied but with revealing gaps by Stefansson, *Voyages of Martin Frobisher*, I, 55-73.

⁹⁸ B. Allaire and D. Hogarth, "Martin Frobisher, The Spaniards and a Sixteenth century Northern Spy", *Terrae Incognitae*, 28 (1996): 46-58. M.A.S. Hume, *Calendar of Letters and State Papers relating to English Affairs preserved principally in the Archives of Simancas*, 4 vols (London, 1892-1899), II, 567-69.

⁹⁹ Best, *A True Discourse*, in Stefansson, *Voyages of Martin Frobisher*, I, 22.

¹⁰⁰ In Dee's copy of Richard Hakluyt's translation of *El viage que hizo A[ntonio] de E[speio] en el anno de ochenta y tres: el qual con sus companeros descubrieron una tierra [...] a quien pusieron por nombre nuevo Mexico etc.* (Madrid and Paris, 1586), now British Library, B32.a.32, we find the following

inscription in Dee's hand: 'Johannes Dee: A[nn]o 1590. January 24. Ex dono Thomae Hariot, Mei Amici.' It is thus very soon after his return to his home at Mortlake.

¹⁰¹ State Papers describing Sir Thomas Gresham's investments are: Public Record Office, SP 12/111/48; SP 12/119/30 and 41; SP 12/126/2, 8, 32 and 56; SP 12/127/8 and 16; SP 12/130/16, 21, and 35. More detail about Sir Thomas Gresham's foundation in its earliest phases is to be found in John Ward, *The Lives of the Professors of Gresham College* (London, 1740), iv-viii; Sydney John Teague, *Sir Thomas Gresham financier and college founder* (London: Synjon Books, 1974); Peter Winckworth, *History of the Gresham Lectures, Inaugural lecture, City University* (London: City University, 1966); Francis R. Johnson, "Gresham College: Precursor of the Royal Society", *Journal of the History of Ideas*, 1 (1940): 413-438; Public Record Office, SP 12/170/1.

¹⁰² Now Hatfield House Library, CPM 1/69 reproduced here by courtesy the Marquess of Salisbury.

¹⁰³ For a full discussion of the significance of other contemporary work on terrestrial magnetism, by Borough, Gilbert and Norman in England, and of the longitude prizes offered formally from 1598 by Philip III of Spain, see Richard C.D. Baldwin, *The international interchange of navigational information between the maritime communities of Iberia, Asia and North Western Europe, 1500-1620* (Unpublished thesis, University of Durham, 1980), 155-254.

¹⁰⁴ Richard Hakluyt, *The Principal Navigations*, I, Prefatory address. Gresham's large incomes arising from clever currency speculation, trading in Ordnance and servicing the wool trade's needs meant his large trading debts extended far beyond the Cathay venture and caused the House of Commons to take a close interest in the matter of his estate. That led to Parliament passing a special statute, which began as "A Bill for the relief of Sir Thomas Gresham's creditors" that secured its first and second readings on 15 and 20 February 1580. It passed quickly through Committee stage between 28 February and 4 March 1580, to a third reading on 13 March 1580. In its final form it was passed as a Private Act 'for the establishment of an agreement between Sir Henry Nevill, Knight, and Dame Anne Gresham for the better purposes of the last will and testament of Sir Thomas Gresham deceased and paying his debts.' Its main effect was to put off endowment of the lectureships until after Anne Gresham's death by which time it was hoped all Sir Thomas's trading positions would have unwound.

¹⁰⁵ Ward, vii.

¹⁰⁶ Dee, *General and Rare Memorials*, sig. B2'.

¹⁰⁷ *MP*, sig. A.iiij^{r-v}.

WILLIAM H. SHERMAN

JOHN DEE'S COLUMBIAN ENCOUNTER*

On at least one occasion between 1571 and 1583 John Dee encountered Christopher Columbus. The medium was Columbus's son Ferdinand, and they met in the margins of Ferdinand's famous *History [...] of the Life & Deeds of the Admiral Christopher Columbus* – one of the earliest and most important accounts of Columbus's encounter with the New World.¹ Dee purchased the work sometime after its publication in 1571, and he read and annotated it carefully.² In 1583 the book was entered in his library catalogue, with a slightly garbled title.³ It ultimately made its way into the British Library, where I stumbled upon it in the summer of 1994.⁴

My discovery, like that of Columbus himself, was accidental. Columbus had set out from Spain expecting that his westward course would take him clear across to the eastern coast of Asia: when he made his landfall in the Bahamas his sources led him to suppose that he was somewhere near Japan. When I called up the *Life of Columbus* I was not searching for the tracks of John Dee: following up a passing comment made by David Quinn, I had been led to expect some interesting marginalia by Gabriel Harvey, the other great Elizabethan annotator to whom I had turned my attention. I recognized almost immediately that the notes were unmistakably Dee's⁵ – a realization that filled me with as much apprehension as excitement, since my book on Dee (with its detailed assessment of Dee's contribution to English maritime expansion) was already making its way through the press.

In that study I tried to assemble all of the available primary and secondary sources pertaining to Dee's place in maritime history and the history of geography.⁶ Following Eva Taylor, David Waters, and others, I argued that he did more than anyone to import knowledge of the science of navigation and the history of empire to England, and – often behind the scenes – worked to apply this knowledge in the texts and voyages which would gradually allow England to catch up with its Continental rivals.⁷ In a series of treatises, maps, and conferences from the 1550s to the 1590s, Dee developed an expansionist program, which he called “this British discovery and recovery enterprise.”⁸ Calling for both the discovery of new lands and the recovery of regions that were once arguably subject to the British crown, Dee

* Different versions of this paper were delivered at ‘John Dee: an Interdisciplinary Colloquium,’ Birkbeck College, University of London; The Postgraduate Seminar, School of English and Drama, Queen Mary and Westfield College, University of London; and the fourth annual conference for ‘New Researchers in Maritime History,’ National Maritime Museum, Greenwich (UK). I am grateful to all three audiences for their helpful comments, and to all three institutions for their financial support.

eventually claimed for the queen a vast territory covering most of the water and much of the land in the northern hemisphere.

Dee's writings on navigation and empire cluster around 1576 to 1578 – the precise dates of Martin Frobisher's three voyages to the Canadian Arctic, an enterprise for which Dee was the primary scholarly advisor. The Frobisher connection is important, as we shall see, for Dee's Columbian encounter. Over eighty years after Columbus's voyages, Frobisher's saw the first extensive contact between English explorers and North American natives and the first attempts at a permanent colony. Although they were unsuccessful on almost every level, they thus mark England's belated entry into direct competition with Spain, and the beginning of its rise as an imperial power. Dee's marginalia, I would suggest, were produced in the context of the Frobisher voyages and reflect a key moment in that transfer of power.⁹

In my book I also argued that the textual exploration of Dee was as important as the geographical exploration of figures like Frobisher in effecting this transfer. Libraries played an especially important role in the launching and directing of voyages of exploration and colonization. This was certainly true of Dee and his massive collection; but it was equally true of Columbus. Recent work has revealed the extent to which his own readings both enabled and framed his New World encounter. The Biblioteca Colombina, as it is now known, has been largely dispersed; but it still contains a number of books that belonged to Columbus and bear his marginal annotations.¹⁰ And in relating these readings to the two men's often enigmatic texts and actions, scholars have turned to similar sources and models: a recent description of Columbus as "a Hermetic character" who "was aware, it would appear, of his existence on the cusp of two temporal worlds – the Medieval and the Renaissance," would not be at all out of place in a book on Dee.¹¹ Dee's Columbian encounter, then, represents more than just a curious and hitherto unknown chapter in the reception of Columbus in early modern England. This meeting in the margins of the book that Washington Irving called "the cornerstone of the history of the American continent"¹² provides the occasion for some further thoughts on Dee's reading practices (offering a sustained example of the kind that I was unable to deliver in my book), on English imperialism, and on the modes of cross-cultural contact in sixteenth-century Europe.

II

One of the most consistent features of Dee's marginalia as a whole is their attention to the conditions of textual production and reception: he regularly notes any reference in the text to the author's life as well as the authorship, ownership, or use of any other texts.¹³ The very first marginalia in *The Life of Columbus* concern Ferdinand's textual legacy. Next to the passage, "I, who had sailed with [Columbus] for some time, and had written of lesser things," Dee jotted, "Note other bokes of this Author."¹⁴ But Dee was even more interested in Ferdinand's ownership of books – not surprisingly, since Ferdinand was perhaps the most serious bibliophile of his day. I have already mentioned that Columbus founded a great library; but it was Ferdinand who turned it into what must have been an unrivalled institution. He

quickly abandoned his career as a colonial administrator to devote himself to book-collecting and the advancement of learning; and by the 1520s the collection had evidently achieved almost universal coverage.¹⁵ A dedicatory epistle in the *Life* praised the collection in the following terms: "Ferdinand [...] left to the cathedral of Seville [...] a library that was not only very large but rich, full of the rarest works in all the sciences and regarded by all who have seen it as one of the most remarkable things in all Europe."¹⁶ Dee tagged the passage with the simple word, "Bibliotheca", but it must have had particular resonance for his own "Bibliotheca" in Mortlake.

These notes, like the ones in which Dee provided information about when and where an author lived, and where other related books could be obtained, owe much to the uncertainties of textual transmission in his day – especially the difficulty of identifying and accessing books in an age before lending libraries or national libraries and in which cataloguing was still very primitive. In the maritime sphere the textual record was even more uncertain. First, Dee knew how important it was – when places and phenomena were being observed, potentially, for the first time – for explorers to keep detailed records. Reading that "the Admiral was very careful to keep a journal of all that happened on the voyage: wind directions and currents, the distance run by each ship, and all that they sighted on the way," Dee wrote in the margin, "Note what things are to be noted in a voyage by Sea."¹⁷ On more than one occasion Dee was responsible for briefing English mariners on precisely this practice and, in fact, played a significant role in the development of ships' logs.¹⁸ Dee was especially interested in Columbus's techniques for ensuring that reports of his discoveries would make it back home even if he did not. In Chapter 37 Ferdinand cites a dramatic passage from his father's log when, on 14 February 1493, a storm scattered Columbus's ships:

Then, with my thoughts in this whirl, I thought upon Your Highnesses, and considered some means whereby, even were I dead and the ship lost, you might get news of the success of my voyage [...] Therefore I wrote on a parchment, as briefly as the state of things required, how I had discovered those lands as I had promised to do; the length of the voyage and the route thither; the goodness of the country and the customs of its inhabitants; and how I had left Your Highnesses' vassals in possession of all I had discovered. This writing, folded and sealed, I addressed to your Highnesses with a written promise of 1,000 ducats to whoever should deliver it sealed to you [...] I straightaway had a great wooden barrel brought to me, and having wrapped the writing in a wax cloth and put it in a cake or loaf of wax, I dropped it into the barrel, which I made secure with hoops and cast into the sea; and all thought this was an act of devotion.

Along the top of that page Dee wrote, "Note these Practices to saue his Letters and Aduertisements to the King of Castile."¹⁹

Geographical and navigational notations were themselves subject to uncertainty, as previously canonical texts and previously current maps were being rendered obsolete by new experiences.²⁰ Not surprisingly, Dee's marginalia display a constant concern with Columbus's itinerary; with the distances he travelled and the means he used to measure them; and with the location of various points in the New World. For the Spaniards and their competitors, the most celebrated and contested location was, naturally, their first site of contact. Dee identified this spot in Ferdinand's narrative

by noting, “The first place of the Spaniards inhabiting and the Rutter [or directions] how to arrive at it.” In several places, Dee commented on Columbus’s mistaken landfall: he drew special attention to the passage, “[he] was mistaken in his belief that the first lands to which one would come would be Cathay and the empire of the Great Khan.”²¹ Given his own goal of finding a way around the Americas to Cathay – which was, after all, the initial purpose of Frobisher’s voyages – Dee was extremely attentive to Ferdinand’s summary of classical and medieval sources on the subject (particularly those that had led to Columbus’s mistake).

Columbus’s reckonings – and Ferdinand’s accounts – were full of inconsistencies, and Dee was careful to note “A marvaylous error in Latitude”,²² a “great error in Mariners reckoning”,²³ and a “Diuersitie in Reconing”.²⁴ His own work on the science of navigation, especially in the polar regions, brought him up against the vexing problem of magnetic variation; and at several points he drew attention to “the variation of the Cumpas.”²⁵

There was almost as much variation in Columbus’s place-names as in his reckoning; and in a string of notes Dee struggled to sort out the group of names apparently given to single islands, and the single names given to groups of islands. When Ferdinand names several “sub-polar islands” in Chapter 9 – such as Friseland, Greenland, and (most important for Dee’s claims on behalf of a British Empire) St. Brendan’s Isle – Dee’s pen was predictably active.

Elsewhere I have discussed Dee’s reliance on, and propagation of, the myth that 300 years before Columbus, the Welsh Prince Madoc sailed to America and left behind a tribe of Welsh Indians.²⁶ One of the main lines of proof for this surprisingly persistent myth was a perceived similarity between the Welsh language and certain Native American dialects. In Gwyn Williams’s fascinating account of this story, there is a chapter entitled, “Marginal Madoc”²⁷ – and Madoc makes several appearances in the margins of Dee’s Columbus. In the bottom margin of sig. M7^v, Dee speculated that the word “Zaunia” derived from “the Welsh pronunciation of Iohn,” and that “Huino” was “perhaps so named of some Owen which cam with Madoc ap Owen Gwynned.” When Ferdinand reported that the Indians recite the names of their ancestors, Dee found another Welsh parallel: “Note [...] custom of [...] rehersing the names of theyr parents [...] after the Welsh manner.”

These linguistic fantasies notwithstanding, it should be clear that Dee’s concerns were remarkably pragmatic. There is very little attention, here, to prophecy or the supernatural – and, indeed, surprisingly little in the way of wonder, which Stephen Greenblatt has identified as the primary mode by which early modern Europeans apprehended the New World and its inhabitants.²⁸ In his related annotations in André Thevet’s *Cosmographie Universelle*, by contrast, Dee was more clearly interested in novelties and curiosities, noting the people of Madagascar who live to the age of 160, “the first Invention of Letters Hieroglyphic,” and the people of Zipangu [Japan] who “eat flyes.”²⁹ Dee’s Columbian marginalia focus above all on Columbus’s practical methods and “policies” – perhaps the most commonly used word in the notes (after, of course, “nota/note” itself). Some of these concern the voyages them-

selves, as in Dee's notes on the number of men on the ships or the reward for the first man who spotted land. Others concern the establishment of a colony on that land: he notes descriptions of forts and deliberations about leaving men behind. Most, however, are policies for successful interaction with, and exploitation of, the indigenous population. Dee identifies tricks for securing the faith of the people, extracting information from them, and – what would become the most familiar colonial scenario of all – exchanging worthless trinkets for valuable commodities.

A sickening number of these practices that Dee labels "policies" entailed the forceful seizure of natives: on G6^r Dee noted that "7 interpreters [were] taken," on H3^v that "12 indians [were] taken," on H7^v that "a woman [was] gotten," on H8^v that "An indian in a canoe [was] taken," and so on. This, along with the detailed discussions of how to procure the natives' permission to leave men behind, and how many men were needed to keep that colony safe, takes us close, once again, to Frobisher's own voyages, in which a total of four Inuit natives were seized (one of whom while still in his kayak), and which – had not a ship gone down carrying building materials and provisions, would have led to the first English winter colony in the New World.

Frobisher's venture is also invoked by Dee's careful attention to any mention of gold. Gold was the master commodity and at least the indirect object of all European exploration, so it is not surprising to find Dee noting "a shew of gold"³⁰ and, later, a "great quantity of gold".³¹ But, more specifically, Dee attended to the fact that gold was accidentally discovered on Columbus's first voyage and that in subsequent voyages hired labourers from Spain were taken to mine the ore – a sequence of events which would be precisely replayed in Frobisher's voyages, whose first voyage created an unprecedented gold rush and whose second and third voyages were equipped primarily as mining ventures.

Not all of Dee's notes were quite so ruthless about the domination of the New World. Annotations in the *Life of Columbus* and related volumes reveal Dee's fascination with natural phenomena: at one place he noted, "Flying fish" in the margin,³² and along the edge of another page he jotted, "Melons in two monthes grown; Cucumbers in 20 dayes; Wheat in a month."³³ He was also capable of a more sympathetic attitude toward the native population: he noted several descriptions of the people (especially those of Cuba, as opposed to the hostile "Caribi") which described them as gentle, tractable, and apt to learn languages; and compared their social and religious institutions favourably to those of Europe.

But one senses that this is less ethnographic admiration, of the sort found in Thomas Harriot's *Brief and True Report of the New Found Land of Virginia* (1588), than an attempt to play up the atrocities committed by the Spanish *conquistadores* on an innocent population. Ferdinand was not especially concerned with screening out Spanish abuses (except those that directly implicated his father), and his text provided much fuel for Dee's anti-Spanish sentiments. He identified several descriptions of what he labelled "ill rule" among the colonists, such as the point in the narrative when Columbus returned to Española and "asked about the Christians

he had left there and was told that some had died of sickness, some had separated from the rest, and [...] all had four or five wives apiece.”³⁴ Dee suggested in the margin of Q3^v that the Spaniards were too harsh in punishing the Indians and too lenient with their own men, and observed that “The Indians [were] seduced by the Spaniards to vse violence.”³⁵ When Ferdinand suggested that “The Admiral would not permit his men to take anything [...] [so] that the Indians might not regard the Christians as thieves,” Dee quipped, “Wel done if you had kept that rule allwayes.”³⁶ And when Ferdinand reported that some of the settlers had almost degenerated into cannibals themselves (“some, like Caribs, proposed to eat the Indians aboard [...] and would have done it, too, if the Admiral had not forbidden it, saying that as [...] human beings, they should not be treated worse than others”) Dee scathingly remarked, “Well sayd, if you allwayes made such account of them.”³⁷

But Dee saved his most vehemently critical, and explicitly political, outbursts for Ferdinand’s frequent assertions of Spain’s claims to territorial possessions in the New World. Dee was well aware of the obstacle the Spanish claims presented to his “discovery and recovery enterprise.” What he did with Ferdinand’s account is the textual equivalent of Francis Drake’s piratical raids on Spanish ships: he learned what he could about the various methods of taking possession (the legal procedures, military strategies, ritual dedications, etc.) before refuting the validity of their application to Spain.³⁸ On L5^v Dee wrote along the top margin, “A more close and just title by the Popes gift then by force of sword: neyther good, as it was vsed,” and alongside the text on that page he entered two simple words – “Possession” and “Noe,” echoing a marginal note from several pages back, “No good Possession.”

Ferdinand’s text ends with a brief section, probably added by the translator, which describes Columbus’s funeral and celebrates his legacy. On these last few pages Dee hung a final string of objections: “Where?”, “Note Lyes”, “Note this Aequivocation”, “By what justice?”. In the end, Dee could only match the text’s triumphant conclusion – “History knows of no man who ever did the like, wherefore the world will ever remember the first discoverer of the West Indies” – with a final, emphatic “Not true.”

III

As in the sources I have discussed in my previous accounts, this encounter reveals a Dee who is more concerned with advocating policies gleaned from his reading of historical texts than with establishing “a quasi-mystical, quasi-scientific, quasi-religious world order” based on his own prophecies.³⁹ Nevertheless, history and prophecy are inextricably linked in Renaissance thought and its extensions into the New World; and there is evidence to suggest that, for at least a brief period, Dee gave in to a “prophetic impulse” not unlike that which had driven Columbus to the ends of the earth. Djelal Kadir’s provocative study, *Columbus and the Ends of the Earth: Europe’s Prophetic Rhetoric as Conquering Ideology*, describes Columbus’s “self-perceived role as providential agent with [...] a prophetic task”,⁴⁰ in which he is “the elect hero and privileged emissary to play out the last and climactic act of this cosmic theater.”⁴¹ And, in a useful paper describing the 1583 angelic conversations

which accompanied (and to some extent explained) Dee's departure from England and his withdrawal from the imperial projects he had helped to set in motion, Stephen Clucas finds a new strain of apocalyptic prophecy: "Dee hoped for a divine millennial comedy," he concludes, "whose catastrophe would be universal forgiveness and the apotheosis of his nation."⁴² While I clearly underplayed these important sources in my previous account of Dee's role in English imperial expansion, I remain wary of a tendency to mystify the terms of Dee's highly rhetorical conversations (angelic and otherwise), and to project them onto circumstances in which they may not apply.

In tracing the parallels between Dee's and Columbus's projects there is a danger of collapsing the differences between the two explorers, as well as obscuring the particular circumstances of their own lives. Kadir suggests that "the prophetic impulse exhorts peregrination to the peripheries, to the thresholds or liminalities of time-space [...] It obliges one to live beyond one's present and [...] in an untenable terrain."⁴³ This certainly applies to the exploration represented by Dee's angelic conversations as much as to the voyages of Columbus. But it is not much help in placing Dee's encounter with Columbus; and I would suggest that we need to attend to a different, and more precise, set of time-space coordinates. Like England's interest in the New World in general, Dee's Columbian encounter was belated and second-hand. His exploration, which took place in the margins of a book in a library, was that of the armchair traveller. And it took place at a moment of significant political and professional insecurity.

In a discussion of Columbus's prophetic writings published the same year as Kadir's, Valerie Flint offered a different reading of his prophetic posture: she suggested that "the great need he had for a 'finem honestum' [honest end], a justifying higher motive for his pursuit of gold for his sovereigns and rewards for his family [...] might bring us to look now with new eyes upon the nature of Columbus's attachment to the [apocalyptic and messianic messages]."⁴⁴ Other work on prophecy in the early modern period has stressed that it was usually deployed by marginal figures, and while it was usually concerned with some form of national legitimation it was also a means of personal legitimation.⁴⁵ We may not think of figures like Dee or, especially, Columbus as marginal figures in need of legitimation; but they felt, and expressed, this need acutely. Despite the status which their explorations granted them, both Dee and Columbus – like Doctor Faustus – were ultimately bound by the constraints of service.

There is, in fact, one significant moment of sympathy in Dee's Columbian marginalia, where he wrote "True" rather than "Not true" – and it concerned Columbus the frustrated advocate of exploration rather than Columbus the celebrated prophet of empire. In the early chapters of the work, Ferdinand recounted how Columbus made the rounds of the European courts seeking a patron for his voyages – including England's own King Henry VII (whose counsellors Dee faulted for losing this opportunity). The passage which evoked Dee's sympathetic agreement concerns Queen Isabella's reluctance to invest and reads, "As for the foolish argument that it would discredit the Queen to have contributed to the project

in case the Admiral did not fulfill his promises, he was rather of the opinion that the Sovereigns would be regarded as generous and high-minded princes for having tried to penetrate the secrets of the universe [...].”⁴⁶

The work of Mary Helms throws some light on the position that Dee and Columbus found themselves in, which was at once powerful and precarious. In her book, *Ulysses' Sail*, Helms traces an association, in pre-modern cultures, between esoteric knowledge, travel, and socio-professional status: “To the extent [...] that geographically distant places, peoples and experiences are perceived [...] within essentially supernatural or cosmological contexts, then knowledge of, or acquaintance with, geographically distant places, peoples and things rightfully falls within the domain of political-religious specialists whose job it is to deal with ‘mysteries’.”⁴⁷ Lisa Jardine and Jerry Brotton have recently applied Helms’s insights to the world of Renaissance ambassadors;⁴⁸ but they may be even more applicable to less official, more mysterious emissaries like Columbus and Dee.

IV

In justifying his own “desire to speak with the dead,” Stephen Greenblatt explains that “the dead [have] contrived to leave textual traces of themselves, and those traces make themselves heard in the voices of the living. Many of the traces have little resonance, though every one, even the most trivial or tedious, contains some fragment of lost life; others seem uncannily full of the will to be heard.”⁴⁹ It may well seem that the traces of Dee’s marginal encounter with Columbus are more trivial and tedious than uncannily full of the will to be heard, and it is easy to be disappointed by such texts. It should be clear even from the *Life of Columbus* that Dee’s annotations lack, for the most part, the personal, creative, and emotional intensity that modern readers have come to look for in engagements with texts. Likewise, they may seem less resonant than the dramatic stories of exploration and piracy which have sustained and shaped Elizabethan maritime history.

But if they are seen in the context of a range of transactions – if they are set alongside not only the texts which they annotated but the explorations which they informed – such marginal texts do afford an unexpected intimacy and vitality. They may also take us closer to the important ways in which texts mediated both personal lives and power politics in the early modern period. And, finally, in what they do if not always in what they say, they may be an unexpected key to the “secrets of the universe” that Dee and Columbus tried to master and offer both to their patrons and to posterity.

NOTES

¹ *Historie Del S.D. Fernando Colombo; Nelle quali s'ha particolare, & vera relatione della vita, & de' fatti dell' Ammiraglio D. CHRISTOFORO COLOMBO, suo padre* (Venetia, 1571). First published in Italian thirty-two years after Ferdinand's death, this text took an appropriately eccentric route to the press. Ferdinand wrote his account in Spain and in Spanish, but it remained unpublished during his life. After his death in 1539 the

manuscript found its way into the hands of the Genoese physician Baliano de Fornari, who finally took it to Venice to be translated by Alfonso Ulloa. When Fornari died, not only were the projected Spanish and Latin editions abandoned but the Spanish original was lost. For a useful account of the text, and a listing of recent editions, see the English translation of Benjamin Keen, *The Life of the Admiral Christopher Columbus, by his Son, Ferdinand* (New Brunswick, NJ: Rutgers University Press, 1958; repr., 1992), whose edition I cite throughout.

² Dee traveled to the Continent in 1571 to consult with doctors about the queen's illness, and it is possible that he acquired the book on that trip.

³ See *R&W* 1101. The entry reads, "Historia del mondo nuovo di Fernando Colombo. 8o Ven. 1571." This misleading description might be explained by the full title of the work: after "suo padre" the title-page continues, "Et dello scoprimento, ch'egli fece dell'INDIE Occidentali, dette MONDO NUOVO, hora possedute dal Sereniss. Re Catolico." If we imagine the title-page being quickly scanned during a hasty inventory, it is easy to see how the words "historia" (the first word) and "mondo nuovo" (in all caps) would be picked out.

⁴ The British Library has three copies of this text: the one containing Dee's annotations is shelf-mark 615.d.7.

⁵ I want to thank Julian Roberts for confirming my attribution. See his comments in his essay in this volume.

⁶ William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995), Chapter 7.

⁷ See especially E. G. R. Taylor, *Tudor Geography, 1485-1583* (London: Methuen, 1930) and D.W. Waters, *The Art of Navigation in England in Elizabethan and Early Stuart Times* (London: Hollis and Carter, 1958).

⁸ John Dee, *Brytanici Imperii Limites*, British Library, Additional MS 59681, 29.

⁹ Needless to say, this was not the only venture which Dee helped to advance, nor were Dee's texts the only ones which tried to come to terms with Columbus and Spanish imperial claims.

¹⁰ On Columbus's reading see, most recently, Valerie Flint, *The Imaginative Landscape of Christopher Columbus* (Princeton: Princeton University Press, 1992). On Columbus's own texts and their Renaissance readers see Margarita Zamora, *Reading Columbus* (Berkeley: University of California Press, 1993) – especially her chapter, "In the Margins of Columbus."

¹¹ Djelal Kadir, *Columbus and the Ends of the Earth: Europe's Prophetic Rhetoric as Conquering Ideology* (Berkeley: University of California Press, 1992), 1-2. In fact, my own book opens with an almost identical formulation.

¹² Cited on the back cover of Keen, *Life of the Admiral Christopher Columbus*.

¹³ Sherman, 85-86.

¹⁴ Sig. A1^r in the original, p. lxxi in Keen's translation. In all subsequent citations of Ferdinand's text I will provide the page number on which the original Italian passage appears and the page number from Keen's English translation. When citing Dee's marginalia alone I will only refer to the original text. Dee's marginalia are in Latin, Italian and English: I have retained the original spelling and punctuation for those in English and have silently translated the rest.

¹⁵ By the estimate of John Boyd Thacher, Ferdinand "gathered no less than 15,370 books and manuscripts" (Keen, viii). A new descriptive catalogue of the library is currently being compiled from Ferdinand's own "Repertorios": *Catálogo Concordado de la Biblioteca de Hernando Colón*, ed. Tomás Marín Martínez, José Manuel Ruiz Asencio, and Klaus Wagner (Seville: Cabilado de la Catedral de Sevilla, 1993).

¹⁶ *Historie Del S.D. Fernando Colombo*, sig. a3^r; lxxiv.

¹⁷ *Historie Del S.D. Fernando Colombo*, sig. E6^r; 45.

¹⁸ David W. Waters, *The Art of Navigation in England in Elizabethan and Early Stuart Times* (London: Hollis and Carter, 1958).

¹⁹ This appears in Chapter 36 (sigs. K4^v-K5^r) in the original, Chapter 37 (92) in Keen.

²⁰ Anthony Grafton, *New Worlds, Ancient Texts: The Power of Tradition and the Shock of Discovery* (Cambridge, MA: The Belknap Press, 1992), esp. Chapter 2.

²¹ *Historie Del S.D. Fernando Colombo*, sig. C3^r.

²² *Historie Del S.D. Fernando Colombo*, sig. T5^v.

²³ *Historie Del S.D. Fernando Colombo*, sig. T5^v.

²⁴ *Historie Del S.D. Fernando Colombo*, sig. F7^v.

²⁵ *Historie Del S.D. Fernando Colombo*, sigs. T5^r, X3^v.

²⁶ Sherman, 187-189.

²⁷ Gwyn Williams, *Madoc: The Legend of the Welsh Discovery of America* (Oxford: Oxford University Press, 1987).

²⁸ Stephen Greenblatt, *Marvellous Possessions: The Wonder of the New World* (Chicago: University of Chicago Press, 1991).

²⁹ Dee's copy of Vol.1 of this 2-volume work (*R&W* 238) is now at the library of the Royal College of Physicians, London (shelf-mark D5/8, 48f). For a sophisticated reading of 'the geographical imagination' of Thevet – whose career parallels Dee's in some interesting ways – see Frank Lestringant, *Mapping the Renaissance World: The Geographical Imagination in the Age of Discovery*. Trans. by David Fausett (Berkeley: University of California Press, 1994).

³⁰ *Historie Del S.D. Fernando Colombo*, sig. H5^v.

³¹ *Historie Del S.D. Fernando Colombo*, sig. I5^v.

³² *Historie Del S.D. Fernando Colombo*, sig. F6^r.

³³ *Historie Del S.D. Fernando Colombo*, sig. O2^v.

³⁴ *Historie Del S.D. Fernando Colombo*, sig. N3^r; 118.

³⁵ *Historie Del S.D. Fernando Colombo*, sig. Y1^v.

³⁶ *Historie Del S.D. Fernando Colombo*, sig. G8^r; 67.

³⁷ *Historie Del S.D. Fernando Colombo*, sig. T5^v; 173.

³⁸ For a useful comparative perspective on these practices see Patricia Seed, *Ceremonies of Possession in Europe's Conquest of the New World, 1492-1640* (Cambridge: Cambridge University Press, 1995).

³⁹ Gwyn Williams, "Welsh Wizard and British Empire: Dr. John Dee and a Welsh Identity." *The Gwyn Jones Lecture* (Cardiff: University College Cardiff Press, 1980), 6.

⁴⁰ Kadir, 2.

⁴¹ Kadir, x. This approach to Columbus has been increasingly popular in the 1980s and 90s: cf. Pauline Moffitt Watts, "Prophecy and Discovery: On the Spiritual Origins of Christopher Columbus's 'Enterprise of the Indies'", *American Historical Review*, 90 (1985): 73-102, and Alain Milhou, *Colón y su mentalidad mesiánica franciscanista española* (Valladolid: Casa-Museo de Colon, 1983). For an English edition and explication of the key text, see August Kling and Delno C. West, trans. & eds., *The Libro de las Profecias of Christopher Columbus* (Gainesville: University of Florida Press, 1991).

⁴² Stephen Clucas, "'Thow shalt prevayle agaynst them': John Dee and the Politics of the Elizabethan Court 1575-1585" – a paper delivered at Northern Arizona University, 13 February 1996. I am grateful to Stephen Clucas for sharing a copy of this paper with me and for ongoing discussions of Dee and his contemporaries.

⁴³ Kadir, 20.

⁴⁴ Flint, 208.

⁴⁵ Richard L. Kagan, *Lucretia's Dreams: Politics and Prophecy in Sixteenth-Century Spain* (Berkeley: University of California Press, 1990); Phyllis Mack, *Visionary Women: Ecstatic Prophecy in 17th-Century England* (Berkeley: University of California Press, 1992); Diane Purkiss, "Producing the Voice, Consuming the Body: Women Prophets of the 17th Century" in Isobel Grundy and Susan Wiseman, eds., *Women, Writing, History: 1640 – 1799* (Athens: University of Georgia Press, 1992).

⁴⁶ *Historie Del S.D. Fernando Colombo*, sig. E5^r, 43.

⁴⁷ Mary W. Helms, *Ulysses' Sail: An Ethnographic Odyssey of Power, Knowledge, and Geographical Distance* (Princeton: Princeton University Press, 1988), 5.

⁴⁸ I am grateful for the chance to read some of their work in progress on this topic.

⁴⁹ Stephen Greenblatt, *Shakespearean Negotiations* (Berkeley: University of California Press, 1988), 1.

PART THREE: DEE AND THE OCCULT SCIENCES

KAREN DE LEÓN-JONES

JOHN DEE AND THE KABBALAH

IS THERE A CHRISTIAN KABBALAH ?

Recent scholarly debate on the impact of the Kabbalah, a form of Jewish mysticism, on the development of early modern Christian thought has been divided over whether the reception of the Kabbalah was motivated by philo- or anti-Semitism. Even in the same volume, contrasting opinions may be upheld by critics.¹ Debates are welcome, however, as they demonstrate not only the recognition of influence of Judaism on Christianity, but also because they show the progress made not only by scholarship on Jewish-Christian relations but also in what was once called the “occult philosophy”. The degree of detailed research indicates that no one seriously doubts that there were Christians not only familiar with Jewish Kabbalah but who considered themselves to be practicing Kabbalists while remaining wholly within whatever form of Christianity they embraced, whether Catholic or Protestant. Current research into the Jewish tradition and its relationship to Christian thought by scholars of the calibre of Moshe Idel and David Ruderman² has moved a long way from the initial groundbreaking studies of Gershom Scholem on Jewish mysticism and Kabbalah, or from Frances Yates, Paolo Rossi and D. P. Walker, who first mentioned the more “esoteric” and pluralistic aspects of *prisca theologia* in Christian intellectual circles and whose writings are now familiar to anyone undertaking the study of early modern thought. Yates in particular played an important role in signalling the presence of the Kabbalah in the Neoplatonic circles in England and on the Continent, inspired by the Italian School founded by Marsilio Ficino and Giovanni Pico della Mirandola.

Undoubtedly there were Christian practitioners of the Kabbalah. Pico was most likely one of them, however Ficino, who initially introduced the Kabbalah in his philosophical writings, was certainly not one of them. The issue of who is a Kabbalist is a complex one, as there is no consensus among scholars as to how to define the term. Each critic or historian has used the term “Kabbalist” differently, sometimes to indicate Christian Hebraic scholars who focused specifically on recuperating, translating and commenting Jewish Kabbalistic works, sometimes simply to indicate a Christian thinker who makes essentially very general remarks on the subject. Kabbalah was common knowledge in the sixteenth century.

I would argue that it was an intellectual trend that can be compared to the popularity of some critical methodologies in the twentieth century, particularly to some of the hermeneutical approaches such as Deconstructionism, that can be found in more or less complex forms in the writings of scholars and critics who more or less

grasp the material. Thus I hesitate to apply the term “Kabbalist” to any thinker, especially Christian pluralists or syncretists of the early modern period, preferring instead to consider each case individually, keeping in mind that Kabbalah is a phenomenon of the sixteenth century intellectual world. I must emphasise that I do not, *a priori*, assume or exclude the possibility that Christians can be Kabbalists: rather I accept that there is a form of Christian Kabbalah, and Christians who considered themselves practitioners or at least initiates. Whether present scholarship or they themselves would have used the term “Kabbalist” to designate themselves, is another question.

Among the thinkers Yates labelled a “Christian Cabalist” is the mathematician John Dee. In the sixteenth century many mathematicians, for example, Johannes Kepler and Tycho Brahe, were familiar with at least the reputed numerological aspect of the Kabbalah, although the greatest mathematician interested in the Kabbalistic tradition was probably Leibniz, a century later. Ever visionary in her scope, the basic premise of Yates’s famous work, *The Occult Philosophy in the Elizabethan Age* argues in favour of a significant and widespread influence of the Jewish tradition, that is the Kabbalah, on Elizabethan thought: she even approaches the somewhat tricky issue of philo- versus anti-Semitism.³ For Yates, Dee is part of an establishment context of Kabbalah that permeates all of his *opus*: from mathematical speculation to imperial propaganda, and of course angel magic. Of his stance on the Jews, she is rather silent, as in fact there is little material for discussion given that Dee’s writings on Kabbalah are nearly asemitic. While I disagree that Dee is an inherently and intrinsically Hermetic-Kabbalistic thinker, let alone necessarily a true “Christian Cabalist”, I do agree with Yates’s insistence that Dee’s use of Kabbalah is intrinsic to his mathematical theorizing, as outlined in his early works on Euclidean geometry. As Yates rightly pointed out, the extant texts that designate Dee’s familiarity with Kabbalah are his renowned preface to Euclid’s geometry, his *Aphorisms* and the *Monas Hieroglyphica* in which he puts forth a clear argument for the mathematical basis of Kabbalah.

IS JOHN DEE A KABBALIST?

In his *Monas Hieroglyphica* (1564), Dee proposes what he terms the “real Kabbalah”, to set himself apart from the Christian Kabbalistic tradition. In doing so, the uniqueness of his interpretation and the lack of self-definition as a Kabbalist make it difficult to define him as such. Like many of his contemporaries, Dee was familiar with the Christian form of Jewish mysticism known as the Kabbalah, which came into vogue in Renaissance Christian philosophical circles after Giovanni Pico della Mirandola’s publication of the (in)famous *Conclusions*. Various Christian Kabbalistic texts by Pico, Johannes Reuchlin and others were owned by Dee,⁴ even some Jewish ones (those that circulated more freely in Christian circles), often with elaborate commentary. Of the Christian adaptations of the Kabbalah, the thinkers most influential on Dee have already been identified as most likely to have been Cornelius Agrippa and Reuchlin, two of the most renowned thinkers of the period, known even among Jewish Kabbalistic circles. Reuchlin’s *De arte cabalistica* (1517) and Agrippa’s *De occulta philosophia* (1533)⁵ were *de rigueur* reading, often

treated as textbooks or reference guides, for aspiring students of the Kabbalah. The general influence of Reuchlin on Dee, well documented by scholars and attested to by the numerous heavily annotated works by him present in Dee's personal library, will be discussed later. For now it is crucial to make the point that the influence of Reuchlin's Kabbalistic precepts is manifest in Dee's careful definition of the term "Kabbalah" that implies Reuchlin's differentiation of the significance of the term "Kabbalist" and its employment.

In the preface to the *Monas*, Dee claims that the Jewish Kabbalah focuses on "what is said", and is based entirely on grammar, while his is a Kabbalah of "what is."⁶ Therefore Dee consciously sets himself apart from what he considers traditional Christian Kabbalists, emphasizing his differences with them and the uniqueness of his work, rather than points in common. Among these traditionalists are all the Christian Hebraists, who learned Hebrew, often from a converted Jew or New Christian, so as to study the original text of the Old Testament and the Kabbalah. The trend was started by Pico, who learned Hebrew and was initiated into the Kabbalah by the New Christian Flavius Mithridates.⁷ Many others followed, especially in Italy, where there were notable Jewish thinkers of a Neoplatonic and Kabbalistic bent such as Leon Ebreo and Johannes Alemanno (who knew Ficino), to name a few, and where for a period relations between the faiths permitted intellectual exchange.⁸

A Hebraist, Reuchlin himself was heavily influenced by the Italian Neoplatonic School of the fifteenth century originating in Ficino and Pico, seen by him to have directly inherited the Jewish Tradition.⁹ Skilled in the language, Reuchlin published a Hebrew grammar and dictionary, for beginners and specialists alike. Although inspired by Pico's pluralistic vision, his philological knowledge of Jewish texts surpassed Pico's, as does his mathematical interest. It is likely that Dee was more influenced by Reuchlin in his Kabbalistic thinking than by either Pico or Agrippa.¹⁰ Let us not forget that Dee's analysis of Kabbalah is intimately linked to his mathematical theories based on Euclidean geometry and Pythagorean theorems. It was Reuchlin who ably defended the idea, inherited by the Italian Neoplatonic School in a mathematically undeveloped form, that Pythagoreanism was directly related to Jewish Kabbalah.¹¹ He goes so far as to have one of the characters in his famous dialogue, *De arte cabalistica*, define Pythagoreanism in the same manner as Kabbalah: "The Pythagorean is he who gives credence to what is said, remains silent to begin with, and understands all the precepts."¹²

By approaching the Kabbalah in a highly mathematical manner, playing on and developing Kabbalistic hermeneutic techniques, and transforming them into scientific proofs, it is clear that what Dee develops in his Kabbalah are the Pythagorean precepts, that Reuchlin already argued were Kabbalistic in his *De arte cabalistica* (1517). Probably Dee's primary source for the *Monas Hieroglyphica*, it is the only work by Dee that he claims as "Kabbalistic". For Dee, Reuchlin's work exposes the "real Kabbalah" precisely by demonstrating the proofs of the validity of Kabbalah in Pythagorean-like theorems. In Book Two of his *De arte cabalistica*, for example, Reuchlin argued that Pythagoreanism had its origins in Kabbalistic doctrines, concluding that Pythagoras had gleaned his ideas concerning the creation and

use of symbols from Kabbalah, and that he employed the techniques of *gematria*, *notarikon* and *temurah* to derive such things as the Tetractys or Quarternary. Accordingly, for Reuchlin the Kabbalah is a sort of symbolic theology, where words and letters are codes for other things found in Nature. In a more radical interpretation, Dee reduces Reuchlin's definition of the Kabbalah to one universal symbol that contains all the theoretical power of the universe: the hieroglyph of the Monas. The symbol of the Monas encompasses all of the elements of the structure of the universe, all of the theories that illustrate the process of Creation, and contains all of the revelations of the primary sources whether mathematical, philosophical or technological.

If the Monas contains the revelations of the Kabbalah, does this make Dee a Kabbalist? Conveniently, the question of who is and is not a Kabbalist is an ancient one, that Reuchlin attempted to resolve in the following manner in his *Ars*:

Kabbalah [*Cabala*] is a matter of divine revelation handed down to further the contemplation of the distinct Forms and of God, contemplation bringing salvation; Kabbalah is the receiving of this through symbols. Those who are given this by the breath of heaven are known as Kabbalics [*Cabalici*]; their pupils we will call Kabbaleans [*Cabaleos*]; and those who attempt the imitation of these are properly called Kabbalists [*Cabalistæ*]. Exactly this, day by day, they sweat over their published works.¹³

A clear hierarchy, separating the mystic believer from the lay receiver, with a barb at the academics who publish on the material. Already in his time, Reuchlin saw the diffusion of Kabbalah. The last category is seemingly the one Dee fits into, as he is not obviously a receptor of divine revelation in his Kabbalistic writings: one may argue that he is in his angel communications, but these works are marginally related to Kabbalah, at best. We shall see that although his knowledge of Kabbalah itself is certainly of the latter kind, thus of a Kabbalist in the Reuchlinian sense, Dee's aspirations would be to be considered someone who has achieved the symbolic stratum of the Kabbaleans.

For our purposes, as twentieth-century scholars of the Kabbalah, the term "Kabbalist" no longer has the meaning intended by Reuchlin as the tripartite distinction is not made. Yates certainly did not make such distinctions; she also certainly thought of Dee, among others, as a practitioner of what she terms "natural magic" or the "Hermetic-cabalistic" magic. Unfortunately, none of these definitions are entirely satisfactory, as even if consensus were achieved on categories of Kabbalistic practice or influence, the degree of initiation would nonetheless remain an issue. Sixteenth-century thought (I use the term carefully, as this comprises philosophy, theology, mathematics and sciences) is full of Kabbalah, in the loosest possible sense of the word. Encyclopaedias and dictionaries of the time employed its terminology or at least had a reference to Kabbalah. The first Kabbalistic texts printed were published by Christians, presumably because there was a market for them.¹⁴

My hesitation in labelling Dee or any Christian thinker who does not declare himself a Kabbalist as well as my arguments against Yates's labelling him and others as such, has been discussed at length elsewhere;¹⁵ essentially, it lies in the

facile access to and use of some Kabbalistic jargon or ideas during the sixteenth century that do not carry much philosophical or theological weight. Because Dee's otherwise prolific writings on the subject of the Kabbalah are limited to three short works with no significant carry over to others and because he is not interested in arguing in favour of a Kabbalistic vision of the Monas or espousing a Kabbalistic approach to English Protestant theology, I do not consider him a Kabbalist.

This said, I do not diminish the importance of the Kabbalah in the three works influenced by it: the preface to Euclid's geometry, Dee's *Aphorisms* and *Monas*. I will even go so far as to claim that these works do more than testify to the general diffusion of the Kabbalah in Elizabethan intellectual circles, but are a unique and interesting example of religious and scientific syncretism in the period. Where I draw the line is to declare that the *Monas*, the most complex and complete of the three works, is a radical new contribution to the development of Christian Kabbalah or that the Monas is a vehicle for Dee's personal and distinct Kabbalistic revelation. Kabbalah, as defined by Dee, is too real, the way numbers are invisible but "real", for it to transmit the inexpressible wonder and awe of Creation at the basis of the worship of the Judeo-Christian divinity.

To the question "Did Dee consider himself a Kabbalist?" I would answer in the negative. By carefully distancing himself from Christian Hebraicists, in vogue at the time in Reforming circles such as that of Philip Sidney, Dee emphasizes the scientific rather than the mystical concept of Kabbalah, that voids it of its particularly Jewish character and in turn eliminates all the pro-Reform rhetoric often associated with Christian Kabbalah. The rapture inspired or sought by the Kabbalah among Christians is well documented, one has only to think of the writings of Giordano Bruno, in the 1580s, who fused science with mysticism, whose polemical tone urged a reform of Christianity. What is original to Dee, is that the mystical language associated with the Kabbalah is totally lacking in the *Monas*. It is replaced by the use of Kabbalistic terms such as *gematria*, *temurah* and *notarikon* associated with numerologically based hermeneutical techniques. These are carefully interpreted in a Pythagorean vein, to disassociate the Kabbalistic techniques from their exegetical or grammatical use, and rather to emphasise their mathematical value. Through the Kabbalah, whose number mysticism is often reduced in its Christian form to number symbolism, he aspires to provide a new universal symbol whose mystical potential also has mathematical credibility. By doing so, Dee takes further the Christological interpretations of Kabbalistic precepts begun by Pico: the prophetic voice of the Kabbalah that Pico describes is here redefined and contained in the symbol of the mathematical universe, the monad, that Dee calls a cross. Although it is Reuchlin who stated that Kabbalah provides the symbolism that is the absolute basis of life,¹⁶ for him this is also a declaration of faith. For Dee, it is the generating life force of the universe, which derives from the divinity but is neither a definition nor a description of God. Crucially, the Monas is not a symbol to interact with, as the *sefirot*, manifestations of the divinity, may be for the Jewish or Christian Kabbalist. Without creating a direct relationship with the divine, at the basis of Reformed Christianity, the symbol of the Monas may have Christological and cosmological implications, but it is not a meditative device for the faithful to focus their belief upon.

This is a startling deviation from most Christian Kabbalistic thinkers, who place themselves in a long line of Jewish and Christian Kabbalistic authorities, and insist on the precedent not the innovation. Earlier generations of Christian Hebraicists hunted for rare and unpublished, untranslated Hebrew texts that could deepen their acquisition of the language as a means of penetrating the mysteries of the Kabbalah, forcing it to reveal the universal Truth of Christian fulfilment of Biblical prophecy. Rather than seek to translate and publish Hebrew works, Dee presents himself as the publisher of Pythagorean theorems and Euclidean Geometry: it is a return to the Greek basics. Kabbalah derives from and depends upon Greek culture, precursor in its own right of the Christian rationalist tradition. Furthermore, Dee is sidestepping the great debates of his time, centred around the Aristotelian School at Oxford and the Platonic school often associated with Christian Hebraicists, by returning to pre-Socratic thought. This said, again Reuchlin offers an alternative, by defending Pythagorean mathematics with the statement that the Arab mathematician Abubacher claimed that “Mathematical knowledge was still not perfect at the time of Aristotle.”¹⁷ Thinkers like Bruno who were contemporaries of Dee will resolve the issue differently, proposing a syncretic model that absorbs all of the above. Nicholas Clulee has convincingly outlined Dee’s polemic against traditional Kabbalah, and the fact that Dee retains only the link between Grammar and Mathematics, which Dee discusses in his Dedication to the *Monas*. Rather than basing his Kabbalah on language, Dee’s “alphabet of nature”, as most scholars agree to define it, is based on Euclidean Geometry and Pythagorean mathematics. Thus the “real Kabbalah” according to Dee is a mathematical Truth that can be proven concretely by numbers and spiritually in the profound revelations it offers as to the source of the power of Creation. The “Kabbalah of what exists” is a revelation of the potential of human knowledge and comprehension, as all the Arts are united in it, whose ultimate source may be God, but whose power is comprehensible and quantifiable. Dee approaches the Kabbalah as mathematics, treating the Kabbalistic principles he espouses as if they were theorems or hypotheses, while at the same time universalising his Kabbalah as an all-inclusive discipline. Dee then, is not easily labelled a Kabbalist, or even a Kabbalistic thinker, but one who utilizes certain specific aspects of the Kabbalah in a unique manner. It is precisely in this innovative interpretation of traditional Kabbalistic principles or techniques that the significance of the “real Kabbalah” postulated by Dee lies.

Ironically, creativity and innovation are what make it problematic to label Dee a Kabbalist. The term has certain implications. It implies adherence to certain practices and beliefs that Dee did not share. At the very least, those thinkers generally labelled Christian Kabbalists were dedicated to the study of the Hebrew texts, to promulgation and commentary much in the same manner as their Jewish models: two outstanding examples of this are of course Pico and Johannes Reuchlin. The term also implies the development of a Christian Kabbalistic system that incorporates within a syncretic philosophy the fundamental principles of the Jewish texts. At the basis of this system is always the cosmology of the *sefirot* that reveals the secret Names or aspects of God, and that when contemplated and meditated on lead to a direct mystical union with the Deity. Few of the Christian thinkers who delved into the teachings of the Kabbalah could really be labelled Kabbalists. Most

Christians interested in Kabbalah avoided delving more than necessary into the often obscure depths of the discipline, relying predominantly on Christian texts and applying the art in a wholly superficial manner. At best they may be deemed Kabbalistic thinkers, not Kabbalists. In the case of Dee, his specific interest in the *Monas Hieroglyphica* in the Kabbalah of Creation, and his reduction of the Kabbalah to *gematria* transforms this contemplative, mystical art into a mathematical discipline: into the “Kabbalah of reality” wherein lies the power of Creation. It is impossible to consider him a Kabbalist when he does away with so much of the fundamental character of the Kabbalah, whether in its Jewish or Christian form.

MONAS HIEROGLYPHICA

Dee comprehends and interprets the Kabbalah in a context different from that of both his predecessors and contemporaries. Schooled in the pluralistic Humanist tradition, that united Neo-Platonism, Neo-Pythagoreanism, Hermeticism, Alchemy and Kabbalah, Dee is actually at the cusp of modernity that will take the Humanist tradition further into a syncretic whole. He will transform syncretism into synthesis. What sets Dee apart from his contemporaries is the extent to which he “mathematicizes” his peculiar version of the Kabbalah, essentially eliminating from it the usual cosmological, exegetical, mystical and prophetic aspects that fascinated Humanists. A mathematician of some note, expert in navigation and optics, Dee is a thinker of what now would be termed a “scientific bent”, curious about the workings of nature, in all its manifestations and ramifications. His curiosity encompasses metaphysics and mysticism, Euclidean geometry and communications with angels to get at the primordial mystery of Nature: and it is precisely in this seemingly paradoxical union, typical of early modernity, that Dee must be understood.

Two aspects of the Jewish Kabbalah primarily interested Christian thinkers: the cosmology of the *sefirot* and the magical/mystical manipulation of the Hebrew alphabet. Dee eliminates from his Kabbalah the ten emanations or Names of God, the *sefirot*. Dee never mentions the ten emanations by name, which is extremely significant, as they are the basis of Kabbalistic cosmology, as well as ten of the Names of God, and are the most popular adaptation of the Kabbalah amongst Christian thinkers. Unlike his contemporaries, obsessed with the multiplication of cosmological systems to structure their universe, Dee never brings in the *sefirot*, even though they are also known as the divine numerations, and we shall see that Dee is interested in the mathematical basis of the Kabbalah.

What Dee retains of the Kabbalah in the *Monas* are the three hermeneutic techniques, based on the manipulation of letters, that result in numerical calculation: *gematria*, *notarikon*, and *temurah*. *Gematria* is the calculation of the numerical equivalent assigned to each consonant of the Hebrew alphabet (*aleph*, the first consonant equals the number one) so that words that are different in linguistic significance are equivalent numerically, and thus semantically linked. *Notarikon* is the representation of an entire word by any consonant that makes up its root (vowels are not written), usually the first letter of the word. (An excellent example of this is Dee’s use of the Greek letter *delta* to represent his name.) *Temurah* is the exchange

of one consonant for another, much like a basic code, so that words are rewritten not in the letters that phonetically represent the sound, but using other letters assigned to represent the sounds (b for d, d for f).

Ultimately, the purpose of much Kabbalistic speculation is to imitate the act of the Creation of Adam and produce an artificial anthropoid, shaped from clay: the *golem*. At the very heart of certain Kabbalah is the explication, interpretation and commentary on Creation for a practical purpose. Already early texts like the *Sefer Yetzirah* and the *Bahir* reveal the secrets of not only God's Act, but on how the worthy may create or animate a *golem*. In the early Jewish texts the consonants of the Hebrew alphabet serve as not only the vehicle for the primordial Creation, but for the creation of the *golem*. After fashioning a figure from clay, the Kabbalist inscribes on the forehead three letters, א מ ט, (*aleph, mem, tav*) that form the word *emet* (truth). Afterwards, the Hebrew alphabet, in all its permutations including the vowel-consonant combinations, is recited, to animate the being. The *golem* contains all the permutations of the alphabet, like the Monad. The difference is that the creature itself cannot create, for it is sterile. In essence, this is an imitation of the biblical account of the creation of Adam. Thus the Theorems are Kabbalistic because they too replicate the act of Creation by creating the symbol of the Monas. That is to say, the symbol of the Monas is a sort of *golem*, within the Kabbalistic tradition, and also tied into the alchemical tradition of the creation of the homunculus. The adept or initiate who assembles, through Dee's Theorems, the hieroglyph of the Monas may animate it in the fashion of the Kabbalists animating the *golem*: by inscribing the Truth (*emet* in Hebrew), on the figure. *Emet* appears repeatedly in other works by Dee, such as *De heptarchia mystica* as a Seal and a divine Name, which reconnects the *Monas Hieroglyphica* with Dee's angel magic and other speculations.

Dee himself declares the hieroglyphic Monas to be, among other things, "Kabbalistic", and claims that the text will explicate the figure "mathematically, magically, cabalistically and anagogically."¹⁸ Clulee rightly defines the Monas as "a powerful hieroglyph revealing the unity of created nature and embodying the unity of knowledge about the unity of creation."¹⁹ Dee attempts to contain in one symbol the process of Creation, confident that the unity of creation is revealed through 24 theorems based on the 24 Metatheses of the Pythagorean Quaternary. Through the theorems with which he assembles the hieroglyph of the Monas, Dee attempts to demonstrate the primordial act of Creation, with the intention of containing the potential of creation. These theorems are reiterations of Euclidean and Pythagorean principles, with which Dee was intimately familiar. Pythagoras assumes number to be the indisputable, fundamental component of what exists. What is Kabbalistic about Dee's theorems is the method behind their construction, which is an expansion of the hermeneutic techniques of *gematria*, *notarikon* and *temurah*. By adapting techniques traditionally applied to textual analysis, often in the context of interpreting Genesis, Dee underscores the fact that his work concerns the process of Creation. By applying techniques of biblical exegesis to his Theorems, Dee explicates a "creationist Kabbalah" that defines what is, how it came to be and how it may come to be. Dee is the first thinker to attempt the construction, mathematically proven in 24 theorems, of a symbol of Creation, and is unique in suggesting it as a

“scientific” hypothesis and arguing its proof based on the Kabbalah.

To condense the Kabbalah into a symbol Dee must first construct it. This he does beginning with the straight line, circle and point: the three elements from which letters are also composed. The first five theorems are a very close re-interpretation of Genesis, even with the appearance of the Sun and Moon. If read in the manner of Kabbalistic exegesis, the first theorems are very interesting in their relationship to the tradition of Pico, Reuchlin and Guillaume Postel, who most closely follow the hermeneutics of the books *Yetzirah* and *Bahir*. In these early Jewish texts Genesis is replayed through the formation of the letters of the Hebrew alphabet, tracing out the shapes of the consonants and interpreting them in a mystical vein, revealing the intrinsic divine powers of the letters. Dee, who laments in the text of the *Monas* the inadequate explanations of Jewish Kabbalists for the configuration of the letters, provides through the theorems of the “real Kabbalah”, what he claims are the true reasons for the “shapes of the letters, their positions, their order in the alphabet, and their numerical value.” At the origin of all letters, according to Reuchlin and Dee, is the point, line and circle: that is, they derive from the most basic geometrical symbols. Rather than the explicit heaven and earth of Genesis 1:1, in Theorem I Dee divides the line and circle: Reuchlin had already described the derivation of the Monad from numbers that derive from duality, points from numbers, lines from points, plane figures from lines, solid figures from plane figures, and from these solid bodies and this sensible world, a globe with all its orbits, and its constituent elements: fire, air, water, earth.²⁰ So it is clear that the bodies, appearing in a later Theorem, derive from the same geometrical source as letters. Dee’s Kabbalah thus centres around the manipulation of the letters of the Hebrew alphabet, and the development of what I would term a language for Creation that can ultimately be reduced to one complex symbol that contains and incorporates the meanings and powers that the letter combinations of an alphabet transform into language and then act and revelation. In one of the theorems, it shall be seen that the actual pictorial representation, the glyph of the *Monas* itself, is made up of letters, and of their numerical values.

THEOREMS

Theorem I is very much like the opening lines of the *Bahir*, notably repeated by Reuchlin, in which the first verse of Genesis, in Hebrew, *bereshit elohim* (God created), is interpreted in light of the initial consonant *bet* (ב).²¹ In Hebrew, *bet* has the value of two, and Dee poses two initial units from which all else is created: “by the straight line and the circle.” In Pythagorean speculation, two is the first number, since one is the basis of number.²² But there are also two worlds to consider, the micro- and macro-cosm, encountered in Theorem XXII with the mortal and immortal Adam. As in the second verse of Genesis, in Theorem II form emerges, expanding from the base of matter: line and circle with the point. Earth forms from these components in Theorem III, in addition to the Sun and Moon, concluding the first day of Creation, as Dee himself notes in Theorem V. The genesis of the Monad, is an imitation of the primordial act, a demonstration of the evolution of geometry and a profound argument for the mathematical structure of the universe: an inno-

vative speculation, for the time. In the first Theorems Dee establishes that universal meanings may be appointed to all symbols, thus the calculations based on the symbols may be universally applied, since in essence he manipulates the three fundamental components (line, circle and point) using three fundamental techniques.

Thus, there exists an affinity between grammarians, the manipulators of language, and mathematicians, the manipulators of numbers, united by Dee's "real Pythagorean Kabbalah". Apart from the linguistic and numerical value of a letter, the symbol itself is significantly made up of geometrical shapes, as is seen in the theorems. Dee links his hieroglyph with grammar, and thus with the use of sacred language. It is, however, a Pythagorean language, with a mathematical basis, so that the hieroglyph is defined in the "Pythagorean manner". The powerful result of a Pythagorean manner of understanding the hieroglyph is that as numbers are universal signs, the meaning of the symbol can be universally recognized, transcending language. Grammar is universal to all languages, but all languages are not universally understood: hence, language is not an impartial description of reality, like numbers. Consequently, Dee claims that he will explain the functions of letters, at the basis of Kabbalah, in terms of what, according to Pythagoras, incontestably exists: the mathematical principles of the universe. Clulee has already demonstrated how the disciplines of grammar and geometry, among others listed by Dee, are incorporated in his "real Kabbalah".²³

Dee expands the linguistic-numeric power of letters to the Greek and Latin alphabets, and treats the components of language, expressed or defined by an alphabet, made up of letters, as Pythagorean symbols. In essence, the symbols that make up the three alphabets represent the same sounds, they derive their form from the point, line or circle and have a numeric value: thus they contain the same power of Creation. Therefore, he not only applies the three linguistic techniques of the Kabbalah to the Latin tongue, but attempts to condense the complexities of linguistic combinatory techniques into a unique symbol, a hieroglyph, adding an "Egyptianizing" element to the linguistic syncretism of his philosophy. A hieroglyph is essentially a symbol that has a pictorial, linguistic and magical value. It remains then within the confines of the Pythagorean interest in symbols. In his Theorems Dee composes the Monas in the same manner that a Kabbalist composes a *golem*: through letters.

In his theorems Dee transforms the three basic Kabbalistic techniques of exegetical method into scientific method. *Gematria* (the calculation of the numerical equivalent of a letter) is equated by Dee with geometry, and is thus the most common Kabbalistic technique he employs and will be the focus of my analysis of his theorems. Geometrical *gematria* is most evident and most complex in those theorems related to the supporting Cross element of the Monas, based on Pythagorean concepts. The Cross is significantly composed of either the Ternary (formed by two intersecting straight lines and the centre) or the Quaternary (formed by four straight lines enclosing four right angles). To begin the possible *gematriot*, the two Pythagorean definitions of the Cross of the Monas are derived from the double sense of the symbol and the doubling of the parts that make it up. When the elements of the Quaternary are squared, they produce the Octad: the squaring of the

figure is also a form of *gematria*. To attain the Septenary, the lines and point, still treated as if they had a numerical or linguistic value, can be added together to form seven: the two lines plus the point of the Ternary and the four lines of the Quaternary equal seven elements. According to this logic, the *gematria* or geometry of the universe unites the Ternary and the Quaternary to the Septenary or the Octad, so that the Monas contains all the fundamental Pythagorean numbers. Their equal numeric value can only prove their equal interpretative value. What is truly fascinating in Dee's case is that he derives *gematriot* for the components of a symbol, not of a word or phrase: he has invented the *gematria* of symbolic images.

Theorem VIII illustrates well Dee's syncretic Kabbalistic-Pythagorean method. Dee ably reiterates the Pythagorean expansion of the Quaternary (that Reuchlin associates with the four letter Name of God, the Tetragrammaton, יהוה) in the Decad ($1+2+3+4=10$), claiming that it is a "Kabbalistic extension". What follows is also a significant Kabbalistic explication of the Latin use of letters to signify numbers. Thus the Roman numeral X (letter X), is both the Quaternary and the Decad. On the one hand it recalls the Rectilinear Cross of Theorem VI, symbol of the Quaternary: which, if the four straight lines are separated, gives four of the Roman numeral I (letter I). On the other hand, the numerical value of the symbol is ten: naturally, it also contains the Ternary and the Septenary, which add up to the Decad. This is a very limited example of *gematria*. It is an obvious application of the technique, resulting in the unoriginal conclusion that the Monad is the unity that comprehends multiplicity.

A more successful interpretive calculation is that of the Roman numeral V, or the Latin letter "V" found in Theorem XVI. Two straight lines of equal length shape the letter-numeral "V" which is assigned the value of five for it is the fifth vowel, and naturally represents the Quinary. If two of these figures are united, they form the Equilateral Cross of the previous theorems, and their combined value also adds up to ten, or, if multiplied, 25. If the Roman numeral is squared then it also yields the number 25, and the sum of the two squares is fifty. Squaring is certainly part of *gematria*, and to conclude in this vein, Dee noted that the symbol "V" is the fifth vowel of the Latin alphabet but also the twentieth letter, which adds up to 25. Squared, the Roman numeral X is one hundred.

The divisions of the Cross are also the Latin letter "L" (tenth letter of the alphabet) with the numerical value of fifty, which in the form of the Cross has the accumulated sum of one hundred. Now, if the Quinary is multiplied by the Decad, its product is fifty, at the basis of the L-shaped Cross. This is proven by the fact that the letter "L" is the tenth in the alphabet, also if read back from the letter "X", establishing their equal value, so that the letter "L" can also represent the Denary, as it is the tenth letter of the Latin alphabet. If the three Roman numerals are added together, as in theorem XVII, they form the Latin word *lux*, which leads to more *gematria*. I shall illustrate only one possibility, and that is that the $L=V \times X$ ($50=5 \times 10$), which in turn is the sum of the name of God, El. El is the name of God most cited by Dee throughout his works. The latter is a form of *notarikon*, where one letter, the first, is equal to the sum of the parts of the word.

Dee turns the *notarikon* of the Roman numeral, Latin letter “L”, as the name of God El, into *temurah*. By exchanging El (L) for the first consonant of the Tetragrammaton, *yod*, “V” for the repeated *heh* and “X” for *vav*, the Tetragrammaton in Latin letters spells *lux*. Reuchlin states, in derivation from *Yetzirah* that the Tetragrammaton created Heaven and earth.²⁴ So from Dee’s El, or the Latin letter, light is created light (*lux*). Furthermore, Psalm 118 is reinterpreted by Reuchlin to read “El, the Tetragrammaton, has given us light.” El is one of the most powerful names of God: it is added as a suffix to the root base to form the names of the angels (Gabriel, Michael, Raziel), imbuing the name with divinity. Thus El is the name of power from which all the other names are formed,²⁵ even the Tetragrammaton.²⁶ It is also one of the two fundamental letters for the Kabbalistic Creation, as is clear from the opening verses of *Yetzirah*. As *bet* (ב) is the first letter in Torah, *lamed* (ל) is the last. Kabbalistic Creation can be said to go from *bet* to *lamed* as from *alpha* to *omega*. Together, they form the word *lev* (לב)²⁷ or “heart”, whose numerical value is 32 and represents the Kabbalistic 32 paths of wisdom contained in the Torah. For this reason, and because the consonants are also prepositions, they can be combined with the letters of the Tetragrammaton, and in turn “El” or *lamed* functions as a suffix for the 72 angelic names. The first letter of the Tetragrammaton is the tenth consonant of Hebrew, *yod* and Dee states in the Dedication that all the consonants of the Hebrew alphabet derive from *yod*. Furthermore, יחוד is interpreted by Christian Kabbalists as the name of Christ. The Christological implications of including the Names of God in the Cross of the Monas are obvious, as is the mystical function such a symbol performs. The Equilateral or Rectilinear Cross, that contains and repeats the Name El, and incorporates the Creative aspect of the divine in the anatomy of the symbol.

This is clear in Theorem XVII, where the *gematria* culminates in an illustration of the first five Theorems. Dee continues his Kabbalistic computations to produce the number 252, derived from all the *gematriot* (addition, multiplication, etc.) and which when written in Roman numerals (CCLII) produces the fundamental elements of the Monas: two semi-circles, two straight lines and two intersecting lines at a 90° angle. In this context, with the letter-numerals that compose the glyph clearly indicated, Theorem XII, with its recombination of the astrological symbols based on the circle and lines of the Monas is better understood. As Clulee has pointed out, Theorem XII is itself a demonstration of *temurah*, where the signs of the zodiac are derived from the symbol of the Monas. A *gematria* of the zodiac signs is thus possible, revealing all their numerical and proportional affinities, since it is evident from the symbols that all the lunar signs and all the solar signs add up to the same amount: 252.²⁸

In Theorem XVIII the *temurah* of the planetary symbols and the *gematria* of light come together in the figure of the Egg. Immediately recognizable as an allusion to the alchemical *opus*, the figure is less familiar as a Kabbalistic allusion to Creation. For Reuchlin the cosmic egg represents the two Kabbalistic worlds: the physical and transcendent. Reuchlin believes that the two worlds are “‘like the white of an egg’, the white being inside the shell, which is the firmament, while itself it surrounds the yolk.” In this way, from Creation, the intelligible world is bound to the archetypal world.²⁹ In short, even in Kabbalah, the egg contains the cosmos. Dee

claims that the preceding theorems demonstrated how the Inferior Astronomy is guided by the superior celestial Astronomy. This understanding is brought through Kabbalistic illumination, which reveals how the Monas is constructed. By merging the Monas glyph with the figure of the Egg, the cosmic structure is included in the symbol. It is here, where Dee clearly presents a Ptolemaic planetary order, that the absence of the *sefirot* and of a traditional Kabbalistic cosmology is glaring. Essentially, Dee has no need to employ the cosmology of the *sefirot*, usually at the heart of any traditional Kabbalistic analysis. Their cosmological value, as the mystical aspect of the planets, may be well integrated in the planetary signs included in the Egg. If the *sefirot* are to be taken as ten Names of God, then these too are incorporated in the hieroglyph of the Monas, under the all powerful names El and Tetragrammaton. If anything, Dee considers the *sefirot* truly numerations, and has subsumed them in the anatomy of his Monas, in the letter-numerals that make up the glyph, and in their Pythagorean equivalents. The structure of his Theorems eliminates the need for the ten *sefirot*, or could even replace them as the structure of the universe, since they could individually or collectively be interpreted as Pythagorean numbers: their unity is already demonstrated in the Decad. Interestingly enough, by dealing with numbers, Dee has eliminated the need for contemplating the numerations of the Deity in the form of the *sefirot*, for the theories and numerical ratios are encompassed in the actual anatomy of the glyph. He has replaced the cosmological system with a cosmological symbol.

However, Dee retains in his Monas the symbols that represent the cosmological system of the *sefirot*, in the form of the Adam Kadmon, to which he refers in Theorems XIII and XXII. The Adam Kadmon is the Name of one of the formations of the *sefirot*. In Theorem XIII Dee calls the Monas the Mercury of the Philosophers, well known from alchemy, and also the “celebrated microcosm and ADAM.” Reuchlin states that there is an Adam for each world, a “heavenly Adam,” the ADAM KADMON, “made by his word,” and another, “earthly Adam, fashioned from clay by the hand of God.” One is one with God; the second is not only “the other one,” but “different”, quite “other” from God.³⁰ The other Adam is man, as God said “let man be the image of this world, hence he is the microcosm.”³¹ Both represent the infinite celestial world connected with the finite earthly world. Both encompass the elements of creation. Like the cosmic egg, the Adam Kadmon represents the dimensions of the universe. In essence, the glyph of the Monas is the Adam Kadmon, and the *sefirot* that compose the figure are contained in the dimensions of the symbol.

Already Pantheus, in his *Voarchadumia*, had used a form of alchemical Kabbalah to create the new Adam, the Mercury of the Philosophers. Dee’s use of the term *voarchadumia* in his Dedication is an evident reference to Pantheus’s text. The association of the *terra lemnia* with the philosophical Hermes, and the red earth of the *voarh beth adumoth*, where from the Hebrew *adamah* (earth) derives *adam* (man), is an allusion to the Adam Kadmon, the celestial Adam formed by the *sefirot*. Hence, it is the figure that contains all of the divine numerations, the macrocosmic or immortal Adam of Theorem XXII, whereas the earthly, mortal Adam is the microcosm, often associated with Christ or with a sort of celestial *golem* which contains powers of revelation and creation. The earthly Adam and the

golem are both shaped from clay and then animated through language. If the celestial Adam, the Adam Kadmon is thought of as a celestial *golem*, then it is animated by *emet*, by divine Truth.

Through the complex application of *temurah* to the structure of the Monas in Theorems XXI-XXIV it is evident how Dee manages to liberate himself from the *sefirot*. These final theorems constitute an elaborate example of what Dee also calls *metathesis* (the transposition of sounds or letters) applied to the Pythagorean Quaternary. Theorem XXII, dedicated to the symmetry of the hieroglyph, reveals the similarity of the structure of the Monas to the structure of the *sefirot*. By geometric calculations on the intersections of the lines and circles of the Monas, attributing letters to the connecting points, Dee is essentially interconnecting the parts of the Monas as is done to the structure of the Adam Kadmon. By eliminating the cosmological structures of the *sefirot*, Dee has eliminated the elements of the traditional Kabbalah that cannot be proven to exist, and absorbed them into mathematical theorems that can be proven. This passage into the realm of numerations is the passage from the first Monad into all possible Metatheses, which Dee reconnects to the *temurah*, culminating into a sort of final vision of the Monas in the final Theorem, replacing the Adam Kadmon or the Apocalyptic vision of God the Creator.

This confirms that the ultimate source of Creation is God, and that what Dee has revealed can only be an imitation of the act of Creation. It is also a projection into the Adam-Christ of the Christian spirit, so that in the assembly of the Monas, the adept is, like the Kabbalist, animating a *golem*: a pale imitation of the primordial creation, where nonetheless the adept approaches God.

If there has been little evidence found for a satisfactory general Kabbalistic interpretation of Dee, the most significant factor is the fact that Dee, as Clulee has pointed out, is not a thinker whose texts demonstrate an easy and consistent line of thought. This is the case with his use of Kabbalah, which is negligible in some of his texts, but a substantial component in others. Although there are elements of the Kabbalah in many of Dee's writings, often these are unoriginal aspects of limited significance in the overall context of the work, for the most part related not to the Neo-Pythagorean principles but to angelic communications. Or else, as in the case of the seal *emet*, or the name El, they are fairly derivative although important functions in the text. Certainly, the function of the Kabbalah is different in each individual text, according to the purpose of the text. Dee's works span a wide range of subjects and interests, and hence of method and interpretation. Their originality is increased by the syncretic context of Dee's intellectual background. Only the *Monas Hieroglyphica* exemplifies Dee's creative and innovative use of the Kabbalah.

CONCLUSION

In the end, the important question is not so much whether or not Dee is a Kabbalist, but what the function of his new mathematical Kabbalah is. In the well-established Humanist tradition of Christian Kabbalah, the purpose of its study was the recuperation of ancient knowledge to establish a universal Truth. Thinkers like Pico (who deemed himself a Kabbalist) had a religious agenda: to demonstrate the universal truth of Christianity via the Kabbalah, based on Christological interpretations of the texts, often with the aim of utilizing the Kabbalah to convert Jews. Later thinkers saw within it a system compatible with other philosophical and even scientific systems then in vogue, that by the mid-sixteenth-century attracted a certain amount of experimentation by intellectuals of Dee's calibre: a contemporary example would be Giordano Bruno, who combined Kabbalistic mystical revelations with Copernicanism to develop his own Nolan philosophy.³² Dee is neither a Humanist like Ficino, interested in recuperating ancient texts, nor a Hebraist and Kabbalist like Reuchlin, nor is he concerned with the philological aspects of the Kabbalah. Reuchlin argues that the Kabbalah is the source of salvation, and that a Kabbalist is one who studies it to redeem himself and the human race. With the dominion of Protestantism in England, the establishment of a universal religion is of less concern to Dee than it was to Pico or even Bruno, and the conversion of Jews is not a relevant concern. In the *Monas Hieroglyphica* Dee is concerned with a different sort of revelation, that of a new form of numerical revelation that is closer to Cartesian than traditional Jewish Kabbalistic thought; indeed, it anticipates somewhat the later interest of mathematicians like Leibniz.³³ Even taking into account the final vision offered in the *Monas*, the exaltation is ultimately that of the indisputability of Dee's proofs, mystically inspired perhaps, but mathematically exact. It is an application of Kabbalah which predates the development of scientific method, of "objective" scientific proof. Dee's Kabbalah helps usher in a new era, marked by thinkers like Bruno, Robert Fludd, Leibniz and Isaac Newton: the modern, paradoxical era of scientific discovery never far removed from theological confirmation. Much research remains to be done to fulfil the plea made by Yates in the epilogue of *The Occult Philosophy* for scholars to pursue the study of the importance of the Kabbalah in the development of Christian thought.

NOTES

¹ For a good summary of the arguments, see the various chapters dedicated to the subject in Richard Popkin and Gordon Weiner, eds., *Jewish Christians and Christian Jews: From the Renaissance to the Enlightenment* (Dordrecht: Kluwer Academic Publishers, 1994).

² Moshe Idel, *Kabbalah: New Perspectives* (New Haven: Yale University Press, 1988); David Ruderman, *Kabbalah, Magic and Science: The Cultural Universe of a Sixteenth-Century Jewish Physician* (Cambridge, Mass.: Harvard University Press, 1988). See also David Ruderman, ed., *Essential Papers on Jewish Culture in Renaissance and Baroque Italy* (New York: New York University Press, 1992).

³ Frances Yates, *The Occult Philosophy* (London: Ark Paperbacks, 1979). She discusses Dee at least in passing in nearly all of her numerous works.

⁴ *R&W*, 28-29.

⁵ The text was already in a written version in 1510, but went unpublished until 1533. For a detailed discussion of the textual history, see Paola Zambelli's *L'ambigua natura della magia: filosofi, streghe*,

riti nel Rinascimento (Milano : Il Saggiatore, 1991) as well as her numerous articles on Agrippa that heavily influenced Yates and are contained in the bibliographical references of *Occult Philosophy* and other works. Agrippa probably knew Reuchlin's earlier Kabbalistic work, *De verbo mirifico* (1494), directly inspired by a meeting with Pico: it is one of the books listed in Dee's library inventory, heavily annotated by him.

⁶ Frances Yates thought of the *Monas* as a "cabalist mathematical alchemy," and conceived of the glyph as an amulet. Michael T. Walton also interprets it as an alphabet of nature, based on the Kabbalah. See *NP*, 78 for a brief summary of the different interpretations of the text.

⁷ See Chaim Wirzubski, *Pico della Mirandola's Encounter with Jewish Mysticism* (Cambridge: Harvard University Press, 1989).

⁸ An excellent starting point for the historical background is Cecil Roth, *The Jews in the Renaissance* (Philadelphia: The Jewish Publication Society of America, 1959); tempered by the more recent work of Robert Bonfil, *Jewish Life in Renaissance Italy*, trans. Anthony Oldcorn (Berkeley: University of California Press, 1994). Bonfil argues against the importance of the proliferation of Kabbalah.

⁹ Johann Reuchlin, *De arte cabalistica* (New York: Abaris Books, 1983), 39.

¹⁰ Yates and Zambelli would disagree, but Agrippa's mathematical abilities must have seemed extremely limited to Dee.

¹¹ Reuchlin, 43.

¹² Reuchlin, 43.

¹³ Reuchlin, 63. The Latin terms inserted into the citation are from the original text.

¹⁴ David Werner Amram, *The Makers of Hebrew Books in Italy: being chapters in the history of the Hebrew printing press* (London: Holland Press, 1963).

¹⁵ See Karen de León-Jones, *Giordano Bruno and the Kabbalah: Prophets, Magicians and Rabbis* (New Haven: Yale University Press, 1997).

¹⁶ Reuchlin, 45.

¹⁷ Reuchlin, 55.

¹⁸ *MH*, 113-114.

¹⁹ *NP*, 77.

²⁰ Reuchlin, 219.

²¹ *Bet* is interestingly enough written as a half circle and line in Hebrew, which traditionally leads to a long explanation on the formation of the letters. Dee complains in the text of the *Monas Hieroglyphica* how there is little on the history of the formation of the letter in Hebrew, and I think here he is recreating and reinterpreting the explanation of *bet* in terms of the basis of the hieroglyph of the *Monas*, to demonstrate how the real Kabbalah distinguishes itself from the mere description of common language to the true event of Creation, for Dee in the form of geometrical *gematria*. The act of writing the letter, *bet*, would proceed from the point, formed from the initial contact of pen on paper, and developed into a half circle, with a line underneath. Dee himself even indulges in the common Kabbalistic explanation for why the second letter of the alphabet, *bet*, and not the first *aleph* is used in creation, by adding it later in theorem XV, as we shall see. So the line and circle are the basis of the glyph and of creation.

²² Reuchlin, 155.

²³ *NP*, 83.

²⁴ Reuchlin, 303.

²⁵ Reuchlin, 305.

²⁶ Reuchlin, 303.

²⁷ By the way, the consonant *bet* has two pronunciations, a guttural and a palatal, which explains why "heart" is pronounced with a final "v". I do not believe Dee thought of this, but that would make the first and last letters of Creation in Torah the letters that make up his *Monas*: "L" and "V", even including the *LVX* they equal.

²⁸ Since the lunar signs are composed from only one semicircle, hence excluding one Roman numeral C, they total 152. They remain within a proportional ratio to the other, solar signs, since they still contain the essential numbers. One hundred is of course one of the ratios of the alchemical *opus*.

²⁹ Reuchlin, 101.

³⁰ Reuchlin, 71.

³¹ Reuchlin, 211.

³² See de León-Jones, *Giordano Bruno and the Kabbalah*.

³³ See Allison Coudert, *Leibniz and the Kabbalah* (Dordrecht: Kluwer Academic Publishers, 1995).

FEDERICO CAVALLARO

THE ALCHEMICAL SIGNIFICANCE OF JOHN DEE'S
*MONAS HIEROGLYPHICA**

Throughout his career John Dee had an abiding interest in alchemy. As a renaissance scientist he developed this interest in the alchemical tradition descended from the Alexandrines into a philosophy of nature that included laboratory practice. In the *Monas Hieroglyphica* (1564) he distinguished his own scholarly endeavours from the general mass of practitioners who had discredited the name of “alchymia”, and for this reason he preferred to use the terms “voarchadumia”, “mechanical magic” or “Real Cabala” to refer to his own work. The term “voarchadumia” was coined by the Venetian alchemist Johannes Pantheus, whose work was known to Dee and is known to have been one of the sources for the *Monas Hieroglyphica*.¹ Dee saw the alchemical enterprise as a task for an alchemist/“hero” who “understands the supercelestial virtues”.² Contemporary commentators of the *Monas Hieroglyphica* clearly had no doubts that its primary focus was alchemy,³ and Dee’s continual pursuit of alchemical revelations seems to support this interpretation. Long after the publication of the *Monas Hieroglyphica* Dee continued his alchemical researches, even while he was engaged in the “angelic” revelations of 1582-9, during which (together with his “skryer” Edward Kelley), he sought immediate divine knowledge of “nature’s secrets”.⁴ In the angelic revelations Dee was inspired by references to invocations in the ancient Greek alchemists. In the *Monas*, however, he was influenced by “natural magic” which works its miracles in the laboratory through the power of “philosophical mercury”, which reigns both in “superior” and “inferior” astronomy (as Dee calls them): that is, both heavenly Mercury (i.e. *spiritus mundi*) and the mineral Mercury. In the preface to the work, Dee clearly states that he is seeking the “fundamental truths of natural science” the “explanations of [...] celestial influences and events”, and “supercelestial virtues and metaphysical influences”.⁵ Only the “singular hero”, he says, is capable of understanding these things. He contrasts the “astronomical characters” that represent the planets with his own mystical symbols “imbued with immortal life”, which would be understandable “in any tongue and in any nation”.⁶ From the symbol of Mercury, which forms the basic structure of the hieroglyphic monad, Dee derives all the other planetary symbols as well as the origin of the Greek, Hebrew and Latin alphabets, numbers, and even geometry.⁷ [Plate 4] The Geometer who reads the *Monas Hieroglyphica*, Dee says, will discover in it something akin to the quadrature of the circle,⁸ although it seems likely that he is referring here to an obscure alchemical allegory rather than to a geometrical demonstration. Michael Maier, in

* This chapter was translated from the Italian by Stephen Clucas, with the kind assistance of J.V. Field. For the purposes of this volume the author’s citations of Dee’s *Monas Hieroglyphica* have been referred to the standard English translation by C. H. Josten.

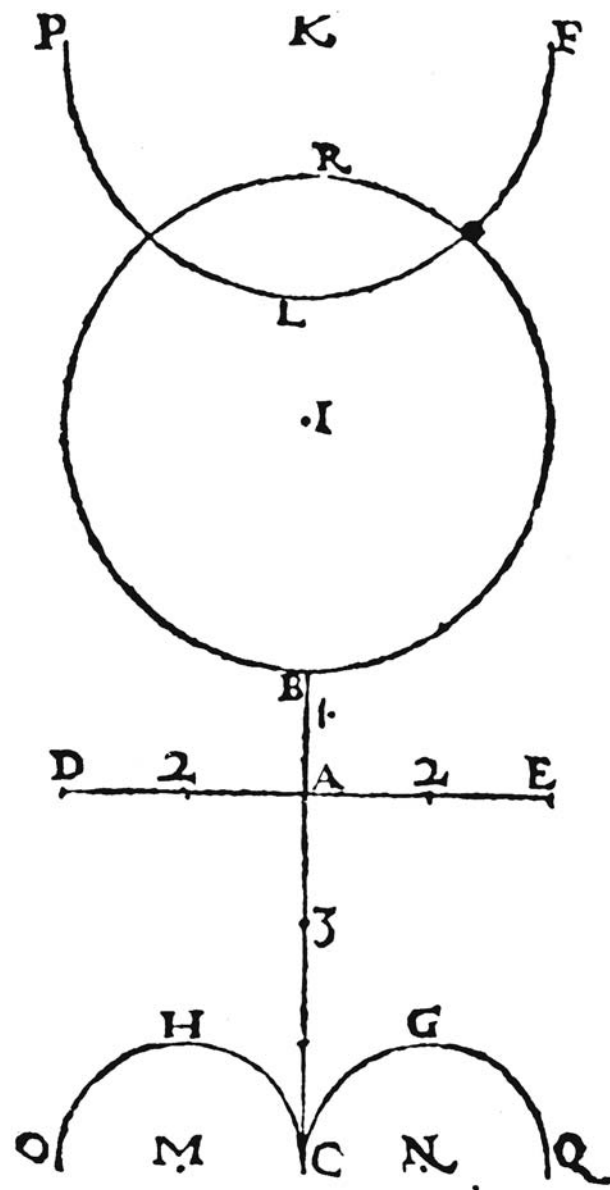


Plate 4: The geometrical construction of Dee's 'Hieroglyphic Monad', *Monas Hieroglyphica* (Antwerp, 1564), p. 24^r. Reproduced from the facsimile edition of C.H. Josten, courtesy of *Ambix*.

his extensive collection of alchemical symbols, the *Atalanta fugiens* (1617), states (in Emblem XXI) that the circle is the simplest substance and the square is the four elements which are also represented by the four colours during the alchemical “work”.⁹ Hence Dee’s statement that the circle transforms itself into a square signifies the alchemical passage of the mineral into a perfected, purified substance which manifests itself successively in the seven phases (and four colours) commonly described by alchemical authors.

The musician, he says, will be “struck with wonder” by the “inexplicable celestial harmonies”¹⁰ which are represented in the alchemical work, a reference to the idea of alchemy as an “art of music”, in so far as it involves an understanding of the harmonic proportions between the weights of materials and durations of processes. The “music” also refers to certain sounds said to be heard during the final stages of heating. The astronomer, he says, will be able to observe the motions of the planets without getting cold. He refers here to the various stages of the matter as it is heated, stages that derived their names from the seven planets.

Just as the optical practitioner creates, by means of a conic section, a mirror which when placed in the sun’s rays burns certain substances, so the alchemist makes a trigonal section of a tetrahedron to make a three-dimensional mirror which “can reduce any stones or any metal to, as it were, impalpable powders by the force of [...] heat”, without the aid of the sun.¹¹ This allegory refers to the power of the Mercury that forms the basis of the symbol of the Monas, which is represented here by the mirror. Mercury is the primary purified mineral used in the alchemical *opus* or work. In a subsequent phase, in which it becomes “Alkahest” or a “universal solvent”, Mercury (antimonite) is called “philosophical Mercury” by some alchemical authors.¹² The triangle refers to the fundamental alchemical Ternary or triad of sulphur, salt and mercury, which are to be understood as essential principles and not to be confused with the everyday substances that bear the same names. Those who work and reflect on “the subtle investigation of weights”, Dee says, will see that “the element of earth can float above water”.¹³ He refers here to the relative quantities of the various alchemical substances, and the proportions between them, and to the condensation of liquid on the surface of the heated substance which resembles a floating island. Maier and others refer to this as “the island of Delos”, where Latona gave birth to Diana and Apollo, or the lunar and solar principles.¹⁴

Dee calls these symbolic games which are applied to physical reality “Real Cabala”. He says that the hieroglyphic monad conceals a “terrestrial body” in its “innermost centre”, which must be united with solar and lunar influences. This union or “marriage” is the terrestrial sign of a union of cosmic influences, because the monad cannot be “fed” or “watered” on earth until the “fourth [...] metaphysical revolution” has been completed.¹⁵ Once this union has been effected, he says, the operator will “go away into a metamorphosis” and will “afterwards very rarely be seen by mortal eyes”.¹⁶ A few pages later Dee insists on the necessity of assimilating the product obtained by means of this process in such a way that the alchemical operator himself will be “dignified”.

An explanation of this obscure passage is that the hidden body in the innermost centre is the Philosophers' Stone, which lies hidden in primal matter. During the course of the work it is strengthened by the divine powers or influences – that is, by the energies emanating from the Sun and Moon. A brief seventeenth-century treatise entitled *The Centre of Nature Concentrated, or The Regenerated Salt of Nature commonly called the Philosophers' Stone*, sheds some light on the significance of the metamorphosis of the Monas-Stone.¹⁷ The earth or Salt increases in power through what alchemists call “multiplication”. Dee refers to four of these multiplications in the text of the *Monas Hieroglyphica*. Essentially, the process of placing the Philosophers' Stone in a crucible together with a quantity of Philosophical Mercury, or “alkahest”, on four separate occasions is meant to enhance the Stone's powers. Whoever was “fed” by the stone would attain such an intense spiritualization of their body that they would become invisible.

The Stone has other explicitly stated properties that Dee is interested in. He claims that those familiar with the Philosophers' Stone may observe through a thin, transparent sheet all the things contained underground and in the waters of the earth. In this “carbuncle or Adam's stone” the adept would be able to explore the airy and fiery regions. The most likely explanation of this passage has again to do with alchemical experimentation in the laboratory. By placing a thin sheet of mica on the crucible during the work, the alchemist may observe the transformation of the materials as they are subjected to the fire.¹⁸ This transformation is identical to that experienced by the minerals in the entrails of the earth. In short, all the four principal elements may be observed, and the carbuncle is the final Red Stone of the alchemical *opus*.

In order to put these rather obscure and oblique alchemical references into a larger context it is necessary to briefly analyse the twenty-four theorems found in the second part of the *Monas Hieroglyphica* in an alchemical perspective. The first four theorems deal with the most abstract concepts: the point, the line, and the circle. Dee claims that all things are created from the point: thus the Monas symbol contains a circle with a central point that represents the earth, as well as containing the symbols of the sun and the moon.¹⁹ [Plate 5] This initial point of creation (earth) represents the beginning of the alchemical *opus*. Maier seems to corroborate this interpretation when he states that the point from which the line originates is sulphur, and goes on to say (in words which are reminiscent of Dee's) that the innermost centre of the terrestrial body or mineral is formed by the principle of sulphur.²⁰ This particular mineral (antimonite) used by the alchemists, is the progenitor of metals, and when the sulphur principle contained in it is strengthened and stimulated, any metal has the potential to be transformed into gold. The theorems continue with the central cruciform section of the Monas. In theorem VI Dee equates this cross with the Pythagorean Ternary, which in turn becomes the Quaternary, and the Octonary.²¹ The ancient alchemists considered the “magic” Ternary to be the triad of body, spirit and soul (*corpus, spiritus, anima*): this is valid for the Quaternary and the Septenary as well. Dee is most likely referring here to Ostanès, an author he refers to later in the text. Ostanès explicitly referred to the Ternary allegory of the “vital spirit” and the “soul” which are needed to enrich the “body” of the mineral stone.²² This kind of

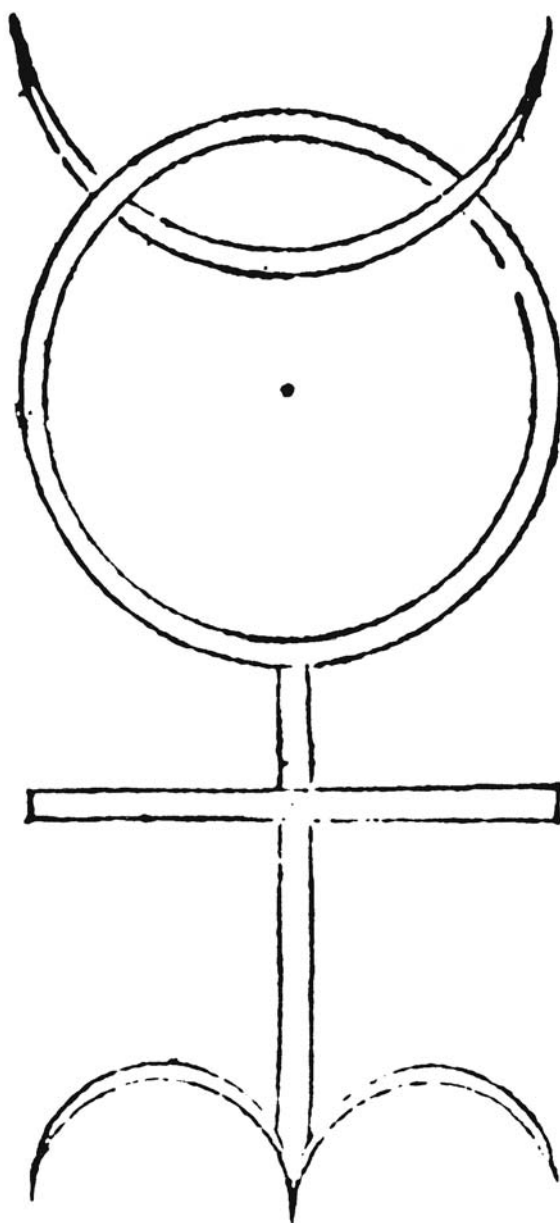


Plate 5: The 'Hieroglyphic Monad', *Monas Hieroglyphica* (Antwerp, 1564), p. 25^r.
Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

terminology has led to serious confusions in modern interpretations of these kinds of texts. The “body” is, of course, the mineral and the materials which the alchemist begins with; the “spirit” and the “soul” are the sulphur and mercury which these materials contain. Dee’s contemporary Paracelsus preferred to speak of “salt” rather than “body”. The “Septenary” which Dee refers to are the seven types of metal generated by the Elements and the Ternary. In Theorem VII, Dee says that the four elements must be drawn out of their “natural habitations” and compares the geometrical line which is composed of flowing points to the physical “line” of droplets (*Lineae, ex STILLAE*) which rain down during “mechanical magic”.²³ The “natural habitations” of the elements refers to composed bodies in general and specifically to the minerals used in the alchemical *opus*, as is clear from ancient and mediaeval alchemical theories. According to Maier, who follows these earlier theories, during the “cooking” (*coctio*) the alchemical egg is formed and the four elements are liberated in order: Water, Air, Fire, Earth.²⁴ This is the sequence of states in which we see the materials during the alchemical process: first liquid, then gaseous, then in a red-hot molten state before they re-solidify into the Philosophers’ Stone. Theorem VIII also refers to the elements and metals. The twenty-first letter of the Roman alphabet “X”, Dee says, is the sign of the “Denary” which is produced by the Pythagorean Quaternary ($1 + 2 + 3 + 4 = 10$) which is the union of the Ternary ($1 + 2$) and the Septenary ($3 + 4$) as well as the four initial lines that form the cruciform mid-section of the Monas. This alludes to union of the Ternary (salt, sulphur and mercury), the Quaternary (the elements) and the Septenary (the seven metals) in the alchemical *opus*.

In Theorem IX, Dee says that through the “magic of the [...] four elements” the four lines of the Monas are separated and made into a circle which is the conjunction and completion of the solar circle which forms part of the Monad symbol.²⁵ This separation and conjunction refers to the “solve et coagula” of the alchemists, which refers to the whole alchemical process, but especially to the final separation of the four elements and their re-conjunction in the Philosophers’ Stone. This process is often represented as a circle, or by the ancient cosmic symbol of the *ouroboros*, the snake biting its own tail. The zodiacal division of Aries, he says in Theorem X, is the place in the heavens from which the “fiery triplicity” originates. “In the practice of this monad the aid of fire is required”, Dee says, and it is fire which will effect the separation of the elements, “in which the denarian proportion will be strong”.²⁶ The astrological sign of Aries here signifies the vernal fire, that is, the celestial, cosmic or solar fire. In 1758 the erudite alchemist Pernety reiterated Dee’s theorem, claiming that the celestial fire was the principle of two other fires: the “terrestrial” or “central” fire, and “artificial” fire. The first, the terrestrial fire is innate in terrestrial bodies, and is stimulated by celestial bodies. The second, artificial, fire is kindled by man to heat bodies from the outside.²⁷ In his theorem Dee refers to the fundamental operation of the separation of the elements by means of the “fires”. In Theorem XI he says that the two semi-circles of the sign of Aries (at the base of the Monad) signify that the Earth – the mineral of the *opus* – must be mixed in equal proportions with the celestial fire, just as the day at the equinox is divided into equal proportions of light and dark.²⁸ This signifies that the initial weights of the mineral (which is considered in some texts, because of its characteristics to be the natural salt of anti-

mony), and the celestial fire, must be equal. Naturally the “celestial fire” had to be collected in some concrete form, and it was considered to be especially concentrated in the springtime, in morning dew. This was another of the “secrets” of the alchemists, but we should note that dew was also used in *spagyria* (chemical medicine) and the collection of dew is clearly shown in the engravings of the *Mutus liber*.²⁹ There are many references to dew in the various alchemical authors, but they tended to be more circumspect about revealing the identity of the mineral that was used. Dee is quite explicit about the use of dew, and his original frontispiece shows the sun and the moon pouring their aqueous humours into two dishes.³⁰ In Theorem XII, Dee shows the figures of three planets which contain the crescent-shaped symbol of the moon: that is Saturn, Jupiter and Mercury. Dee says that it is the “purest magic spirit [i.e. Mercury]”, rather than the moon itself, which carries out the “work of albification”, by impressing the figures into the prepared earth.³¹ These figures represent the final phases of the *opus*, the first of the so-called “Kingdoms” or “Reigns”, which is associated with the “white” or lunar phase of the work, but does not participate in the process which leads to the formation of the “red” or solar stone. The pure earth is the primal matter after the necessary preparation in the first two phases of the work. It is worth noting that Dee deals with general principles, and does not give concrete details of the process, which would seem to indicate that his knowledge was more speculative and theoretical than derived from laboratory practice.

In Theorem XIII, Dee analyses those planets whose signs contain the symbol of the sun: that is Mars (which also contains the sign of Aries), Venus (which contains the cross of the elements), and especially Mercury, the “Philosophical” Mercury, which he also calls “microcosm” and “Adam”. The alchemical authors usually represent the red stone with the solar symbol, but Dee emphasises the leading role of the mercurial rather than the solar aspect, which he calls the “golden work” (*Operi Χρυσοκοραλλινω*).³² The term derives from Stephanos of Alexandria, and may indicate Dee’s preference for the early Greek alchemical tradition.³³ Dee also adds that to attain the Adam (or Philosophical Mercury), it is necessary to reunite the soul which has been separated from the body in the work. This is done by means of the art of fire, he says, which is dangerous because of the “fiery and sulphurous fumes which it occasions”.³⁴ Here the “soul” probably represents the fumes (*halitus*) or mercurial principles of the mineral liberated during the “cooking” process, corresponding to the phases of the metallic “reigns”, which are gradually reabsorbed in a natural manner by the mass at the bottom of the crucible. Nonetheless these fumes carry the sulphur or the principle of combustion, and this makes the work dangerous as they may cause the crucible to explode. When he states, at the end of this theorem, that Lucifer or Venus must be united to the Moon or Mercury or Mars to make “the Sun of the philosophers” appear, he is referring to the final metallic “reigns”, known to the alchemists as Venus, Mars and the Sun. The solar reign ends with the “multiplication” of the final Stone, which Dee calls the Monad, or the red Adam.

In Theorem XIV, Dee cites one of the sayings from the *Tabula smaragdina* attributed to Hermes Trismegistus that the father and mother of the Stone are the Sun and the Moon, which he says have been “clearly proved” by means of his hiero-

glyphic symbol. To this Dee adds that the “offspring” or *Terra Lemnia*, mentioned in the Theorem, is nourished by solar and lunar rays.³⁵ Many alchemical texts attribute the absorption of solar and lunar influences not only to the dew deposited under the sign of Aries, but to the process of the work itself. The *Terra Lemnia* thus refers to the island where Vulcan’s forge was situated, representing the application of fire to the alchemical materials.³⁶ In the following theorem (XV) he deals with the times of greatest solar and lunar influence, and therefore the best times of year to accomplish the alchemical *opus*. The “sun’s splendour” is at its height in Aries, and the moon’s in Taurus. Therefore the moon has a “prolific conjugal love” for the sun, and their union is the alchemical marriage which Ostanes refers to when he says “Nature rejoices in Nature”.³⁷ The changes of season, marked by solar eclipses, are the conjunction of the Sun with Mars, with the power of Mars, exalted in the astrological house of Aries. The sign of Aries is joined with the elemental cross and sign of Taurus in Dee’s symbol of the Monas. This union exalts the Sun and Moon by means of the science of the elements. Dee is reiterating a common alchemical doctrine that the alchemical work should be undertaken in the spring, when the sun is astrologically exalted in Aries and the moon in Taurus, and Mars in the house of Aries. Solar eclipses are explained as the eclipse of light by the purified primal matter when iron is added to dust in the work. It is necessary to purify the mineral of antimony as well, to obtain the famous *regulus martis stellatus* (“starry regulus of mars”) of the alchemists and metallurgists (an idea which recurs later in Newton’s alchemical writings).³⁸ Through “the science of the elements” (by which Dee meant alchemy) the Sun and Moon’s exaltations are obtained.

The elemental cross reappears in theorem XVI as the figure “X”. Dee subjects the symbol “X” to a “cabbalistic anatomy” (*notarikon*) in order to obtain the letter “V” whose value in the Latin numerical system is five, or the Quinary.³⁹ In the divine name “El” (here written in the Latin alphabet!), Dee finds the letter “L”, tenth in the Latin alphabet, and so on. Dee concludes that one may progress from the number one to ten to one hundred through his method.⁴⁰ Alchemically the Latin “X”, or St Andrew’s Cross, is the “manifested light” or spark of the celestial and terrestrial fire which “composes or disintegrates, begets or kills” the “superior or spiritual force which acts in a mysterious manner within concrete matter”.⁴¹ The celestial fire, or “magical spirit” represented by the “X” is qualified by Dee as one of God’s “great [...] mysteries”.⁴² The number five recalls the Quintessence, or synthesis of the four elements, and Dee calls it the *Quinarius*, or “circular number” which refers to the circulation and transformation of elements referred to in earlier theorems. The numerical progression from one to ten to one hundred alludes to the increase of power in the Philosophers’ Stone during the course of the *opus*. Dee continues his numerical calculations relating to the symbol “X” in the following theorem (XVII). By a cabalistic calculation ($4 \times 5 + 4 \times 50 + 10 + 21 + 1$) Dee reaches the total 252, a number which probably represents Mercury. Indeed, if it is transformed back into Roman numerals – CCLII – its components can be used to assemble the Monas symbol. The three basic Roman letter/number forms, L, V, and X, are for Dee the sources of light, since the combination of the three symbols form the Latin word *lux* [i.e. LVX].

Theorem XVIII states, in accordance with alchemical teachings, that the superior celestial astronomy is the “teacher” of the inferior one. Dee presents an “anatomy” of the Monas to reveal its mysteries through physical analysis. The Monas is seen here as the “celestial messenger”, whose celestial movements are co-ordinated through the figure of the “egg”.⁴³ Inferior astronomy refers to the alchemical material which contains the unaltered planetary virtues that are revealed in the various colours and appearances during the transformations in the furnace. This is what Dee means by physical analysis. The Monas represents the god Mercury, and the Egg is the name given by alchemists to the materials assembled in the last part of the alchemical work. According to Dee the oval shell of the Egg is composed of ether, like the heavens in the Ptolemaic system. He invites the “wretched alchemists” to comprehend the meaning of the albumen’s water, the yolk’s oil and the shell’s chalk. The symbol of the Egg is an ancient one in alchemy as an analogy for the furnace.⁴⁴ In Dee’s “Egg diagram” [Plate 6] the planets are depicted in Ptolemaic sequence, with the central planets (Mars, the Sun and Venus) related to the final solar phases of the metallic “reigns” in the centre or yolk, and the “lunar” planets in the watery albumen. Dee then outlines a fable concerning the scarab beetle, the eagle and the egg. This refers to the ascent of vapours in the closed crucible towards “heaven”, that is towards a “jovial” material state. To compel these vapours to descend, so that they coagulate and form solids is known as the “dung’s Art”. Dee also alludes to “the art of the Heliocantharis” or solar beetle, which involves drawing out the solar qualities hidden in obscure and stinking matter during the phase of Saturn’s “reign”, as is often described in alchemical texts. According to Dee the person who knows the art of the beetle may dissolve the egg and the shell with pure albumen, by adding the yolk and rotating and mixing them. That is to say, the shell of the Philosophers’ egg is formed naturally by salt compounds.⁴⁵ The pure albumen is the mineral, the purified primal matter or “mercury” which is added during the final phase, and mixed with the albumen which is already present. The yolk is the sulphurous component which must prevail and transform the egg into gold. The spiral revolutions in the crucible follow the sequence of planetary “rulers” – that is, Saturn, Jupiter, Moon, Mercury, Mars, Venus, and Sun. In concluding this theorem Dee claims that Anaxagoras had attained this *magisterium* which was an excellent medicine (although he is not referring here to Anaxagoras of Clazomene).⁴⁶ Theorem XIX completes the *analysis Pyronomica*, or separation carried out in the “reigns” by the regulation of the fire under the crucible. This theorem states that the virtues of the Sun and the Moon are infused into inferior bodies to produce aqueous and igneous humours which give the Stone its reddish colour.⁴⁷

Theorem XX returns to the Cross and its intersecting axis. The two axes form a binary, which is immediately explained as the Sun and Moon, or Sulphur and Mercury. By dividing the axis in various manners, Dee produces the Ternary (Sulphur and Mercury with Salt, or Body). The central point of the cross is the origin of all things, but it is also earth (“feculent, corruptible and full of darkness”) which must be purified in order to free the elements.⁴⁸ The mineral-earth liberates the point-moanad which allows the Ternary to reunite, clothing it in “the ornaments of white garments” like the white stone during the lunar “reign”.⁴⁹ The “ratio of equality” which Dee mentions refers to the perfect balance of the four elements, which he

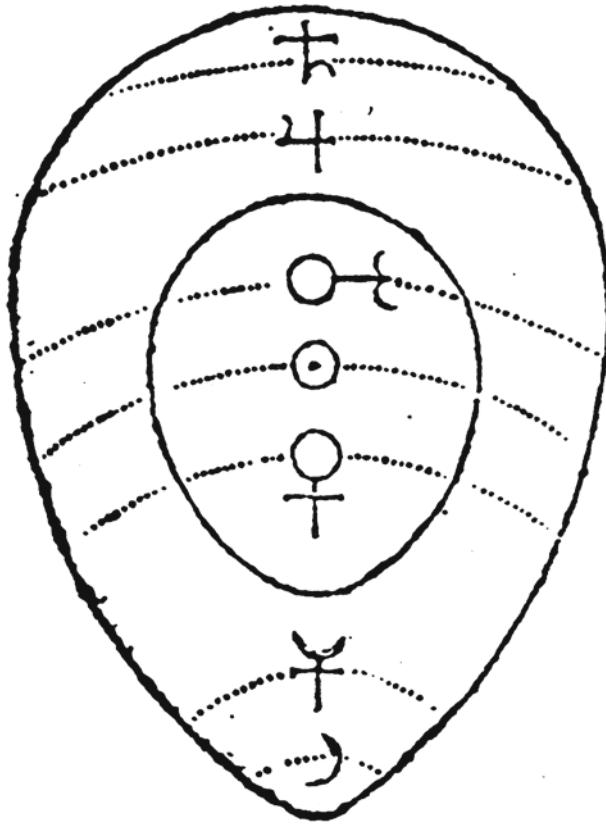


Plate 6: The 'Egg diagram', *Monas Hieroglyphica* (Antwerp, 1564), p. 17^r.
Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

repeatedly emphasises throughout the work. Thus the Monad increases its “dignity” and power through the “uncommon activity of a master”.⁵⁰ There is little new material in this particular theorem, apart from the balance of the elements, which are examined not so much in terms of their material weight, as much as the developments occurring during the phases of the different “reigns” which manifest the dominion of the various elements. Most alchemical authorities suggest that the alchemist must intervene at this point, regulating the fire, either increasing or decreasing it, so that the substance is neither under- nor over-heated during the seven phases, which would require several weeks’ work.

Theorem XXI also reiterates an earlier theme: he says that he has already shown how the substance “enveloped in the recesses of the Monad” could be “brought to light” and vice versa. Here Dee alludes to the power of the Sun and the Moon, and Sulphur and Mercury, which are contained in the Philosophers’ Stone and manifested in the “planetary” colours. Whereas in Theorem XVIII he followed the Ptolemaic planetary order he now considers the order of the planets favoured by Plato (which Plato called the “Egyptian order”), beginning with Saturn, and followed (in descending order) by Jupiter, Mars, Venus, Mercury, the Sun and the Moon.⁵¹ The first three are said to congregate around the sign of Aries, while Venus and Mercury congregate around the Cross. Dee is most likely referring here to the planetary symbols extracted from the Monas symbol when it is disassembled: so that the sign of Aries is united with the elemental cross, and the Sun and the Moon are separated. Dee invites the reader to observe that when the figure is inverted, the Sun and the Moon revolve downwards towards the earth, which (he says) represents the principles of “stability” and “fixation”.⁵² Evidently Dee is referring here to the insertion of the Sun and Moon – by means of the fire of Aries and the elemental fire – into the mineral Earth in which they can be “fixed” and utilised. In examining the figures of Aries and the cross, Dee says that Aries is a “doubled moon” (i.e. it is constructed symbolically out of two semi-circles or lunar “crescents”), or a Moon which “exists and is alive”, and is provided with vital movement by the “craft of the elements” signified by the cross. The two semi-circles can be assembled into the sign of the Sun, and thus the living and existing Moon must be “treated by the magisterial art of the elements” because “it possesses the power to manifest the circular fullness of the sun”.⁵³ Dee understands “Moon” here as the lunar “ruler” in the process, as well as the primary white mineral, which is called “moon” when it has been purified. This is the mineral that is enriched by celestial influences during the course of the work. This mineral is also known as “philosophers’ Venus” and Dee places it close to Venus in his scheme. The overall meaning of this passage is that the power of Aries is solidified in the solar force, and forms the final stone. With this Dee ends the “cabbalistic anatomy” of his symbol, and instructs his reader to educate himself in “the fire of Aries of the first triplicity” or the “equinoctial fire” which causes the sun to be exalted to an uncommon degree. As has already been demonstrated, this is the vernal fire of Aries, the “beginning of the fiery triplicity” in Theorem X.⁵⁴ The fire originates in the Sun which, according to the alchemical writers, contains more power than ordinary solar heat.

Theorem XXII focuses on the “secret vessels of the holy art”.⁵⁵ Dee begins with the “artificial vessel” symbolically derived from the circle of the Monas, or from the Sun and Moon that it represents [Plate 7]. He then refers to an “earthen” and a “vitreous” vessel (represented by the Greek letters δ and λ respectively, which he also compares to a mortar and pestle which can be used to grind pearls, crystals, rubies and other stones).⁵⁶ The glass vessel is the salty crust that forms as a result of the application of fire to the materials in the final cooking. Because this crust is formed naturally it is also called “nature’s vessel”. The “vessel of the Art” or artificial vessel is the refractory of earth, which contains the glass vessel as the mortar contains the pestle.⁵⁷ The ground stones represent the various stages or colours of the “reigns” undergone by the material through the *opus*. Dee also refers to an “alpha” and an “omega” vessel,⁵⁸ which represent the beginning and the end of the alchemical process. The alpha is formed by the Sun and the Moon, while the omega is “full of mysteries”, although both are formed from base but necessary matter. This can only be the alchemists’ Mercury, the basis of the work, the primal matter that transforms into the Philosophers’ Stone. The celestial Mercury contains the Sun and Moon (as dew’s salt) already contained in the mineral earth. Dee then obscurely states that the alpha vessel must be employed by means of “the very secret and short art of using the air-shaft [of the vessel]”.⁵⁹ This is followed by a sentence of garbled Hebrew, which Grillot de Givry translates as “The incorruptible salt in which the first principle of things is preserved, in which the vitriol floats after dissolution.”⁶⁰ This could refer to the “mysterious artifice”, often alluded to in the alchemical literature, which is used in the central part of the work to collect the vitriol or “green lion”, which is not ordinary vitriol, but a by-product of the transformed primal matter. This process is referred to as “the taking of the Island of Delos”, the birthplace of Diana and Apollo (or Moon and Sun) in the operations called “sublimations”.⁶¹ Dee refers to the omega vase as “a man of all hours” (*omnium horarum homo*),⁶² which is similar in meaning to the “slave” or “mercury of all trades” which are the names given by alchemical authors to the purified primal matter sometimes added during the course of the work. According to Dee, at this point the “fruits of the Hesperian garden” will be seen in the alpha and omega, as in a mirror.⁶³ That is, through the “common Mercury” the alchemist will arrive at the mythical golden fruit guarded in the garden of the Hesperides. The phases of the metallic “reigns” may be observed during the *opus* through the mercurial mirror. Dee concludes this theorem by citing the praise of Pseudo-Democritus (i.e. Bolos of Mendes) for those who thrive on the “fiery strength” (the “heroes” of Dee’s preface) – the Greek alchemists who intone hymns for “the healing of the soul and a deliverance from all distress”.⁶⁴

Finally, in Theorem XXIII, Dee assembles the graphic symbol of the Monas. Returning once more to the four elements, he says that they are found in everything which contains the generating principle, and that it is essential when practising the Art that the elements should be present in equal proportion. He then tells the reader how to construct the Monas, which, he says, can be reproduced on seals or rings. In sum, he suggests two units of measure for the radii of the circle, and two units for each of the horizontal arms of the cross, with one and three units respectively for the upper and lower vertical arms. This gives us an overall height of nine units (“nine

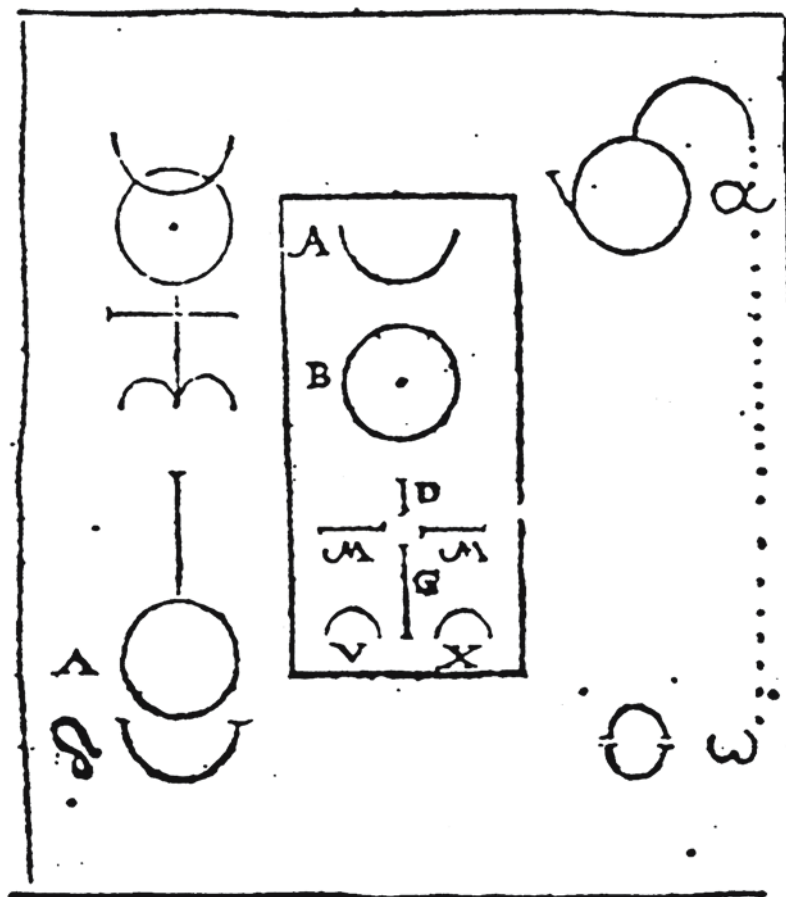


Plate 7: The 'artificial vessel' (*Vas artificiale*) *Monas Hieroglyphica* (Antwerp, 1564), p. 22^r. Reproduced from the facsimile edition of C. H. Josten, courtesy of *Ambix*.

equal parts of the length of our fundamental AB”), which represent the nine operations of the Hermetic work.⁶⁵ Theoretically these proportions or symmetries should be utilised in the alchemical work, and the four equalized elements should therefore dominate in turn through the course of the “reigns” in the alchemical process. Dee then goes on to make a comparison between the “Pythagorean” Quaternary and the four arms of the cross, which represent an “artificial” Quaternary (*Quaternarii artificialis*) which can be subjected to “a peculiar and mystical division and computation.”⁶⁶ Dee extracts certain numbers, adding, multiplying and permutating the alchemical Quaternary in an application of the Hebrew technique of the transposition of letters (*tsiruf*). He then constructs a diagram based on the Pythagorean Quaternary 1 – 2 – 3 – 4, which is based on the number of units used to construct the cross, and he says that this Quaternary can be used to calculate both the duration of time and the intensity of “powers and virtues” in the alchemical work.⁶⁷ Using similar calculations, Dee derives the force of the heat of the fire using the progression 10 – 20 – 30 – 40, which runs parallel with the increasing intensity of the “acquired and internal power” that accumulates in a denary proportion (1 – 10 – 100).⁶⁸ It should be noted, however, that the intensity of the fire is measured in relation to an initial temperature which is not stated. The “internal power” refers to the anticipated multiplication of power of the Philosophers’ Stone during the various stages of the alchemical work. The “analytic weights” (*pondera analytica*) which Dee refers to (designated by the numbers 3 and 4) are related to the Ternary and the Quaternary, while the “synthetic weights” (*pondera synthetica*) – a sequence of ten numbers from 13 down to 1 – seem to refer to the decreasing weight of the materials which terminates in the monadic unity of the Philosophers’ Stone.⁶⁹ The schema separates time into the “particular” and the “magisterial”. The first includes the seven alchemical operations: Preparation, Putrefaction, Separation, Conjunction, Coagulation, Contrition and Imbibition, while the second refers to the “lapidific” and “fermentative” phases of the formation of the Philosophers’ Stone, which is designated by the number 252 (which, as we have seen represents the final perfected Mercury, but could also allude to the number of days needed to complete the Work). Dee’s “magisterial time” refers to those final operations which are often briefly referred to by alchemical authors as *solve et coagula*, which makes nine operations in total. In the following diagram, the “Horizon Æternitatis”,⁷⁰ [Plate 8] Dee once again insists upon the necessity of the successive predominance of the four elements in the Work, in the following order: Earth, Water, Air, Fire – whose power must increase in a denary proportion: 1 – 10 – 100 – 1000.⁷¹ He also refers to the progressive development of the “body, soul and spirit” of the minerals represented in the traditional colour sequence, from “darkness” (black), to “crystalline” (white) to “citron” (yellow), and “anthrax” or the final red carbuncle of the Stone itself.

Dee then declares that once the monad has been “correctly, wholly, and physically restored to itself”, it is “not in the power of nature or of any art to impel it more than four times by supercelestial revolutions to make any progressive movement”.⁷² Here Dee refers to the four “multiplications” of weight and power which (according to alchemical authors) are permitted once the Stone has reached the celestial or ethereal level, and has attained its maximum level of creative force. Dee ends this theorem with an obscure reference to “four very famous men, philo-

sophizing together" (*Quatuor simul [...] Philosophantes Clarissimi Viri*), who had been "granted [...] power over other creatures and large dominion" by God through the "very great wonder" of the Monas.⁷³ Although it does not seem likely that Dee saw himself as one of these favoured operators, it is possible that he might have known them. The last Theorem (XXIV) ends by suggesting that the circle of the elements (divided into equal proportions in the alchemical work) is analogous to the equinoctial circle (the equal proportions of day and night), the metamorphosis and metastasis of the Quaternary being defined by the number 24 (4 X 6). This number is related to the four beasts of the apocalypse ("each having six wings") and to the twenty-four "elders" surrounding God in heaven.⁷⁴ It should also be noted that six is the number of metals excluding gold involved in the alchemical Work, i.e. the number of "reigns" of each of the four elements prior to the final "reign of Gold". Thus Dee's twenty-four theorems taken together are themselves a "cabalistic" presentation of the Monad.

While Dee's alchemical observations might seem far too abstract and "literary" to be considered a "theory", and while he fails to follow a consistent line in his presentation of the *opus*, we should remember that these tendencies are present both in the ancient alchemical tradition and in the more recent alchemical literature with which Dee was intimately acquainted. How much he may actually have practised alchemy in the laboratory is difficult to estimate,⁷⁵ but his deep familiarity with the fundamental principles of alchemy, and his desire to theorise on the process of the alchemical *opus* speak for themselves.

NOTES

¹ Johannes Augustini Pantheus, *Voarchadumia contra alchimiam: ars distincta ab archimia & sophia: cum additionibus: proportionibus: numeris: & figuris opportunis* (Venice, 1530). Dee's annotated copy of this work is now in the British Library, C.120.b.4 (2). On Pantheus's influence on Dee's *Monas Hieroglyphica*, see NP, 101-3.

² It is interesting to note that in 1605 the Italian alchemist Cesare della Riviera entitled his own work on the subject *Il mondo magico de gli heroi* (*The Magic World of the Heroes*). See Cesare della Riviera, *Il mondo magico de gli heroi*, ed. J. Evola (Carmagnola: Arthos, 1979).

³ See NP, 78.

⁴ On the alchemical dimensions of the "angelic conversations" see Deborah Harkness, *John Dee's Conversations with angels: Cabala, alchemy, and the end of nature* (Cambridge: Cambridge University Press, 1999), 195-214.

⁵ MH, 117.

⁶ MH, 121.

⁷ MH, 123, 127.

⁸ MH, 129: "by the square mystery of the Hieroglyphic Monad something circular and altogether even[ly round] is being conveyed."

⁹ Michael Maier, *Atalanta Fugiens, hoc est Emblemata Nova De Secretis Naturae Chymica* (Oppenheim, 1617), ed. and trans. H. M. E. De Jong, *Michael Maier's Atalanta Fugiens: Sources of an Alchemical Book of Emblems* (Leiden: Brill, 1969), Emblem XXI, 166-169. All subsequent references to Maier are to this edition.

¹⁰ MH, 131.

¹¹ MH, 131.

- ¹² See Fulcanelli, *Le Mystère des Cathedrales et l'interprétation ésotérique des symboles hermétiques du grand oeuvre* (Paris: Jean Jacques Pauvert, 1964), Italian trans. *Il mistero delle cattedrali e l'interpretazione esoterica dei simboli ermetici della Grande Opera* (Rome: Mediterranee, 1972), 100.
- ¹³ *MH*, 131.
- ¹⁴ Maier, *Atalanta Fugiens*, Discourse XI, 114-115.
- ¹⁵ *MH*, 135.
- ¹⁶ *MH*, 135, 137.
- ¹⁷ See J. W. Hamilton Jones, ed., *The Epistle of Ali Puli (circa 1700 A.D.)* (London: John M. Watkins, 1951), 133-158.
- ¹⁸ Atorène, *Le laboratoire alchimique* (Paris: Guy Trédaniel, Éditions De La Maisnie, 1981).
- ¹⁹ *MH*, 155, 157.
- ²⁰ Maier, *Atalanta fugiens*, Discourse VI, 82-3.
- ²¹ *MH*, 157.
- ²² On the Ternary of body, soul and spirit (salt, sulphur and mercury), see De Jong's commentary on Hermes Trismegistus's *Tractatus vere Aureus de Lapidis Physici Secreto*, in *Atalanta Fugiens*, 172-3. For *The Book of Ostanès* see Pierre Eugène Marcelin Berthelot, *Collection des anciens alchimistes grecs, publiée sous les auspices du Ministère de l'instruction publique par M. Berthelot [...] avec la collaboration de [...] C. E. Ruelle*, 3 vols (Paris, 1887-88), II, 261-2 and III, 250-252.
- ²³ *MH*, 159.
- ²⁴ Maier, *Atalanta Fugiens*, Discourse VIII, 95-6.
- ²⁵ *MH*, 159.
- ²⁶ *MH*, 161.
- ²⁷ Antoine Joseph Pernety, "Traité de l'Œuvre Hermétique" and "Principes Généraux de Physique, Suivant la Philosophie Hermétique", in *Les Fables Egyptiennes et Grecques Dévoilées & réduites au même principe, avec une explication des Hiéroglyphes, et de la Guerre de Troye* (Paris, 1758), 45-214. Italian trans. *Trattato dell'opera eremetica* (Genoa: Phoenix, 1979), 48. (Cf. *Les Fables*, 86-7, "Du Feu").
- ²⁸ *MH*, 161.
- ²⁹ See Eugene Canseliet, ed., *Alchimie et son Livre Muet* (Paris: Jean Jacques Pauvert, 1967), plates 4, 9, 12 and the relevant commentaries.
- ³⁰ See Frances A. Yates, *The Occult Philosophy in the Elizabethan Age* (London: Routledge Kegan and Paul, 1979), Plate 10.
- ³¹ *MH*, 163.
- ³² *MH*, 163, 165.
- ³³ See Jack Lindsay, *The Origins of Alchemy in Graeco-Roman Egypt* (London: F. Muller, 1970), 382-3.
- ³⁴ *MH*, 165.
- ³⁵ *MH*, 165, 167.
- ³⁶ *MH*, 167, n.55.
- ³⁷ Lindsay, *Origins*, 115, *MH*, 167, n.58.
- ³⁸ See Betty Jo Teeter Dobbs, *The Foundations of Newton's Alchemy, or "The Hunting of the Greene Lyon"* (Cambridge: Cambridge University Press, 1975), 146-156. Cf. Atorène, *Laboratoire Alchimique*, 207.
- ³⁹ On Dee's use of cabalistic analytical and exegetical techniques in the *Monas Hieroglyphica*, see *NP*, 92-5.
- ⁴⁰ *MH*, 169, 171, 173.
- ⁴¹ See Fulcanelli, *Les Demeures Philosophales et le Symbolisme Hermétique dans ses Rapports avec L'Art Sacré et L'ésotérisme du Grand-oeuvre*, 2 vols (Paris: Jean Jacques Pauvert, 1965), Italian translation: *Le Dimore Filosofali: Un labirinto in cui sono sparsi i frammenti di un grandioso disegno alchemico*, 2 vols (Rome: Mediterranee, 1973), I, 199-204.
- ⁴² *MH*, 171: "O my God, how great are these mysteries!"
- ⁴³ *MH*, 175, 177. On Dee's use of the "egg" symbol and its cosmological significance, see J. Peter Zetterberg, "Hermetic geocentricity: John Dee's celestial egg," *Isis*, 70 (1979): 385-393.
- ⁴⁴ Eugene Canseliet, *L'Alchimie expliquée sur ses Textes Classiques* (Paris: Jean Jacques Pauvert, 1978), Italian translation: *L'Alchimia spiegata sui suoi testi classici*. (Rome: Mediterranee, 1972), 150.
- ⁴⁵ Canseliet, *L'Alchimia spiegata*, 151.

⁴⁶ *MH*, 179 and n.81: "It was surely through this doctrine that Anaxagoras afterwards came to make his most excellent medicine, as may be read in his treatise περί των εκτροφών φυσικων."

⁴⁷ *MH*, 181.

⁴⁸ *MH*, 183, 185.

⁴⁹ *MH*, 185.

⁵⁰ *MH*, 187.

⁵¹ *MH*, 187, see also n.92.

⁵² *MH*, 189.

⁵³ *MH*, 191.

⁵⁴ For a fuller exposition of the "vernal" or "equinoctial" fire, see Pernety, *Trattato dell'opera eremetica*, 89 et seq. (Cf. *Les Fables*, 166-172 "Du feu en general" and "Du feu Philosophique").

⁵⁵ *MH*, 195.

⁵⁶ *MH*, 197.

⁵⁷ See Fulcanelli, *Il mistero delle cattedrali*, 149 et seq.; Canseliet, *L'Alchimie expliquée*, 151; Pernety, *Trattato*, 87 (cf. *Les Fables*, 163, "Noms donnés à ce vase par les Anciens").

⁵⁸ *MH*, 195, 197.

⁵⁹ *MH*, 197.

⁶⁰ See Grillot de Givry, trans., *La Monade Hieroglyphique* (Milan: Sebastiani, 1975). Both Josten and Gershom Scholem pronounced this passage to be untranslatable. See *MH*, 197, n.112.

⁶¹ Fulcanelli, *Le dimore filosofali*, I, 199-204.

⁶² *MH*, 197.

⁶³ *MH*, 199.

⁶⁴ *MH*, 199, 201 and n.116.

⁶⁵ *MH*, 201, 203, 205. See Fulcanelli, *Il mistero delle cattedrali*, 74.

⁶⁶ *MH*, 207, 209.

⁶⁷ *MH*, 211.

⁶⁸ *MH*, 213.

⁶⁹ *MH*, 213.

⁷⁰ *MH*, 214. On Dee's "Horizon Aeternitatis", see Nicholas H. Clulee, "John Dee and the Paracelsians" in Allen Debus and Michael T. Walton, eds., *Reading the Book of Nature: The Other Side of the Scientific Revolution*, Sixteenth Century Essays and Studies, 41 (Ann Arbor, Michigan: Sixteenth Century Journal Publishers, 1998), 111-132 (117-119).

⁷¹ On the use of the denary proportion in the alchemical process see De Jong's comments in *Atalanta Fugiens*, 172-3.

⁷² *MH*, 215.

⁷³ *MH*, 217.

⁷⁴ *MH*, 217.

⁷⁵ For evidence of Dee's practical alchemical work, and an analysis of some of his laboratory notebooks see Urszula Szulakowska, *John Dee and European Alchemy*, The Durham Thomas Harriot Seminar, Occasional Paper No. 21 (Durham: University of Durham, 1996), 14-17.

J. REEDS

JOHN DEE AND THE MAGIC TABLES IN THE *BOOK OF SOYGA*

“Oh, my great and long desyre hath byn to be hable to read those tables of Soyga”. –
(John Dee).¹

1. JOHN DEE AND THE BOOK OF SOYGA

Until recently the *Book of Soyga* was known only by repute, through mention in the diaries of John Dee (1527-1608). Dee's association with the *Book of Soyga* is conveniently summarised by Christopher Whitby:² On 18 April 1583 Dee was unable to find his *Book of Soyga*: it had been mislaid. On 29 April 1583 Dee remembered a detail about the missing book: “E[dward] K[elley] and I wer talking of my boke Soyga, or Aldaraia and I at length sayd that, (as far as I did remember) Zadzaczadlin, was Adam by the Alphabet therof.” On 19 November 1595 Dee recovered his *Book of Soyga*. Many years later Elias Ashmole (1617-1692) reported that “the Duke of Lauderdale hath a folio MS. which was Dr. Dee's with the words on the first page: Aldaraia sive Soyga vocor”.

In addition to these unremarkable appearances of the *Book of Soyga* in Dee's *nachlaß* – unremarkable, for who does not sometimes mislay and later recover a valued book? – there is the singular exchange held between Dee and the angel Uriel on the occasion of their first conversation, at Mortlake on Saturday, 10 March 1581/1582, the very first scrying session mediated by Dee's most famous scryer, Edward Kelley (1555-c.1595), also known as Kelly and Talbot.³ In the following, Δ is Dee, VR is Uriel:

Δ – ys my boke, of Soyga, of any excellency?

VR – Liber ille, erat Ada[m]e in Paradiso reuelatus, per Angelos Dei bonos. [That book was revealed to Adam in Paradise by God's good angels.]

Δ – Will you give me any instructions, how I may read those Tables of Soyga?

VR – I can – But solus Michaël illius libri est interpretator. [Only Michael is the interpreter of that book.]

Δ – I was told, that after I could read that boke, I shold liue but two yeres and a half.

VR – Thow shallt liue an Hundred and od yeres.

Δ – What may I, or must I do, to haue the sight, and presence, of Michael, that blessed Angel?

VR – Presentias n[ost]ras postulate et invoke, sinceritate et humilitate. Et Anchor, Anachor, et Anilos, non sunt in hunc lapidem invocandi. [Request and invoke our presence with sincerity and humility. Anchor, Anachor and Anilos are not to be called into this stone.]

Δ – Oh, my great and long desyre hath byn to be hable to read those tables of Soyga.
 VR – Haec maximè respiciunt Michaëlem. Michaël est Angelus, qui illuminat gressus
 tuos. Et haec revelantur in virtute et veritate non vi. [These things are mostly to do with
 Michael. Michael is the angel who illuminates your steps. And these things are revealed
 in virtue and truth and not by force.]
 Δ – Is there any speciall tyme, or howre to be observed, to deale for the enioying of
 Michael?
 VR – Omnis hora, est hora nobis. [Every hour is ours.]⁴

To summarize: Uriel confirms Dee's high estimation of the *Book of Soyga's* value. Dee wants angelic help in understanding his *Book of Soyga*, but only the angel Michael is cleared to talk about this topic. If, as some scholars believe, Kelley was a charlatan, then here we find him (in the voice of Uriel) being characteristically evasive. As a newcomer to Dee's household he does not want to commit himself to any more specific statements about the *Book of Soyga*, about which he knows very little beyond the fact that it fascinates Dee.⁵

These things rested for roughly four centuries. Dee prized his *Book of Soyga*, but since the book was lost, modern scholars could only guess about its contents and possible influence on Dee's magic system, especially for the version in his *Book of Enoch*.⁶

But then in 1994 Deborah Harkness – like the hero of Poe's "The Purloined Letter" – located not one but two copies in the obvious places, in this case in two of England's greatest libraries. They had been catalogued under the title *Aldaraia* instead of *Soyga*.⁷

At last we can examine the *Book of Soyga*, and in particular its tables, and see for ourselves what it was that Dee prized so highly.

The *Book of Soyga* is an anonymous late-mediaeval or early modern Latin magical work extant in two sixteenth-century manuscript copies: one in the Bodleian Library, which I refer to as Bodley 908, and the other in the British Library, which I refer to as Sloane 8.⁸ Since there is as yet no edition or translation of either of the two manuscripts for me to refer to, nor even a synopsis of their contents, I offer the following brief description.⁹

The Sloane 8 copy (but not the Bodley 908 one) bears the title *Aldaraia sive Soyga vocor* at the head of the text and on the leaf preceding the text, both in the same hand as the text, fitting Ashmole's description. Sloane 8's preceding leaf also bears the description *Tractatus Astrologico Magicus*, written in a different hand. Both copies contain the equation of "Adam" with "Zadzaczadlin", so there can be no doubt that Harkness's *Book of Soyga* is closely related to Dee's *Book of Soyga*; on Ashmole's *Aldaraia sive Soyga vocor* evidence, and based on the arguments I present at the end of section 5, it is easy to guess that Sloane 8 was in fact Dee's copy of the *Book of Soyga*.¹⁰

The 197 leaves of Bodley 908 contain three named works, *Liber Aldaraia*, *Liber Radiorum*, and *Liber decimus septimus* (of 95, 65, and 2 leaves, respectively) as well as a number of shorter unnamed works totalling about 10 leaves. The final 18 leaves

contain the tables that are the subject of this paper. Sloane 8 has 147 leaves, and seems largely identical with Bodley 908, except that the tables occupy 36 leaves and the *Liber Radiorum* is present only in a 2 leaf truncated “executive summary” version.

A cursory inspection of the *Book of Soyga* shows it is concerned with astrology and demonology, with long lists of conjunctions, lunar mansions, names and genealogies of angels, and invocations, not much different from those found, say, in pseudo-Agrippa.¹¹ A single example, of a list of spirits of the air, is illustrative of the whole:

Adracty, Adaci, Adai, Terocot, Tercot, Herm, Hermzm, Hermzisco, Cotzi, Cotzizi, Cotzizizin, Zinzicon, Ginzecohon, Ginchecon, Saradon, Sardon, Sardeon, Belzebuc, Belzscup, Belcupe, Saraduc, Sarcud, Carc, Sathanas, Satnas, Sacsan, Contion, Conoi, Conoison, Satnei, Sapnn, Sappi, Danarcas, Dancas, Dancasnar.¹²

Some of the spells or incantations have a vaguely Christian or alchemical air to them, as “Petra Ouis Angelus Agnus Lapis Sponsus” and “Diuinitas Christus Venturus Iustorum Humanitatis Vnitas”,¹³ but the overall impression is that it is no more an alchemical treatise than it is a devotional work.

Several features of the *Book of Soyga* seem worth particular mention, as being untypical of a standard late mediaeval or Renaissance magical work, or of the run-of-the-mill necromancy handbook.¹⁴ In contrast to most mediaeval or Renaissance works, the text has extremely few references to known authors or personalities. There are no recognizable *auctores*. Other than the occasional mention of a few Old Testament names, and two references to *Libro Geber*, and a puzzling marginal gloss “Steganographia” in the same hand as the text, which is presumably a reference to the work of Johannes Trithemius (1462-1516), there are no references to recognizable personalities.¹⁵

Instead, it makes numerous references to what are presumably mediaeval magical treatises, works such as *liber E*, *liber Os*, *liber dignus*, *liber Sipal*, *liber Munob*, and the like.

Throughout the book much importance is placed on writing words backwards. This can be seen in some of the titles mentioned above: *Sipal* backwards is *Lapis*, and *Munob* reversed is *Bonum*. Phrases such as “Retap Retson” occur throughout. This principle is reflected in the form of the tables, as discussed below. The name of the work, *Soyga*, is itself explained to be “Agyos, literis transvectis”.¹⁶

Throughout the book there is a preoccupation with letters and combinations of letters, assignments of numerical values to letters, assigning letters to planets and to elements, listing combinations of letters associated with houses of the moon, recombining letters and syllables in incantations to form new magic words, listing new names for the 23 letters of the Latin alphabet, sometimes taken in reversed Z through A order, listing new symbols for the 23 letters, and so on.

And, towards the end of the book there is the set of thirty-six large square tables, described in section 2 of this paper, filled with a seemingly random jumble of letters.

(One of these is illustrated in Plates 9 and 10.) These tables do not appear to be like any illustrated in, say, Shumaker's survey of mediaeval and early modern magic works.¹⁷

The *Book of Soyga*'s preoccupation with letters, alphabet arithmetic, Hebrew-like backwards writing, and so on, is of course characteristic of the new Cabalistic magic which became popular in the sixteenth century, exemplified by the great compilation of Agrippa of Nettesheim (1486-1535), and borrowing authority both from the Renaissance humanist interest in the Cabala expressed by such figures as Pico and Reuchlin and from the supposed Biblical antiquity of the Cabala.¹⁸ Although large square tables are not themselves a characteristic feature of the traditional Cabala, they had by Agrippa's time become an integral part of the Christian magical Cabala.¹⁹

Such a work must have appealed to Dee since it encompassed so many of the ingredients associated with early modern magical and Christian Cabalist texts; we know the tables in the *Book of Soyga* excited John Dee's interest, as seen in the dialogue with Uriel. They certainly also excited mine as a professional cryptologist. Were they, I wondered, filled with a random (and hence pointless) selection of letters, or were they a cryptogram (with a hidden "plain text" meaning, which might at least in principle be recoverable by cryptanalysis), or was there some other structure or pattern to them? I approached the tables as I would any cryptographic problem, first transcribing the data and entering it into the computer, and then trying out what I knew of the bag of code-breakers' tricks. The results, which I describe in sections 3 through 6, were unexpectedly gratifying.

This paper, then, indirectly addresses the question of the *Book of Soyga*'s possible influence on Dee by examining and comparing the *form* (or method of construction) of the tables in the *Book of Soyga* and those found in other early modern magic tables (including Dee's and Agrippa's), rather than their *function* (i.e., purpose or method of use).

2. THE MAGIC TABLES OF *THE BOOK OF SOYGA*

The *Book of Soyga* contains thirty-six tables; each table is a square grid of 36 rows and columns; each grid cell contains a letter of the Latin alphabet.²⁰ These tables turn out to be formed by a completely deterministic calculation method, or algorithm, starting from an arbitrary "code word" for each table. This construction algorithm is so intricate that it is unlikely that its presence would be detected on casual examination of the tables.

Each of the thirty-six tables is headed with a number and a label. I summarize these in my Table 1. For convenience I will refer to them as T1, T2, and so on. T1 through T12 are labelled with the signs of the zodiac, Aries through Pisces; as are T13 through T24. T25 through T31 are labelled with the seven planet names, and T32 through T35 with the four element names. T36 is labelled with the word

Tabula

pri

ma

Aries

n	d	i	z	b	f	i	z	b	f	i	z	b	f	i	z	b	f	i	z	b	f	i	z	b	f
i	f	r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t
s	c	v	c	k	x	i	t	a	x	i	t	a	x	i	t	a	x	i	t	a	x	i	t	a	x
r	o	e	r	n	m	b	c	e	d	o	b	f	i	z	b	f	i	z	b	f	i	z	b	f	
A	g	b	t	x	d	n	x	y	t	p	b	t	x	d	n	x	y	t	p	b	t	x	d	n	
m	p	p	i	m	e	g	s	e	b	a	d	z	i	l	b	f	i	z	b	f	i	z	b	f	
m	z	r	f	i	r	d	z	i	g	x	t	h	z	e	c	y	k								
a	g	b	c	m	g	a	b	l	n	m	f	y	s	i	t	s	f								
r	d	b	e	c	t	i	e	h	f	d	k	h	m	h	a	i	e								
f	m	a	o	i	k	a	s	e	p	k	b	k	d	n	p	p	p								
l	t	d	u	h	p	o	r	t	z	m	a	m	e	g	m	x	e								
n	r	p	b	k	s	b	s	d	e	c	d	r	o	a	e	f	f								
n	h	b	r	x	y	m	r	p	s	l	a	t	y	g	e	r	t								
l	y	m	q	s	o	s	b	r	f	n	p	f	n	o	r	o	d								
s	o	s	a	b	y	h	e	r	e	u	e	f	l	k	y	i	e	f							
r	s	e	d	f	a	m	e	b	y	u	x	e	n	z	o	a									
a	u	s	m	a	e	p	f	d	d	b	z	e	d	f	h	m	z								
m	t	e	p	o	l	m	e	s	m	a	b	f	k	h	e	z	o	b							
m	s	l	m	n	b	o	n	i	c	d	e	n	a	m	p	f	k								
a	b	c	p	r	e	c	d	e	l	a	i	d	f	e	s	m	i								
y	h	h	z	s	n	t	m	n	b	c	m	r	i	e	x	d	e								
s	q	e	l	p	e	y	d	s	k	s	u	f	r	g	f	m	u								
l	f	l	h	u	f	o	k	k	b	u	m	r	e	s	a	o	x								
n	x	c	l	r	f	i	a	m	a	p	d	n	y	f	l	f									
n	m	b	n	h	l	f	e	p	e	o	k	e	u	o	r	f									
i	c	e	d	n	b	h	b	f	i	a	g	b	p	u	u										
s	l	b	f	p	p	x	z	y	x	a	e	t	k	e	r	m	t								
r	y	r	r	e	f	b	a	z	e	f	x	t	i	r	e	x									
a	a	t	e	i	b	r	m	y	s	o	f	d	o	b	b	z									
m	z	x	r	e	f	p	i	c	b	u	f	h	i	e	s	p	p								
m	p	n	h	x	x	o	r	e	k	m	e	p	a	o	p	o	z								
a	a	p	x	n	n	h	t	f	u	u	o	i	x	e	y	p									
r	m	o	f	p	p	x	l	p	k	m	n	z	e	f	t	z									
s	b	f	h	v	r	e	a	n	f	m	l	k	p	n	f	b	t								
i	l	c	l	r	e	r	m	e	c	e	f	z	n	p	n	r	n								
n	b	e	b	t	n	h	r	z	e	i	e	r	o	z	y	i	d								

i	z	b	d	i	z	b	d	i	z	b	d	i	z	b	d	i	z	b	d	i	z	b	d	i	z
r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t	r	l	p	t	r	l
i	b	a	x	i	b	a	x	i	b	a	x	i	b	a	x	i	b	a	x	i	b	a	x	i	b
f	d	f	z	l	p	y	f	r	n	p	l	f	d	f	z	l	p	y	f	r	n	p	l	f	
u	t	o	h	g	t	a	u	i	d	u	c	i	f	e	o	g	t								
e	k	f	k	h	a	c	z	l	a	p	f	r	f	g	e	o	t								
n	b	h	p	x	g	z	b	a	p	m	r	e	u	h	k	p	r								
x	n	p	o	d	x	p	p	c	f	u	i	t	e	p	b	a	t								
z	p	m	f	f	z	r	c	f	u	m	h	a	o	e	g	x	l								
p	e	c	i	u	p	o	i	u	m	l	e	p	u	u	h	c	o								
z	e	i	z	y	o	n	z	p	d	e	b	r	h	b	k	f	y								
u	p	a	b	a	i	d	e	n	f	a	d	y	z	d	p	h	d								
e	n	p	p	o	r	p	f	x	k	g	a	a	b	f	r	t	m								
k	e	f	r	b	t	z	n	n	a	f	i	p	t	b	x	d									
f	n	u	i	g	u	m	m	z	u	a	r	e	p	r	i	f									
u	e	l	f	f	a	y	d	r	l	r	m	g	z	a	t	r	f								
y	u	c	i	i	p	m	c	u	c	u	d	x	p	o	d	y	x								
d	b	e	z	l	m	l	z	y	f	e	f	r	b	f	a	z									
t	k	u	p	a	o	t	h	d	z	e	a	h	y	r	r	m	y								
k	b	y	o	o	u	l	e	f	h	m	z	k	o	b	t	n	o								
f	k	o	p	u	m	k	u	k	z	o	h	y	d	e	b	p	f								
i	a	f	m	t	u	b	y	b	t	g	e	f	f	i	g	t	o								
a	c	t	u	l	v	n	n	g	y	h	k	x	x	a	f	d	t								
i	r	e	c	o	b	p	c	t	e	o	f	z	c	x	t	d									
l	o	p	g	l	y	o	i	k	y	f	u	x	p	y	f	d	i								
e	r	e	t	t	o	n	z	m	x	x	m	u	e	p	k	t	r								
l	o	l	y	f	d	f	h	r	v	m	l	r	f	e	g	f	o								
e	r	p	h	x	t	c	l	e	r	z	n	h	z	e	o	p	f								
e	h	d	n	m	f	l	h	t	b	b	p	x	p	p	y	o	o								
f	g	a	p	b	u	c	l	f	p	r	r	a	r	k	e	p	f								
u	h	f	r	n	l	z	n	e	h	h	f	t	f	p	o	o									
k	z	h	y	e	b	t	p	u	u	z	k	x	l	p	m	n	e								
m	p	z	a	o	h	o	x	m	t	h	p	l	h	u	d	f	n								
o	o	f	r	k	z	i	m	l	f	e	f	n	y	n	r	x	e								
e	x	x	f	h	i	u	c	t	n	u	e	m	r	f	z	o									
k	n	m	r	f	k	f	y	f	d	f	e	t	x	f	o	b	m								

Plate 10: *Book of Soyga*, T1 Aries table. Department of Manuscripts, British Library, MS Sloane 8, fols. 102^v and 103^v. (By Permission of the British Library).

“Magistri”. (See Plates 9 and 10 for the Bodley 908 and Sloane 8 versions of T1 “Aries”).

Table 1. Soyga Tables

Table	Label	Code word	Location in		
			Bodley 908	Sloane 8	Sloane 3189
1	Aries	NISRAM	180 ^r	102 ^v /103 ^r	58 ^v
2	Taurus	ROELER	180 ^v	103 ^v /104 ^r	60 ^v
3	Gemini	IOMIOT	181 ^r	104 ^v /105 ^r	62 ^v
4	Cancer	ISIAPO	181 ^v	105 ^v /106 ^r	64 ^v
5	Leo	ORRASE	182 ^r	106 ^v /107 ^r	
6	Virgo	OSACUE	182 ^v	107 ^v /108 ^r	
7	Libra	XUAUIR	183 ^r	108 ^v /109 ^r	
8	Scorpio	RAOSAC	183 ^v	109 ^v /110 ^r	
9	Sagittarius	RSADUA	184 ^r	110 ^v /111 ^r	
10	Capricornus	ATROGA	184 ^v	111 ^v /112 ^r	
11	Aquarius	SDUOLO	185 ^r	112 ^v /113 ^r	
12	Pisces	ARICAA	185 ^v	113 ^v /114 ^r	
13	Aries	MARSIN	186 ^r	114 ^v /115 ^r	59 ^r
14	Taurus	RELEOR	186 ^v	115 ^v /116 ^r	61 ^r
15	Gemini	TOIMOI	187 ^r	116 ^v /117 ^r	63 ^r
16	Cancer	OPAISI	187 ^v	117 ^v /118 ^r	65 ^r
17	Leo	ESARRO	188 ^r	118 ^v /119 ^r	
18	Virgo	EUCASO	188 ^v	119 ^v /120 ^r	
19	Libra	RIUAUX	189 ^r	120 ^v /121 ^r	
20	Scorpio	CASOAR	189 ^v	121 ^v /122 ^r	
21	Sagittarius	AUDASR	190 ^r	122 ^v /123 ^r	
22	Capricornus	AGORTA	190 ^v	123 ^v /124 ^r	
23	Aquarius	OLOUDS	191 ^r	124 ^v /125 ^r	
24	Pisces	AACIRA	191 ^v	125 ^v /126 ^r	
25	Saturni	OSRESO	192 ^r	126 ^v /127 ^r	
26	Jovis	NIEBOA	192 ^v	127 ^v /128 ^r	
27	Martis	OIAIAE	193 ^r	128 ^v /129 ^r	
28	Solis	ITIABA	193 ^v	129 ^v /130 ^r	
29	Veneris	ADAMIS	194 ^r	130 ^v /131 ^r	
30	Mercurii	REUELA	194 ^v	131 ^v /132 ^r	
31	Lunae	UISEUA	195 ^r	132 ^v /133 ^r	
32	Ignis	MERONF	195 ^v	133 ^v /134 ^r	
33	Aeris	ILIOSU	196 ^r	134 ^v /135 ^r	
34	Aquae	OYNIND	196 ^v	135 ^v /136 ^r	
35	Terrae	IASULA	197 ^r	136 ^v /137 ^r	
36	Magistri	MOYSES	197 ^v	137 ^v /138 ^r	

Eight of these tables also appear copied in Dee’s notebook, the *Book of Enoch*, joined in pairs: “The First Table” in the *Book of Enoch* is a 72-row table, filling both pages of an opening, the first 36 rows of which are Soyga’s T1 and the last 36 rows

The image shows a manuscript page from the Book of Enoch, folio 58v. The page is filled with a complex grid of text, likely a table or a list of names and numbers, written in a cursive script. The text is organized into columns and rows, with some larger, possibly decorative, letters or symbols interspersed. The right side of the page features a vertical column of text, possibly a summary or a key. The overall appearance is that of an ancient or medieval manuscript, with some wear and tear visible at the bottom.

Plate 11: *Book of Enoch*, equivalent of T1 'Aries' Table. Department of Manuscripts, British Library, MS 3189, fol. 58^v. (By Permission of the British Library).

of which are Soyga's T13, the two "Aries" tables, and so on, as indicated in my Table 1.²¹ See Plate 11 for the *Book of Enoch* version of T1 "Aries".

The tables are written with italic letters, mostly lower case, written into a neatly pencilled regular grid. In Bodley 908 the grid cells measure approximately one quarter of an inch, so a complete table fits on one page. In Sloane 8 the grid cells are approximately one third of an inch in size, and each table occupies the two facing pages of an opening. In each book there is occasional use of the short *s*; much more common is the long *ſ*. The writing becomes more even after the first few tables, with greatly diminished use of upper case letters, as if the copyist became accustomed to what must have been an unusually irksome and tedious task of copying completely senseless data which offered no obvious contextual clues for correcting mistakes. In Bodley 908 upper case *L* is used exclusively, presumably to avoid confusion with long *ſ*. In Sloane 8 lower case *l* is used exclusively.

The handwriting in Bodley 908 is quite even, and pains seem to have been taken to make the letters clearly distinguishable. The handwriting in Sloane 8 is less clear, so that *n* and *u* are often hard to tell apart, as are the pairs *c/e* and *l/i*. Sloane 8 shows obvious signs of proofreading, with dots, double dots, and cup strokes marking errors or doubtful readings. Occasionally a cell contains, in addition to its main letter, a tiny *f* followed by another tiny letter; I surmise *f* means *forte* and the following letter is a suggested correction. Some corrections seem to have been made by erasure and overwriting; the handwriting also seems to change part way through.

The left-hand margin in each table is special. Each table has a "code word", e.g., T1 "Aries" has code word NISRAM. The left margin is composed entirely of the code word and the reversed code word, e.g., NISRAM MARSIN NISRAM MARSIN [...] repeated until the margin is filled.

The code words are listed in the third column of my Table 1. All thirty-six of them are exactly 6 letters long. The treatise in the *Book of Soyga* which discusses the tables, the *Liber Radiorum*, has a series of paragraphs mentioning the code words for twenty-three of the tables, together with number sequences which stand in unknown relation to the words.²²

Note that the code words for T13–T24 are the reverses of those of the corresponding T1–T12. Thus, T1 "Aries" has code word NISRAM and T13, also "Aries", has code word MARSIN.

In Bodley 908, T36 "Magistri" has a blank 13th line – the first line after the first complete MOYSES/SESYOM cycle on the left. The Sloane 8 version of the table has the same 35 non-blank lines, but they have "closed ranks" so it is the last line of 36 which is blank.

In general, the first four or five rows of the tables appear very repetitious. Often the first row or two consist entirely of endless repetitions of a given two-letter "motif", followed by two or three rows of repetitions of a 4-letter motif, with maybe another row or so consisting of repetitions of a 12-letter pattern. But these

This may be seen in T1 “Aries”, shown in Plates 9 and 10, where the first three lines soon fall into repetitions of the 4-letter motifs *dizb*, *lytr*, and *xiba*, respectively, and the next two rows into repetitions of the 12-letter motifs *qsrnylfdzfzly* and *ohqtauiducis*, respectively. Many of these motifs are found in several of the tables.

[illegible]

3. ANALYSIS OF TABLES

is, the pattern $\begin{bmatrix} ? \\ m & m \end{bmatrix}$ was almost always actually $\begin{bmatrix} n \\ m & m \end{bmatrix}$. This led to a tabulation

of all triplets of letters occurring in a $\begin{smallmatrix} N \\ WX \end{smallmatrix}$ configuration, and it was found that in

a large majority of case the letter occupying the X position was predictable from the letters in the N and W positions. (The names of these variables are meant to represent the letter at the spot marked by X , the letter to its *North*, and the letter to its *West*.)

This led to discovery of an equation of form:

$$X = N + f(W)$$

where $f(W)$ is a function of W and the addition is taken *modulo* 23. Here the letters are assigned numerical values according to their positions in the 23-letter Latin alphabet: $a = 1$, $b = 2$, [...], $u = 20$, $x = 21$, $y = 22$, $z = 23$, so that $z + 2 = b$, etc. The final ingredient in this formula, the auxiliary function f , is known to us only by a table of values determined empirically.

Table 2. Auxiliary function values

W	$f(W)$	W	$f(W)$	W	$f(W)$	W	$f(W)$
a	2	g	6	n	14	t	8
b	2	h	5	o	8	u	15
c	3	i	14	p	13	x	15
d	5	k	15	q	20	y	15
e	14	l	20	r	11	z	2
f	2	m	22	s	8		

Expressed another way: a letter is obtained by counting a certain number of letters after the letter immediately above (i.e., north of) it in the table. The number of letters to count is determined by the letter standing to the immediate left (i.e., west). If the letter to the left is an f , for instance, we are to count two letters past the letter above. So, continuing the example, if the letter above is an l , then the letter in question

must be n , which is two letters past l :

	l
f	n

. If the end of the alphabet is reached in this letter counting, one starts over at the beginning, treating a as the letter after z , and so on.

For letters in the top row of a *Soyga* table, for which there is no N letter, the following formula holds:

$$X = W + f(W)$$

where the addition is again performed *modulo* 23. That is, for letters in the top row one applies the rule for letters in the interior of the table, acting as if the letter appearing to the left also appears above.

4. DIRECTIONS FOR CREATING THE TABLES

This, then, is a recipe for recreating the tables, although almost certainly not expressed in the same terms the *Soyga* author would have used. Starting with a code word, such as NISRAM, and an empty grid of 36 rows and columns:

4.1. *Left Column*

Write the code word followed by its reverse into the cells of the left hand column, starting at the top and working downwards, repeating the process until the column is full.

4.2. *Top Row*

Fill in the remaining 35 cells of the top line, working from left to right, repeatedly applying the formula $X = W + f(W)$.

In our example, the first application of this formula yields $n + f(n)$, that is, the letter $f(n) = 14$ places after n in the 23-letter alphabet, which is d . (Thus: n is the 13th letter; $13 + 14 = 27$; reduced *modulo* 23, 27 is 4, which is d .) Write the letter d in the second cell in the top row, just to the right of the n of NISRAM.

The second application yields $d + f(d)$. Since $f(d) = 5$, this gives us i , the fifth letter after d . Write an i in the third cell of the top row.

The third application yields $i + f(i)$. Since $f(i) = 14$, this gives us z , the 14th letter after i . Write a z in the fourth cell of the top row.

The fourth application yields $z + f(z) = 23 + 2 = 25 = 2 = b$; put a b in the fifth cell.

The fifth application yields $b + f(b) = 2 + 2 = 4 = d$; put a d in the sixth cell. At this point we have fallen into a cycle: the next application yields $d + f(d)$ which we have already seen before is i , and the rest of the first row will continue to repeat $dizb\ dizb\ \dots$

At this point the top few rows of the partially filled in table will look like this:

```
ndizbdizbdizbdizbdizbdizbdizbdizbdiz
i.....
s.....
r.....
```

4.3. Interior of Table

Now, starting with the second row and working left to right within rows, fill in the interior cells as follows. With each blank cell encountered, if the work has progressed in normal European page-reading order, the cell just above the blank cell and the cell to the left have both been filled in. Call the letters appearing in those cells N and W , respectively, and use the formula $N + f(W)$ to determine what to write into the blank cell under consideration.

For example, the first blank cell in row 2 is the second cell. It has a d above it and an i to its left. So the letter $d + f(i) = 4 + 14 = 18 = s$ is written in that blank cell.

The next cell, cell 3 in row 2, has an i above it and an s to its left (the s which we just wrote). So we put $i + f(s) = 9 + 8 = 17 = r$ in cell 3 of row 2. The next cell gets $z + f(r) = 23 + 11 = 11 = l$, and so on. The top few rows now look like this:

```
ndizbdizbdizbdizbdizbdizbdizbdizbdiz
isrl.....
s.....
```

This process, carried out row by row, left to right, will eventually fill the table.

Alternatively, instead of working row-by-row, left-to-right in each row, as described here, one could equivalently work column-by-column, working downwards within each column. The final results would be the same.

Of course I make no claim that the *Soyga* author intentionally used my $X = N + f(W)$ formula. Whatever means were actually used to construct the tables clearly had this formula's mathematical structure implicitly "built in", but we can only guess at its implementation. The arithmetic *modulo* 23, for instance, could have been effected equally well by paper-and-pencil computations, by consultation of charts, by letter counting on finger tips, or by the use of Lullian wheels.

5. ERROR ANALYSIS AND GENEALOGY

In fact the tables found in the two extant manuscripts of the *Book of Soyga* are not identical with those I produced by a computer programmed to carry out the above rules, starting with the same code words as in the manuscripts. This is for two reasons:

1. The law of formation for the tables is sufficiently intricate that the *Soyga* author occasionally made mistakes in working out the original tables.
2. The copyists made new mistakes when transcribing so much apparently unpatterned text.

Fortunately for us, these two kinds of errors have radically different consequences. If a cell in the original is miscalculated, the mistake spoils the calculation of the cells to its right and below it, resulting in an avalanche of error with an easily recognizable rectangular shape. A mere copying error, however, will not have a cumulative effect, and will be classifiable into one of several familiar types: transposition, deletion, eye skip, and replacement.

In short, the constraints placed on the tables by the $X = N + f(W)$ formula allow an aggressive form of textual emendation of the received tables in Bodley 908 and Sloane 8. A similar technique has been used to trace copying of logarithm tables by Charles Babbage (1792–1871), but is of course not generally applicable.²³ Only texts with a well-defined mathematical structure are amenable to this method of detecting and correcting errors of generation and transcription.

5.1. Principles of Error Diagnosis: An Artificial Example

This can all be seen in an artificial example, concocted so as to display every kind of pathology in the first few lines of the table. Suppose the code word is SARTON. Ideally, the first few lines of the table would be:

```
scfhndizbdizbdizbdizbdizbdizbdizbdiz
aeuzprupprupprupprupprupprupprupprup
rqrlmqrcsbygxiilmobygxiilmobygxiilmobyg
tattuhyscenxznzncrnnxnznzncrnnxnznzncrnnx
oiklrtgaetxndedhyedcqueredsfndhyedc
nzmkiqyqbnditmetmbsetbgkxgtmetmb
noublgeghcqalqixuliqpsdgnamuylixuliq
oym anxuyzeggrdofycmpeispcdrhdqfzycmp
tgsidczabgnxisyxolifgphusmqesahenr zr
rscmcfbcexemhzazqhoopeymrzsnipxueheh
...
```

Call this the *ideal original table*. Suppose, however, that in working this out a mistake was made: an e was put down instead of a p in the fifth cell of the second line. This mistaken letter will cause mistaken values to be calculated for the sixth cell of the second line and for the fifth cell of the third line, and those mistakes will beget others. The resulting *actual original table* will be (with the erroneous e capitalized):

```
scfhndizbdizbdizbdizbdizbdizbdizbdiz
aeuzEsrllytrlytrlytrlytrlytrlytrlytrl
rqrlbuibaxibaxibaxibaxibaxibaxibaxib
tattkmhggdokqsrnplfdzlyqsrnplfdzly
oiklgsqdmcrxhztxgrphtqtauiducisohqt
nzmkykhicftfkpimftbrgoaxqruterukfkha
noubamgpqcyxbrudlqyixfcasbylbteahpxq
```

```

oymacpugysgdgzyttaalsolxkrkcekuqefzs
tgsirczinixtpnnklxqhzqhcnpqbmtagmyk
rscmqzblkazxgtxbnmpxpfksxzrdgsdficbm
...

```

Finally, suppose we receive this table, derived from the actual original but with a variety of copying errors:

```

scfhudizbdizbdhzbdisbdizbdkzbdizbdiz
aeuzefrlytrlyutlyttlyrtlyttlytrlytrl
rqrlbnibaxibaxibaxibxibaxibaxiibaxib
rattkmhggdokqstnplfdzlyqfrnplfdzly
oikglsqdmcrxhztgxrrpthqranidueisohqt
nzmkykhiestfkipmstyixfeafbylbtcahpxq
uoubamgpqpyxbiudlqalsolxkrkcckuqefzf
oymacpugyfgdgzyrtaqhzqhcnpqbmtagmek
tgfirczinixtpnnzlxqhzqhcnpqbmtagmyk
rfcmqzblkazxgtxbnmpxpsksxztgdgsdsicbm
...

```

Our task is to recover the ideal original and actual original and diagnose the copying errors.

First we inspect the left margin, where we see SARRON UOTR [...], etc, which is a damaged version of SARTON NOTRAS, etc.; the code word is SARTON. (The left margin contains in all six copies – forward and reversed – of the code word, so in practice there is no doubt about what the code word is.)

From this we work out the ideal original table, and examine those positions where the received table differs from it. This diagram displays places where the received table agrees with the ideal original with a dot and places where they disagree with the value seen in the received table:

```

....u.....h.....k.....
....efrlytrlyutlyttly.tlyttlytrlytrl
....bnibaxibaxibaxib..baxiba..ibaxib
r...kmhggdokqstnplfdf.lyqfrnplfdzly
...glsqdmcrxhztgxrrpthq.anidueisohqt
....y.hicstfkipims.yixfeafbylb.cahpxq
u...amgpqpyxbiudlqalsolxkrkcckuqefzf
....cp.gyf.dgzyrtaqhzqhcnpqbmtagmek
..f.r...inixtpnnzlxqhzq.cnhpqbmtagmyk
.f...qz.lkazxgtxbnmpx.sksx.tdgsdsicbm
...

```

Here we see an essentially solid rectangular region of disagreement, starting in the fifth cell of row 2, with the value *e*, which is due to an error in the original. The “pepper and salt” pattern of sporadic disagreements elsewhere is characteristic of

copying errors. So we conclude that an e was put down by mistake in row 2, cell 5 in the original.

Now we work out the corresponding putative original, and display the disagreements between it and the received copy:

```

.....u.....h.....k.....
.....f.....ut...t..rt...t.....
.....n.....xibaxibaxi.....
r.....t.....f.....
...gl.....r.n...e.....
.....s.....s.yixfeafbylbtcahpxq
u.....p...i....alsolxkrkcckuqefzf
.....f.....r..qhzqhcnhpqbmtagmek
..f.....z.....
...

```

Since the remaining rectangular regions of disagreement do not reach to the bottom of the table, we conclude that they are not due to errors in the original. (Further examination will show they are due to eye skip.) No further errors seem to have been made in the original, so our putative original table is finished.

We are now in a position to diagnose the copying errors. The mistakes in cells 21 through 30 of line 3 are easily seen to be due to elision of an a from one of the repeating *baxi* groups; the pattern ends on the right foot again in cell 31 by the insertion of an extra *i*. We might term this a *horizontal eye skip* error. The errors in cells 19 through 36 in lines 6, 7, and 8 are seen to result from a *vertical eye skip* error, as follows. The rightmost 18 cells of lines 6, 7, 8, and 9 of the original are:

```

brgoaxqruterukfkha
yixfcasbylbteahpxq
alsolxkrkcckuqefzs
qhzqhcnhpqbmtagmyk

```

and of the received copy are:

```

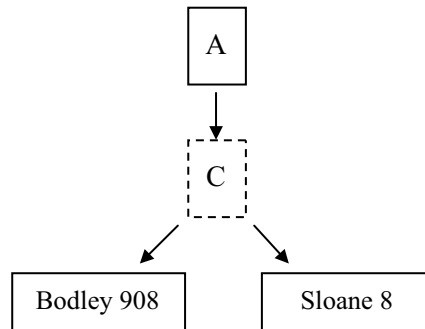
yixfeafbylbtcahpxq
alsolxkrkcckuqefzf
qhzqhcnhpqbmtagmek
qhzqhcnhpqbmtagmyk

```

so we see that the copyist deleted the right half of line 6 and duplicated the right half of line 9. There is a transposition error in row 5, cells 4 and 5: the original has *lg* and the copy has *gl*. The remaining errors are simple replacements of one letter by another.

5.2. Summary of Actual Errors

In fact all of the types of errors illustrated above occur in both the Sloane 8 and Bodley 908 versions of the tables. There seems to have been one set of original tables which I call A. Our extant versions, Bodley 908 and Sloane 8, seem to have been derived independently from a flawed intermediate version which I call C.



The originals A were constructed with the code words as listed in my Table 1, by application of the $N + f(W)$ formula; the errors in applying the formula are listed in my Table 3. Since errors in applying the $N + f(W)$ formula propagate and spoil everything below and to the right of the error locus, we can be sure that this is the complete list of errors in A. Out of the 46,656 cells in the complete set of tables, only 13 errors were made in applying the formula.

Table 3. Errors in Originals

Table	Row/Col.	Error	Row/Col.	Error	Row/Col.	Error
T5	15/24	t				
T8	28/25	r				
T10	18/11	t				
T12	15/9	y				
T13	18/2	t				
T19	19/29	e	20/28	g		
T29	18/11	m	17/16	h		
T32	6/25	l	7/24	e	34/27	k
T35	19/23	d				

The alternative, that Bodley 908 and Sloane 8 did not share a common original, would require us to believe that exactly these same particular errors (and no others) were committed in working out the originals for both Bodley 908 and for Sloane 8. This is so unlikely under any reasonable model for errors that I reject this alternative in favour of a single shared common original A.

A number of gross eye skip errors were committed in the descent of Bodley 908 and Sloane 8 from A. In Bodley 908's version of T2, row 3, cells 20–35 read

axibaxibaxibaxib instead of xibaxibaxibaxiba; that is, an a was inserted at cell 20. In both Bodley 908's and Sloane 8's versions of T24, the right hand half of row 35 was elided and the right hand half of row 34 was duplicated. In both Bodley 908's and Sloane 8's versions of T36, row 3, cells 30–36 read baxibax instead of A's ibaxiba, and row 12 is elided.

I detected seven transposition errors, some unique to Bodley 908 and to Sloane 8, and some shared, as listed in my Table 4.

Table 4. Transposition Errors

<i>Table</i>	<i>Row</i>	<i>Col.</i>	<i>Actual</i>	<i>Correct</i>	<i>Where found</i>	
T3	22	29	kq	qk	Bodley 908	
T12	6	8	cp	pc		Sloane 8
T25	14	34	ms	sm	Bodley 908	
T30	33	28	nm	mn	Bodley 908	Sloane 8
T31	35	16	lf	fl		Sloane 8
T35	22	21	nh	hn	Bodley 908	Sloane 8
T35	27	34	rs	sr	Bodley 908	Sloane 8

A tabulation was made of all corresponding places where Sloane 8, Bodley 908, or A were all legible but failed to give unanimous readings of cell entries, except for those involved in the gross eye skips noted above. The tabulation was made again, where all differences explainable by mere confusion of *i/l*, *u/n*, *f/s*, *e/c*, or *t/r* were censored, in an attempt to compensate for possible transcription errors on my part (especially in reading Sloane 8).

Table 5. Summary of cell reading disagreements

<i>Type of Disagreement</i>	<i>Raw</i>	<i>Censored</i>
A, Bodley 908, and Sloane 8 all differ	10	6
A and Bodley 908 same; Sloane 8 different	266	115
A and Sloane 8 same; Bodley 908 different	144	75
Bodley 908 and Sloane 8 same; A different	394	223
A, Bodley 908, and Sloane 8 all agree	45541	45936

The results, in my Table 5, again show Bodley 908 and Sloane 8 each have a large number of unique errors in addition to a larger number of shared errors. If either of Sloane 8 or Bodley 908 were copied from the other, the errors unique to the ancestor would have had to have been corrected in the child. Because the text is incoherent, there is no natural “self repair” mechanism analogous to a scribe’s knowledge of orthography or grammar allowing emendation of errors, at least in the large areas of the tables lacking repeating motifs. If both Bodley 908 and Sloane 8 were independently derived from the original A, the 394 (or 223) shared errors would all be the result of accidental occurrence of precisely the same mistakes, independently committed in copying Bodley 908 from A and in copying Sloane 8 from A. This is very unlikely under any reasonable model of copying errors. So we

conclude instead that both Bodley 908 and Sloane 8 were derived from a common flawed copy, which I call C, of the originals. Because Bodley 908 seems to have fewer disagreements with A than Sloane 8 does, we conclude that Bodley 908 is a more accurate copy of C than Sloane 8 is. Overall, there seems to be a 3/4% copying error rate in going from A to C, a 1/2% error rate in going from C to Sloane 8, and a 1/3% error rate in going from C to Bodley 908.

The same techniques can be used to see what relation Dee's copy of the eight *Soyga* tables appearing in Sloane 3189, the *Book of Enoch*, has to Bodley 908 and Sloane 8.

In the first place, the T13 of Sloane 3189 shows the same mistake in applying the $N + f(W)$ formula (in row 18, column 2) present in the T13 of A. Hence even if not copied directly from Bodley 908 or Sloane 8, the *Soyga* tables in Sloane 3189 are, like those of Bodley 908 and Sloane 8, ultimately derived from A. *A fortiori*, they are copies of the *Soyga* tables, rather than simply creations inspired by, or in the same style as, the *Soyga* tables.

Secondly, the T2 of Sloane 3189 lacks the gross eye skip error found in row 3 of T3 of Bodley 908. This suggests Sloane 3189 was not copied from Bodley 908, but not strongly so: the eye skip error occurs in the repeating *baxibaxi* area and could have been corrected by a naive but alert copyist.

Thirdly, looking only at locations where all four of A, Bodley 908, Sloane 8 and Sloane 3189 supply legible values, I found the results in my Table 6. The agree-disagree counts seem to make Sloane 3189 slightly but insignificantly closer to Bodley 908 than to Sloane 8.

Table 6. Summary of cell differences between Sloane 3189 and A, Bodley 908 and Sloane 8.

Sloane 3189, Compared with	Raw		Censored	
	Disagree	Agree	Disagree	Agree
A	288	9877	209	9956
Bodley 908	203	9962	149	10016
Sloane 8	208	9957	155	10010

Fourth, and more tellingly, the transposition error in T3 of Bodley 908, where there is a *kq* instead of the correct *qk* in row 22, is not present in the T3 of Sloane 3189. Unlike the T2 eye skip error, this error is well outside the area of repeating motifs, and so uncorrectable by a naive copyist.

On balance, then, it seems that the *Soyga* tables in Dee's *Book of Enoch*, Sloane 3189, are closer in manuscript transmission to Sloane 8 than to Bodley 908.

Assuming that the Sloane 3189 *Soyga* tables were copied from Sloane 8, the most common copying error was replacing *z* by *x*: out of the 477 occurrences of the

letter z in the Sloane 8 tables which have corresponding Sloane 3189 versions, it was rendered correctly 441 times, rendered as an x 34 times, and as a q and an r each once. There are 9 instances where an i was written instead of a y. Overall, there is a 1.5% copying error rate from Sloane 8.

Regardless of which particular manuscript the *Book of Enoch* got its *Soyga* table copies from, the questions of *why* they were copied and what relation they have to the Enochian system are central to furthering our understanding of Dee's relation to the *Book of Soyga*. On the one hand it is possible that Dee deliberately copied them (or had them copied) into his notebook (in rearranged sequence: T1, T13, T2, T14, and so on, so both "Aries" tables were visible on an opening, both "Taurus" tables visible on the next, etc.) for ready reference, possibly with motives similar to mine in section 3 of this paper, or possibly in order to use them in magical operations. This might have happened some time before 1582, that is, before his "Enochian" period, in which case their appearance with the Enochian material in Sloane 3189 would be the accidental result of reuse of a largely blank notebook. On the other hand, they might have a more direct connection with the Sloane 3189 Enochian material: they might have been revealed the same way the rest of the *Book of Enoch* material was (in which case the copying errors could be attributed either laudably to angelic emendation or deplorably to mundane data-entry-clerk error), or they might have been accorded a semi-privileged status, not themselves revealed but worthy of inclusion as an appendix to the *Book of Enoch* by a principle of virtue-by-association. Even though I see no way to use the methods of this paper to distinguish between these possibilities, I do not hesitate to speculate in the next section about one possible stylistic connection between the *Soyga* tables and the rest of the *Book of Enoch*.

6. COMPARISON WITH OTHER TABLES

Large square tabular arrays of letters are quite common in early modern magic works, exhibiting a variety of forms as yet unsurveyed in the scholarly literature. Here I present a brief taxonomy of magic tables according to their internal structure.

The more usual point of view, represented by Yates, pays primary attention to the authors' theories of magic and scant attention to the actual form of the tables:

[...] in Agrippa's Third Book [on Occult Philosophy] there are elaborate numerical and alphabetical tables for angel-summoning *of the type* [my emphasis] which Dee and Kelley used in their operations [...] These can be seen in Dee's manuscript 'Book of Enoch', British Museum, Sloane MSS. 3189. Cf. the 'Ziruph Tables' in Agrippa's *De occult. phil.*, III, 24. Agrippa was not Dee's and Kelley's only source for practical Cabala, but their minds run on these things within the Agrippan framework.²⁴

In fact Dee's tables and Agrippa's have completely different forms (as can be seen by glancing at Plates 12 and 13), so Yates must be using "of the type" to refer to the authors' intentions and not to their tables' actual appearance or formation.²⁵

My tentative taxonomy begins by crudely dividing all square magic tables into two classes, the small and the large, according to whether they have, say, fewer than

fifteen rows and columns or more. Among the small tables are those with letters forming words when read either vertically or horizontally, as in the famous square found at Herculaneum,

S	A	T	O	R
A	R	E	P	O
T	E	N	E	T
O	P	E	R	A
R	O	T	A	S

which are nowadays known as “word squares”. Word square charms have been in continuous use from Roman times to the present. Many such squares appear in Abraham ben Simeon’s *Cabala Mystica*, which Patai concludes – based in part on an analysis of the text in the squares themselves – was written around 1400.²⁶

Small numerical tables like

11	24	7	20	3
4	12	25	8	16
17	5	13	21	9
10	18	1	14	22
23	6	19	2	15

nowadays known as “magic squares”, have also been used since the late middle ages in Europe and in Asia for far longer as charms or arithmetical amusements.²⁷ (The numbers in each of the rows, columns, and two main diagonals all add up to the same sum, in this case 65.) Such a small numerical square appears in the 1514 print *Melencolia I* of Albrecht Dürer (1471–1528); many others are to be found in Agrippa’s Book II, where each planet is assigned its own magic square, each square being presented in both Arabic and equivalent Hebrew numerals.²⁸

As far as I know, all large magic tables in mediaeval or early modern sources are alphabetic. We may divide them into unpatterned and patterned; the latter are subdivided into those in which the form of the pattern is obvious and those in which the pattern is hidden.

Most of Dee’s tables in the *Book of Enoch* are unpatterned: squares and lozenge shaped arrays with 49 rows and columns filled with text in the “Enochian” language described by Laycock and Whitby.²⁹ One of these is illustrated in Plate 12. The text is inscribed in the tables line by line, left to right, one letter per cell, with no space between words. The eight *Soyga* tables appearing in the same book are of course patterned, but with a hidden pattern; it is tempting to believe that Dee’s favourite table size, 49, was inspired by the size of the *Soyga* tables, 36, since $49 = 7 \cdot 7$ is the next perfect square after $36 = 6 \cdot 6$. Similarly there are 36 *Soyga* tables and, as Kelley informed Dee on 24 March 1582/1583, there were to be 49 Enochian tables.³⁰

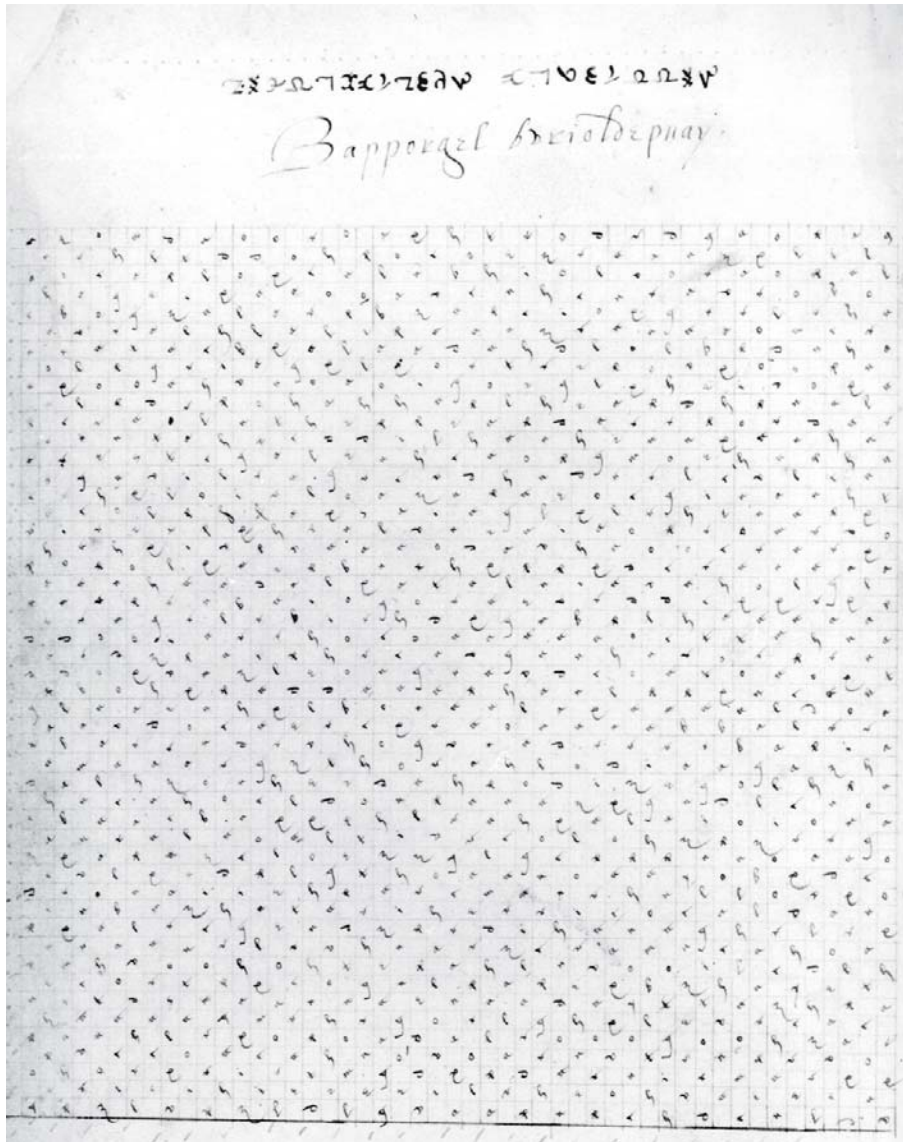


Plate 12: *Book of Enoch*, non-Soyga, 'Bapporgel bvrioldepnay' table. Department of Manuscripts, British Library, MS 3189, fol. 56^v. (By Permission of the British Library).

There are many large patterned tables in one of Agrippa's Cabalistic chapters.³¹ They include: an angel chart of no interest to us, a "right table of commutation", an "averse table of commutation", an "irrational averse table of commutation", a "table of Ziruph", and a "rational table of Ziruph".

The three tables of commutation are examples of what are nowadays known as "Latin squares", N by N tabular arrays of symbols from an N symbol alphabet – in this case the $N = 22$ letter Hebrew alphabet – arranged in such a way that each letter appears just once in each row and in each column.³²

It is possible that Agrippa received the idea of the "tabula commutationum recta" from Trithemius. Book 5 of Trithemius's *Polygraphia* (written in 1508 but printed in 1518) contains a "recta transpositionis tabula" and a "tabula transpositionis aversa" of exactly the same form as Agrippa's but based on a hybrid 24 letter alphabet formed by adjoining "w" to the end of the standard 23 letter Latin alphabet.³³ These Latin squares are of a particularly simple type, where each row is a shift of its predecessor, giving the table an overall barber-pole pattern of diagonal stripes.

Agrippa's third table of commutation, the "tabula aversa dicatur irrationalis" is a more complex Latin square. The top row and right-hand vertical margin contain the alphabet in its usual order; the bottom row and the left-hand vertical margin contain the alphabet in reversed order. The interior of the table is partially patterned. Most rows contain blocks of letters in consecutive alphabetical order. Because most of these blocks are shifted by one square from corresponding blocks in neighbouring rows, much of the area of the table has a diagonally striped pattern. But there does not seem to be a simple rule specifying the overall conformation of the table. It seems to be the result of an attempt to construct a Latin square as diagonally striped as possible, consistent with the given normal and reversed alphabets appearing in the margins.

Agrippa's table of Ziruph, illustrated in Plate 13, is possibly copied from Johann Reuchlin (1455-1522), who in turn owes much to the thirteenth century Cabalist Abraham Abulafia (1240-1292).³⁴ It consists of 22 rows, each with 11 cells per row. In each cell is a pair of Hebrew letters, placed in such a way that each letter appears exactly once in each row. Each row represents a reciprocal substitution alphabet: the letters in each of the 11 pairs are to be substituted for each other. One of these rows gives the "Atbash" alphabet according to which the first and last letters of the Hebrew alphabet (*aleph* and *taw*) are interchanged, the second and second from last (*beth* and *shin*), and so on.³⁵ Successive rows are obtained by alternately shifting all the left hand elements of the pairs to the pair to the left or all the right hand elements to the pair to the right (with a provision for reversing direction when the end is reached) in a kind of *contredanse*.³⁶

Such substitution alphabets are used in the branch of the practical Cabala known as *temurah* (permutation) in connection with the operation of *tseruf* (combination). The intent is to enlarge the scope of Cabalistic correspondences between words and phrases: two words are related not only if they have the same numerical sum, as in

usual *gematria*, but also if the one is equal to the Atbash-transformed version of the other, and so on. The “rational table of Ziruph” is possibly Agrippa’s invention. The size, shape, and general appearance of this table are the same as the Ziruph table, but the pattern by which the letters shift from row to row is slightly different.

Not all large patterned tables appearing in the early modern period are magical, however. For instance, a manuscript of Thomas Harriot (1560-1621) contains letter squares intended to illustrate a combinatorial calculation.³⁷ These tables, like the *Soyga* tables, are derived from a key word or phrase, but unlike the *Soyga* tables, the pattern is completely obvious. Harriot used the key phrases HENRICVS PRINCEPS FECIT and SILO PRINCEPS FECIT to form squares of 21 and 17 rows respectively. The following artificial example based on the key word VERITAS illustrates the pattern. (The key phrase starts at the centre and emanates in concentric lozenges towards the corners.)

S	A	T	I	T	A	S
A	T	I	R	I	T	A
T	I	R	E	R	I	T
I	R	E	V	E	R	I
T	I	R	E	R	I	T
A	T	I	R	I	T	A
S	A	T	I	T	A	S

Each of these tables is accompanied by a numerical calculation, which turns out to give the number of ways the given key phrase can be spelled out in the square, following a path of vertical and horizontal moves to adjacent cells, starting in the centre and finishing in a corner. (The present VERITAS specimen has 80 such paths; the general formula is 4 times the binomial coefficient $2n$ choose n when the key phrase has $2n + 1$ letters.)

And finally we have the tables in the *Book of Soyga* as our sole examples of large patterned tables whose pattern is hidden. None of the other tables, intricate as they are, have so complex an underlying pattern as that given by the $N + f(W)$ formula used in the *Book of Soyga*. It is no wonder that Dee found them perplexing.

ACKNOWLEDGEMENTS

I gratefully acknowledge the Bodleian Library, University of Oxford, for permission to publish the illustration of Bodley 908, fol. 180^r; the Department of Manuscripts, British Library, for permission to publish the illustrations of Sloane 8, fols. 102^v and 103^r, and Sloane 3189, fols. 56^v and 58^v; and Robert O. Lenkiewicz, for permission to publish the illustration of the “Tabula combinationum Ziruph”. I am most grateful to Drs. S. Clucas, K. de León-Jones, J.V. Field, D.E. Harkness, J.C. Lagarias, and K. M. Reeds for their generous help, advice, and encouragement. I am also grateful to Clay Holden, Dr David Kahn, Joseph H. Peterson, Dr Muriel Seltman, and Dr Allan Wilks. All mistakes are of course my own.

NOTES

¹ *Lib.Myst.*, fol. 9^r.

² All of these examples: Christopher Whitby, *John Dee's Actions With Spirits*, 2 vols (New York: Garland, 1988), I, 146-147.

³ Scrying, a cooperative magical operation during which privileged visual and aural information – in this case from angels – is conveyed to the participants, was much used by Dee. Three differing views of what “really went on” are presented in Meric Casaubon, *A True and Faithful Relation* (London, 1659) (which I have not seen), in Whitby, *Actions with Spirits*, I, and in D. E. Harkness, “Shows in the Showstone: A Theater of Alchemy and Apocalypse in the Angel Conversations of John Dee (1527–1608/9)”, *Renaissance Quarterly*, 49 (1996), 707-737.

⁴ *Lib.Myst.*, fol. 9^r, transcribed in Whitby, *Actions with Spirits*, II, 17-18 and translated in Whitby, *Actions with Spirits*, I, 211-212.

⁵ A marginal note on *Lib.Myst.*, fol. 9^r, transcribed in Whitby, *Actions with Spirits*, II, 18, seems to suggest that Kelley and Dee had met for the first time two days previous to this: “Note: he had two dayes before made the like demaunde and request vnto me: but he went away vnsatisfied. For, his coming was to entrap me, yf I had any dealing with Wicked spirits as he confessed often tymes after.” See my note 16 for evidence of Kelley’s continued ignorance of basic facts about the *Book of Soyga* a month later.

⁶ Whitby, *Actions with Spirits*, I, 146-147; Deborah Elizabeth Harkness, “The Scientific Reformation: John Dee and the Restitution of Nature” (Unpublished Ph.D. dissertation, University of California, Davis, 1994), 317-318, 415. Both guess that the *Book of Soyga* might well have influenced Dee or Kelley. Harkness, 415, suggests that the *Book of Soyga*’s Adamic association – in particular its use of an Adamic language, discussed by Uriel and Il, in *Lib.Myst.*, fols. 9^r and 89^v – would have especially appealed to Dee. Whitby, *Actions with Spirits*, I, 147, cites I.R.F. Calder as conjecturing that the *Book of Soyga* is the Voynich manuscript (Yale University, Beinecke Rare Book & Manuscript Library, MS 408), the notorious cipher manuscript described by J.M. Manly, “Roger Bacon and the Voynich MS”, *Speculum*, 6 (1931): 345–391; if true, this would be a case of solving one mystery by replacing it with a greater. I see no connection between the two books, other than their probable ownership by Dee. The *Book of Enoch*, also called *Liber Logaeth* and *Liber mysteriorum sextus et sanctus*, British Library, Sloane MS 3189, was in effect Dee’s lab notebook, written concurrently with Sloane MS 3188. Whitby, *Actions with Spirits*, I, 143, gives a description of its contents.

⁷ Deborah Harkness, personal communication, 1996, and “The Nexus of Angelology, Eschatology, and Natural Philosophy in John Dee’s Angel Conversations and Library” in this volume.

⁸ Oxford, Bodleian Library, Bodley MS 908; British Library, Sloane MS 8.

⁹ The description of Bodley MS 908 is based on examination of a microfilm copy, not on the manuscript itself.

¹⁰ “Zadzaczadlin”: Bodley MS 908, fol. 69^v and Sloane MS 8, fol. 70^v.

¹¹ Robert Turner, *Henry Cornelius Agrippa His Fourth Book of Occult Philosophy* (London, 1655; reprinted London: Askin, 1978).

¹² Bodley MS 908, fol. 51^v.

¹³ Both in Bodley MS 908, fol. 42^r.

¹⁴ As described by, say, Richard Kieckhefer, *Magic in the Middle Ages* (Cambridge: Cambridge University Press, 1989).

¹⁵ “Geber”: Bodley MS 908, fols. 116^v and 126^r; “Steganographia”: Bodley MS 908 fol. 123^v.

¹⁶ Bodley MS 908, fol. 4^r; Sloane 8, fol. 6^r. But this directly contradicts what the spirit “Il” said during a scrying session with Edward Kelley and John Dee on Thursday 18 April 1583, as recorded in *Lib.Myst.*, fol. 89^v, transcribed in Whitby, *Actions with Spirits*, II, 332: “Soyga signifieth not Agyos. *Soyga alca miketh*.” (Dee’s – or Il’s – emphasis.) One might take this as evidence of Kelley’s unfamiliarity with the *Book of Soyga* at this early stage in his residence in Dee’s household.

¹⁷ Wayne Shumaker, *The Occult Sciences in the Renaissance: A Study in Intellectual Patterns* (Berkeley, California: University of California Press, 1972).

¹⁸ D.P. Walker, *Spiritual and Demonic Magic from Ficino to Campanella*, (London: Warburg Institute, 1958) and Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964). It is certain that Hermeticism and Cabalism were important formative influences on early modern magic, even if Yates’s claims about their influence on early modern science are rejected.

¹⁹ Karen de Léon-Jones, personal communication, 1998. I have not found a single table or chart or discussion of such anywhere in the works I have seen of the two great modern historians of the Cabala, Gershom Scholem and Moshe Idel.

²⁰ In Bodley MS 908, at fols. 180-197; in Sloane MS 8, at fols. 102-138; see my Table 1.

²¹ *Book of Enoch*, Sloane MS 3189, in four openings of the book, between fols. 58-65, as shown in my Table 1.

²² In Bodley MS 908, fols. 167^r-168^v; in Sloane MS 8, fols. 138^v-140^v. The Bodley MS 908 version seems to contain many mistakes.

²³ Charles Babbage, "Notice respecting some Errors common to many Tables of Logarithms", *Memoirs of the Astronomical Society*, 3 (1827): 65-67, which I have only seen reprinted in Charles Babbage, *The works of Charles Babbage*, edited by Martin Campbell-Kelly, 11 vols (London: W. Pickering, 1987), II, 67-71. Summarized in Dr Dionysius Lardner, "Babbage's Calculating Engine", *Edinburgh Review*, July 1834, no. 120; which I have only seen as reprinted in Philip Morrison and Emily Morrison, eds., *Charles Babbage and his Calculating Engines, Selected Writings by Charles Babbage and Others*, (New York: Dover, 1961), 163-224; the discussion of errors in logarithm tables appears on 177-183.

²⁴ Yates, *Giordano Bruno*, 149 and note. The tables are in Agrippa, *De Occulta Philosophia*, III, 25, not III, 24.

²⁵ That is, Yates did not care to pay attention to the differences between the tables, possibly because she did not know how to. It is also possible that for Yates, magic tables – unlike texts or images – are not subject to the processes of copying, emulation, improvement, and confusion; that is, they are neither vehicles for ideas nor potential sources of evidence in intellectual or cultural history.

²⁶ Raphael Patai, *The Jewish Alchemists* (Princeton: Princeton University Press, 1994), 277-288.

²⁷ Menso Folkerts, "Zur Frühgeschichte der magischen Quadrate in Westeuropa", *Sudhoffs Archiv*, 65 (1981): 313-338 gives a detailed survey of the genre. Vladimir Karpenko, "Between Magic and Science: Numerical Magic Squares", *Ambix*, 40 (1993), 121-128, surveys alchemical magic squares; in this connection, also see Patai, *The Jewish Alchemists*, chapter 26.

²⁸ Heinrich Cornelius Agrippa of Nettesheim, *De Occulta Philosophia libri tres* (Cologne, 1533). I rely on the edition of V. Perrone Compagni (Leiden: Brill, 1992). In a supercilious scholium, Shumaker, *The Occult Sciences in the Renaissance*, 139, takes Agrippa to task for a mistake in one of his magic squares. However the mistake is clearly a typographic error present only in the Arabic numeral form of the square, and only in the particular edition Shumaker looked at. (Shumaker, 158, note 70, seems to say he relies on "Henricus Agrippa ab Nettesheym, *Opera* (Lugduni, c.1650?)", which he understands to be printed in London instead of Lyons!). For a discussion of Agrippa's magic squares, see K. A. Nowotny, "The construction of certain seals and characters in the work of Agrippa of Nettesheim", *Journal of the Warburg and Courtauld Institutes*, 11 (1949): 46-57 and I.R.F. Calder, "A note on magic squares in the philosophy of Agrippa of Nettesheim", *Journal of the Warburg and Courtauld Institutes*, 11 (1949): 196-199.

²⁹ Donald C. Laycock, *The Complete Enochian Dictionary: A Dictionary of the Angelic Language as Revealed to Dr. John Dee and Edward Kelley*, revised edition (York Beach, Maine: Samuel Weiser, 1994); Whitby, *Actions with Spirits*, I, 144-146.

³⁰ Sloane MS 3189, fol. 62^v, transcribed in Whitby, *Actions with Spirits*, II, 227. Apparently one of the tables is not to be written, leaving only 48 to be put in the *Book of Enoch*. It is tempting to compare this with the *Book of Soyga*'s T36 "Magistri", which has a missing row.

³¹ Agrippa, *De Occulta Philosophia*, III, 25, sigs. yii.^r-yiiiii.^r. These tables are surveyed in a modern re-issue of the John French translation (London, 1651) of Agrippa: *Three Books of Occult Philosophy*, edited by Donald Tyson (St. Paul, Minnesota: Llewellyn Publications, 1993), appendix VII, 762-767.

³² J. Dénes and A. D. Keedwell, *Latin Squares and their Applications* (New York: Academic Press, 1974).

³³ Johannes Trithemius, *Polygraphiae libri sex* (Oppenheim, 1518), V, sigs. oij.^r and oij.^v. It is most unlikely that Trithemius received the idea of such tables from Agrippa when they met in the winter of 1509/1510 as both of the 1508 *Polygraphia* manuscripts (Wolfenbüttel, Herzog August Bibliothek, Cod. Guelf, 8 Aug. 2^o, and Vienna, Österreichische Nationalbibliothek, Cod. 3308) contain these tables. In 1510 Agrippa sent Trithemius a draft of his *De occulta philosophia* which, according to Compagni (58), lacked the chapter containing the Ziruph tables and tables of commutation. Trithemius's use of the *tabula recta* is purely cryptographic, and most printed works on cryptography ever since include such diagrams, often under the name of "Vigenère table". Since Agrippa's text does not discuss his tables of commutation it seems more likely, in the absence of further direct evidence, that Agrippa copied from Trithemius.

³⁴ Johann Reuchlin, *De Arte Cabalistica* (Hagenau, 1517), Book III, sig. Nvi.^r; I rely on the parallel-text translation of M. Goodman and S. Goodman, of 1983, reissued with introduction by Moshe Idel (Lincoln, Nebraska: University of Nebraska Press, 1993). For gematria and the Reuchlin-Abulafia connection see Gershom Scholem, "Gematria" in *Encyclopaedia Judaica* (Jerusalem: Macmillan, 1971) and Gershom Scholem, *Major Trends in Jewish Mysticism*, second edition, reissued (New York: Schocken, 1995), 127.

³⁵ A somewhat similar table of reciprocal substitution alphabets occurs in Giovanni-Battista della Porta, *De Occultis Literarum Notis* (Naples, 1563) II, 16; I rely on a facsimile (Zaragoza: Cátedra de Cripto-

grafía del Centro Politécnico Superior de la Universidad de Zaragoza, 1996) of the 1593 Montbéliard edition. This is a cryptographic work, and Porta tables are almost as much a fixture in cryptographic literature as Vigenère tables. Porta's table is based on a 22-letter Latin alphabet with the letter K omitted. In Porta's table but not in the Ziruph table letters from the first half of the alphabet are paired only with letters from the last half.

³⁶ There appears to be one deviation from this pattern. In the seventeenth row of both Reuchlin's and Agrippa's tables the letters *sade* and *resh* are paired, as are *tet* and *taw*. The rule used to produce the rest of the table would pair *taw* with *sade* and pair *tet* with *resh*.

³⁷ British Library, Additional MS 6782, fols. 27, 28, with associated calculation on fol. 57. These are briefly described in John W. Shirley, *Thomas Harriot: a Biography* (Oxford: Oxford University Press, 1983), 419–420, who apparently did not understand the calculation on fol. 57. I intend to address these Harriot tables in a subsequent paper.

PART FOUR: DEE'S CONVERSATIONS WITH ANGELS

GYÖRGY E. SZÖNYI

PARACELSUS, SCRYING,
AND THE *LINGUA ADAMICA*

*Contexts for John Dee's Angel Magic**

1. DEE, HISTORY OF SCIENCE, AND MAGIC

Two recent monographs have shown once again that John Dee is worthy of the attention of scholars from many different fields of studies, since he was himself involved in the whole spectrum of Renaissance scholarship.¹ In his early career he had had a humanistic orientation and focused on mathematics but from the 1580s he gave up these endeavours and almost entirely involved himself with angel magic, that is to say spiritual séances, or in Dee's terminology "angelic conversations". During these "conversations", Dee – aided by certain rituals, paraphernalia (including a crystal ball or "shewstone"), and a medium, or "scryer" – tried to gain various pieces of information from the celestial beings. This last activity of his, documented in his spiritual diaries written for the most part during his sojourns in East-Central Europe, is also of interest for scholars of Poland and Hungary, and his séances have often been commented upon by historians. Researchers have nevertheless been perplexed by the apparently sudden turn which transformed the venerable scientist into an eccentric enthusiast. Approaches from the viewpoint of the history of science – which, until recently constituted the majority of Dee scholarship – found this phenomenon difficult to come to terms with, and at best a superficial explanation was advanced, according to which the humanist became disappointed in science (based on rational principles and logic), and – in a similar way to Doctor Faustus, although avoiding the direct contact with Satan – could only imagine achieving his intellectual goals with the help of supernatural powers.² This explanation seems to have some grounding in Dee's own statement addressed to Emperor Rudolph II in which he tried to summarise his mission:

Hereupon I began to declare that All my life time I had spent in learning: but for this forty years continually, in sundry manners, and in divers Countries, with great pain, care, and cost, I had from degree to degree sought to come by the best knowledge that man might attain unto in the world: and I found (at length) that neither any man living, nor any Book I could yet meet withal, was able to teach me those truths I desired and longed for: And therefore I concluded with my self, to make intercession and prayer to the giver of wisdom and all good things, to send me such wisdom, as I might know the natures of his creatures; and also enjoy means to use them to his honour and glory.³

* I wrote this paper at the Herzog August Bibliothek in Wolfenbüttel, Germany. I am grateful to the Mellon Foundation for the three months' scholarship and the staff of the Library for their most helpful assistance in my work. Special thanks are due to William H. Sherman and Stephen Clucas whose comments on the draft have contributed to the improvement of the final version.

Very few efforts have been made to embrace Dee's scientific experiments and angel magic in their entirety and interconnectedness, especially given that such an examination would seem to promise little benefit for the history of science. Until recently, interpreters of Dee's magic have tried to underline the importance of magic as a vital precondition to the development of the scientific revolution, and with this consideration in mind, Frances Yates invented the term, "Rosicrucian enlightenment".⁴ After some initial enthusiasm the Yates thesis was severely challenged by historians of science,⁵ and, although Clulee and Sherman have to some extent successfully restored Dee's place in the distinguished gallery of the history of science, this would hardly work for his magic. My suggestion is to shift the focus of interest from history of science to cultural anthropology and the history of mentality, by asking in what way Dee's scientific activities inspired his visionary and occult programme. Seeking the company of angels may seem an eccentric monomania for the enlightened researcher; indeed, some historians have even suggested that Dee had become mentally ill.⁶ By contrast, anthropologists and historians of mentality have learnt how deep the roots of occult thinking were in the world picture of the sixteenth century. Such an approach may throw fresh light on the strange ambitions and practices of this extraordinary Englishman. Furthermore, it may also provide us with relevant tools to measure the lasting attraction of the occult in our own age.

In the following essay I am going to examine Dee's shift from natural to occult science from the viewpoints of both the history of science and historical anthropology and I will argue that the gulf between the two is much less significant than it may appear from existing studies. First I shall look at the pre-modern traditions of gaining magical knowledge and in this respect I believe it is relevant to re-explore Paracelsus's epistemology. An examination of the magic of Agrippa and Paracelsus leads us to the interrelatedness of Renaissance intellectual magic and popular occultism, with the latter having been entirely neglected by the great Warburgian intellectual historians. A typological analysis of the visions in the angelic diaries will prove that Dee's ultimate "scientific" goal remained unchanged throughout his life: he aspired to universal knowledge, trying out alternative ways of investigation, finally ending up in the search for the angelic language. In the concluding sections I shall try to re-map Dee's standing in intellectual history in relation to two great seventeenth-century trends: the scientific revolution and the new esotericism (or, as Frances Yates somewhat simplistically referred to it, the "Rosicrucian Enlightenment").

Recent studies have done a lot to refine the crude divide between the "scientist-Dee" and the "magus-Dee", and this also applies to the chronology of his career.⁷ Yewbrey and Whitby called attention to the fact that Dee did not start his angel magic in 1581, as had been earlier supposed. According to his first angelic diary he had already employed a scribe in 1579 and, commenting on this, he even added:

From the year 1579 usually in this manner: in Latin, or English; (but around the year 1569 in another and special way: sometimes on behalf of Raphael, sometimes on behalf of Michael it has been most pleasing to me to pour out prayers to God: God works his wonderful mercy in me (est circa annum 1569 alio et peculiari modo: interdum pro Raphaele, interdum pro Michaelē ad Deum preces fundere: mihi gratissimum fuit).⁸

This fact is important because in that year, during 1569 and 1570, Dee wrote one of his most ambitious scientific works, the *Mathematicall Praeface*, in which – on the occasion of introducing the *Elements* of Euclid to the English reader – he attempted a synthetical survey of all the mathematical sciences. The question thus becomes even more relevant: what was the relationship, if any, between Dee’s scholarly thinking and the angelic conversations?

The *Mathematicall Praeface* offered a scheme for presenting a general hierarchy of sciences and Dee made it clear that the ultimate end of any science should be the understanding of God’s creative genius. This means that Dee’s work is not in any sense a technical textbook or a manual for engineers, although it does not entirely lack a practical dimension. In the *Praeface* Dee emphasised the cosmic significance of mathematics and suggested that the mathematical practitioner had the power to become a magus, capable of *exaltation*, the emulation of God. The “Mathematicien” is represented as a priest of the new science:

By *Numbers* [...] we may both winde and draw our selues into the inward and deepe search and vew, of all creatures distinct vertues, natures, properties, and *Formes*: And also, farder, arise, clime, ascend, and mount vp (with Speculatiue winges) in spirit, to behold in the Glas of Creation, the *Forme of Formes*, the *Exemplar Number* of all thinges *Numerable*: both visible and inuisible, mortall and immortall, Corporall and Spirituall.⁹

When mapping the hierarchy of the sciences, Dee gave first place to a discipline called *archemastrie*. “So that, this Art, is no fantastical Imagination: as some Sophister might [...] dash your honest desire and Courage, from beleuing these thinges, so vnheard of, so meruaylous, & of such Importance.”¹⁰ Dee also mentions the auxiliary sciences completing the work of *Archemastrie*:

To this Science, doth the *Science Alnirangiat*, great Seruice. Muse nothyng of this name. I chaunge not the name, so vsed, and in Print, published by other: beyng a name, propre to the Science. Vnder this, commeth *Ars Sintrillia*, by *Artephius*, briefly written. But the chief Science, of the Archemaster, (in this world) as yet knowen, is an other (as it were) OPTICAL Science: wherof, the name shall be told (God willyng) when I shall haue some, (more iust) occasion, therof, to Discourse.¹¹

Nicholas Clulee, writing about Dee’s natural philosophy, has identified all three of the above-mentioned sciences as magical practices. The expression “alnirangiat” derives from Arabic sources: the term “nīrangīyāt” meant a certain magical procedure; in the Arabic version of the *Picatrix* the term “nīrang” referred to magical incantations used to invoke heavenly powers. It is also used in connection with magical images or talismans. Dee’s source for this term, as Clulee has shown was Avicenna’s *De divisionibus scientiarum*, in which “scientia alnirangiat” is listed among the subordinate branches of natural science. Here it is a form of natural magic, for the manipulation of the hidden virtues of things. Dee possessed Avicenna’s work in his library and from the surviving copy we know that he underlined the word *alnirangiat* and glossed it in the margin: “magicæ”.¹²

The next science mentioned by Dee is the *ars sintrillia* which has been connected with the name of a medieval author, Artephius, who is often referred to in numerous treatises but whose identity is unclear. According to Dee’s catalogue, in 1556 he possessed a manuscript which contained Artephius’s *Ars sintrillia* but this treatise is not

extant.¹³ The only clue scholars have been able to track down is a remark of William of Auvergne, who mentions a certain Artesius known for his ability to conjure up visions by placing a glossy sword over a water-basin so that the glittering of the two caused the viewer to see strange sights.¹⁴ The context of Dee's note makes this conjecture plausible since immediately after the reference to Artephius he lists "optically science" which, as Clulee rightly points out, involved not only physics but also crystallo-mancy, or as it was more commonly known, "scrying". As we have seen, Dee started his scrying experiments around the time of the writing of the *Mathematicall Praeface* and his scientific treatise suggests that, at this point in time, he saw no fundamental division between natural philosophy and spiritualism.

Before touching upon the various traditions of crystallo-mancy in the Renaissance, I want to refer to another aspect of "optically science" which is also pertinent in Dee's works. As early as 1558, in his first synthesising work (*Propædeumata Aphoristica*) he refers to "catoptrics" of which he wrote:

If you were skilled in 'catoptrics', you would be able, by art, to imprint the rays of any star much more strongly upon any matter subjected to it than nature itself does [...]. And this secret is not of much less dignity than the very august astronomy of the philosophers, called inferior [i.e. alchemy], whose symbols, enclosed in a certain Monad and taken from my theories, I send to you along with this treatise.¹⁵

Catoptrics in classical natural philosophy meant the study of the radiation and reflection of light and it was Roger Bacon in the Middle Ages who devoted much work to this field.¹⁶ As we know, Dee was most interested in Bacon's work and it was partly this influence which raised his ambition to catch the power of the stars by the help of mirrors, interpreting this activity as a scientific version of ancient talismanic magic. Talismanic magic which had been much discussed in medieval Arabic and Latin sources, was reinvented by the Florentine neoplatonists,¹⁷ and its scientific application was proposed by Heinrich Cornelius Agrippa and Paracelsus. Of these magical images, or "sigils" Agrippa noted:¹⁸

So great is the extent, power and efficacy of the Celestiall bodies, that not only natural things, but also artificiall when they are rightly exposed to those above, do presently suffer by that most potent agent, and obtain a wonderfull life which oftentimes gives them an admirable Celestiall vertue [...]. Such an image, best prepared to receive the operations and powers of the Celestial bodies and figures, and instantly receiveth the Heavenly gift into it self; then it constantly worketh on another thing, and other things do yeeld obedience to it.¹⁹

Agrippa developed an intricate typology of these magical symbols from direct emblematic representations of celestial demons through traditional signs of planets, metals and zodiacal signs to the numerologically symbolic cabalistical characters or sigils. One of his notable examples describes the power of planetary amulets:

This fortunate Moon being engraven on Silver, renders the bearer thereof grateful, amiable, pleasant, cheerful, honored, removing all malice, and ill will. It causeth security in a journey, increase of riches, and health of body, drives away enemies and other evil things from what place thou pleasest; and if it be an unfortunate Moon engraven in a plate of Lead, where ever it shall be buried, it makes that place unfortunate, and the inhabitants thereof, as also Ships, Rivers, Fountains, Mills, and it makes every man unfortunate.²⁰

2. PARACELSUS AND MAGICAL WAYS OF KNOWING

Dee scholars have only recently become aware of the fact that Paracelsus may have had a much greater influence on the English doctor's natural philosophy than has previously been believed. Frances Yates systematically overlooked Paracelsus in her accounts of Christian magic, and Peter French, although he noticed Dee's massive holdings of Paracelsica, gave only superficial references to the philosophy of Paracelsus and its influence on Dee's system of thought.²¹ More surprisingly, Paracelsus has only one mention even in Clulee's monograph on Dee's natural philosophy. Roberts and Watson, in their edition of Dee's library catalogues, have revealed the fact that Dee possessed an unusually large collection of Paracelsica which he neatly grouped according to size and language in his inventory: "Paracelsi libri compacti" (*R&W* 1461-1501), "Paracelsici libri latinè compacti" (*R&W* 1502-1522), "Paracelsici libri non compacti" (*R&W* 2220-2240), "Germanici" (*R&W* 2241-2275), etc.²² Dee's interest in Paracelsus can also be seen in his entry in the *album amicorum* of the famous Swiss natural scientist, Conrad Gesner whom Dee visited in Zurich in April 1563. In the album, next to Dee's signature, Gesner commemorated his English guest's great knowledge of and interest in Paracelsus.²³ From a 1562 edition of Paracelsus (*R&W* 1476) annotated by Dee in 1594, we learn that he was preoccupied with the German sage even in his later career and discussed it with his disciples, Mr. Barker and Mr. Alped. The names of his good angels, Anchorus, Anachor, and Anilos, noted in the same book, indicate the interrelatedness of Dee's interest in Paracelsus and angel magic.²⁴

In this context, it is pertinent to juxtapose Agrippa's remarks on "sigils" with what Paracelsus wrote about images and his definition of *Gamaaea*:

OF IMAGES [IMAGINUM]. This science represents the properties of heaven and impresses them on images, so that an image of great efficacy is compounded, moving itself and significant. Images of this kind cure exceptional diseases, and avert many remarkable accidents, such as wounds caused by cutting or puncturing. A like virtue is not found in any herbs.

OF GAMAHEI [GEMAHEORUM]. These are stones graven according to the face of heaven. Thus prepared they are useful against wounds, poisons, and incantations. They render persons invisible, and display other qualities which, without this science, Nature of herself cannot exhibit.²⁵

Let us compare this to Dee's thesis in *Propædeumata Aphoristica*:

The stars and celestial powers are like seals whose characters are imprinted differently by reason of differences in the elemental matter [...]. You will therefore consider talismans rather attentively, and other still greater things [*Hinc Gamaeas considerabis attentius, aliaque maiora*].²⁶

and with the *Monas Hieroglyphica*, written in 1564:

This our hieroglyphic monad possesses, hidden away in its innermost centre, a terrestrial body. It [the monad] teaches without words, by what divine force that [terrestrial body] should be actuated [...]. When this Gamaaea has (by God's will) been concluded, [...] he who fed [the monad] will first himself go away into a metamorphosis [*quo finito Progressu: qui aluit, in METAMORPHOSIM, Primus Ipse abibit*] and will afterwards very rarely be held by mortal eye.²⁷

It becomes clear from this otherwise obscure passage that the monad as a symbol has two levels of reference. One points to the earthly material which during the

alchemical process is clarified and becomes supernatural. In its other meaning the monad is a talisman (“Gamaaea”) by the help of which the magus, who so far has been feeding and fuelling the oven of the *opus magnum*, undergoes a transmutation himself, and escaping the prison of matter ascends to the level of transcendental reality. The above quotations from Dee redirect us to Paracelsian contexts, since in his various tracts connected with his great later work, the *Astronomia magna sive Philosophia sagax* the German doctor made it clear:

Man is born of the earth, therefore he also has in him the nature of the earth. But later, in his new birth, he is of God and in this form receives divine nature. Just as man in nature is illuminated by the sidereal light that he may know nature, so he is illuminated by the Holy Ghost that he may know God in his essence. For no one can know God unless he is of divine nature.²⁸

And indeed, it is in this similarity to God that man can himself become a creator of things, even more powerful than the upper and lower firmaments:

Thoughts create a new heaven, a new firmament, a new source of energy, from which new arts flow [...]. When a man undertakes to create something, he establishes a new heaven, as it were, and from it the work that he desires to create flows into him [...]. For such is the immensity of man that he is greater than heaven and earth.²⁹

Creation, the establishment of wondrous things, happens through magic – “after all, God has permitted magic, and this is a sign that we may use it; it is also a sign of what we are”,³⁰ and Paracelsus in his writings introduces magic according to the three tiers of the Agrippan model, from *magia naturalis* through planetary, astrological magic up to mystical rebirth: “He who imitates the image of God will conquer the stars”.³¹ This is nothing else but the doctrine of *exaltatio*, or Man’s deification through white magic, also proposed by Paracelsus’s contemporary and compatriot, Agrippa, in his *De occulta philosophia*:

Man being united to God, all things which are in man, are united, especially his minde, then his spirits and animal powers, and vegetative faculty, and the Elements are to the matter, drawing with it self even the body, whose form it hath been, leading it forth into a better condition, and an heavenly nature, even until it be glorified into Immortality. And this which we have spoken is the peculiar gift of man, to whom this dignity of the divine image is proper, and common to no other creature.³²

At this point Agrippa connects the topic of deification with an alchemical parallel which can be related to the alchemical subtext of Dee’s *Monas Hieroglyphica*:

Geber in his summ of Alchimy teacheth, that no man can come to the perfection of this art, who shall not know the principles of it in himself; but by how much the more every one shall know himself, by so much he obtaineth the greater power of attracting it, and by so much operateth greater and more wonderfull things, and will ascend to so great perfection, that he is made the Son of God, and is transformed into that Image which is God, and is united with him, which is not graunted to Angels, the world, or any creature, but to man only.³³

The highest magic is angel-magic and in both Agrippa and Paracelsus we find Dee’s ambitions prefigured:

He who inherits God’s wisdom walks on water without wetting his feet; for in the true art inherited from God, man is like an angel. But what will wet an angel? Nothing. Similarly, nothing will wet the wise man. God is powerful and He wills it that His power be revealed

to men and to angels in the wisdoms of the arts. He wills it that the world and the earth be like Heaven.³⁴

In fact, this was Dee's most ambitious magical programme: he aspired to this state of *exaltatio* in order to fully understand the work of Creation and become God's partner. His whole scientific program was subordinated to this goal, and this is why he was experimenting with astrological catoptrics as well as with the monad, extracted and transmuted from talismanic magic into geometry and alchemy.

3. FROM NEOPLATONIC TO POPULAR CONTEXTS OF MAGIC

It would be a mistake, however, to see the source of Dee's magic lying solely in the hermetic neoplatonism of Agrippa or Paracelsus. What makes his esoteric experiments fascinating is the ease of syncretism with which he freely exploited quite distinct traditions, from medieval Baconian magic through Old Testament traditions to some semi-scientific, semi-popular practices of dubious origin. I have already mentioned the technique of Artephius ("ars sintrillia") which operated with glittering mirrors in order to bring the viewer into a trance where logic is suspended. The ancient and venerable nature of this practice derived its authority from the Bible where, in Genesis 44.5, we read about Joseph who hides a silver chalice in Benjamin's pouch saying, "Is not this it in which my lord drinketh, and whereby indeed he divineth?"³⁵ In the Second Book of Moses we learn that the priestly garment made for Aaron contained a golden breastplate with twelve shining jewels, symbolizing the twelve tribes of Israel. This shining breastplate could also be used for purposes of divination (helping the gazing prophet to fall into a trance) and it is in this sense that medieval lapidaries refer to it.³⁶ Paracelsus also speaks about a particular way of divination by using shining surfaces. He calls it *ars beryllistica* which aims at gaining visions from diamonds, mirrors and other glossy materials, such as black coal:

VISIONS. This species sees in crystals, mirrors, polished surfaces, and the like, things that are hidden, secret, present or future, which are present just as though they appeared in bodily presence.³⁷

The most important difference between *catoptromantia* and *crystallomantia* was that in the former the operator – after proper preparations and sufficient fasting – did not want to conjure spirits in the mirror, rather he expected visions relating to the future. In scrying, the magus or his medium definitely aimed at calling spiritual beings (angels or the spirits of already dead persons), hoping to gain information, not necessarily about the future. It looks as though Dee possessed instruments for both kinds of magic: a shining black obsidian mirror may have been used to practise *ars sintrillia* or *catoptromantia*, that is divination from mirrors,³⁸ while his much exploited crystal ball served the purposes of scrying. What becomes perplexing for the cultural historian is that Dee, having been acquainted with the most complex magical theories and techniques, finally ended up practising the crudest divination, that is *crystallomantia*, and, having pursued it till the last days of his life, lost no faith in it at all.

Crystallomantia, or scrying, was relatively neglected in the works of Renaissance humanists, although some references can be found in the works of Trithemius and others, in a context following the anti-magical condemnations of medieval authorities

and encyclopedias, such as John of Salisbury's *Policraticus*, or Gregorius Reisch's *Margarita philosophica nova*.³⁹ It seems that by the sixteenth century, *crystallomantia* had become most widespread in popular culture as a common form of magic. We have two groups of sources to document such practices. Humanist literature, on the one hand, has anecdotes recording these kinds of magical practices. Girolamo Cardano, for example, tells a story about the conjuration of a young scryer who sees angels in a crystal by the help of Saint Helena.⁴⁰ Another type of source-material for the popular usage of the crystal ball (or *beryl*, or *sphera*) is the protocols of witchcraft trials and ecclesiastical visitations. In my own city, Szeged in Hungary, judges would regularly ask the suspect as late as 1730: "Wie hast du aus Kristall, aus Glas, Spiegeln den Menschen (ohne Schaden) gewahrsagt?"⁴¹

Needless to say, scrying was strictly damned by both secular and ecclesiastical law. In England law-court processes took place in 1467, 1534, and 1549 and the 1541 statute against conjuration and witchcraft specifically prohibited it.⁴² Since scrying was mostly used for finding lost or stolen property, the possibility of financial gain meant that the law was often disregarded. Although such practices were strictly private, almost all astrologers and alchemists can be suspected of having exercised them. Another Elizabethan astrologer and "magus", Simon Forman kept a journal not unlike Dee's, and he noted about the year 1584: "a reasonable, good, and quiet yere; but I had certain braulles and sclaunders fell out against me aboute detecting of one that had stollen certain thinges, whereby I was like to have bin spoiled". As if he were dissociating himself from scrying at this point but by 1588 he openly admitted that he "began to practise necromancy and to call angells and spirits."⁴³

It is worth noting that the sixteenth- and seventeenth-century manuscript literature abounds in secret diaries, notes and copies of grimoires, revealing the widespread magical practices of the day. Journals of actual divination are nevertheless more of a rarity: interested amateurs seemingly did not get much beyond collecting and copying magical materials, prayers, incantations, and books of rituals which, at least theoretically, were intended to equip the reader for contacting the spirit world.⁴⁴

Dee seems to have become interested in divination in 1569 and started scrying in 1579. His "glass" is first mentioned on 10 March 1575, when he notes a significant event in his diary:

The Queens Majestie with her most honourable Privy Councell, and other her lordes and nobility, came purposely to have visited my library; but finding that my wife was within four houres before buried out of the house, her Majestie refused to come in; but willed me to fetch my glass so famous, and to shew unto her some of the properties of it, which I did; her Majestie being taken downe from her horse (by the Earle of Leicester, Master of the horse, by the wall of Mortlack), did see some of the properties of that glass, to her Majestie's great contentment and delight, and so in most gracious manner did thank me, &c.⁴⁵

The first well-documented instance of scrying with the help of a medium, Barnabas Saul, took place on 22 December 1581.⁴⁶ Prior to this, Dee may have developed more interest in this kind of magic during his continental journey in 1578, when he visited some German courts with the purpose of consulting medical doctors about the Queen's

condition. Stopping over in Hamburg and Berlin, finally, on 15 December 1578, he met Leonhard Thurneysser, the famous doctor, alchemist and interpreter of Paracelsus in Frankfurt-am-Oder.⁴⁷ He might have taken the meeting as an omen, since at that time the learned doctor came under attack of conjurations and crystal-magic. A year later Franz Joel, a doctor of Greifswald published a book about witches and black magic in which he openly attacked Thurneysser as a stubborn sorcerer whose source of knowledge – especially of foreign languages, including Chaldee, Hebrew and Sanskrit – was a *dæmon*, appearing in his showstone.⁴⁸ Thurneysser had to write a passionate apology, very much in the manner of Dee's own "Digression Apologeticall" in the *Mathematicall Preface* of 1570: "And for these, and such like marueilous Actes and Feates, Naturally, Mathematically, and Mechanically, wrought and contriued: ought any honest Student, and Modest Christian Philosopher, be counted, & called a Coniurer?"⁴⁹

Barnabas Saul – a household servant or a laboratory assistant – became Dee's scryer after having complained to his master about a spirit which had tortured him at midnight.⁵⁰ Dee, being himself ready for the parapsychological experience, employed the following prayer-formula, (suggesting that he had had vague experiments with mediums before) "perceived by some slight experience, with two diverse persons, that thou [God] hadst a special care to give me thy light, and truth, by thy holy and true ministers Angelicall and Spirituall."⁵¹

Another entry from the period prior to meeting Saul reinforces this hint: "I had sight in κρυσταλλῳ [i.e. *crystallo*] offered me, and I saw".⁵² This early personal experience was not continued later: he scarcely saw the visions himself, they remained communicated through his scryers.

4. SCRYING AND THE *LINGUA ADAMICA*

As has been mentioned, Dee pursued angel magic until his death. During these years he had three regular scryers, of whom he worked longest with Edward Kelley who accompanied him on his journey to East-Central European courts. As for the general contents of the angelic conversations, they differed significantly from the average scrying sessions, which usually aimed at finding thieves or lost property. Dee hoped to gain mystical knowledge through the angelic conversations which would arm him with universal knowledge. To possess this knowledge, he believed, one had to learn the lost primordial language, the *lingua adamica*, a medium of direct communication with God which Adam spoke when he named the parts and things of the created universe.⁵³ Consequently, his ultimate scientific programme became centred on the acquisition of this universal language because, as he wrote, "the logos of the creative universe works by rules so that man, godly minded and born of God, may learn by straightforward work and by theological and mystical language".⁵⁴

Dee's ideas on primitive language seem to have been influenced by one of his favourite authors, Johannes Trithemius, Abbot of Sponheim, and a future task for Dee scholarship would be to look at his speculations on the angelic language in the context of sixteenth- and seventeenth-century deliberations on a universal or artificial language.

It is noteworthy that Dee hardly appears in studies on this topic,⁵⁵ perhaps because of the curious turn of his thinking, namely, that since his pursuits concerning the above goal in the terrain of natural sciences remained futile, he turned to angel magic and during the conversations repeatedly and passionately petitioned God to order his heavenly servants to share secret knowledge with him. Umberto Eco's recent book is the first attempt to place Dee in the context of universal language schemes and Eco also offers interesting links between Dee and his acquaintance, Guillaume Postel, who also asserted that every "demonstration of the world" results from geometric elements, such as point, lines, circles and triangles.⁵⁶ One immediately remembers Dee's argument in the *Monas Hieroglyphica* concerning the origin of the alphabet: "the first and mystical letters of the Hebrews, the Greeks, and the Latins, issued from God alone and were [by Him] entrusted to mortals; [also] the shapes of all those [letters] are derived from points, straight lines and the circumference of circles,"⁵⁷ and these considerations again clearly establish the link between Dee's scientific and magical programmes.

In this respect, the most interesting parts of the angelic diaries are the so-called *Book of Enoch*,⁵⁸ the *48 claves angelicæ* (1584) and *De heptarchia mystica* (1588)⁵⁹ in which one finds invocations and complicated tables, summarizing the orders of angels. Most of this is written in hardly comprehensible "angelic language", although some scholars of occultism claim to have already penetrated into the depth of its meaning.⁶⁰ Since most of the Enochian magic material has been included in Meric Casaubon's printed edition of the angelic diaries,⁶¹ one can use this collection to set up a typology of Dee's angelic visions:

1. Verbal descriptions of visions of the divine cosmic order and the world of angels sustaining it. On 20 June 1584, Dee and Kelley received such a vision in Cracow:

There appeared to him [E.K.] four very fair Castles, standing in the four parts of the world: out of which he heard the sound of a Trumpet [...]. Out of every Gate then issued one Trumpeter, whose Trumpets were of strange form, wreathed, and growing bigger and bigger toward the end [...]. After the Trumpeter followed three Ensign bearers. After them six ancient men, with white beards and staves in their hands [...]. *The 4 houses, are the 4 Angels of the Earth, which are the 4 Overseers, and Watch-towers, that the eternal God in his providence hath placed, against the usurping blasphemy, misuse, and stealth of the wicked and great enemy, the Devil [...]. In each of these Houses, the Chief Watchman, is a mighty Prince, a mighty Angel of the Lord: which hath under him 5 Princes [...]. The seals and authorities of these Houses, are confirmed in the beginning of the World. Unto every one of them, be 4 characters, Tokens of the presence of the Son of God: by whom all things were made in Creation.*⁶²

2. Descriptions of rituals and magical invocations, either verbally communicated by the Angels – mediated by Kelley, or seen by Kelley as visions in the crystal:

E.K. There appeareth in the stone, like a white Curtain all over the stone: After awhile it was drawn, and layed on the back-side of the stone, on a heap together. Now here standeth one in a white Garment, with a white Cerclet about his head like a white smock, I remember not that ever I saw this Creature before, his Garment is tucked up [...]. Now is there fire come, and hath consumed this Creature all to pieces, and he is fall'n down to ashes. Now he riseth up, and he is brighter then he was before.
[margin: Δ: *Quasi figura de terra renovanda.*] [...] *So doth the Glory comfort the just, and they rise again with a threefold glorie.*

Δ. A place was made.

E.K. Now he spreadeth the aire, or openeth it before him, and there appeareth before him a square Table. Now he taketh off the Table a black Carpet. Now he taketh off a green Carpet. Now he taketh off a white Carpet. Now he taketh off a red Cloath. And now the Table appeareth to be made of earth, as Potter's Clay, very raw earth.

[margin: Δ. The Table of the Earth. He taketh off the coloured cloaths in due order, respecting the four parts of the World.]

E.K. The Table hath four feet, of which two touch the ground, and two do not [...]. The Table is square. E.K. On the left corner (farthest from E.K.) did a T appear on the Table: Out of the top of this T do four beams issue of clear collour bright).⁶³

3. A considerable portion of the angelic communications consists of obscure historical prognostications in the Enochian style of prophecy. The predictions foretell the coming of a new age in which Dee and Kelley would have an important role since they have been chosen by God to perform certain rituals. Dee is quite explicit about this when he tells Emperor Rudolph:

[God's] holy Angels, for these two years and a half, have used to inform me: and have finished such works in my hands, to be seen, as no mans heart could have wished for so much: yea they have brought *me a Stone* of that value, that no earthly Kingdom is of that worthinesse as to be compared to the vertue or dignity thereof, &c. [...] The Angel of the Lord hath appeared to me, and rebuketh you for your sins. If you will hear me, and believe me, you shall Triumph: if you will not hear me, The Lord, the God that made Heaven and Earth, (under whom you breath, and have your spirit) putteth his foot against your breast, and will throw you headlong down from your seat. Moreover, the Lord hath made this Covenant with me (by oath) that he will do and perform. If you will forsake your wickidnesse, and turn unto him, your Seat shall be the greatest that ever was: and the Devil shall become your prisoner: Which Devil, I did conjecture, to be the Great Turk, (said I) This my Commission, is from God.⁶⁴

4. Finally, those pieces of angelic information belonging to the fourth category, which were meant as a direct instruction of the *lingua adamica*. These messages communicated names of angels as well as ritualistic expressions in the Enochian language of a cabalistic nature, each letter having numerical equivalents. Dee's *idée fixe* was that the comprehension of these numerical relations would lead to the ultimate enlightenment. That Dee's mathematical expertise did not desert him during his visionary episodes, can be seen in the following passage where he accuses the angel Nalvage of arithmetical miscalculation. Kelley was certainly a far less able mathematician than his master, but his (or the Angel's) wit was more than a match for Dee's suspicion:

Nal[vage]. Pray [...] Δ. We prayed.

There is an error in the last, not in the Number, but in the Letter. I will first go through the Letters, and after come to the Numbers. How many words have you received this day?

Δ. Thirteen, where of *Iaida* was said to be the last of the call.

Nal. [...] *They be more worth than the Kingdom of Poland. Be patient, for these things are wonderful.*

N (*The number must needs go to*) *the sixth, descending 309.*

A *The 7th ascending 360.*

O *The 9th ascending 1000.*

O *The 13th ascending 1050.*

V *The 17th ascending 2004. It is Vooan. It may be sounded Vaoan.*

Adde those last Numbers [...]

Δ. *Vooan is spoken with them that fall, but Vaoan with them that are, and are glorified. The devils have lost the dignity of their sounds.*

Δ. They make 4723.

NAL. [...] *It is called the Mystical roote in the highest ascendent of transmutation.*

Δ. These phrases are dark; when it shall please God they may be made plain.

NAL. [...] *It is the square of the Philosophers work.*

Δ. you said it was a roote.

NAL. [...] *So it is a roote square.*⁶⁵

After this somewhat humorous quotation it is worth returning to a longer passage which deals with more theoretical issues concerning the power of numbers and the Cabalistical ur-language. At the session held in Cracow on 21 April 1584 it was the Archangel Gabriel himself who joined Nalvage to deliver the teachings to Dee and his scribe:

Gab[riel]. [...] *Every Letter signifieth the member of the substance whereof it speaketh. Every word signifieth the quiddity of the substance. The Letters are separated, and in confusion: and therefore, are by numbers gathered together [...].*

E.K. Whether is this Language known in any part of the World or no? if it be, where and to whom?

Gab. *Man in his Creation, being made an Innocent, was also authorised and made partaker of the Power and Spirit of God: whereby he not onely did know all things under his Creation and spoke of them properly, naming them as they were: but also was partaker of our [i.e. the angels'] presence and society, yea a speaker of the mysteries of God; yea, with God himself: so that in innocency the power of his partakers with God, and us his good Angles [sic], was exalted, and so became holy in the sight of God until that Coronon (for so is the true name of that mighty Devil) envying his felicity, [...] began to assail him and [... Man] was driven forth (as your Scriptures record) unto the Earth [...] where being as dumb and not able to speak, he began to learn of necessity the Language in the which [...] he uttered and delivered to his posterity, the nearest knowledge he had of God his Creatures: and from his own self divided his speech into three parts, twelve, three, and seven: the number whereof remaineth, but the true forms and pronounciations want; and therefore is not of that force that it was in his own dignity, much lesse to be compared with this that we deliver, which Adam verily spake in innocency, and was never uttered nor disclosed to man since till now, wherein the power of God must work, and wisdom in her true kind be delivered: which are not to be spoken of in any other thing, neither to be talked of with mans imaginations; for as this Work and Gift is of God, which is all power, so doth he open it in a tongue of power [...].*⁶⁶

This “tongue of power” became the ultimate object of Dee’s investigation, and he grew so obsessed with his search that he not only abandoned his scientific experiments, but also neglected his humanist philological caution and overlooked the serious warnings against angel magic to be found even in the works of his favourite occult authors. I have already referred to the Bible’s reservations concerning divination,⁶⁷ but he could have easily found similar warnings in Trithemius or in Paracelsus:

Spirits often teach those persons who deal with them to perform certain ceremonies, to speak certain words and names in which there is no meaning, and they do all such things [...] to have some sport at the expense of credulous persons. They are seldom what they pretend to be, [...] on the whole, all these spirits surpass each other in deception and lies.⁶⁸

5. HISTORICAL ANTHROPOLOGICAL PERSPECTIVES

The Eastern-European context of Dee's prophecies has been discussed elsewhere.⁶⁹ The present paper aims at exploring the pertinence of the angelic conversations to the history of mentality and to cultural anthropology in relation to what we know about the systems of science, knowledge, and beliefs in the Renaissance. Areas of further investigation might include:

1. An examination of the reasons why Dee, who began his career as a serious natural scientist, could devote himself entirely to crystal gazing, and how this activity satisfied his desire for universal knowledge. This question would benefit from more extensive comparative study of Dee's prophecies in the context of a wide range of sixteenth-century traditions and practices: the revived interest in Enochian writings as well as in medieval prophecies such as those of Joachim of Fiore; Paracelsus's obscure *Papstbilder* prophecies; Guillaume Postel's highly idiosyncratic visions; some trends of Reformation chiliastical mysticism; and, last but not least, the humanist interest in classical prophecy as manifested especially in Psellus and Iamblichus.⁷⁰
2. An equally interesting question to address is why, although Dee's Continental mission was far from successful, he was never branded a charlatan, or locked up in an asylum like his fellow enthusiast, Guillaume Postel a few decades earlier? Apparently Dee, in spite of his occasional financial and existential difficulties, managed to retain his dignity and in 1589 he returned to England in relatively luxurious circumstances.⁷¹
3. Another task is to examine Edward Kelley's role in generating the visions and the whole system of Enochian magic, since Dee appears to have been only a scribe who noted down the angelic messages dictated by Kelley. Although many interpreters have considered Kelley a fraud who ruthlessly cheated the credulous Dee,⁷² a recent unorthodox trend of Dee-criticism has suggested that it was actually Dee who victimized his scryer. As Geoffrey James writes, "Kelley was forced to stay with Dee because the money that the doctor gave him supported Kelley's wife and brother. It was Dee, not Kelley, who was gaining the benefit from the magical ceremonies, for it sated his lust for 'radical truths'."⁷³ Whichever interpretation we choose (the extraordinary and strained psychotic symbiosis in which the two men spent their days invites rather a combination of arguments) we cannot help feeling that Kelley either must have believed in the prophecies he was communicating or, if it was all pretence and invention, he successfully deceived himself, too. A characteristic and recurring episode was recorded by Dee on 24 May 1584 in Cracow:

Δ. Because *E.K.* came not (according as it was bidden yesterday) to follow the Action: I went to his Study door, and knocked for him: And I requested him to come; and he refused so to do, and gave me a short and resolute answer, That he would never more have to do with these Actions [...]. After half an hour and lesse, he came speedily out of his Study, and brought in his hand one volume of *Cornelius Agrippa* his works, and in one Chapter of that Book he read the names of Countries and Provinces collected out of *Ptolomeus* (as the Author there noteth). Whereupon he inferred, that our spiritual Instructors were *Coseners* to give us a description of the World, taken out of other Books: and therefore he would have no more to do with them. I replied, and said, I am very glad that you have a Book of your own, wherein these Geographical names are expressed, such as (for the most part) our Instructors had delivered unto us: and that, [...] they (our Instructors I mean) are very greatly to be thanked, and to be deemed (in all reasonable

mens judgements) most friendly [...] I had here brought [Gerardus's] [...] description Geographicall of the whole earthly Globe [...] to the intent he might see the verity of their words yesterday delivered unto us.⁷⁴

Dee's naive logic is wonderful but Kelley's behavior is no less perplexing if we suppose him to have fabricated the visions. In this case he found himself in a situation similar to that of Edward Alleyn, leading actor of the Elizabethan age, who had once so perfectly identified himself with Doctor Faustus that at the appearance of the stage devils he stopped the performance and together with the whole audience spent the rest of the evening in fervent prayers.⁷⁵

According to Whitby, Dee's firm belief in scrying had two principal motivations. One was his disappointment in the ordinary natural sciences, in comparison with which he considered his crystallomantic operations successful. The other was a paradigm-shift which took place within magic during the sixteenth century. Whereas for the fifteenth-century Neoplatonic Magus there were clear boundaries between white and learned magic on the one hand and popular, superstitious practices on the other, after the all-embracing syntheses of Agrippa and Paracelsus the boundaries had become less distinct and unambiguous.⁷⁶ The Renaissance transformation of natural philosophy and science produced an epistemological vacuum which was temporarily filled by various kinds of magic. This explains the great popularity and prestige of magic during the sixteenth and the first half of the seventeenth centuries, and also the readiness of patrons to support such experiments. The development of such complex and intellectually ambitious alchemical patronage was most characteristic of the German *kulturkreis* of Central Europe, as seen in Emperor Rudolph's Prague or in some of the German princely courts which all had strong connections with their local universities and always had a supply of learned enthusiasts (Heidelberg, Kassel, Weikersheim, Wolfenbüttel). John Dee, who never enjoyed that kind of patronage in England (as Sherman has recently noted, Dee's rather modest house was his own castle, museum and academy), may have easily found such scholarly and intellectual prospects attractive.⁷⁷ In fact, he had already had first hand experience of European courts before setting out on his long journey to Central Europe, since in 1562 he had visited Pozsony (today's Bratislava in Slovakia) and witnessed Emperor Maximilian's coronation as King of Hungary; then, in 1578 he had taken a rather mysterious journey to Berlin and Frankfurt-am-Oder, allegedly in connection with the Queen's health.⁷⁸ On his way to Frankfurt he must have visited several German princely courts and Kassel would have been a natural stop. Kassel was the location of the intriguing court of William of Hesse-Kassel which his son, Moritz, soon turned into a centre of hermetic and alchemical research. As we know Dee briefly visited Kassel in 1586,⁷⁹ and later exchanged letters with both father and son (1589 and 1595),⁸⁰ and the prospect of German alchemical patronage haunted his imagination until his death. It was probably the court at Kassel which was the subject of one of his last scrying sessions. Between 11 July and 15 July 1607, during the last recorded conferences with Bartholomew Hickman as scryer, the ailing doctor asked his angel, Raphael, whether he should put up one more journey to the continent to spread God's message delivered to him in the angelic conversations. The answer was ambiguous, as befitted a message from spiritual beings of dubious origin:

Raph[ael]. John Dee, *thou hast been a Traveller, and God hath ever yet at any time provided for thee in all thy Journeys [...]* John Dee, *he that hath commanded thee to take this Journey in hand, he will provide for thee in Germany, or any other Country wheresoever thou goest. Therefore let thy good will and liking be in placing thy self, if thou wilt be near unto England or far off [...]* And for the good health of thy body, God will so carry thee in good health, that thou shalt set forth such service when thou art there placed, that shall be thy great comfort unto Gods honour, in making of his marvellous works to be known. And thus much for thy comfort through Gods merciful goodness.⁸¹

The journey never took place, Dee died on 26 March 1609.

6. BACK TO THE HISTORY OF SCIENCE AND HISTORIOGRAPHY

Looking at the relationship between magic and science in the early modern age it would be a simplification to claim, as Frances Yates did, that Renaissance neoplatonist magic, let alone hermeticism, fostered the scientific revolution of the sixteenth and seventeenth centuries in a direct way. On the other hand, it is possible to say that in the works (as well as in the mind) of Dee and his fellow scientists/magi layers of discursive logic and irrationalism, scientific thinking and occultism happily coexisted in a variety of ways which would be dangerous to generalize. Each case should be approached individually: some of them have magical conceptions which complement their scientific thinking (Bruno, Bacon), in others the two orientations show an almost total discontinuity (Kepler, Newton), in other cases science and magic are intermixed in a disorderly concoction (Paracelsus) and in Dee's case it seems that his magical ideas totally absorbed his scientific orientation, although in his middle career one can still see independently functioning subsystems in his thought (his geographic interests, or his ideas about public science, for example).

If one contrasts the last three important views on Dee in modern scholarship – those of Yates/French, Clulee, and Sherman – one sees that each of them has contributed at least one important proposal to our understanding of Dee. The Yates School brought magic into the awareness of historians of science, legitimising a pre-occupation which had previously been considered no more than obscurantism. Clulee highlighted the diachronic reorientation during Dee's career and brought into the discussion the medieval roots of sixteenth-century magic and science which had been overshadowed by Yates's enthusiasm for neoplatonic hermeticism.⁸² Sherman's approach has revealed a synchronic multiplicity in the English doctor's diverse interests and activities. If we look at this historiographical line, we see a direction of scholarship moving from a somewhat static and simplistic interpretation of Dee as an English magus towards a more complex contextualization in intellectual history in which elements of discontinuity have become emphasized and in which the originally proposed "master narrative"⁸³ has become subverted by more and more – often conflicting and contradictory – subtexts. It may seem surprising, but at this point I would still avow a return to the Yatesian "master narrative", albeit with some modifications. I am inclined to see Dee as a "magus", who had an amazingly wide range of interests but who also increasingly had a focusing obsession, a magical program, not necessarily to improve the sciences in order to prepare for the scientific revolution, but rather to find an alternative system of knowledge. And we are really talking about alternative systems of knowledge, since Dee clearly distinguished between science after the Fall and that of

the primordial wisdom. His aim was to restore the Adamic or Enochian wisdom of the Golden Age and that would not be compatible with the methods and means of fallen science relying on discursive logic.

Dee's program is by no means exceptional in the intellectual spectrum of the Late-Renaissance. The humanists of the sixteenth and seventeenth centuries – with their passion for the restoration of all ancient thought and texts – rediscovered a number of alternative systems of knowledge: the Chaldean prophecies, the Zoroastrian writings, the corpus of the hermetic and pseudo-hermetic treatises, and the mystical speculations of the cabala.⁸⁴ Some of the Renaissance *intellecti*, such as Erasmus, abhorred and deeply mistrusted these “lunacies”. Others entertained a scholarly philological interest, combining it with a religious program to prove the general superiority of Christianity over Judaism and Islam (Reuchlin and the early Postel).⁸⁵ It is interesting to note that while in sixteenth-century Germany heterodoxy manifested itself primarily in religious mysticism (Sebastian Franck, Kaspar Schwenckfeld, Valentin Weigel, and Johann Arndt), there was also a more active and less abstract trend of speculative thinking, often taking its impetus from classical humanism, occasionally dabbling with magic, and finally definitively rejecting the logical sciences in favour of intuitive and revelatory ancient wisdom. Dee's somewhat older contemporary, Guillaume Postel, is one of the best examples of this kind of active enthusiasm and his stubborn insistence on his visionary ideas parallels Dee's unshakeable belief in his angels.⁸⁶ This sort of alternative thinking has not often been examined in its own terms. It has mainly been looked at as “proto-science” or religious dissent and this approach may be highly misleading. The course of alternative thinking becomes especially interesting around the turn of the sixteenth and seventeenth centuries, when the rapid development of the natural sciences destroyed the conceptual foundations of the animistic universe, the correspondences, and the great chain of being. In spite of these assaults, amazingly, esoteric or occult thinking has not completely disappeared; on the contrary, it has persisted up to the present day. The only sensible account of this phenomenon must come from the area of anthropology and what Gershom Scholem decades ago wrote about the significance of mystical-cabalistical trends within Judaism perfectly applies to the whole early modern esoteric movement:

It is characteristic of Kabbalistic theology that it attempts to construct and describe a world in which something of the mythical has again come to life. [...] Mystics and philosophers are as it were both aristocrats of thought; yet Kabbalism succeeded in establishing a connection between its own world and certain elemental impulses operative in every human mind. It did not turn its back upon the primitive side of life, that all-important region where mortals are afraid of life and in fear of death, and derive scant wisdom from rational philosophy. Philosophy ignored these fears, out of whose substance man wove myths, and in turning its back upon the primitive side of man's existence it paid a high price in losing touch with him altogether.⁸⁷

Since this esoteric movement heavily relied on primordial wisdom, an important source of which, besides the Enochian legends and gnostic and neoplatonic speculations, was the Egyptian-Hellenistic *Corpus Hermeticum*, I do not share Clulee's and Sherman's serious reservations about using the term “hermetic philosopher” for Dee.⁸⁸ Dee was, or at some point *became*, a hermetic philosopher who went beyond science and when we situate him in the context of the seventeenth-century epistemological paradigm-shift we should not see him as a predecessor of the members of the Royal

Society, but rather as a forefather of those seventeenth-century thinkers – Heinrich Khunrath, the Rosicrucians, Jakob Böhme, Robert Fludd, Athanasius Kircher – who, in spite of the advancement of learning, preferred to adhere to an alternative system of knowledge and work for a spiritual (if not a corporeal) restitution of the lost Golden Age and the exaltation of man.

For a flexible approach to John Dee's intellect and psyche I can recommend the attitude of Wayne Shumaker, who came to the following conclusion while reading four seemingly bizarre Renaissance magical texts, including Dee's angelic diaries:

Evidently the consciousness of learned Renaissance men [...] was structured in ways I had failed to imagine. [...] I began to perceive that, far from being eccentric, such ideas have characterized most times and cultures – an insight corroborated by anthropology. [...] Dee, Cardan, Trithemius, and Dalgarno all demonstrate that intelligent men could, and did, hold ideas that now seem extraordinary; and I should think that a reader [...] would lay the book aside with an enhanced realization of the possible varieties of intellectual orientation.⁸⁹

A modification of perspective from evolution-oriented history of science to anthropology seems particularly useful in Dee's case and opens up further vistas of research.

NOTES

¹ See NP and William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995).

² A typical example of this sort of argumentation can be found in PA, 12.

³ T&FR, 231. Cf. "Ad omnipotentem Deum Protestatio fidelis ad perpetuam rei memoriam", *Lib. Myst.*, fol. 7.

⁴ See Frances A. Yates, "The Hermetic Tradition in Renaissance Science" in Charles S. Singleton, ed., *Art, Science and History in the Renaissance* (Baltimore: Johns Hopkins University Press, 1968), 255-274, and Frances A. Yates, *The Rosicrucian Enlightenment* (London: Routledge and Kegan Paul, 1972).

⁵ Cf. for example Robert S. Westman, "Magical Reform and Astronomical Reform: The Yates Thesis Reconsidered" in Lynn White, ed., *Hermeticism and the Scientific Revolution (Papers read at the Clark Library Seminar, March, 1974)* (Los Angeles: UCLA, W.A. Clark Memorial Library, 1977), and Brian Vickers, "Frances Yates and the Writing of History," *Journal of Modern History* 51 (1979): 287-316. Both Clulee and Sherman give a good historiographical account of reactions to the "master narrative" of Dee as magus.

⁶ PA, 15, 43.

⁷ In this paper I primarily rely on the following studies: Graham Yewbrey, *John Dee and the "Sidney Group": Cosmopolitics and Protestant Activism in the 1570s* (Unpublished doctoral thesis, University of Hull, 1981); Wayne Shumaker, "John Dee's Conversations with Angels" in Wayne Shumaker, *Renaissance Curiosa* (Binghamton: Center for Medieval & Early Renaissance Studies, 1982); Christopher L. Whitby, "John Dee and Renaissance Scrying," *Bulletin of the Society for Renaissance Studies* 3:2 (1985): 25-36; NP; R&W; Sherman, *John Dee*.

⁸ Cf. *Lib. Myst.*, fol. 5. Commented upon by Yewbrey, *John Dee and the Sidney Group*, 169.

⁹ MP, sig. *j^{r-v}.

¹⁰ MP, sig. A.iii^v.

¹¹ MP, sig. A.iii^v.

¹² NP, 167 and 285 (notes 55-58). Avicenna's *De divisionibus scientiarum* can be found in Dee's copy of *Avicennae [...] compendium de Anima* (Venice, 1546), R&W, no. 395, which is presently in the Bodleian Library, Oxford. Dee purchased it in 1557. See also Toufic Fahd, *La divination arabe: Études religieuses, sociologiques et folkloriques sur le milieu natif de l'Islam* (Leiden: Brill, 1966).

¹³ Cf. Dee's booklist in Oxford, Corpus Christi MS 191: *J. Dee Libri antiqui scripti quos habeo anno 1556*. According to Roberts and Watson the "Ars sintrillia" was originally included in the codex (R&W, no. CM4), which has been identified with parts of Oxford Corpus Christi MS 233, but the "Ars sintrillia" is missing from

the extant manuscript (*R&W*, 126; *NP*, 167-68). For scholarly literature on Artephius see Clulee's references.

¹⁴ *NP*, 168, gives a detailed description of the complicated interrelatedness of medieval manuscripts and sixteenth-century references by Gianfrancesco Pico, Cardanus and others to Artephius. As John Ferguson notes, Artephius has always been regarded by the alchemists as one of the masters. By virtue of the elixir he is reputed to have lived a thousand and twenty-five years; see John Ferguson, *Bibliotheca Chemica: A Catalogue of the Alchemical, Chemical and Pharmaceutical Books in the Collection of the late James Young of Kelly and Durris, Esq., LL.D., F.R.S., F.R.S.E.*, 2 vols (Glasgow, 1906), I, 50-51. Although Ferguson cites mostly seventeenth- and eighteenth-century sources for this legend, it is interesting to note that Dee's contemporary and personal acquaintance, Postel, was also fascinated by Artephius and compared the magus's long life to his own "restitution". Cf. Guillaume Postel, *De orbis terrae concordia libri quatuor* (Paris, 1543), 90-91. See also François Secret, "Alchimie, palingénésie et metempsychose chez Guillaume Postel," *Chrysopaëia* 3 (1989): 50-51.

¹⁵ *PA*, 148-149.

¹⁶ See Hero of Alexandria, *Mechanik und Katoptrik*, eds. Ludwig Nix and Wilhelm Schmidt (Leipzig, 1900). For mediaeval optics and Roger Bacon's experiments in this field see David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: Chicago University Press, 1976), and Urszula Szulakowska, *The Alchemy of Light: Geometry and Optics in Late Renaissance Alchemical Illustration, Symbola et Emblemata*, 10 (Leiden: Brill, 2000).

¹⁷ A few pertinent works among the extensive scholarly literature on Renaissance talismanic magic include Franz Boll and Carl Besold, *Stern Glaube und Sterndeutung: Die Geschichte und das Wesen der Astrologie*, ed. Wilhelm Gundel (Berlin, 1926); Richard Hans Laars, *Das Buch der Amulette und Talismane: Talismanische Astrologie und Magie* (Leipzig, 1932); Karl A. Nowotny, "The Construction of Certain Seals and Characters in the Work of Agrippa of Nettesheim," *Journal of the Warburg and Courtauld Institutes*, 12 (1949): 46-57; D.P. Walker, *Spiritual and Demonic Magic from Ficino to Campanella* (London: The Warburg Institute, 1958); E. A. Wallis Budge, *Amulets and Talismans* (New York: University Books, 1961); Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964); Liselotte Hansman and Lenz Kriss-Rettenbeck, *Amulett und Talisman: Erscheinungsform und Geschichte* (Munich: Callwey, 1966), etc.

¹⁸ In Henricus Cornelius Agrippa, *De occulta philosophia* (1533). I am quoting the seventeenth-century English edition: *Three Books of Occult Philosophy* (London, 1651).

¹⁹ Agrippa, II, xxxv, 290-1.

²⁰ Agrippa, II, xxii, 242.

²¹ Cf. Frances Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964), 150-1, 251; Peter J. French, *John Dee: The World of an Elizabethan Magus* (London: Routledge and Kegan Paul, 1972), 76-78; 127-8. French, however, must be credited with being the first to label Dee as an English Paracelsian. Another pre-Roberts and Watson scholar to associate Dee with Paracelsus was Charles Webster (see his "Alchemical and Paracelsian Medicine" in Charles Webster, ed., *Health, Medicine and Mortality in the Sixteenth Century* (Cambridge: Cambridge University Press, 1979).

²² As Roberts and Watson remark, collecting Paracelsica "must have been one of his chief preoccupations in the twenty years before his departure for Europe" (*R&W*, 36). It seems that Dee started collecting the works of Paracelsus from 1562 and a heavily annotated German edition (*R&W* no. 1476 – "*Libellus de balneis*", 1562) with marginal translations proves Dee's command of that language. All in all, there are ninety-two editions of Paracelsus in 157 copies mentioned in Dee's catalogue and the concordance with Sudhoff's catalogue (*Bibliographia Paracelsica*, Berlin, 1894); cf. *R&W*, Appendix 5, which documents Dee's possession of works covering the whole spectrum of Paracelsian thought. The author of the only post-Roberts and Watson monograph, William Sherman, has acknowledged Dee's interest in Paracelsus but since his book is not primarily concerned with Dee's natural philosophy, his remarks are restricted to the technical aspects of Dee's book-collecting habits and marginal annotations (Sherman, 43-44, 76-79 & 98-99).

²³ This *album amicorum* has been acquired by the National Library of Medicine (Bethesda, Maryland) and reviewed by Richard J. Durling in *Gesnerus: Revue trimestrielle, publié par la Société suisse d'histoire de la médecine et des sciences naturelles*, 22 (1965): 134-59. Roberts and Watson knew about this inscription in Gesner's album (*R&W*, 20, n.23) but thought that it had been lost. Sherman refers to Durling, (Sherman, 215, n.83).

²⁴ *R&W*, 101. The book – *Libellus de balneis germanicè*, today in New York Society Library – contains extensive notes by Dee, including translations from the German.

²⁵ *Erklärung der ganzen astronomei*, in Karl Sudhoff and Wilhelm Mathiessen, eds., *Paracelsus, Sämtliche Werke. Abteilung I: Medizinische, naturwissenschaftliche und philosophische Schriften*, 14 vols (Vols. 6-9 Munich, 1922-5; Vols. 1-5 and 10-14 Berlin, 1928-33), X, 656. After the Sudhoff edition numbers, I am also giving the references to the definitive sixteenth-century edition by Johann Huser, *Der Bücher und Schriften [...] Philippi Theophrasti Paracelsi: Jetzt auff's new auß den Originalien, und Theophrasti eigener Handschrift, soviel derselben zu bekommen gewesen* [etc], 10 vols (Basel, 1589-90), X, 464. See also: A. E. Waite, ed., *The Hermetical and Alchemical Writings of Aureolus Philippus Theophrastus Bombast* (London, 1894), II, 295. I have also used the following English compendiums of the writings of Paracelsus: Franz Hartmann, *The Life and the Doctrines of Philippus Theophrastus Paracelsus, extracted and translated from his rare and extensive works and from some unpublished manuscripts* (New York, 1891) and Paracelsus, *Selected Writings*, ed. Jolande Jacobi, Bollingen Series 28 (Princeton, NJ: Princeton University Press, 1951).

²⁶ *PA*, 134-135.

²⁷ *MH*, sig. B3^{v-v}, 135, 137. The Latin parenthesis has been added here for the reader's benefit.

²⁸ Paracelsus, *Sämtliche Werke*, XII, 326; Huser, X, 290; Jacobi, 44.

²⁹ Paracelsus, *Sämtliche Werke*, XII, 183; Huser, X, 162.

³⁰ Paracelsus, *Die Bücher von den unsichtbaren Krankheiten, Sämtliche Werke*, IX, 271.

³¹ Paracelsus, *Sämtliche Werke*, XII, 41-2; Huser, X, 35.

³² Agrippa, III, xxxvi, 460-1.

³³ Agrippa, III, xxxvi, 460.

³⁴ Paracelsus, *De fundamento scientiarum sapientiaeque, Sämtliche Werke*, XIII, 306; Huser, IX, 430. On Agrippa's magical notions see Charles G. Nauert, *Agrippa and the Crisis of Renaissance Thought*, Illinois Studies in the Social Sciences, 55 (Urbana: The University of Illinois Press, 1965); Alexandre Koyré, *Mystiques, Spirituels, Alchimistes du XVIe siècle allemand* (Paris: Gallimard, 1971); Wolf-Dieter Müller-Jahncke, "Von Ficino zu Agrippa: Der Magie-Begriff des Renaissance-Humanismus im Überblick" in Antoine Faivre and Rolf Christian Zimmermann, eds., *Epochen der Naturmystik* (Berlin: Erich Schmidt, 1972), 24-51; Paola Zambelli, "Le problème de la magie naturelle à la Renaissance" in *Magia, astrologia e religione nel Rinascimento, Convegno polacco-italiano, Varsavia 1972* (Warsaw: Ossolineum, 1972), 48-82; Charles Webster, *From Paracelsus to Newton: Magic and the Making of Modern Science* (Cambridge: Cambridge University Press, 1982); Michael Keefer, "Agrippa's Dilemma: Hermetic 'Rebirth' and the Ambivalences of *De vanitate* and *De occulta philosophia*," *Renaissance Quarterly*, 41:4 (1988): 614-53. On Paracelsus's concepts of the mystical rebirth (*corpus glorificationis*) I have consulted the following studies: Carl Gustav Jung, "Paracelsus as a Spiritual Phenomenon" in Jung, *Paracelsica: Zwei Vorlesungen über den Arzt und Philosophen Theophrastus* (Zürich, 1942); cf. Jung, *Alchemical Studies* (London: Routledge and Kegan Paul, 1983), 109-91; Ernst W. Kämmerer, *Das Leib-Seele-Geist-Problem bei Paracelsus und einigen Autoren des 17. Jahrhunderts*, Kosmographie, 3 (Wiesbaden: Steiner, 1971); Wolf-Dieter Müller-Jahncke, *Astrologisch-magische Theorie und Praxis in der Heilkunde der frühen Neuzeit*, Sudhoffs Archiv, Beiheft 25 (Wiesbaden: Steiner, 1985); Massimo Luigi Bianchi, *Signatura rerum: Segni, magia e conoscenza da Paracelso a Leibniz*, Lessico Intellettuale Europeo, 43 (Roma: Edizioni dell'Ateneo, 1987); and Elisabeth Ann Ambrose, "Cosmos, Anthropos, and Theos: Dimensions of the Paracelsian Universe", *Cauda Pavonis*, 11:1 (1992): 1-7.

³⁵ *The Holy Bible [...] translated out of the original tongues [...] by His Majesty's special command* (Cambridge: Cambridge University Press, 1833). It should be noted, however, that such divination in the Bible is most of the time condemnable and condemned: "And he made his son pass through the fire, and observed times, and used enchantments, and dealt with familiar spirits and wizards: he wrought much wickedness in the sight of the Lord." (2 Kings 20.21). Dee seems to have tendentiously overlooked such warnings whether in the Bible or in his much admired Paracelsus (see later on the angelic conversations).

³⁶ Exodus 28.15-31. It was Christopher L. Whitby who first called attention to the Biblical context (in the article referred to in footnote 6 above). For lapidaries see the following items from Dee's library: Albertus Magnus, *De lapidibus mineralibus*, – *R&W*, nos. 2290, M24a, M107, M149a, M196a; Lazar Ecker, *Beschreibung allerfürnemsten mineralischen Ertzt und Berckwerksarten* (Prague, 1574) – *R&W* no. 5; "Gesnerus & alii varii de lapidibus & gemmis, 1565" – *R&W*, no. 765; Paracelsus, "De metallis; de mineralibus; de gemmis, germanicè" = *Ettliche Tractatus [...] Von Natürlichen Dingen; Beschreibung etlicher Kreütter; Von Metallen; Von Mineralen; Von Edlen Gesteinen [...]* (Strassburg, 1570) – *R&W*, no. 1485, etc. On the medieval lapidaries see Joan Evans, *Magical Jewels of the Middle Ages and the Renaissance, particularly in England* (Oxford, 1922, repr. New York: Dover Press, 1976); on the twelve symbolic jewels

see György Szönyi, "Mannerist Imagery and Thinking in the Prose of András Prágai," *Acta Litteraria, Academiae Scientiarum Hungaricae*, 26 (1984): 207-32.

³⁷ Arthur Edward Waite, *The Hermetic and Alchemical Writings of Paracelsus*, II, 296. Cf. also: "Visiones, das sind gesicht so man mit künsten macht in spiegeln, crystallen, negeln und der gleichen", *Erklärung der gantzen Astronomie, Sämtliche Werke*, XII, 500, Huser, X, 485. Cf. also *Die 9 Bücher de natura rerum, Sämtliche Werke*, XI, 307 and Waite, *The Hermetic and Alchemical Writing of Paracelsus*, I, 171. One of Dee's Paracelsica, "De rebus naturalibus; descriptio aliquot stirpis de metallis, de mineralibus, de gemmis, germanici, Argentoratum, 1570" – *R&W*, no. 1485 (S120 in Karl Sudhoff's *Bibliographia Paracelsica*, Berlin, 1894) can be identified with *Die 9 bücher*. That Dee must have known the "ars beryllistica" concept of Paracelsus is shown by the fact that in the *Monas Hieroglyphica* he had already used the term "beryllisticus" (See *MH*, B3v, 137 and *NP*, 141). There are a great many useful studies on *crystallomantia* in Polish. See for example, Roman Bugaj, *Nauki tajemne w Polsce w dobie Odrodzenie* (Warsaw: Ossolineum, 1976), 120 et seq., and Ryszard Gansiniec, "Krystalomancja," *Lud*, 41 (1954): 1-83. This latter is the most extensive and relatively up-to-date article on crystal gazing I have found.

³⁸ This mirror, at present in the British Museum, was donated by the eighteenth-century eccentric aristocrat, Horace Walpole. See Hugh Tait, "The Devil's Looking Glass: the Magical Speculum of Dr John Dee" in Warren Hunting Smith, ed., *Horace Walpole, Writer, Politician and Connoisseur. Essays on the 250th anniversary of Walpole's birth* (New Haven and London: Yale University Press, 1967), 195-212. Clulee reproduces this precious item (*NP*, figure 8.1).

³⁹ Gansiniec, "Krystalomancja" gives an excellent summary of these remarks. I am adopting a few of his citations: "Nonnunquam ad quod vocantur demones praenunciant diversis figuris quas miseri homines videre solent vel in polito lapide, ferro, calibe, speculo [...]." Gregorius Reisch, *Margarita Philosophica* (Strassburg, 1512), 7:23 – Dee had the 1504 edition, *R&W*, no. 1385; "Hinc est quod multi profanis artibus dediti demones ad circulum, ad speculum, sive ad quaelibet alia receptacula horrendis conjurationibus convocare laborantes. [...] Daemones terrestres commurantur interdum et pollicentur vesanis in vitro vel in crystallo sive in speculo [...]." Trithemius, *Tractatus de reprobis atque maleficis* (Cologne, 1566), *R&W*, nos. 468 and 472. See also "Joh. Trithemii libellus octo quaestionum, 1564", *R&W*, no. 897.

⁴⁰ "[Q]uidam sic experiuntur: in crystallo sedens conversus ad orientem, crucem facito cum oleo olivæ, et sub cruce scribe nomen sanctæ Helenæ hoc modo: Sancta Helena. Inde puer natus ex conjugibus, ætatis annorum decem vel circa, virgo, capiat crystallum dextra manu et tu genibus flexis post illum stans supplicationem ter, dices: 'Deprecor te, domina sancta Helena, quæ crucem domini nostri Iesu Christi invenisti et per illam sanctissimam devotionem [...] debeas demonstrare in hoc crystallo quidquid peto et scire cupio, Amen.' Et cum puer videbit angelum in hoc crystallo, rogabit quæcunque volueris angelusque respondebit." in Girolamo Cardano, *De rerum varietate* (Lyons, 1663), cited by Gansiniec, 12. Dee had the 1557 edition, *R&W*, no. 60. Cardano's example was taken over by Johann Wier in *De præstigiis dæmonum*, Ch. 5. Dee had two copies of this work (*R&W*, nos. 456 and 862); he even lent it to help the clarification of a witchcraft case as late as 1597.

⁴¹ János Reizner, *Szeged története* (Szeged, 1900), IV, 390. For further examples cf. Gansiniec, 11ff.

⁴² For more information on these statutes see the introductory section of Whitby's thesis.

⁴³ James O. Halliwell, ed., *The Autobiography and Personal Diary of Dr Simon Forman* (London, 1849), 17, cit. Whitby, 31.

⁴⁴ Whitby mentions two spectacular examples of such manuscript compendia. One is British Library, Additional MS 36,674 which contains magical journals by Dee's associates, Humphrey Gilbert and John Davies, and has marginal notes by Gabriel Harvey. In the neighborhood of these texts, this codex also accommodates a holograph draft of Dee's primer for his Enochian magic, "De heptarchia mystica". The other, Sloane MS 3851 contains standard texts, such as "The Magick of Arbatel", "Signum pentaculum Solomonis", and "The Fourth Book of Agrippa" as well as private incantations and rituals ("Invocations to call a spirit into a chrystall Stone and to keep him there", fols. 92-109; and "To have conference with spirits", fols. 129-31). Some infamous rituals of ceremonial and black magic have been published by Arthur Edward Waite, *The Book of Ceremonial Magic: A Complete grimoire* (London, 1911, repr. Secaucus, NJ: The Citadel Press, 1961). For German examples of magical manuscripts see the Herzog-August Bibliothek, Wolfenbüttel, HAB MS 115 Aug fol (3903), *Allerhand in Kreise gestellte magische oder kabbalistische Figuren*, sixteenth century; *Arbatel, d.i. die Heylige Geistkunst, darinnen der grundliche unfehlige Weg angezaigt würt, wie man zu der rechten wahren Erkenntnis Gottes, auch sichtigen vnd vnsichtigen Geschöpf, aller Künsten, Weyssheyten vmd Handwercken khomen solle*, seventeenth century, HAB MS 48.2 Aug 4to; *Razijel. Das Edle Buch von der Gottlichen Magia. Unserm Ersten Vater Adam stracks nach dem er auss dem Paradeiss*

verstossen von dem Engell selbstn Offenbahett. Nebenst anderer Mehrer Cabalistischen und Magischen Maistere Schönen, herlichen und geheimen Additionibus, seventeenth century, HAB MS 246.5 Extravagantes.

⁴⁵ John Dee, *Autobiographical Tracts*, ed. James Crossley, Remains Historical and Literary of Lancaster and Chester Counties, 1 (Manchester, 1851), 17.

⁴⁶ *Lib. Myst.*, fol. 8.

⁴⁷ *Private Diary*, 5, *R&W*, 53. Halliwell's transcript is incorrect and must be checked against the original entry in Stadius's *Ephemerides* (1570), which is now available on microfilm: Elisabeth Leedham-Green and Julian Roberts, eds., *John Dee, Renaissance Man: The Reconstructed Libraries of European Scholars, 1450-1700. The Books and Manuscripts of John Dee. Manuscripts from the Bodleian Library* (Marlborough: Adam Matthews, 1991), reel 4. Dee purchased several of Thurneysser's books: his Paracelsus dictionary, published in Berlin in 1574 (*R&W*, no. 2275), a 1569 edition of the *Archidoxa* (*R&W*, no. 1455), and a 1560 edition of the *Quinta essentia* (*R&W*, no. 1445).

⁴⁸ Franciscus Joel, *De morbis hyperphysicis et rebus magicis* (Rostock, 1579) cit. Hermann Kopp, *Die Alchemie in älterer und neuerer Zeit: Ein Beitrag zur Kulturgeschichte* (Heidelberg, 1886), I, 117.

⁴⁹ *MP*, sig. Aj^r.

⁵⁰ *Private Diary*, 13 [9 October 1581] and 14 [27 January, 12 February, 6 March 1582].

⁵¹ *Lib. Myst.*, fol. 7^r, cit. *NP*, 179 and 288, note 11.

⁵² *Private Diary*, 11 [25 May 1581].

⁵³ Cf. Genesis 2. 19-20: "And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them: and whatsoever Adam called every living creature, that was the name thereof."

⁵⁴ *MH*, 23^r, 201

⁵⁵ On the quest for a mystical, universal language, see studies on Trithemius, Dalgarno, Kircher, John Wilkins, Leibniz, etc. A few important works: Alessandro Bausani, *Geheim und Universalsprachen: Entwicklung und Typologie* (Stuttgart: Kohlhammer, 1970); Arno Borst, *Der Turmbau von Babel: Geschichte der Meinungen über Ursprung und Vielfalt der Sprachen und Völker*, 4 vols (Stuttgart: Hiersemann, 1957-63); Joscelyn Godwin, *Athanasius Kircher: A Renaissance Man and the Quest for Lost Knowledge* (London: Thames & Hudson, 1979); James Knowlson, *Universal Language Schemes in England and France 1600-1800* (Toronto: University of Toronto Press, 1975); George McCracken, "Athanasius Kircher's Universal Polygraphy," *Isis*, 39 (1948): 215-228; Wilhelm Schmidt-Biggemann, *Topica universalis: Eine Modellgeschichte humanistischer und barocker Wissenschaft, Paradeigmata*, 1 (Hamburg: Meiner, 1983); Gerhard F. Strasser, *Lingua universalis: Kryptographie und Theorie der Universalsprachen im 16. und 17. Jahrhundert*, Wolfenbütteler Forschungen, 38 (Wiesbaden: Harrassowitz, 1988); Marina Yaguello, *Les Fous du langage: Des langues imaginaires et de leurs inventeurs* (Paris: Éditions du Seuil, 1984).

⁵⁶ Umberto Eco, *The Search for the Perfect Language* (Oxford: Blackwell, 1995), 185-90. See Guillaume Postel's *De originibus* (Basel, 1553), *R&W*, no. 868. See also *NP*, 88.

⁵⁷ *MH*, 5^r, 127.

⁵⁸ John Dee, *Liber mysteriorum, sextus et sanctus*, 1583, British Library, Sloane MS 3189.

⁵⁹ Both in manuscript, in British Library, Sloane MS 3191. *De heptarchia mystica* was recently published by Robert Turner (Wellingborough: Aquarius Press, 1986). A not uninteresting compendium of Dee's Enochian magic was edited and translated by Geoffrey James, *The Enochian Magic of Dr. John Dee* (St. Paul, Minnesota: Llewellyn Publications, 1994). In this compilation the Enochian passages scattered in Dee's diaries are taken out of their original context and are arranged into a logical sequence, which, obviously, is the invention of the editor.

⁶⁰ See, for example, Donald C. Laycock, *The Complete Enochian Dictionary of John Dee* (London: Askin, 1978).

⁶¹ Except for the early diaries in Sloane MS 3188, which until recently have remained unstudied. From the early 1980s on, Yewbrey made use of this manuscript, and later Whitby wrote a doctoral dissertation (University of Birmingham, 1981) which included a full transcription of this material. A facsimile edition of Whitby's thesis was published by Garland (New York) in 1988.

⁶² *T&FR*, 168-70.

⁶³ *T&FR*, 172-3.

⁶⁴ *T&FR*, 231.

⁶⁵ *T&FR*, 80.

⁶⁶ *T&FR*, 92.

⁶⁷ See footnote 35 above.

⁶⁸ *Astronomia magna*, as quoted by Hartman, 149. An influential source of these kinds of warnings is Augustine, *De civitate Dei*, Book 10, Chapters 9-10, where he attacks Porphyrian theurgy – an attack repeated almost verbatim in Chapter 46 of Cornelius Agrippa's *De vanitate scientiarum* (Cologne, 1533).

⁶⁹ See Luigi Firpo, "John Dee, scienziato, negromante e avventuriero," *Rinascimento*, 3 (1952): 25-84; Robert J.W. Evans, *Rudolph II and His World* (Oxford: Clarendon, 1973; London: Thames & Hudson, 1997), 214-28; and my articles: "John Dee i jego związki ze Środkową Europą" (John Dee and his Contacts with Central Europe), *Odrodzenie i Reformacja w Polsce*, 25 (1980): 99-111; "Traditions of Magic: From Faustus to Dee at European Universities and Courts," *Cauda Pavonis*, 10:2 (1991): 1-8; and "'Eastward Ho!' John Dee a kelet-közép-európai udvarokban" (John Dee at Eastern European Courts), in Monok István, ed., *A III. Hungarológiai Kongresszus előadásai* (Budapest-Szeged: JATE, 1993), 1063-1074.

⁷⁰ Some of Dee's books related to prophetic traditions: for Joachim of Fiore see "Joachimi Abbatis Vaticinia" – *R&W*, nos. 436 and M18; "Pauli Scalichii explanatio imaginum abbatis Joachim & Anselmi, Cologne, 1570" – *R&W*, no. 2028; for Psellus and Iamblichus see *R&W*, no. 256. This fascinating *colligatum* (now in the Folger Shakespeare Library) of mystical and pneumatological literature is heavily annotated by Dee; for the Paracelsus prognostications see "Paracelsi expositio magicarum figurarum, germanici, 1569" – *R&W*, no. 956 [Sudhoff 106], "Paracelsi expositio imaginum magicarum, 1570" – *R&W*, no. 844 [Sudhoff 115]. For Postel's prophecies see "Configuratio signorum coelestium, 1553" – *R&W*, no. 432 and *De orbis terrae concordia*, (Basel, 1544) – *R&W*, no. D18; etc.

⁷¹ On Postel's alleged madness, see William J. Bouwsma, *Concordia mundi: The Career and thought of Guillaume Postel, 1510-1581* (Cambridge Mass.: Harvard University Press, 1957), 26-27 and Marion L. Kuntz, *Guillaume Postel: Prophet of the Restitution of All Things: His Life and Thought* (The Hague: Martinus Nijhof, 1981), 162. On the circumstances of Dee's return to England, see *Private Diary*, 31, and *Autobiographical Tracts*, 14.

⁷² This is echoed in Casaubon's elaborate preface to the *True & Faithful Relation* (see *T&FR*, "The Preface", sig. D3^{rv} and "Postscript", sig. I2^r), and in almost all monographs on Dee which aimed at placing him in the venerable tradition of hermetic magi of the Renaissance (Calder, Yates, French).

⁷³ James, xxv. This is implied by Clulee in relating to the vagaries of patronage, then explicitly stated by Susan Bassnett in her studies of Kelley and Elizabeth Weston (see "Revising a Biography: A New Interpretation of the Life of Elizabeth Jane Weston based on her autobiographical poem on the occasion of the death of her mother," *Cahiers Elisabéthains*, 37 (1990): 1-8 and her article in the present volume).

⁷⁴ *T&FR*, 158-159.

⁷⁵ This anecdote is mentioned by Anthony Burgess, *Shakespeare* (London: Penguin, 1970), 103. According to the legend, in order to commemorate the event, Alleyn later founded Dulwich College on the site where that amazing revelation had taken place.

⁷⁶ Whitby, 33-34.

⁷⁷ This is a strong argument, and is by no means invalidated by the sceptical – and somewhat simplistic – references to the general shortage of money and greed of the aristocratic patrons. On the magical contexts of some German courts see Yates, *The Rosicrucian Enlightenment*; Robert J.W. Evans, *Rudolph II and his World*; Wolf-Dieter Müller-Jahncke, *Astrologisch-magische*; Bruce T. Moran, *The Alchemical World of the German Court: Occult Philosophy and Chemical Medicine in the Circle of Moritz of Hessen, 1572-1632*, *Sudhoffs Archiv*, 29 (Stuttgart: Steiner, 1991); Jost Weyer, *Graf Wolfgang II von Hohenlohe und die Alchemie. Alchemistische Studien in Sloss Weikersheim, 1587-1610* (Sigmaringen: Jan Thorbecke, 1992); Debra L. Stoudt, "'Probatum est per me': The Heidelberg Electors as Practitioners and Patrons of the Medical and Magical Arts," *Cauda Pavonis*, 14:1 (1995): 12-18. On Dee's "academy", see French, 126-188; and Sherman's more modern approach (Sherman, chapters 2 and 3).

⁷⁸ See *Private Diary*.

⁷⁹ In June, when he was banished from Prague and took temporary refuge in Germany, see *T&FR*, 429; and *R&W*, 77-78.

⁸⁰ *R&W*, Appendix I, nos. 2 and 3.

⁸¹ *T&FR*, (new numbering), *37, *39.

⁸² The medieval contexts have recently been explored by Stephen Clucas in a study of Dee's interest in Solomonic magical manuscripts. See his essay in the present volume.

⁸³ Sherman uses this term in his book. See Sherman, 12-19.

⁸⁴ In spite of all recent criticism, I find the best summary of these discoveries in D.P. Walker's *Spiritual and Demonic Magic from Ficino to Campanella* (London: The Warburg Institute, 1958) and Frances A. Yates,

Giordano Bruno and the Hermetic Tradition (London: Routledge Kegan and Paul, 1964). On hermeticism, see André Marie Jean Festugière, *Hermétisme et mystique païenne* (Paris: Louvain, 1967); Raymond Marcel, "La fortune de l'Hermès Trismégiste à la renaissance" in André Stegman, ed., *L'humanisme français au début de la renaissance* (Paris: Vrin, 1973), 137-54; Konrad Eisenbichler and Olga Zorzi Pugliese, eds., *Ficino and Renaissance Neoplatonism*, University of Toronto Italian Studies, 1 (Ottawa: Dovehouse Editions Canada, 1986); Ingrid Merkel and Allen G. Debus, eds., *Hermeticism and the Renaissance: Intellectual History and the Occult in Early Modern Europe* (Washington: The Folger Institute, 1988), etc. On the cabalistic interpretations, see Joseph Blau, *The Christian Interpretation of the Cabala in the Renaissance* (New York: Columbia University Press, 1944); and François Secret, *Les Kabbalistes Chrétiens de la Renaissance* (Paris: Dunod, 1964, repr. Milan: Arché, 1985); on Dee and the Cabala, Michael T. Walton, "John Dee's *Monas Hieroglyphica*: Geometrical Cabala," *Ambix*, 23 (1976): 116-23, and Karen De Léon-Jones's article in the present volume.

⁸⁵ See, for example, Erasmus to Albert of Brandenburg, 19 October 1519 in P. S. Allen, ed., *Opus epistolarum*, 12 vols (Oxford: Clarendon Press, 1906-58), IV, 100. On Erasmus's attitudes to magic and Judaism, see Werner Gundersheimer, "Erasmus, Humanism and the Christian Cabala", *Journal of the Warburg and Courtauld Institutes*, 26 (1963): 38-52; Paola Zambelli, "Cornelio Agrippa, Erasmo e la teologia umanistica", *Rinascimento*, 21 (1969): 29-88; and Charles Zika, "Reuchlin and Erasmus: Humanism and Occult Philosophy", *The Journal of Religious History*, 9 (1976-77): 223-246 (242-6). For a near-contemporary review of the possible role of the cabala in philosophy, see Johann Pistorius, *Artis cabalisticæ, hoc est Reconditæ Theologiæ et Philosophiæ Scriptorum* (Basel, 1587). On Reuchlin's troubles in connection with his alleged Judaism, cf. Max Brod, *Johannes Reuchlin und sein Kampf: eine historische Monographie* (Stuttgart: W. Kohlhammer Verlag, 1965). On Postel, see the next footnote.

⁸⁶ For some time I have been preparing myself to engage in a comparative study of the alternative occult thought of Postel and Dee. For more on Postel's esotericism, see Bouwsma and Kuntz, also François Secret, "Notes sur Postel", *Bibliothèque d'humanisme et renaissance*, 37 (1975): 101-19; 39 (1977): 115-32, 573-90; Secret, 'Alchimie'; Frank Lestringant, "Cosmologie et mirabilia à la Renaissance: l'exemple de Guillaume Postel", *Journal of Medieval and Renaissance Studies*, 16 (1986): 253-79.

⁸⁷ Gershom Scholem, *Major Trends in Jewish Mysticism* (Jerusalem: Schocken Publishing House Ltd., 1941, repr. New York: Schocken Books, 1974), 35.

⁸⁸ I would argue with Sherman's typological argument according to which magic is passive and contemplative while humanism is active (Sherman, 14-5). These are two different and rather independent paradigms each having a scale from passive to active. In the esoteric tradition this would range from passive mysticism through occult knowledge to active and assertive magical manipulations. In humanism, which is based on explication and discursive logic, one again finds a wide range of attitudes from enthusiasm through stoicism to scepticism. I do not, however, contest Sherman's central argument which considers Dee *both* as a humanist and as a magus.

⁸⁹ Shumaker, *Renaissance Curiosa*, 11. These remarks are the more noteworthy since Professor Shumaker had previously written an acerbic and sceptical monograph on the occultism of the Renaissance: *The Occult Sciences in the Renaissance: A Study in Intellectual Patterns* (Berkeley: The University of California Press, 1972).

STEPHEN CLUCAS

JOHN DEE'S ANGELIC CONVERSATIONS AND THE *ARS NOTORIA*

Renaissance Magic and Mediaeval Theurgy

On 27 June 1584 John Dee records that he and his “scryer” Edward Kelley were in conference with an angelic spirit named “Ave” in their lodgings in Cracow. The spirit instructed them on the use of a magical “Table” they had been given, inscribed with “the names of God”:

Four dayes [...] must you onely call upon those names of God, or on the God of Hosts, in those names: And 14 dayes after you shall (in this, or in some convenient place) Call the Angels by Petition, and by the name of God, unto which they are obedient. The 15 day you shall Cloath your selves in vestures made of linnen, white: and so have the apparition, use, and practise of the Creatures.

Kelley observed that these prescriptions were “somewhat like the old fashion of Magick.”¹ While it has been commonplace to characterise Dee’s angel conversations (along with the works of Heinrich Cornelius Agrippa, Johannes Reuchlin, and Johannes Trithemius) as a form of neoplatonic magic, I would argue that we must turn to “the old fashion of Magick” – the Pseudo-Solomonic *ars notoria* or theurgic magic which flourished virtually unabated from the thirteenth to the seventeenth century,² in order to come to a clearer understanding of the origins of Dee’s practices, and the “Christian Cabalistic” tradition of Northern Europe as a whole. Examining works from this abundant manuscript tradition make it apparent that pseudo-Solomonic theurgy forms the most significant precedent for Dee’s “angelic magic”, and dictates many of the ritual, instrumental and linguistic forms of his “Actions”, especially its combination of magical “angelic language” and operative Christian prayer.

1. DEE'S ANGELIC CONVERSATIONS AND INTELLECTUAL HISTORY

The precise nature and disciplinary province of Dee’s conversations has been a thorny issue amongst intellectual historians, who have approached them with varying degrees of open-mindedness and historical imagination. As an example of how early-modern intellectual formations can be intelligently misunderstood or mis-categorised, the angelic conversations make an instructive historiographical case study. Long dismissed as either weak-minded and foolish superstition,³ or misguided “spiritism,”⁴ Dee’s “occult” or “magical” beliefs and activities were initially recovered by historians who subscribed to the influential thesis that Renaissance neoplatonism anticipated the themes of emergent modern science.⁵ This was certainly the view of I.R.F. Calder,

whose monumental unpublished thesis, *John Dee Studied as an English Neoplatonist*, stressed the continuities between Dee's neoplatonic beliefs and the themes of seventeenth-century natural philosophy. Although Calder was historically sensitive to the normative character of Dee's beliefs in spiritual creatures,⁶ and provided a patient descriptive account of the conversations (albeit with an imbalance in favour of the printed texts), he was patently frustrated by their intractability to his attempts at characterising Dee as an "English Neoplatonist". Commenting on Dee's records of the conversations held during his continental journeys, he says:

many are totally unintelligible, nor do they seem to be closely enough related to any usual Kabbalistic or numerological system to be even partially "interpreted" on any ordinary methods.⁷

While he notes that they are "made up of prayers, charms and incantations," Calder can find precious little evidence for their basis in the "usual" Neoplatonic or Cabalistic sources.

Published in the same year as Calder's thesis was submitted, Luigi Firpo's essay "John Dee, Scienziato, Negromante e Avventuriero,"⁸ shares some of the strengths and weaknesses of Calder's account of the angelic conversations. Like Calder, his account is meticulously descriptive, but utterly unsympathetic to the nature and objectives of Dee's dealings with the angels. While he rightly sees Dee's career as a "particularly revealing document of the beliefs, aspirations and culture of the sixteenth century,"⁹ his anachronistic depreciation of the values underlying Dee's practices are an insurmountable obstacle to the historical recovery of the milieu which he claims to be investigating, and prevents a proper historical appreciation of their culturally representative character. Like many subsequent commentators, Firpo becomes too embroiled in uncovering the "dissimulation" of Kelley, or the "credulity" of Dee, ignoring the very real opportunity which the conversations offer to explore the *mentalités* or cultural formations which made the deception possible (and credible) in the first place. Thus, while he notes that Dee's motives were "sustained by an exalted conception of his own intelligence and by a profound religious spirit [...] and the certainty of God's special favour towards him,"¹⁰ these motives are not investigated but disprized. Dee is principally criticised for his failure to unequivocally embrace "scientific" principles (a modern category which would have been incomprehensible in Dee's time). He is accused, for example, of having "no understanding of the infinite humility and patience which experimental researchers have to submit to in order to attain – at the cost of tedious labour – small provisional and partial truths", instead he sought a "quick, infallible way to ascend to a total knowledge, which coincided with man's limitless power over nature". This was, in Firpo's view, simply "the sin of impatient pride, reducing natural philosophy to occultism."¹¹ This prejudice is the undercurrent of Firpo's whole account, and prevents any serious attempt to assess or understand Dee's practices. He scoffs at Dee's "prolix" prophetic discourse, and belittles his "verbose and vacuous" orations to God, and his "fastidious rituals".¹² He speaks of Dee's "fraudulent 'mysteries'"¹³ and his "inspired and histrionic expressions."¹⁴ While he meticulously records the events of Dee's career, Firpo is ultimately unable to disguise his contempt for the proceedings as a whole:

The supposed revelations of the future turned out to be completely false, they are full of geographical and scientific errors, with ungrammatical Latin, used sparingly, because the angels preferred to speak in English [...]. The angelic style was a trivial parody of Biblical language, with frequent and obvious borrowings of scriptural phrases. In some séances [...] the invisible spirits spoke a meaningless language, claiming that they spoke the language used by Adam before the fall. In conclusion, the learning which is reflected in the pseudo-revelations is the patched-together, defective and imperfect learning of Kelley, and it is always the urgent, material (and sometimes shameful) interests of Kelley which the angels endeavour to safeguard.¹⁵

Firpo shows no ability to understand that Dee's practices might have been viewed as legitimate in their own historical context, and in the final analysis he represents Dee as a "fractured personality" whose work in mathematics, geography and astronomy were "suddenly eclipsed and extinguished by a blind superstitious infatuation".¹⁶ Thus, while Firpo rehearses the historical and biographical facts concerning the angelic actions, he does nothing to explain or elucidate the conversations as a cultural or intellectual formation.

The most influential (though not necessarily the best documented) account of Dee's conversations has probably been that of Calder's research supervisor, and exponent of the "Hermetic Tradition," Frances Yates. In her study of "Elizabethan Neoplatonism", *The Occult Philosophy of the Elizabethan Age*, Yates argued that Dee's angelic conversations were largely based on Agrippa's *De occulta philosophia*, which she claimed was Dee's "main guide in such operations."¹⁷ This view no doubt emerged from her earlier characterization of Dee as participating in "that powerful stream of influence, descending from Marsilio Ficino and Pico della Mirandola, in which the so-called Renaissance Neoplatonism is strongly imbued with Hermetic and Kabbalist elements." In her view, Dee's philosophy represented "a delayed infiltration into England of the Hermetic tradition."¹⁸ As Agrippa had formed an important part of her initial formulation of the "Hermetic Tradition,"¹⁹ the identification of Agrippa subordinates Dee's magical practices to her vision of an essentially Hermetic and Christian Cabalist "Elizabethan occult Philosophy". Yates's account, however, makes no attempt to describe or analyse what she calls his "sensational angel-summoning," and she does not quote a single word of the angelic materials, concentrating instead on the "Christian Cabalist" elements of the *Monas Hieroglyphica*. Peter French (another of Yates's students), whose *John Dee, The World of an Elizabethan Magus* (1972) has exerted a powerful influence over many later accounts of Dee, followed Yates's lead in seeing the angelic conversations as primarily Hermetic. Although he notes the importance of prayer in Dee's dealings with the angels, and briefly acknowledges the existence of mediaeval precedents,²⁰ in deference to Yates's account of the "Hermetic Tradition" he prefers to shift the focus on to comparisons with later thinkers. Thus Dee's "intense inner piety" is seen as comparable to that of Agrippa and Bruno, and Dee's overall project is characterized as Hermetic:

Dee must be classed with such unorthodox religious thinkers as Pico, Agrippa and Giordano Bruno. Bruno died as a Heretic after trying to get to the roots of all religion by embracing the magical Hermetic religion of the world in its most extreme Egyptian form as outlined in the Asclepius. Bruno thought that the revival of true Egyptian religion offered a means of reuniting Christendom, and John Dee's attempts at religious magic reveal a similar concern.²¹

Christopher Whitby, in a 1981 PhD thesis,²² whilst deferring to Calder, French and Yates's accounts of Dee's intellectual affiliations,²³ worked more extensively on the angelic materials than any of his predecessors, and provided some critical new contextual evidence on the question of Dee's angelic practices – focussing particularly on the art of “scrying,” or catoptromancy and crystallogomancy. Thus while he initially accepts that “the greatest influences upon Dee and Kelley appear to have been Agrippa and Reuchlin,”²⁴ he goes on to observe that Dee's actions “differed in method from the daemonic magic catalogued by Agrippa.”²⁵ The use of the “shew-stone”, he argued, were not consistent with an “intellectual” neoplatonic magic, but belonged to a “popular tradition of magic” which “had changed little since the Middle Ages.”²⁶ Looking at mediaeval accounts of scrying and sixteenth and seventeenth century accounts of the practice by Martín Del Río and Jules César Boulenger, and accounts of English trials, Whitby shows that a substantial part of Dee's practices owed more to popular mediaeval magic than to Hermetic and Neoplatonic precedents.²⁷ “Despite Dee's acceptance and propagation of the doctrines of natural magic,” Whitby concluded, “the art of scrying which he practised was not based upon any tradition of natural magic nor upon a mathematical conception of the universe.”²⁸ In his 1985 article on “Renaissance scrying” he put it even more forcefully: “[Dee was a] practitioner, virtually up to his dying day, of a form of magic that seems to have no connection with Hermeticism and the intellectual tradition.”²⁹ While Whitby's work at recovering the early modern art of scrying marked a substantial advance in understanding the context from which Dee's angelic conversations sprang, in the final analysis he attributes the ceremonial side of Dee's actions – the “seals, talismans, combinations of letters, numbers, divine names and ritual invocations” – to Agrippan influence,³⁰ ignoring their common roots in the practices of mediaeval theurgy.³¹

Wayne Shumaker in his 1982 essay on “John Dee's Conversations with Angels,” embraces both French's characterisation of Dee as “Elizabethan magus,” and Calder's idea of Dee as “neoplatonic sage” despite the fact that Calder himself was unable to render the conversations intelligible in terms of his model.³² Shumaker is quite vague about the details of Dee's angelic practices. Using an approximately contemporary typology of magic drawn from Giordano Bruno's *De magia*, Shumaker saw Dee as a mixture of the various categories, including divination and “the veneration or invocation (*cultus seu invocatio*) of angels by prayers, consecrations and other ceremonies.”³³ While, like Calder, he acknowledges that belief in Spirits was “by no means peculiar to Dee,”³⁴ and that his religious motivations were not untypical amongst pious individuals of the period,³⁵ Shumaker also places an unhelpful emphasis on what he calls the “comical insanity” or “weirdness” of the angelic revelations,³⁶ and despite his evocation of contemporary categories of explanation, like Firpo he allows his impatience with the “unreliable prophecies”³⁷ to interfere with his historical account of Dee's thought. Although he has an avowed interest in the occult sciences, and stresses the fact that the conversations “deserve attention because they absorbed much time and energy,”³⁸ he is unable to assess the motivations behind them: “nowhere in the large book are we struck by observations that look forward to later discoveries or are even insightful”, he says, “Not much is learned, and little usefulness can be perceived in it.”³⁹ Shumaker allows his belief that the occult sciences are an anticipation of modern science to interfere with his assessment of the conversations,⁴⁰ and his main

criticism is that (regardless of what Dee himself might have believed) the conversations are “not a disciplined and responsible understanding of the physical universe,” and that “the information of the kind obtained by Dee in the séances could [n]ever, no matter how copiously elaborated, add up to ‘science’.”⁴¹ Concurring with Firpo’s “decisively negative judgement” of “the whole later part” of Dee’s career, Shumaker ends by consigning Dee to the historical scrap-heap of psychologism. Dee’s story, he says, “is full of interest for readers who are bemused by psychological curiosities as well as by the possible varieties of intellectual organization.”⁴² But it is precisely the “varieties of intellectual organization” which are lost in Shumaker’s approach, which insists on evaluating the worth of activities with historically alien modes of explanation. By foregrounding Dee’s “personality”, “gullibility” and “credulity”, Shumaker leaves Dee’s “intellectual orientation [...] [and] occultist assumptions” unexamined.⁴³

A far more historically imaginative account of the conversations is rendered in Nicholas Clulee’s *John Dee’s Natural Philosophy* (1988). Although Clulee distinguishes the angelic conversations from what he calls Dee’s “*significant* work in natural philosophy and science,”⁴⁴ his account represents one of the most informed and sympathetic attempts to understand Dee’s actions, and he makes a number of illuminating observations about the nature of the practices involved which form the starting point for my investigations here. Clulee’s argument begins by suggesting (like Shumaker) that Dee’s conversations “cannot be considered as science or natural philosophy in its own right,” albeit there are “elements that reflect Dee’s concerns in natural philosophy.” Although he begins by suggesting that Dee’s actions are “a kind of spirit magic,”⁴⁵ he sees these practices as anomalous within the occult tradition of Renaissance magic,⁴⁶ and goes on to suggest that “Dee did not consider these actions a type of magic but as a variety of religious experience.”⁴⁷ Dee’s angelic manuscripts, he argues, are a record of “what he thought were divine revelations through the angels and not a kind of magic”.⁴⁸ While I agree that “magic” might be an inappropriate way of defining Dee’s practices, I do not subscribe to Clulee’s belief that the conversations are essentially *passive* or *petitionary*. “The practice of the actions”, Clulee says, “takes place in the simple religious atmosphere of Dee’s oratory following a period of silent prayer [...]. There is no element of invoking angels and compelling their services.” Neither are there “elaborate ritual preparations, quasi-sacramental ceremonies, or incantations”, familiar from Agrippa’s magical practices.⁴⁹ “Dee’s objective”, he concludes “is not the attraction of beneficial influences or the invocation and manipulation of spirits for specific purposes; rather it is to learn and follow God’s will”.⁵⁰ Clulee sees Dee’s conversations as speculative (or contemplative) rather than operative, a form of experience rather than a form of agency. It is precisely on this issue that I disagree with Clulee’s treatment of the conversations, which are – above all – *practices*. That is to say, attempts at acting upon, and manipulating the world (both natural and political) through supernatural means. While I believe he is right to direct us back to religious contexts, I think Dee’s conversations prompt a re-assessment of the boundaries between the agentive and the experiential in devotional practices, and rather than being anomalous in the magical tradition are in fact directly descended from the religious practices of mediaeval theurgy.⁵¹

In her 1996 article, “Shews in the Shewstone,” Deborah Harkness sets out to examine the conversations “as cultural artefacts deeply immersed in their own time,” in need of “relevant cultural and intellectual contexts” in order for them to become legible to modern readers.⁵² “To the modern mind”, she says, Dee’s conversations appear “to be a confused jumble of strong, though mysterious images conveyed by a flat narrative that moves through a series of circumscribed actions.” “But how,” she asks, “would it have appeared to its participants?”⁵³ Although I have some reservations about Harkness’s claims that the crystallomantic aspects of Dee’s conversations are directly connected to his interest in the mediaeval radiation theories of Robert Grosseteste and Roger Bacon, and that this differentiates his spiritual exercises from other sixteenth-century practices of this kind,⁵⁴ her emphasis on the conversations as “multi-dimensional dramatic events,” in which Dee found “symbolic confirmation that his work was of great importance”⁵⁵ is a sophisticated advance on previous attempts at characterising these practices, where the dialogic and performative nature of the conversations have been ignored, or dismissed. In her 1999 book, *John Dee’s Conversations with Angels: Cabala, Alchemy and the End of the World*, as I have already indicated, Harkness develops some of the ideas of her “Shewstone” article into a rich, detailed and sympathetic account of the conversations as a phenomenon. In her book-length study she presents a cogent and well-argued case for seeing Dee’s angelic conversations as continuous with the natural philosophical and alchemical interests of Dee’s earlier career, and shows how his library formed an important intellectual resource for his work of recording (and understanding) angelic revelations.⁵⁶ Where my treatment differs from that of Harkness – as will become clear – is on the question of the extent to which Dee was indebted to mediaeval magical practices.⁵⁷

Despite the advances made by Whitby, Clulee and Harkness, in their contextualization of Dee’s scrying practices, the “Yates thesis” still exerts a considerable influence over intellectual historians, and while there have been critical qualifications of her characterization of the “occult philosophical tradition,”⁵⁸ there has been little progress in assessing the vital continuities between mediaeval and Renaissance magical traditions, so evident from even a cursory examination of the major European archives. In order to achieve a fuller understanding of early modern magic we need to expose some of the rhetorically compelling presuppositions of Yates’s history of magic and critically re-assess their validity. At the heart of Yates’s account of the “Hermetic Tradition” is her characterization of the “barbarous” mediaeval magical traditions being superseded and reformed by the “learned” neoplatonic or Cabalist traditions of the Renaissance. In this Burckhardian narrative of the civilizing force of Renaissance culture triumphing over narrow mediaevalism, Yates consistently underestimates the continuity and persistence of mediaeval magical practices and techniques in early-modern magic. In her influential *Giordano Bruno and the Hermetic Tradition*, for example, Yates simultaneously acknowledges and dismisses the similarities between mediaeval and Renaissance magical practices:

There was also a type of mediaeval magic which used names of angels, names of God in Hebrew and curious magical arrangements of letters and diagrams. Magicians ascribed such magics as these to Moses, and more particularly to Solomon, and one of the most characteristic text books of this type of magic was the work known as the *Clavis Salomonis* which was widely circulated surreptitiously in variant forms. It is probably of this type of work that Pico is thinking when he says that his practical Cabala has nothing to do

with wicked magics going under the name of Solomon, Moses, Enoch, or Adam, by which demons were conjured by bad magicians. When seen in the context of the lofty philosophical mysticism of Cabala and from the stand-point of some real knowledge of the Hebrew alphabet, those old magics were seen to be not only wicked, but also ignorant and barbarous. They are replaced by practical Cabala, the learned Hebrew magic which takes its place beside the learned Neoplatonic magic as one of the two disciplines which together make up the Renaissance Magus.⁵⁹

Comparing the “extraordinary change in the status of the magician” to the “change in status of the artist from the mere mechanic of the Middle Ages to the learned and refined companion of princes of the Renaissance,” she vividly dichotomises the two magical traditions:

Who could recognise the necromancer studying his *Picatrix* in secret in the elegant Ficino with his infinitely refined use of sympathies, his classical incantations, his elaborately Neoplatonised talismans? Who could recognise the conjuror, using the barbarous techniques of some *Clavis Salomonis*, in the mystical Pico, lost in the religious ecstasies of Kabbalah, drawing archangels to his side?⁶⁰

Although immediately after this she talks of a “kind of continuity” between mediaeval and Renaissance magic, the rhetorical force of her presentation sweeps aside the possibility that these continuities might have a constitutive function in Renaissance magic. Moving briskly through a sketch of the “mingling” of “pagan and Jewish sources” in the early mediaeval period, she emphasises the recourse of Renaissance magic and Cabala to the “Hermetism, or pagan gnosticism,” which preceded them, characterising “Renaissance Magia and its Kabbalah” as “reformed revivals of magics ultimately derivable from [ancient] pagan and Jewish gnosticism.”⁶¹ Yates suggests a filiation for Renaissance magic which stresses the continuity of the “learned” Hermetic tradition which she was establishing, and ignores the assimilation of mediaeval traditions. Thus she says “Through Reuchlin, Pico’s kabbalist magic leads straight on to the angel magic of Trithemius or of Cornelius Agrippa, though these magicians were to work it in a more crudely operative spirit than the pious and contemplative Pico.”⁶² If one examines the canonical texts of Yates’s renaissance magic, a different picture emerges (as Yates perhaps involuntarily registers in her uneasy reference to the “more crudely operative spirit” of Agrippa). Ficino’s *De vita triplici*, for example, makes repeated references to mediaeval magical sources, particularly to those of “the Arabic fraternity,” (*in quodam Arabum collegio*) such as Al-Kindi and Thebit ben Corath, alongside Neoplatonic authorities such as Plotinus, Porphyry and Iamblichus,⁶³ while Johannes Trithemius, the “learned abbot” singled out by Yates as a vital influence on the “Cabalist magic” of Cornelius Agrippa (and thus a representative of the “new elegant magic”),⁶⁴ drew almost exclusively on mediaeval sources in his *Steganographia*.⁶⁵ Yates’s basic argument that “mediaeval magic was reformed and superseded in the Renaissance by the new style philosophic magic,”⁶⁶ needs serious re-assessment, and the persistence of mediaeval magical traditions and their manuscript transmission in the Renaissance need to be seriously investigated. Nicholas Clulee acknowledges the necessity of these kinds of investigation in his book on Dee’s “natural philosophy”:

Although it has become a convention of Renaissance scholarship that magic assumed a considerably enhanced intellectual status in the fifteenth and sixteenth centuries, the process of assimilating and accommodating the magical heritage of late antiquity began in the Middle ages.⁶⁷

Clulee rightly emphasises the need for looking more closely at the Renaissance re-appropriation and transformation of mediaeval science and magic, and in the case of John Dee, the results are particularly instructive. Rather than seeing Renaissance magic as “superseding” mediaeval magic, we might consider how the new philosophical influences were absorbed into the pre-existing forms of mediaeval magic. Although Yates saw the advent of the Hermetic tradition as a privileged moment in the parallel histories of religion and magic,⁶⁸ it was precisely the fact that Renaissance practitioners did not see mediaeval magic as “barbarous” or “dirty” which enabled it to persist into the seventeenth century and beyond.⁶⁹ When Johann Wier attacks these kinds of magic in the middle years of the sixteenth century, his critique involuntarily reveals some of the reasons for its continued survival. “Theologians and physicians,” Wier argued, should:

strive by every effort to banish this most pernicious and deceitful art far from the sacred rites of our Religion and drive it wholly away from the camp of divine Medicine, since it has befouled both disciplines with its specious exorcisms, its barbarous invocations, its litany of unknown names, its abuse of the Sacred Word, and its amulets, peripats and charms.⁷⁰

It is precisely the *comfortable co-existence* of magic with the “sacred rites” of Christianity, the co-optation or adaptation of devotional practices, which Wier is attacking. Comparing the spurious attributions of mediaeval magical arts to patriarchs and saints to the apocryphal pseudo-Gospels attacked by Jerome and Augustine,⁷¹ he objects to what he sees as the profane appropriation of Christian rites in mediaeval magic. The magicians are “architects of abomination” who have “fabricated these books from certain pagan observations, with ceremonies of our own religion designedly mixed in – the better to deceive, as though from ambush.”⁷² He objects to what he calls the “misuse” of sacred scriptures and prayer in these arts: “if any verse from Psalms or any other section of Sacred Scripture is thought apposite for [the] desired purpose, it is mixed in with the [magical] prayers.” He also condemns the “invocation of good spirits,” in which, “after much ranting and raving, Psalm 119 “Blessed are the undefiled in the way” is recited on bended knee, along with the divine names of the angels.”⁷³ But while Wier condemns these “blasphemous prayers to God” as an abuse, it seems clear that it was precisely the religiosity and piety of these practices (and their continuities with more “orthodox” forms of devotion) which ensured their survival. The legitimacy of mediaeval theurgy was endorsed by the continued validity of the religious structures of experience upon which they were based, and while some religious practitioners (such as Wier in Germany, or William Perkins in England) energetically sought to inscribe “magic” outside of the legitimate domains of religious praxis, the possibility of construing theurgy as a legitimate form of devotion remained open. It is precisely the intricate relationship between the fields we now define as “religion” and “magic”, and the boundaries between them, which cause the most difficulty for modern commentators. In his influential 1958 study, *Spiritual and Demonic Magic*, D.P. Walker suggested that there were real disciplinary problems in accounting for Renaissance magic as an intellectual or practical activity because magic was often “on the point of turning into art, science, practical psychology, or, above all, religion,” because there was a “real overlapping of the fields of all these activities” in the Renaissance.⁷⁴ While this is substantially true, it seems likely that the “overlapping” (and the definitional distinctness of the “fields”) is

more a product of our anachronistic inability to account for the uniqueness of Renaissance intellectual, practical and cultural formations, than a real characteristic of those formations. Did Renaissance practitioners experience their activities in terms of “overlapping fields,” or procedural hybridity, or did they view them as integrated practices?

This brings me to my own characterisation of Dee’s angelic conversations, in which, as far as possible, I shall attempt to reconstruct the ways in which Dee perceived and defined his own activities. It is with this objective in mind that I shall begin with an interrogation of some of the terms which Dee used to describe his practices, before going on to consider the extent of his reliance on the theurgical tradition. It is worth bearing in mind, given Clulee’s characterisation of Dee’s conversations as “a variety of religious experience”, that Dee himself tended to use a religious and devotional vocabulary when discussing his activities. At various points Dee refers to his dealings with the angels as “exercises” or “actions” (or uses the Latin “*actio*”). He refers to his “mysticall exercises,”⁷⁵ or to the “Exercise HEPTARCHICAL.”⁷⁶ The word “exercise” (and the Latin “*exercitium*”) designated a wide range of devotional practices, including acts of preaching or prophesying, or other forms of public and private worship.⁷⁷ Archbishop Whitgift, for example, referred to “exercises” as “praying, singing of psalms, interpreting and prophesying,”⁷⁸ and Dee himself refers to the inspired Biblical interpretation of the puritan Roger Edwardes as “spiritual exercises.”⁷⁹ Even more frequently he talks of each particular session of angelic colloquy as an “Action,”⁸⁰ and refers to one of his sessions with the scribe Barnabas Saul as “Actio Saulina.”⁸¹ The words “Action” and “Actio”, besides their judicial and theatrical usages, had a particular set of ecclesiastical meanings in the mediaeval and Renaissance period. In Cicero and Quintilian “*actio*” designated an oratorical act or utterance or its accompanying physical gestures,⁸² and this rhetorical usage carried over into ecclesiastical Latin to designate liturgical orations, sung or spoken masses, benedictions, and prayers and orations.⁸³ The related verbal noun “*actio*” meant to discuss, to transact, or to enact,⁸⁴ and Dee’s “conversations” seem to invoke all of these overlapping senses at various times. Dee’s designation of his records of his angelic colloquies of 1581-3 as the *Liber Mysteriorum*, or “Book of Mysteries”, continues the religious orientation implied by exercise and action. “Mystery” or “Mysterium,” although originally applied by Church fathers such as Eusebius and Clement of Alexandria to refer to the religious secrets of the pagans, was gradually appropriated in the middle ages to designate eschatological or providential mysteries, revelations, sacred teachings, scriptural truths (especially allegorical or anagogical meanings), and ecclesiastical rites and ceremonies, such as the mass and the Eucharist.⁸⁵ Dee talks about his angelic transactions as “the HEPTARCHICAL Mysterie” or “the whole Heptarchicall Reuelation,” and refers to “these revealed mysteries,”⁸⁶ and it is clear from the many and varied acts of prophetic self-fashioning,⁸⁷ that Dee saw his angelic dealings as a prophetic dispensation, a “special gift” or extraordinary election or grace from God granting him “mercifull cumfort and instruction, through the ministry of his holy and myghty Angels.”⁸⁸ But this “Comfortable Instruction,” as the continual stress on “heptarchy” (or “rule by sevens”)⁸⁹ as the basis of an “art” suggests, is conceived by Dee as a praxis or instrumental discipline as well as a divine revelation. The heptarchical revelation is presented to him as a “booke of [...] secrets” which is also a “key of this world,”⁹⁰ and

the angels promise not only understanding but “use”. The angel Carmara assures Dee that the “gouvernement of the [angelic] Princes,” which is being revealed to him is both “a Mystery to a farder matter,” and “a purpose to a present vse,” – “Thow desyrest vse, I teache use,” Carmara tells him, revealing that the “Art is to the farder Vnderstanding of all Sciences, that are past, present or [...] yet to com[m]e.”⁹¹ A similar ambiguity underlies Dee’s presentation of the occult secrets of the *Monas Hieroglyphica*, which are seen as “Mysteria,” (*Mysteria*)⁹² and refers to his art in terms of a revelation or “Mystagogy” (*Mystagogiam*),⁹³ but also relates it to occult practices or instrumental arts such as alchemy, referring to his teaching as “a kind of adeptship” (*ADEPTIVO genere*),⁹⁴ or even a “mechanical magic” (*Mechanica nostra [...] Magia*).⁹⁵ Dee never uses the word “magic” when referring to his dealings with the angels, and given his persistent self-definition of his practices in terms of religious exercise, it would seem that we need to re-position Dee’s heptarchical art within his own sense of Christian profession or devotional practice. In a letter to William Cecil in 1574, defending his interests in practical arts based on “vision” or “iterated dreames,” Dee asserted that it was his conviction that he should “do nothing, but that, which may stand with the profession of a true Christian,”⁹⁶ and in his correspondence with the puritan Roger Edwardes insisted on the “other Christian allowable means of discussing and deciphering the manifold mysteries, by the holy Spirit deliuered and left to our instruction,” than simple biblical interpretation.⁹⁷ It is clear that for Dee Christian “profession” entailed a variety of “allowable means,” which could encompass both prophetic-visionary and practical-instrumental activities.⁹⁸ The heptarchical art was essentially an act of prophecy which encompassed a set of operative and instrumental desires, it is an “art” as well as a “reuelation”, a “purpose to a present vse” in the natural world as well as a religious “exercise”. As a specific intellectual and practical formation, then, Dee’s angelic conversations are characterised by an inextricable co-involvement of what we think of as the separate spheres of “orthodox” religious practices and a set of instrumental desires. The inseparability of these apparently separate spheres or domains in Dee’s art suggest that we should try to conceptualise it as a form of operative practice which has its constitutive roots in religious forms, as a development or expansion of “allowable means”. Such “expanded” religious techniques were not a recent innovation in sixteenth-century England, and I would suggest that the procedures and practices which constituted Dee’s “exercises” closely adhere to the forms and techniques of mediaeval theurgy, in which the boundaries of devotional practice and operative desire are similarly ill-defined. Pseudo-Solomonic theurgy was itself a premonitory “mysticall exercise” (viewed by its practitioners as “an inestimable sacrament” and “great mistery”)⁹⁹ which stressed its continuities with devotional practices, and played a vital, albeit neglected role in shaping many operative “arts” or practices which we have come to think of as Renaissance “magic”.

2. “ISTIUS SACRATISSIMAE ARTIS VEL OPERACIONIS”: THE PSEUDO-SOLOMONIC TRADITION

One of the principal reasons for the omission of the *ars notoria* from earlier accounts of Renaissance magic is undoubtedly the fact that it was primarily a manuscript phenomenon. In the early-modern period, the only printed version of this magical

tradition I have been able to find was a translation by Robert Turner in 1657.¹⁰⁰ The large number of surviving manuscripts (many of them dating from the sixteenth and seventeenth centuries), shows, however, that this lack of printed editions by no means reflects a lack of interest in this tradition on the part of Renaissance scholars. I would suggest, however, that John Dee's own theurgic practices were shaped at every level by a knowledge of the Pseudo-Solomonic tradition, rather than by what Yates calls the "Occult" or "Hermetic" Philosophy of Neoplatonic magic. Nicholas Clulee has already shown the central importance of the mediaeval inheritance for characterizing Dee's occult scientific outlook.¹⁰¹ I propose to show that mediaeval theurgy was an equally important component of his "spirit actions". I shall begin with an outline of the practices described in some of the surviving Pseudo-Solomonic manuscripts, before going on to compare them to the magical practices of Dee's *Liber Mysteriorum* and related manuscript records of his angelic conversations in Europe.

The tradition of Pseudo-Solomonic theurgy includes a number of closely related texts, variously known as the *Liber Sacer*, the *Flos aureos*, the *Liber Virtutis*, the *Liber Sefer Raziel*, the *Ars Notoria*, and the *Clavis Salomonis*. Although there is some variation in the practices described in these texts, there is a common core of attributes. All of them claim to pass on techniques and mysteries which had originally been revealed to King Solomon through a ministering angel sent to him by God. The various practices promise the practitioner or operator a means of attaining a vast knowledge and power by mediate or immediate revelation. This revelation is attained through a mixture of ceremonial ascetic preparation, prayers and orations (including the use of a mystical language, unhelpfully described by Lynn Thorndike as "gibberish"),¹⁰² and the use of a variety of talismanic instruments, including "shew-stones", carved rings, tables, angelic "seals", pentagonal, quadrangular and other elaborately inscribed diagrams.

The Pseudo-Solomonic texts are particularly insistent on the need for ascetic regimen – the *regimen animarum* which Gregory had bequeathed to the middle ages as the *ars artium*¹⁰³ – with its attendant mortifying corporeal practices. The practitioner must be "well confessed, and fast on bread and water for three days, and he must not eat until all the stars are in the sky [...] and give alms to the poor".¹⁰⁴ He must "fast during the days which he looks upon the diagrams".¹⁰⁵ He must only call on the angels and God "after having acquired the grace of God" by "good works, confession, fasting [and] chastity".¹⁰⁶ He must be "pure and unpolluted, and make his devotions disingenuously, neither eating nor drinking".¹⁰⁷ He must be "very penitent and trewly confessed of all his sinnes, he must vtterly forbere *the* company of women and all there intycements, in so much *that* he may nott looke upon them [...] [nor] kepe no company *with* wicked or sinfull men [...] [and] lett not his apparryll be filthe but rather new, or elles very cleane waschyd."¹⁰⁸ Some of the texts also call for purifying suffumigations with amber, musk, aloe, mastick, thyme, myrrh, balsam, and other herbs or spices,¹⁰⁹ and the use of pure materials such as "virgin parchemyn[t]" of "silke or [...] parchemyn[t] of a lambe or of a kidde virgin or of a [...] fawne virgin" or ink made from "cleane galls & [...] good white wine."¹¹⁰ The seventeenth-century physician Arthur Gauntlett of Grays Inn Lane, records two schedules of "Instructions" for operators, attributed to St Cyprian and Ptolemy, which draw on these precepts, which include the injunction to "cleane thy Hands and feete before the sight of the

Signes and Characters of Salomon”, and cleaning “thy hands and face and par[ing] [...] thy nailes both of Hands and feete”.¹¹¹

The texts also specify that the practice must be undertaken in a secret, private and purified place: “a secret place, such as in a church, a private courtyard, or a garden”,¹¹² “an house or a cleane place made cleane well with beesomes & washen & watred & suffumed.”¹¹³ One must “do ne saye with thys booke in none vncleane place [...] but fastinge earlye in hollye ether priuie place; as with greate devotion kneelynge in holly churche, ether in thy chambre priuyle.”¹¹⁴ The operator must be “alone [...] unless he is a master of the art who is giving instructions in the operation”.¹¹⁵ It must be a “secret room, clean, pure and free from cobwebs and dust, secure – only you shall sleep there, it shall be neatly bolted, and contain a small table like an altar covered with clean linen, and a candelabra on it with two candles which have been blessed burning on it for purification.”¹¹⁶

The *ars notoria* is also heavily indebted to mediaeval astrology – the earliest texts (and some of the later exemplars) stress its astrological basis. A thirteenth-century manuscript of the *Flores aureos*, for example, sees the *ars notoria* as one of the “liberal arts” (*Artium [...] liberalium*) for the attainment of knowledge and learning in all the sciences (*eruditionem et cognitionem omnium scientiarum*), based on “the understanding of astronomy or astrology” (*de cognitione astronomiae siue astrologiae*).¹¹⁷ A late fifteenth-century text of the *Sefer Raziel* suggests that “The key of this booke is to knowe & wile the places of the 7 [planetary] bodies aboue & their natures”.¹¹⁸ Many of the practices thus include stipulations as to the time of practice, especially in relation to the lunar calendar,¹¹⁹ and involve angelic spirits identified with planetary bodies.¹²⁰ Many of the texts also stipulate that the practitioner must face eastwards, sometimes on his knees or prostrate.¹²¹

Having made these elaborate preparations, the operator then undertakes a series of orations and prayers. These include conventional precatory genres, such as the seven penitential psalms, and Sabbath orations,¹²² hymns to the Virgin Mary,¹²³ or liturgical texts,¹²⁴ but also prayers and orations which are fashioned specifically as *petitions for revealed knowledge* or for *the fulfilment of particular desires*, which are texts in Latin combined with “mistica verba sanctaru[m] orationu[m] et [...] nomina sanctoru[m] angeloru[m]”¹²⁵ which are variously seen as a primordial Adamic language, or ur-Hebrew, or Chaldee,¹²⁶ although to the modern reader many of the words seem to be corruptions of Greek, Hebrew and Arabic words for God, divine attributes, angels or virtues. To give you an example of this, at the same time as illustrating the textual continuity of the *ars notoria* manuscript tradition, I have chosen two virtually identical passages from a Pseudo-Solomonic oration, the first from a thirteenth-century and the second from a late-sixteenth or early seventeenth-century manuscript:

angeli sancti diuini dei quos eligit ad intellectem hominibus ad augendum qui dei estis
arcangeli propter potestatem sanctorum dei. Potestas angelorum deus virtutes eorum
Geloc Gesomoloc monepimar. anainemom. zemaloi.¹²⁷

Angeli sancti Dei viui, quos eligit ad intellectum hominibus ad augendum; dum estis
archangeli propter potestates angelorum sanctorum et virtutes eorum, Heloy,
Gessemolyc, Nepaymo, primai, Hauenos, Zamalay.¹²⁸

Although there is pronounced evidence of textual corruption (or adaptation and reinvention) at work here, both in the Latin and in the “mystical names,” we can still see strong resemblances between the two orations.

The action-specific prayers and precatory orations which intersperse these “magical orations” can be classified into various kinds of precatory themes. The most important are 1) Protestations of humility and righteousness, (or *legitimizing* clauses),¹²⁹ 2) Vehement requests for revealed knowledge or fulfilled desires (or *desiderative* clauses),¹³⁰ 3) Requests for protection from evil incursions, especially from evil spirits or demons (i.e. *protective* clauses),¹³¹ 4) Pleas for aid or help (i.e. *auxiliary* clauses),¹³² 5) Insistence on divine rather than human agency in the subsequent actions (i.e. *mediatory* clauses).¹³³ Obviously there is a degree of overlap here with the themes and clauses of conventional precatory genres, and I feel that the operative dimensions of traditional prayer need more careful consideration as a structural prehistory of Christian theurgy.¹³⁴

The “holy mystical characters” used in the magical orations include the names or “seals of angels”, the “signs” of planetary spirits, and also the “names of god” (*nomina dei*) or *semaphoras* (*schemphoras*, *sememphoras*, *semoforax*),¹³⁵ which are presumably drawn from contemporary mediaeval Jewish mystical texts. A late fifteenth-century manuscript of the *Liber Raziel*, for example, includes seven *semophoras*, “written in the book of life” (*scriptum in lib[er] vitae*),¹³⁶ the “seven keys of the world”,¹³⁷ which are the “lettres & words and names [...] which god the Creator gaue to Adam in paradise”, including *yana* the “semofor in which the creator formed Adam in [...] paradise” and “*yeferaye*”, a word given to Adam when he “spake with the Angell”.¹³⁸ The utterance of these “semofors” (or *semaphoras*) allows mortals to speak with angels, and grants them operative powers.¹³⁹ The arts also include a variety of talismanic instruments, “tables”, “figures”, “rings”, “seales”, etc, the most important of which was an elaborate series of interlocking polygons decorated with letters known as the *nota* or *sigillum dei*.¹⁴⁰

The practice of Pseudo-Solomonic magic, then, appears to have involved the burning of suffumigations, the pronunciation of the orations, prayers and magical names of God and his angels, and the contemplation, or “inspection” of the talismans or “figures”, and sometimes the use of “stones”, “glasses”, or “crystals”.¹⁴¹ What was it that the magical operators hoped to achieve using these techniques? This varies slightly according to the particular Pseudo-Solomonic text, but can be divided between the attainment of revealed knowledge, and the attainment of magical operative powers. The *ars notoria* in particular, was presented – like contemporary Lullist arts or magical *ars memorativa* – as a means of magically attaining proficiency in the liberal arts in an unusually short time.¹⁴² By “inspecting” (rather than *reading*)¹⁴³ a variety of diagrams inscribed with orations, together with magical prayers, knowledge of the various arts would be infused directly into the heart of the practitioner by the angels.¹⁴⁴ He would possess, acquire and retain in the memory of the arts he desired to master.¹⁴⁵ Thus the *ars notoria* included a series of discipline-specific “figures” – for grammar, dialectic, rhetoric, music, physics, arithmetic and astronomy.¹⁴⁶ The art culminates in a figure of “general science”, an art of arts, which

would include knowledge of all subordinate disciplines.¹⁴⁷ This encyclopaedic ability to “obtainne all syences”, is augmented in other Pseudo-Solomonic texts to include a variety of divinatory and operative powers, potentially unlimited in scope. They can include the ability to “know all thinges present past and to come”, to “alter or chaunge the influence of the planettes and sterres”, to attain “Knoledge off the nature of man and of all his dyedes and his thoughtes”, or “to distroy a kingdome or an empire”.¹⁴⁸

Having outlined the techniques and intentions of the Pseudo-Solomonic magical practitioners, let us now turn back to John Dee’s angelic conversations. What, if any, are the shared characteristics of Pseudo-Solomonic theurgy and Dee’s “heptarchicall art”? First of all, we should note a number of explicit references to Solomon in the *Liber Mysteriorum*. Dee is told by the angel Uriel, for example, that “As truely as I was with Salomon, so truely I be with the[e]”,¹⁴⁹ while one of the angelic “Princes”, Befafes, also claims: “I was with Salomon; [and] was also (vnknown) with Scotus [i.e. Michael Scot].”¹⁵⁰ Dee is also presented with a vision of “a Ring of Gold: with a seale graued in it,” which “was neuer reuealed since the death of Salomon [...] wherewith all Miracles, and diuine works and wonders were wrowght by Salomon.”¹⁵¹ Despite the fact that Dee relates this seal to a printed reference in Reuchlin’s *De Verbo Mirifico*,¹⁵² we should also be conscious of a considerable mediaeval manuscript literature on Solomon’s rings – the *De quatuor annulis* – from which this type of “seal” is ultimately derived.¹⁵³ Dee’s art also imitates the ritual preparations of the Pseudo-Solomonic tradition, including its prescriptions regarding bodily hygiene, diet, and spatial seclusion: “Thow must prepare thy self, to prayer and fasting”, he is instructed, “In all thy doings be Secret: and in all thy doings praying, tyll thow hast thy desyre.”¹⁵⁴ Just as the Pseudo-Solomonic operator can only work with a single associate (*a vero socius*),¹⁵⁵ so Dee is told by his angelic interlocutors that “None shall enter into the knowledge of these Mysteries with the[e] but this worker [i.e. Kelley].”¹⁵⁶

Dee’s art also draws some of its most important techniques and instruments from the mediaeval tradition. Although the prayers and orations used in the actions which are recorded in the *Liber Mysteriorum* do not incorporate complete orations written in the “magical language”, the prayers collected in the *De Heptarchia Mystica* from this period show Dee incorporating the divine names (*nomina Dei*), or *semaphoras* (revealed angelic names) of the Pseudo-Solomonic type, and the “parcells of Inuitations very pleasant to good Angels” communicated in the spring of 1583 are written entirely in the “Angelicall Language”,¹⁵⁷ written in a revealed alphabet of hieroglyphic characters,¹⁵⁸ and we know that on at least one occasion Kelley used this “angelic language” whilst praying during the actions.¹⁵⁹ The *Claues Angelicae* (angelic keys), or “booke of secrets”, which was dictated to Dee at that time, was a series of angelic names purporting to be a “key of this world,”¹⁶⁰ which were designed to be used operatively in much the same way as the magical language of the *ars notoria*. The “49 partes of this booke” which supposedly contained 49 languages spoken simultaneously, were voices “wherevnto the so many powres [...] shalbe obedient”. Uttering these angelic words would transform him “from a mortall creature,”¹⁶¹ and upon hearing them God’s angels would be “forced [...] to render obedience and faithful society. Wherein they will open the mysteries of their creation [...] and give [...] understanding of many thousand secrets”.¹⁶² Dee was also given divine names in the form of talismanic figures, such as

the combinatorial “Tablet” given to Dee by Michael, the seven component letters of which were supposed to be “the 7 seats of the one and euerlasting GOD [...] euery letter conteyning an Angel of brightnes,” which “expelleth euyll spirits, qualifieth the Waters, strengtheneth the Iust, exalteth the righteous, and destroyeth the wicked,” and were a “sufficient BOND to vrge all Creatures to life or death.”¹⁶³ This stress on the angelical and mystical significance of seven, while it is not uniquely found in Pseudo-Solomonic theurgy, is a definite structural characteristic which links the mediaeval practices to Dee’s heptarchical art which also “governs by sevens”.¹⁶⁴ The most significant link between Dee’s heptarchical art and the practices of Pseudo-Solomonic theurgy, however, is his use of a talismanic instrument known as the *sigillum dei* or the *sigillum Æmeth*.¹⁶⁵ Dee’s own *sigillum* (Plate 14) seems to have been closely modelled on the seal in his own manuscript copy of the *Liber sacer* (or *Liber juratus*) which dates from the late-fourteenth or early-fifteenth century,¹⁶⁶ (Plate 15) although his reference to having “considered diuers fashions of this seal: and [...] found them much differing,” seems to confirm that he had access to a number of manuscript sources for his proposed imitation.¹⁶⁷ It seems clear, then, that while Dee glosses the passage in his manuscript dealing with the *sigillum dei* with references to printed works by Reuchlin and Agrippa,¹⁶⁸ he was using Pseudo-Solomonic manuscripts as his primary source, and neither Reuchlin nor Agrippa contain visual representations of the seal which Dee could have copied.

Dee’s heptarchical art also seems to have included some of the aims and intentions of the *ars notoria*. The heptarchical art is, for example, conceived in part as a universal science, or “ars generalis”, being the key “to the farder vnderstanding of all Sciences, that are past, present or [...] yet to comme”,¹⁶⁹ a “Threefold Art” which promises “knowledge of the ¹WORLDE, the ²GOVERNEMENT of his Creatures, and the ³SIGHT of his Maiestie”.¹⁷⁰ That is, a universal art which would give Dee control over the natural and the political world, as well as a privileged revelation of God’s presence. Just as the *Liber sacer* taught how “a man shulde obteyne his will by euery angell”,¹⁷¹ so Dee is promised that this practice will be the “ende and consummation” of all his desires.¹⁷² Just as Pseudo-Solomonic magic promises knowledge of natural things, such as alchemy and astrology, as well as political powers, such as “to haue power over euery man”, “to cause unyte and concorde”, or “to haue a 1000 armed men [...] [and] forme a castell that shall neuer be dystroyed”,¹⁷³ so Dee is promised not only powers over the natural world but powers which will enable him to be “profitable to your Cuntrie”,¹⁷⁴ by “quietting of [...] estates [...] [and] pacifying of the Nobilitie”, by access to those angels which govern the “Exaltation and Gouvernement of Princis [...] Cownsayle and Nobilitie”, and those responsible for “Gayne and Trade of Merchandise”.¹⁷⁵

3. “THE KEY OF PRAYER”: JOHN DEE AND THE PSEUDO-SOLOMONIC ORATION

Even in the absence of such explicit associations of Dee’s practices with the Pseudo-Solomonic tradition as the use of the *sigillum dei*, we could identify its affinities by a close examination of its precatory techniques. Like the Pseudo-Solomonic operators, Dee’s “mysticall exercises” utilize a combination of conventional and “action-specific”

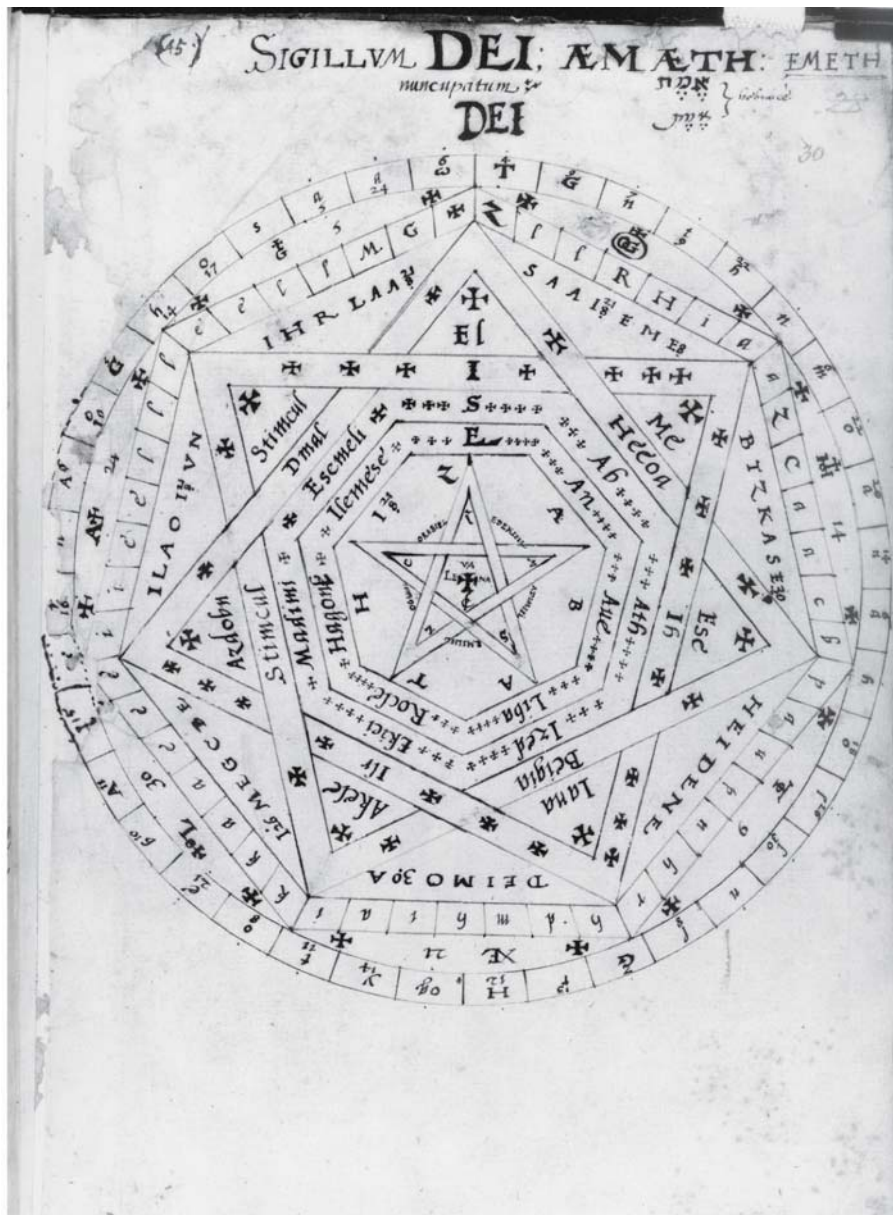


Plate 14: The 'Sigillum Aemeth' or 'Sigillum Dei' from John Dee's *Liber Mysteriorum*, Department of Manuscripts, British Library, Sloane MS 3188, f. 30^r. (By permission of the British Library).



Plate 15: A 'Sigillum Dei' from Dee's own fourteenth-century copy of the Pseudo-Solomonic *Liber Juratus* [R & W, DM 70], Department of Manuscripts, British Library, Sloane MS 313. f. 4^r. (By permission of the British Library).

prayers and orations requesting angelic revelation. In a prefatory apologetic prayer, “Ad omnipotentiam Deum protestatio fidelis <ad> p[er]petuam rei memoriam,” dated 1582, Dee described his active pursuit of revealed “radicall truthe” by “extraordinary giuft” in the fashion of “Salomon the wise” and other prophets who had “enjoyed [... the] fauor & conuersation” of God rather than rational knowledge. He rejects the “vulgar scholēdoctrīne or humane invention” and “reasonable discourse,” reminding himself

what good Counsell the Apostle James giveth, saying, Si quis vestrum careat sapientia, postulat a Deo, &c. And that Salomon the wise, did so, euen immediately by thy self, attayne to his wonderfull wisdom.¹⁷⁶

During one of his conversations of April 1584, Dee reassures himself of the legitimacy of his communications with angels, whose truthfulness is guaranteed by prayer:

seeing I have many years desired, and prayed for wisdom (such as these Actions import) at his hands, and by such means as to his Divine Majesty seemeth best, [I believed] that he would not either mislike my prayer, or abuse my Constant hope in his goodnesse and mercy: Therefore I concluded that I referred all to the mercifull will of God, and doubted nothing at the length to be satisfied of my request, and prayer made unto him.¹⁷⁷

For Dee the faithfulness of his prayer, and his submission to divine will are indisputable warrants of the success of his ventures, granting him an assurance which is secured on gospel teachings concerning faith and its powers. Like the Pseudo-Solomonic operator who relied upon the power of operative prayer,¹⁷⁸ Dee’s “exercises” relied on immediate precatory communication with God and his angels. “I did fly vnto thee by hearty prayer”, he says in the “Protestatio fidelis”, “in sundry manners, sometime crying unto thee, Mitte lucem tuam, & veritatem, quae me ducant, & sometime Recte sapere & intelligere docete me, nam sapientia tua totum est quod volo: Sometime da verbum tuum in oro meo & sapientiam tuam in corde meo fige.”¹⁷⁹ Such prayers for “True knowledge” (*Recte sapere*) and the infusion of knowledge by “extraordinary gift,” are characteristic of the precatory orations of the Pseudo-Solomonic art. In the *ars notoria*, for example, the operator prays for illumination in the science of astronomy with the following prayer:

Deus qui multitudinem stellaru[m] solus numeras et terra[m] palmo mensuras, et montiu[m] altitudine[m] conspicias: *Da mihi recte sapere*, et cognita subtili indagatione perquirere, et intelligere, et discernere, vt Astronomiae habita scientiae notitia, cognoscendo et intendendo eius magnitudinem et subtilitatem.¹⁸⁰

It is interesting to note, however, that Dee’s “hearty prayers” for wisdom are in fact drawn verbatim from a collection of psalmic prayers written by the Henrican Catholic martyr, John Fisher (whom Erasmus had praised as a “man of singular piety and erudition”).¹⁸¹ Fisher’s *Psalmi seu Precationes* was a collection of extemporary prayers, modelled on the psalms, frequently referred to by Dee as a text being used as part of the precatory fabric of his angelic conversations.¹⁸² Fisher’s fifth Psalm, “Pro impetranda sapientia diuina,”¹⁸³ like the Pseudo-Solomonic prayers for wisdom, is a fervent request for the direct infusion of wisdom by God:

Domine Deus misericordiae qui omnia uerbo tuo fecisti, & sapientia tua constituisti hominem. [...]

Cor nouum & spiritum rectum intra me pone,

omneque desiderium prauum procul à me repelle. [...]

Mitte de caelo spiritum sapientiae tuae,
& sensu illius cor meum imple.
Sapientia tua dat veram scientiam,
& ex ore tuo consilium & intelligentia. [...]

Firmetur sapientia in animo meo,
& legem tuam in corde meo scribe.¹⁸⁴

The occurrence of such a prayer in Bishop Fisher's collection of extemporary prayers (which also includes a number of orthodox prayers for the remission of sins, and protection from temptation), suggests that the precatory orations of the Pseudo-Solomonic art developed out of pre-existing modes of extemporary prayer and private forms of devotion. The plea for personal illumination, a permissible use of conventional private prayer, became the primary focus and objective of the Pseudo-Solomonic exercises. We are fortunate to have a number of extant examples of Dee's own extemporary prayers of this type, which, like the Pseudo-Solomonic prayers, combined general requests for wisdom, and more particular and specific requests for certain kinds of knowledge. An early example, dated 1579, is a Latin petitionary "evening and morning oration" – "Pro sapientia,"¹⁸⁵ which, beginning with his quotation from Fisher's psalm, develops into a more specifically "philosophical" prayer (in the sense that it explicitly invokes a philosophical community: "the pious, wise and expert Philosophers"), and requests the aid of specific angels (Michael, Gabriel, Raphael and Uriel) to instruct him perfectly and exactly in God's "arcana and miracles." Similar prayers recorded in his *De Heptarchia Mystica*, make his debt to Pseudo-Solomonic oration even clearer. These "pious and devout invitations" (*Pia, Deuotaque Invitationes*),¹⁸⁶ are a series of prayers addressed to God, the "good Heptarchical angels" (*Bonorum Angeloru[m] Heptarchicoru[m]*), and other groups of angels with specific responsibilities (those with knowledge of stones and metals, medicine, the four elements, the mechanical arts, etc),¹⁸⁷ requesting various kinds of knowledge and power "for the auancing of the Honor and Glorie of our Almighty God."¹⁸⁸ These prayers are clearly invocations (he requires the presence of the various angels), and requests (albeit mediated) for instrumental power:

In the Name of Almighty GOD, the King of Kings, And for his honor, and Glory, to be aduanced by my faithfull service, I require the[e] O Noble Prince, (N.) to COM[M]E presently, and to shew thy self, to my perfect and Sensible eye Iudgment, With thy Ministers, servants and subiects, to my cumfort, and help, in wisdom, and Powre, according to the propertie of thy Noble Office: COM[M]E, O Noble Prince (N.) I say COM[M]E, Amen.

We have here the same concatenation of precatory clauses to be found in the Pseudo-Solomonic orations: the *legitimizing* clauses ("by my faithful service"), *desiderative* clauses ("I require the[e] [...] to shew thy self [...] to my cumfort and helpe, in wisdom and Powre"), *mediatory* clauses ("In the Name of Almighty God [...] and for his honor, and Glory"). Most of the prayers include *protective* clauses, insisting on the presence of "true and faithfull Angels of light," who come "in a godly and frendly manner,"¹⁸⁹ and Dee frequently records the use of prayers "contra demones" in addition to these general calls for protection from conversation with evil spirits.¹⁹⁰ The most significant feature which Dee's "heptarchical invitations" share with Pseudo-Solomonic

oration, is their employment of “divine names” (*nomina dei*) as instruments, and particularly “revealed” divine names (i.e. names not drawn from scriptural sources). The prayers in the *De Heptarchica Mystica* feature, for example, the “Twelve names of God [...] which govern the visible and invisible creatures of the earth,” drawn from a cruciform table of divine names known as the “line of the holy spirit,” revealed by the angel Ave in June 1584,¹⁹¹ these “names” are “MOR, DIAL, HCIGA, OIP, TEAA, PDOCE, MPH, ARSL, GAIOL, ORO, IBAH, AOZEI,” and are invoked in the course of precatory expostulations in the manner of the Pseudo-Solomonic oration.¹⁹²

These “invitations” can only be understood fully in the generic context of the Pseudo-Solomonic theurgical rites, whose Latin petitionary orations are Dee’s model. These “fervent prayers made to God, for [...] instruction, throwgh the ministry of his holy and myghty Angel[s]”, became a fundamental part of Dee’s practice from his first recorded dealings with angels in December 1581 with Barnabas Saul as his “seer”.¹⁹³ Dee constantly refers to prayers which he calls “particular invitations,” or “Ejaculations appropriate to the action.”¹⁹⁴ These are “action-specific” prayers of the kind recorded in the *Heptarchica Mystica*. Like the Pseudo-Solomonic prayers on which they are based, these prayers are essentially requests for divine illumination or wisdom, or help,¹⁹⁵ and include variations on the phrases “Mitte lucem tuam” (send [me] your light) and “Da mihi Recte sapere” (give me right knowledge), which Dee appropriated from Fisher’s fifth Psalm, but also feature prominently in Pseudo-Solomonic orations.¹⁹⁶ While many of the prayers are general requests for illumination, Dee (like the Pseudo-Solomonic “magister,” or “operator”) often made requests for knowledge or help of a highly specific and instrumental nature. For example, when Dee is asked for specific guidance by Edward Kelley and John Husey concerning a “moniment of a boke and a skroll” which they had supposedly found at “Northwik hill”, he uses a variation of the “mitte lucem” prayer to ask for help with this specific task: “O beata Trinitas, mitte lucem et veritate[m] tuam, vt ip[s]a me ducant ad montem sanctum, et ad tabernacula tua,”¹⁹⁷ and during his political involvements in Eastern Europe he would often pray for advice on worldly matters, making a “motion for the Lord Al[bert] Las[key] how to deal with the Chancelour,” for example.¹⁹⁸ More often his requests relate to help with particular aspects of the angelic revelations, asking, for example, for help with collating the texts of the conversations,¹⁹⁹ supplying missing words, characters, or numbers, or simply for the granting of a particular audience or vision. The angels who appear in the visions constantly exhort Dee and Kelley to prayer, sometimes offering them prayers to imitate. Thus during the Cracow conversations of 1584, the angel Gabriel offers a conventional prayer for mercy and fortification, and Dee and Kelley “pray the same prayer.”²⁰⁰ The angels also confirm Dee in his precatory practices by describing to him the prayers and angelic “Calls” of the prophet Enoch which, like the Pseudo-Solomonic theurgy, are based on prayers “desiring” the ministry of the angels “in and through [the] holy names” of God.²⁰¹

While these action-specific prayers are fundamental to the conversations, it is important to acknowledge the vital role played by “conventional” forms of prayer in Dee’s dealings with the angels, and the *continuities* between these conventional forms and “magical” prayer. As we have seen, Wier attacked the “blasphemous prayers” of these magicians, who “designedly mixed” incantations, psalms, and other conventional

prayers, and Dee, like the Pseudo-Solomonic magicians before him, also depended heavily on the operative power of conventional prayer, and especially the psalms in his theurgical practices. In one of Dee's first recorded scrying sessions he asks the angel Uriel for "a meanes or order to vse in the invocating of Michael," and is told:

He is to be invocated by certayn of the psalmes of Dauid, and prayers. The which psalmes, are nothing els, but a means vnto the seat and Maiestie of God: Whereby you gather with your selues due powre, to apply yowr natures to the holy Angells. I mean the psalmes, commonly called the seven psalmes. You must vse pleasant sauours: with hand and hart: whereby you shall allure him and wynn him (thorowgh Gods fauour) to atteyn vnto the thing, you haue long sowght for. There must be Coniunction of myndes in prayer, betwyxt you two, to God, contynually. Yt is the Wyll of God, that you shold, ioinctly, haue the knowledge of his Angells together.²⁰²

"Invoke this name, or we can do nothing," (*Imuocate Nomen eius, aut nihil agere possumus*) Michael tells him later, because "The key of prayer openeth all things".²⁰³

This belief in the power of prayer, and especially the psalms, was a central tenet of early-modern religious life. Dee's contemporary, Anthonie Gilbie, for example, in his *Psalmes of Dauid* of 1581 told his readers, that

this Book of Psalmes [is] most necessarie for euerie Christian [...] to meditate them in their hearts, and so by earnest and continual inuocation and hartie praier to moue the Lord our God to mercies, as his holie seruants haue by the like meanes alwaies found mercies before vs.²⁰⁴

These "mercies" could cover a wide range of practical helps as well as spiritual consolations and directions. An anonymous contemporary translation of a work by St Athanasius, *A Treatise [...] concerning the vse and vertue of the psalmes*, which was routinely appended to editions of Sternhold and Hopkins's *Whole booke of Psalmes*, for example, offered a variety of tasks for which the use of Psalmic invocation was deemed appropriate, which included the frustrating and driving away of enemies, requests for the prospering of the Church, the blessing of a new dwelling, the curing of illnesses, and prayers against "the nobility, the counsel, the magistrates and princes not geuen to religion".²⁰⁵ Calvin also stressed the virtue of the psalms, which he saw as an "infallible rule for directing us with respect to the right manner of offering to God the sacrifice of praise, which he declares to be most precious in his sight, and of the sweetest odour."²⁰⁶ However, he also insisted on certain limits to the use of these "precious" sacrifices. "Whoever would follow [David] aright," he said

must not allow himself to break forth with reckless and blind impetuosity into the language of imprecation; he must, moreover, repress the turbulent passions of his mind, and, instead of confining his thoughts exclusively to his own private interests, should rather employ his desires and affections in seeking to advance the glory of God.²⁰⁷

As a request for divine aid, prayer could become involved in the "private interests" and illegitimate desires of individuals, who might not exercise due restraint in respect of the mercies sought from God. Dee himself, believed his own prayers to be of miraculous efficacy. Dee is told by his angelic interlocutors that he has been granted particular "force in prayer" by God,²⁰⁸ and that the mystical tables or "calls" which are revealed to him give him the special privilege of compelling angelic visitation (a privilege not granted to the prophets and apostles).²⁰⁹ The "utterance" of the "holy and

mysticall Call” compells the angelic “Kings and Ministers” who rule the earth to obedience:

[This Call] is of force, and moveth them to visible apparition [...] they are forced (by the couenant of God delivered by his spirit) to render obedience and faithful society. Wherein, they will open the mysteries of their creation [...] and give you understanding of many thousand secrets.²¹⁰

While these powers might seem to fall within the sphere of Calvin’s proscriptions with regard to private interests, it is also clear that, given Dee’s faith in the authenticity of his revelations, he saw the extraordinary mercies as expressions of the divine will (“by the couenant of God”). Thus, in seeking miraculous powers he believed he was “seeking to advance the glory of God,” rather than seeking private power. Dee frequently insists on his unworthiness and humility, and his desire to be an instrument of God, rather than an autonomous agent. He makes frequent use of the formula “Let thy will, and not ours, be done” (*Non nostra sed Dei voluntas fiat*),²¹¹ and other mediatory clauses in his prayers, requesting God, for example, “to deale with vs, so, as might be most for his glory, in his mercies: not according to our deserts, and frowardnes: &c.”²¹² and one of the angels tells him: “you are become servants of God: Not for your own sakes; but in that it is the Glory of him, which hath called you to this exercise.”²¹³ Thus while Dee’s belief in his entitlement to quasi-divine powers seem extraordinarily arrogant to the modern reader, they seem less audacious when viewed in the light of the contemporary doctrines of grace and providentialism. There is no question that Dee saw his access to “magical” powers as firmly circumscribed by divine will. Thus while he is told by the angels that “All wants shall be opened vnto you,”²¹⁴ he is also warned to “abuse not this Excellency.”²¹⁵ He is permitted, for example, to make “vse” of the angels governing the seas and the earth, but he must only “vse them to the glory [of God].”²¹⁶ Thus whatever Dee believed was done for the glory of God was divinely willed and warranted, and he asks only for “the performing of som[m]e artes such as myght sett forth his glory.”²¹⁷

There is no doubt that Dee’s faith in the conversations and their continued success was underpinned by a fervent regime of private devotion. When Dee asked the angel Ave about the “form of our Petition or Invitation to good Angels”, he was told that correct invocation arises from “the good will of man, and of heat and fervency of the spirit,”²¹⁸ and his conversations are characterised by a performative “heat and fervency” and intense precatory zeal.

Whilst engaged in angelic invocations at his house in Mortlake, the chamber of practice (which rather quaintly appears to have been a converted spare bedroom)²¹⁹ was set out as a ceremonial space dedicated to private worship, furnished with candles and other “holy furniture”, and equipped with a desk at which he recorded the communications. It appears to have been contiguous with the space which Dee used for his private prayers, as he often mentions going to, or coming from his “oratorie”.²²⁰ On his European travels he appears to have replicated this ceremonial space in his various lodgings – in Cracow, for instance, he describes his room as containing a “Table with a white Cloth, a Candlestick, and Taper on it, with a Desk and Cushions (which I had caused to be made with red crosses on them).”²²¹ In this conventional oratorical space, much of the daily practice of the conversations consisted in conventional forms of

worship, the “diuerse [...] eiaculations and pangs of prayer and thanks vnto God,”²²² which were the staple of sixteenth-century Christian worship.

On Holy Thursday 1583, for example, Dee goes to his “oratorie” to pray for “comfort and [a] token of free forgiuenes,” he vents his “vows” in “harty sorrowfull paines” and “prayed the 22 Psalm in the conclusion of the pang”.²²³ On another occasion he records: “EK prayed the 145 and 146 Psalm kneeling reverently; and I likewise in heart consenting thereto, attentively listening.”²²⁴ He and Kelley would frequently pray together on their knees, and he talks of them reciting psalms *mora interposita*,²²⁵ (that is with Dee and Kelley reciting alternate lines),²²⁶ or silently following Kelley’s recitation of a psalm in his mind (“I joyning my mind to his pronounciation thereof.”)²²⁷

The operative dimensions of conventional prayers in Dee’s angelic conversations are clearly visible in the close links between prayer and the appearance of visions in the shew-stone. Dee and Kelley are told by the spirit Madimi that they must: “Always pray that *you may hear truly and receive faithfully*,”²²⁸ and these prayers are frequently in a conventional form. Thus after a brief recitation of Psalm 33, Dee notes the sudden appearance of Gabriel and Nalvage in the “crystal”.²²⁹ On another occasion, Dee notes: “we prayed severally; and at length [...] I prayed in the hearing of EK, (by my desk, on my knees) in great agony of mynde, and Behold there appeared one standing vppon, or rather somewhat behynde the Heptagonall clowde.”²³⁰ Prayer often helps him to overcome difficulties in the progress of the visions; thus a hiatus in one of the actions is ended by the deployment of a psalm: “*I prayed Roffensis Psalm 9 and the Lords Prayer*, and the stone became clear,”²³¹ while the angel Nalvage is helped to overcome an inability to reveal one of the letters of a Table by the recitation of the Lords Prayer.²³²

A great deal of the angelic conversations relies on the ritual performativity of these conventional forms of Christian devotional piety. Thus when Dee and Kelley are shunned by the angel Ave, and are reproached by a cherubic spirit (“a face, very great, with wings about, adjoynd to it”) for their lack of faith and belief, Dee falls to intense prayer, “Cum maximis lachrymis hæc à me & valde serio ad Rem dicta erant,” entering into desperate dialogue with the angelic interlocutor:

Δ: *O Lord, shall we continue in this wavering or stiff-necked willful blindness, and frowardly keep out thy mercies and graces by our fleshly sense, and unreasonable perswasion against the verity of thy true Ministers?*

1. All things are committed to thy charge.

Δ: *O Lord as much as ever I can do by prayer, or otherwise, I do, and yet I enjoy no fruit of my long travel.*

2. Thou hast ground, sow if thou can.

Δ: *How can I without further instructions and help? and now when I require Ave to come, he cometh not: O Lord comfort me.*

3. A V E shall come when thou hast need of him.

*Δ: In te Domine speravi, & spero, & sperabo. In die Tribulationis exaudies me. Refugium meum, spes mea, vita & beatitudo mea Jesu Christe, tibi cum Patre & Spiritu Sancto sit omnis honor, laus, Gloria & Gratiarum actio. Amen.*²³³

This spiritual drama, in which Dee acts out his penitential remorse at their “willful blindness” and “fleshly sense”, and begs for comfort, and gives traditional precatory expression to his trust and hope in God’s help and guidance, is closely modelled on the traditional forms of private devotion.

The mixture of “action-specific” (or “magical”) prayer and conventional prayer forms, and the extemporary and improvisational openness of private worship (“I rehersed part of my intent, vtred to god by prayer and half turned my speche to god him self, as the cause did seme to require”)²³⁴ makes Dee’s angelic conversations into a series of complex ceremonies, or “precatory events”. Take for example, the prayers recorded before the conversation held on the morning of Tuesday 31 July 1584: “The Lords prayer finished, and various ejaculations made both to Gabriel, and to Nalvage, Ave, Mapsma and Ilemer, and above all to God himself for his light, help and protection, both in the present action, as well as for our present and future journey to the court of Caesar [i.e. Rudolph II].”²³⁵ This mixture of conventional prayer and a variety of action-specific prayers (“invitations” to particular angels, and prayers to God for knowledge, help and protection) is a typical assemblage, which on other occasions may be supplemented by liturgical prayers, the seven penitential psalms,²³⁶ short extemporary prayers (*pretiunculas* or *oratiunculas*) for the remission of sins or for God’s grace, or protection from Satan’s deceptions,²³⁷ prayers of humility and obedience,²³⁸ prayers of thanksgiving and for strengthening faith,²³⁹ or prayers asking for help with specific questions or actions.²⁴⁰

These highly variegated and idiomatic prayer structures, in combination with the scrying stone, and the “holy table”, and the various “tables”, “seals” and “characters” which make up the instruments of the heptarchical art, give the conversations their peculiar character. Dee himself was aware that his method of using prayer was distinctive. The angel Raphael refers to Dee’s “Philosophicall Harmonie in prayer,” which Dee identifies as “the prayer which I dayly vse, & often”.²⁴¹ Dee himself talks about his form of prayer as a distinct method: “Copious prayers to God, according to our method.” (*Precibus ad deum fuis, ex more nostro*).²⁴² But this distinct method, these quasi-ceremonial precatory events – like the Pseudo-Solomonic arts of the middle ages – seem to have developed out of (and in parallel with) pre-existent forms of private worship, and the heightened sense of “magical” (or theurgic) agency seems to have been a natural extension of traditional beliefs regarding the power of prayer and the “mercies” extended by God to the faithful.

John Fisher, for example, in his treatise on prayer, *De necessitate orandi*, argued that the granting of requests (*impetratio*) was one of the three chief fruits of prayer.²⁴³ The instrumental nature of prayer rests, however, on a foundation of deep humility, and the “unworthy soul,” (*animus indignum*) acknowledges that the gifts it receives by means of prayer are effected through the grace of God, and not through any power on the part of the devotant.²⁴⁴ The good effects which might result from such prayers, are

the result of God using us as his instrument, not the result of our own virtue or desire. “Whenever we do something right,” Fisher says, “we are in the hand of God, like a hammer in the hand of a workman [...]. God uses us as an instrument to do good works. Whenever we seem to be acting virtuously it is not us, but God in us, who is acting.”²⁴⁵ While God will not grant requests which might be harmful to us, if prayer is undertaken in the right spirit, virtually anything will be granted by God to the faithful:

Anybody’s prayer, provided that it is based on humility, and is uttered freely before God, and provided that nothing which is asked for is repugnant to his own well being, and provided that he proceeds in the name of the Lord, without any doubts, then that which he asks for will be granted.²⁴⁶

Provided that one possessed the requisite sense of piety, and was prepared to submit oneself to being an instrument of the divine will (or to consider one’s own will to be such an instrument) the scope of this kind of prayer was virtually unlimited, and it is here that the boundaries between prayer and incantation, religion and magic become fluid and ill-defined. Dee’s contemporary and putative co-author of the Rosicrucian *Fama Fraternitatis*, Julius Sperber, for example, in his *Kabalisticae Precationes*, published in 1600, produced a series of psalmic prayers which, like Dee’s, were petitions for divine wisdom.²⁴⁷ Such prayers for illumination were an accepted part of conventional Protestant worship in the late sixteenth century,²⁴⁸ but the limits of such requests were not subject to doctrinal proscription, and Sperber’s interpretation of the New Testament promises, suggests that he views prayer as a kind of Christian magic.²⁴⁹ The Cabala, he says, is “the chiefest of the sciences and their summit,” a primacy which it enjoys because it is based on the sacred revelation of the divine names which can be found in the Old and New Testaments.²⁵⁰ The wise man, Sperber says, can expect to receive spiritual and corporeal benefits from God when he prays. Through God’s gift, he will be able to

truly understand God and the inner man (that is, the soul of Man); to foresee the future: to understand the Mysteries hidden in sacred scripture: to uncover secrets, to acquire the glory of the true name and perpetual memory: to cure the sick: to perform miracles: to receive Visions and Revelations [...] and rise up beyond the limits of the mind, and be elevated to heaven, uniting and joining with GOD himself, and be illuminated by the Holy Spirit.²⁵¹

While a limited concept of operative prayer had been widely accepted throughout the Middle Ages and early Renaissance,²⁵² the potential for exceeding these narrow limits had always been present in the existing belief system, and here we can see how belief in the granting of requests could result in a quasi-magical, quasi-prophetic sense of exalted agency.

4. “ONE GOD, ONE KNOWLEDGE, ONE OPERATION”: SECRET MEANS AND APOCALYPTIC ENDS

This brings me to my final observations on Dee’s heptarchical art, and the extent to which it departs from its Pseudo-Solomonic models and becomes an intellectual and practical formation which is *sui generis*. These differences are of a technical and a teleological nature. The technical differences are minor, but not insignificant. As a practitioner, Dee saw himself as both a *philosophus* and a *mathematicus*, and the exalted vision of the mathematician who could “ascend and mount vp (with speculatiue

Winges) in spirit, to behold [...] the Glas of Creation", ²⁵³ was never far from his mind during his dealings with the angelic spirits. While there is a shared mathematical basis underpinning both Dee's angelic conversations and Pseudo-Solomonic theurgy – a rudimentary numerological mysticism – Dee brings a greater degree of mathematical sophistication and facility to his proceedings than one finds in his mediaeval sources. In this he is a beneficiary of the neoplatonic scholarship of the Renaissance, with its complex syntheses of Greek, Hebrew, Christian and Arabic doctrines on the cosmological significance of number. The second, and more significant difference, is the millennial or apocalyptic teleology of Dee's art. Whereas the *ars notoria* and other Pseudo-Solomonic arts were intended for the amelioration of daily life, and were therefore chronic quotidian practices, Dee's art was devoted toward a single action, an action of staggering eschatological significance: "we procede to one God, one knowledge, one Operation". ²⁵⁴ This one operation was to be the Last Judgement, with Dee and Kelley as earthly agents of the divine will, executed through the mystical instruments revealed to them. While the Pseudo-Solomonic arts promised powers to perform wonders, for Dee these particular actions were a peripheral aspect of a single action, an action which was in itself the horizon of all human actions, the end point towards which the whole providential design of the creation had been tending since the resurrection. In May 1583, the angel Uriel tells Dee that the "frute" of his "boke" (i.e. the *Liber Mysteriorum*) would be the restoration of "the holy bokes, which haue perished euen from the begynning." The doctrine revealed in this ur-scripture, was to "towche the skyes, and call the sterrs to testimonie thereof", and Dee is told that in the course of practising his art his "fotesteps shall viset (allmost) [all] the partes of the whole world." The "Vse" of the "Table of practise", however, was to be "onely for one Month". The revelation was not just a communication, but an instrument, designed to bring about the perfection of religion, but also the perfection of human arts:

herein shalbe deciphred perfect truth from imperfect falshode, True religion from fals and damnable errors, with all Artes; which are propre to the Vse of man, the first and sanctified perfection: Which when it hath spred a while THEN COMMETH THE ENDE. ²⁵⁵

The miraculous arts promised by Pseudo-Solomonic theurgy, fantastic and presumptuous as they often are, are actions intended to have effects within historical time. Dee, on the other hand, saw his "action" or "practise" as the culmination of all actions, a last act which would inaugurate the *end* of history and historical time. The boundaries between prophecy and "magic" collapse in Dee's heptarchical art – the "sanctified perfection" of all the practical arts are not seen as acts of personal aggrandisement or empowerment, but as a necessary prelude to the apocalyptic catastrophe. The "holy boke" or "boke of secrets" was to be "the key of this World", which has been "browght to the wyndow" of Kelley's senses and the "dores" of his imagination, "to the end that he may, see and performe the tyme of God his Abridgeme[n]t". A "great miserie" is imminent, Uriel tells them, they must "nedes attend vppon the Will of God: Things must then be put in practise. A thing that knitteth vp all", which "conteyn[s] many Celestiall Vertues". ²⁵⁶ The practice of the heptarchical art would thus subsume all other human actions within itself, it would "knitteth vp all." In comparison with Dee and Kelley, the angel Ave tells them, the theurgists of the past, who practised the "old fashion of Magick", were "only playing". ²⁵⁷

The contrast between Dee's heptarchical art and the magical arts that preceded it (and those which were contemporary with it) is perhaps, from a modern standpoint, illusory. The parallels between Christian magic, or theurgy, and Biblical prophecy are constitutive of these arts, their legitimacy for contemporary practitioners was bound up in the idea of angelic transmission. As "revelations" from spiritual beings, the arts are, *ex definitio*, prophetic. What sets apart Dee's art from his predecessors, perhaps, is his willingness to believe that God was willing him to be an *instrumentum instrumentorum*. But in the light of contemporary beliefs about the imminence of the apocalypse in the 1570s and 80s (and the primacy accorded to faith and revelation in religious experience) even this should be comprehensible, if not credible. Dee was certainly not alone among his contemporaries, either in his belief in the properties of the "shewstone", or in taking Pseudo-Solomonic theurgy as a model for his magical practices. Christopher Whitby has carefully documented reports of English "scryers" in the 1540s-60s,²⁵⁸ and we know that at least one contemporary, Simon Forman, had been practicing a "New method [...] of magic" which, according to Gabriel Harvey, was "inspired by the *ars notoria*", and (like Dee's conversations) apparently made use of an "all-seeing mirror".²⁵⁹ Although some of Dee's contemporaries were sceptical about angelic communications,²⁶⁰ such views were not predominant, and many others disapproved of his practices precisely because they *believed* in his spiritual communications. Other English and European scholars are known to have worked within the same tradition as Dee. Heinrich Khunrath, for example, in the text accompanying his sequence of theosophical-alchemical engravings, the *Amphitheatrum Sapientiae Aeternae*, describes an art or doctrine which he calls "Hyperphysical magic" (*Hyperphysicomageia*), which is "pious and useful conversation with good Angels, God's fiery ministers, mediately or immediately, while we are either waking or sleeping, in accordance with the task delegated to them by God."²⁶¹ He also defines "Theosophy" (*Theosophia*) as "a threefold Theology (that is, Biblical, Macro- and Microcosmic)" and includes the "spiritual conversations" of Hebrew prophets and cabalists amongst the highest accomplishments of "Magic" (*Mageia*).²⁶²

For devout Christian practitioners like Dee and Khunrath, then, the boundaries which modern commentators draw between practices which are "magic" and those which are "religious" or "devotional" seem to have been less clearly distinguishable. The widespread belief in God's willingness to grant requests to the faithful (*impetratio*) while it was often the subject of debate and controversy,²⁶³ had no settled limits or boundaries, and as such offered a mediated form of instrumental agency which could easily be reconciled with orthodox Christian faith. As we have seen, Dee saw the heptarchical art as a form of religious "exercise", a "holy action", during which "mysteries" and divine secrets are revealed. To this extent his art is an *ars prophetica*, and even (given the momentous nature of the supposed prophetic knowledge) an *ars apocalyptic*. In this he was not far removed from some of his religious contemporaries. The puritan Roger Edwardes, who sought (and gained) Dee's support against the Bishops on the matter of apocalyptic prophecy laid claim to a comparable apocalyptic authority in his scriptural interpretations, and was sympathetic to Dee's claims to be dealing with angelic spirits.²⁶⁴ But Dee's art was also an *ars operativa* or *instrumentiva* and his "desired thirst" for "perfect knowledge" was not restricted to purely divine or eschatological illuminations. Dee's requests included requests for

alchemical, medicinal, and natural philosophical knowledge, and help with locating a hoard of buried treasure. While these actions do not seem to fit our perceptions of what a “religious” practice, might be, we should bear in mind both the eschatological horizon within which Dee located his practices, and the latitude of his conception of “Christian allowable means”. Provided that Dee saw no contradiction between his practices and “the profession of a true Christian,” and provided that he construed his actions as dedicated to the glory of God, a wide array of practical and operative activities were available to him in his capacity as a “Modest Christian Philosopher”.²⁶⁵ Like the theurgic practitioners before him, what Dee ultimately sought was a sanctioned form of operative agency, access to arts whose “sanctified perfection” was assured. The “key” of prayer and the “ineffable sacrament” of angelic conversation seemed to him, in the final analysis, the highest and most legitimate form of pursuing both theoretical knowledge and operative practice. Dee spent most of his long scholarly career pursuing “wonderfull divine and secret Sciences”²⁶⁶ and his sense of calling and vocation, is perhaps the most important framework within which he organised and pursued a wide range of practical and theoretical activities. In the broadest religious sense, vocation or calling signified the dedication of all actions to the glory of God or a sacramentalization of human action.²⁶⁷ The doctrine of vocation demanded that “all the religion we haue, all the grace and goodnesse of our hearts, must shew it selfe in the workes of our particular callings,”²⁶⁸ and this belief shaped and formed early modern individuals’ lives in ways which are not comprehensible in terms of the modern, secular conception of “career”. The unique intellectual and cultural formations of early modernity, in which apparently diverse practices are drawn together under the aegis of a unique vocation, are problematic for modern disciplinary historians, for whom the classification (or lawful fragmentation) of theoretico-practical domains of knowledge is a given.²⁶⁹ In order to understand Dee’s angelic visions and their purpose it is, perhaps, less useful to ask whether they are occult science, or magic, or religion, than it is to ask, what an “exercise”, a “conversation” or an “action” is – to locate them, that is to say, within the conceptual vocabulary which presided over their emergence.

If nothing else this reappraisal of the character of Dee’s “mysticall exercises” has, I hope, shown that there is a real need to rethink the conceptual foundations and contemporary categorization of the bewildering array of early-modern practices which have been designated by the term “Renaissance magic” or “occult science”. I also hope that it has signalled a need to extend the study of early-modern “magical” or “occult” practices back into the middle ages. The accounts of Dee’s angelic conversations we find in Yates, Calder and French suggest that they were largely the product of a “Hermetic-Neoplatonic” worldview, whose primary components were derived from the printed philosophical works of Pico, Ficino, Trithemius, Reuchlin and Agrippa. There are a number of references in Dee’s angelic conversations which show that he made use of the printed works of Agrippa, Reuchlin, Trithemius and others, but it is a large argumentative liberty to move from the statement “Dee speaks of the book of Agrippa as lying open on [his ...] table” to concluding “Agrippa was Dee’s main guide in such operations”,²⁷⁰ or that his angelic magic is reliant on “Agrippa on the three worlds”,²⁷¹ or that his “outlook” was predominantly “Renaissance Neoplatonism as interpreted in Pico della Mirandola”.²⁷² As an explanatory model for Renaissance magic neoplatonism has long been dominant, and to a certain extent this is justified, but we must also assess the

influence of the widespread manuscript transmission of earlier magical and religious traditions, particularly in Northern Europe where Italian neoplatonism arrived relatively late, and was often read synthetically together with mediaeval works which already enjoyed prestige and esteem amongst interested scholars. The ascetic, talismanic, cabalistic and incantatory aspects of the works of Northern scholars such as Agrippa, Reuchlin and Trithemius may also be re-illuminated by placing them in the context of mediaeval theurgical manuscript traditions, rather than viewing them simply as conduits for the print tradition of Ficino and Pico. Dee's own practices, as I hope I have shown, are far more indebted to the former than the latter, and my preliminary analysis would suggest that we must look much more closely at the character of mediaeval theurgy and its relation to orthodox forms of religious practice, in order to come to a closer understanding of the nature of Dee's "actions".

APPENDIX 1

John Dee's Oration "Pro Sapientia"
(British Library, Sloane MS 3188, fol. 5^r)

Praeter alias meas extemporaneas preces, et eiaculationes ad Deum vehementiores: Haec vna, maximè vsitata fuit.

Or[ati]o mea Matutina, Vespertinaque: pro Sapientia.

In nomine Dei Patris, Dei Filij, Dei Spiritus Sancti

Amen

Omnipotens, Sempiterna, Vere, et Viue Deus, in adiutorium meum intende: Domine Dominantium, Rex Regum, Iehouah Zebaoth, ad adiuvandum me festina:

Gloria Deo, Patri, Filio, ~~Spi~~ritui Sancto: Sicut erat in principio, et nunc, et semp[er]: et in saecula saeculoru[m]: Amen

Recte sapere, et intelligere doceto me, (ô rerum o[mni]um Creator,) Nam Sapientia tua, totum est, quod volo: Da verbum tuum in ore meo, ô rerum o[mni]um Creator,) et sapientia[m] tua[m] in corde meo fige.

O Domine Iesu Christe (qui sapientia vera es, aeterni et Omnipotentis tui Patris) humilimè tuam oro Diuinam Maiestatem, expeditum mihi vt mittere digneris, alicuius pij, sapientis expertique Philosophi auxilium, ad illa plenissimè intelligenda perficiendaque, quae maximi Valoris erunt ad tuam laudem et gloriam amplificandam: Et si Mortalis nullus iam in terris viuat, qui ad hoc munus aptus sit: vel qui ex aeterna tua providentia, ad istud mihi praestandu[m] beneficium assignatus fuerit: Tunc equidem humilimè, ardentissimè et constantissimè a tua Diuina Maiestate requiro, Vt ad me de caelis mittere digneris bonos tuos Spirituales Ministros, Angelosque, Videlicet Michaëlem, Gabrielem, Raphaëlem, ac Vrielem: et (ex Diuino tuo fauore) quoscumque alios, fidelesque tuos Angelos, qui me plene et perfecte informet et instruant, in cognitione, intelligentiaque vera et exacta, Arcanorum et Magnalium tuoru[m] (Creaturas omnes tuas, illarumque naturas, proprietates, et optimos vsus, concernentium) et nobis Mortalibus. Scitu necessarium; ad tui no[mi]nis laudem, honorem, et gloriam; et ad solidam meam, aliorumque, (per me) plurimorum tuorum fidelium consolationem: et ad Inimicorum tuorum confusionem, et subversionem. Amen. Fiat Iehouah Zebaoth: Fiat Adonay, fiat Elohim. O beata, et superbenedicta Omnipotens Trinitas, Concedas mihi (Ioanni Dee) ~~petitione~~ petitionem hanc, modo tali, qui tibi maximè placebit.

Amen

[*Flourish*]

Ab anno 1579. hoc ferè modo: Latinè, vel Anglicè; (est circa annu[m] 1569 alio et peculiari, particulari modo: interdum pro Raphaële, interdum pro Michaële) ad Deum preces fundere: mihi gratissimum fuit: ~~et est~~ Mirabilem in me faciat Deus Misericordia[m] sua[m]. Amen. [*Flourish*]

APPENDIX 2.

John Fisher, *Psalmi seu Precationes D. Io. Episcopi Roffensis*
(Cologne: Heronem Alopecium, c.1525), Psalmus V, pp.95-109.

Psalmus V. Pro Impetranda sapientis diuina.

Domine, Deus misericordiae, qui omnia uerbo tuo fecisti, & sapientia tua constituisti hominem.

Deus aeternae, & absconditorum cognitor, qui omnia nou- [p. 96] eris, priusquam fiunt.

Aperi labia mea & os meum ut nunciem laudes nominis tui.

Cor nouum, & spiritum rectum intra me pone, omneque desiderium prauum procul à me repelle.

Stultus sum ego domine & rerum ignarus, & scientia tua non est mecum.

Nescio ego nec intelligo, quoniam hebetudo tanta, ut non uidian oculi mei, & cor meum non cognoscat.

Et iam puer sum & paru- [p. 97] lus, ignorans ingressum & exitum meum.

Vir pollutis labijs ego, exiguique temporis, & minor ad intellectum legis tuae.

Da obsecro cor docile seruo tuo, ut sciam quid acceptum sit coram te omni tempore.

Mitte de coelo spiritum sapientiae tuae, & sensu illius cor meum imple.

Sapientia tua dat ueram scientiam, & ex ore tuo consilium & intelligentia.

Sapientia tua os mutorum [p. 98] aperit, & linguas infantium eloquentes reddit.

Si quis uidetur perfectus inter filios mortalium, si tamen effugerit ab illo sapientia tua, in nihilum computabitur.

Hominibus thesaurus indeficiens est sapientia tua, quae qui usi sunt, participes facti sunt amicitiae dei.

Quam bene se habet homo ille qui ingeniosus est, & qui animam sortitus est sapientia predictam. [p.99]

Quisnam inter homines consilium tuum noscit, aut quis poterit cogitare quid uelis tu?

Sensum tuum quis intelligat nisi tu dederis sapientiam illi, & instruas eum per spiritum tuum sanctum?

Nam rationes hominum in multis deficiunt, & parum securae adinuationes eorum.

Corruptibile enim corpus animum grauat & terrenum domicilium retardat mentem multa cogitantem.

Superné, consilium & succes- [p. 100] sus, & illic prudentia ac etiam uirtus.

Tecum sunt diuitiae & gloria, opes incorruptibiles & iustitia.

Qui te inuenerit, inuenit uitam, & te qui non amat, diligit mortem.

Domine Deus tange os meum, ut recedat iniquitas mea, inhabita cor meum ut peccata mea purgentur.

In maliuolam animam sapientia non intrat, nec manebit in corpore quod peccatis subditur.

Doce me domine Deus, ne [p. 101] augescat ignorantia mea, & delicta mea multiplicentur.

Spiritus me doceat quae tibi placita sunt, & ducat in uiam rectam, nam in erroris uia diutius erraui.

Firmetur sapientia in animo meo, & legem tuam in corde meo scribe.

Super omnia quae speciosa sunt, & pulchra, sapientiam desidero in comparatione illius diuitias non aestimo.

Quam amo sapientiam tuam domine, quae unica medi- [p. 102] tatio mea est.

Quam dulcia cordi meo eloquia tua? multo magis quam mel ori meo.

Verbum tuum pedibus meis lucerna est, & uijs meis lumen.

Magis mihi placet sapientia tua, quam milia auri uel argenti.
 In uia sapientiae tuae delector magis quam ingenti diuitiarum copia.
 Vtinam dirigantur uiae meae, ut sapientiam tuam, & sermones tuos discam.
 Eloquium tuum ignitum est, hinc [p. 103] fit ut uehementer illud cupiam.
 O beatum illum quem tu instruis domine, & in lege tua doctum facis.
 Anima eius sapientiam meditabitur, & lingua eius loquetur iudicium.
 Lex dei in corde suo scribetur, & non supplantabuntur gressus eius.
 O domine Deus salutis meae, exaudi precem meam: & lingua mea misericordias tuas semper loquetur.
 Da sedium tuarum adstri- [p. 104] cem sapientiam, ut bonum & malum discernere possim, & occulta tua cognoscam.
 Reuela oculos meos, ut ad miranda perspiciam quae in tua lege sunt.
 Memor esto verbi tui te inuocanti, nam in illo spem meam posui.
 Viam sapientiae notam fac mihi, & scientiam tuam ne coeles à me.
 Fac mecum iuxta misericordiam tuam, & ne confundas me ab expectatione mea.
 Recte sapere & intelligere [p. 105] doceto me, nam sapientia tua totum quod uolo.
 Da uerbum tuum in ore meo, & in corde meo sapientiam tuam fige.
 Sapientia tua cogitationes meas regat, ut placeant coram oculis tuis semper.
 Mirabilia sunt eloquia tua, quapropter delectatur in eis anima mea.
 Sapientia tua perfecta est, scientia tua lucida, & oculos illuminans.
 Amabilia super aurum [p. 106] & gemmas, & dulciora quam mel de fauo.
 Sapientia tua immaculata, animas confortans, eloquium tuum uerax, intellectum docens paruulos.
 Quando sciet errans spiritu intelligentiam? & ignorans doctrinam discet?
 Quando effundetur de excelso spiritus tuus quando cor insipientis scientiam callebit, quando lingua balbutiens deserta erit?
 Paruulus & insipiens sum domine, auxilio sit mihi ma- [p. 107] nus tua fortis.
 Noui quod omnia potes, & nihil est tibi difficile.
 Tu magnus es incognoscibilis, & sapientiae tuae nullus est numerus.
 Annunciaui coram te causam meam, fac cum seruo tuo iuxta magnam misericordiam tuam.
 Respice ad me & miserere mei, ut hoc quod credens per te posse fieri cogito, perficiam.
 Viam sapientiae tuae notam fac mihi, & intellectu illius cor meum imple. [p. 108]
 Vocem meam audi secundum misericordiam tuam domine, secundum iudicium mecum agito.
 Da gloriam nomini tuo domine, tu enim solus es bonus & sapiens, & non est alius praeter te saluator.
 Exaudi me domine, propter nomen tuum, & ne contineas me misericordiam tuam.
 Eructabunt labia mea laudem, cum docueris me sapientiam tuam.
 Tum enarrabo mirabilia tua, ut alij etiam ad te conuertantur. [p. 109]
 Et benedicant nomen tuum in sempiternum & in seculum seculi, Amen.

NOTES

¹ *Libri Septimi Apertorii Cracoviensis Mystici, Sabbatici, Pars Quarta in T&FR*, 184.

² On this tradition see Lynn Thorndike, "Solomon and the Ars Notoria", in *A History of Magic and Experimental Science during the first thirteen centuries of our era*, 8 vols (London and New York: Macmillan & Co., 1923-58), II, 279-289. See also Richard Kieckhefer, *Magic in the Middle Ages* (Cambridge: Cambridge University Press, 1989, repr. 1993), 151-172.

³ See for example John Eglington Bailey, *Diary, for the years 1595-1601, of Dr John Dee, Warden of Manchester from 1595 to 1608. Edited from the original MSS in the Bodleian Library* (n.p., 1880), 2: "[Dee had] long forsaken the exact sciences, having exhausted their study; and had devoted himself to the blighting influence of occult investigations, intermingling with them in credulous simplicity what remained in him of the Christian faith."

⁴ See Carl Kiesewetter, *John Dee, ein Spiritist des 16 Jahrhunderts. Kulturgeschichtliche Studien* (Leipzig, 1893, repr. Schwarzenburg: Ansata Verlag, 1977).

⁵ A thesis which was popularised by Edwin Arthur Burtt's influential study, *The Metaphysical Foundations of Modern Physical Science* (London: Kegan Paul & Co., 1925).

⁶ *JDEP*, I, 744: "The mysteries of the spiritual regions which Dee attempted to penetrate by establishing direct contact, were not infrequently regarded in his age, in which the claim of religion to contain the most perfect and complete expression of the general scheme, structure, and purpose of the cosmos, was neither denied or lightly regarded, as forming a legitimate branch of Natural Philosophy."

⁷ *JDEP*, I, 808.

⁸ Luigi Firpo, "John Dee, Scienziato, Negromante e Avventuriero," *Rinascimento*, 3 (1952): 25-84.

⁹ Firpo, 25: "un documento singolarmente rivelatore delle credenze, delle aspirazioni e della cultura del Cinquecento."

¹⁰ Firpo, 29: "Nel Dee questo avvio è sostenuto da un altissimo concetto del proprio ingegno e da un profondo spirito religioso [e ...] la certezza di uno speciale favore di Dio."

¹¹ Firpo, 29: "non ha la consapevolezza dell'infinita umiltà e pazienza cui dovranno ormai piegarsi i ricercatori sperimentali per conseguire a prezzo di penose fatiche piccole verità parziali e provvisorie: quella ch'egli affanosamente ricerca è una via rapida, breve, infallibile, per assurgere ad una conoscenza totale, che coincida con un illimitato potere dell'uomo sulla natura. Questo peccato di superbia impaziente risolve la filosofia della natura nell'occultismo[...]"

¹² Firpo, 48: "un prolisso discorso [...] una verbosa e vacua orazione a Dio e [...] un minuzioso rituale."

¹³ Firpo, 41: "[i] suoi truffaldini 'misteri'."

¹⁴ Firpo, 45: "[gli] atteggiamenti ispirati e istrioneschi del Dee."

¹⁵ Firpo, 40-41: "Le presunte rivelazioni del futuro risultano tutte grossolanamente false, vistosi gli errori geografici e di scienze naturali, sgrammaticato il latino qua e là usato con parsimonia, chè gli angeli preferiscono parlar l'inglese [...]. Lo stile angelico è una triviale parodia di quello biblico, con frequenti e ovvie intrusioni di locuzioni scritturali in talune sedute [...] gli spiriti invisibili parlano un linguaggio affatto privo di senso, proclamando che si tratta della lingua usata da Adamo prima del peccato originale. In conclusione, la cultura che nelle pseudo-rivelazioni si riflette è bene la cultura raffazzonata, monca e approssimativa di Kelley, e sono sempre gli interessi suoi più urgenti e concreti, turpi talvolta, che gli angeli si affannano a tutelare."

¹⁶ Firpo, 83: "v'è soprattutto in questa personalità [...] una frattura profonda che sgomenta: l'uomo che aveva dato prove tanto degne in molteplici campi di studio, il matematico, il geografo, l'astronomo, si eclissa subitaneamente e si annienta in una cieca infatuazione superstiziosa."

¹⁷ Frances A. Yates, *The Occult Philosophy in the Elizabethan Age* (London: Routledge & Kegan Paul, 1979, repr. 1983), 82.

¹⁸ Frances A. Yates, *Theatre of the World* (London: Routledge and Kegan Paul, 1969), 186.

¹⁹ Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964), see especially 130-143.

²⁰ Peter J. French, *John Dee, The World of an Elizabethan Magus* (London: Routledge & Kegan Paul, 1972), 116, 118.

²¹ French, *John Dee*, 119. Cf. also 2-3: "Hermeticism, the gnostic philosophy based on the rediscovered texts of the legendary Hermes Trismegistus is basic to Dee's thought."

²² Christopher Whitby, "John Dee's Actions with Spirits 1581 to 1585" (Unpublished PhD thesis, University of Birmingham, 1981). A two volume facsimile of Whitby's thesis was published by the Garland Press, New York in 1988). The thesis includes a full transcription of the *Liber Mysteriorum* (see Whitby, II, 1-407).

²³ Whitby, "John Dee's Actions with Spirits", I, 181.

²⁴ Whitby, "John Dee's Actions with Spirits", I, 71.

²⁵ Whitby, "John Dee's Actions with Spirits", I, 75. But see also his later contradictory statement: "the magical system [...] bears a great similarity with the kind of magic described in the third book of Agrippa's *De occulta philosophia*." (Whitby, "John Dee's Actions with Spirits", I, 116).

²⁶ Whitby, "John Dee's Actions with Spirits", I, 74-75.

²⁷ Whitby, "John Dee's Actions with Spirits", I, 79-93.

²⁸ Whitby, "John Dee's Actions with Spirits", I, 74.

²⁹ Christopher Whitby, "John Dee and Renaissance Scrying", *Bulletin of the Society for Renaissance Studies*, 3:2 (1985): 25-37 (26).

³⁰ Whitby, "John Dee's Actions with Spirits", I, 116.

³¹ He does, however, note that the design of Dee's "Holy Table" may have been "derived from a manuscript copy of the Key of Solomon," I, 151. While he notes the circulation of Pseudo-Solomonic manuscripts during the sixteenth century (I, 78 and fn. 27, 95) he does not pursue the possibility that they may have been a model for Dee's ceremonial practices.

³² Wayne Shumaker, *Renaissance Curiosa* (Binghamton: Mediaeval and Renaissance Texts and Studies, 1982), 15-52. Cf. *ibid.*, 15: "Essentially Dee's life was that of the Neoplatonist sage portrayed by Calder, and by intention at least, of the *magus* saluted by French."

³³ Shumaker, *Renaissance Curiosa*, 20-21.

³⁴ Shumaker, *Renaissance Curiosa*, 24.

³⁵ Shumaker, *Renaissance Curiosa*, 40.

³⁶ Shumaker, *Renaissance Curiosa*, 22, 48.

³⁷ Shumaker, *Renaissance Curiosa*, 27.

³⁸ Shumaker, *Renaissance Curiosa*, 33.

³⁹ Shumaker, *Renaissance Curiosa*, 29, 38.

⁴⁰ Wayne Shumaker, *Natural Magic and Modern Science: Four Treatises 1590-1657* (Binghamton: Mediaeval and Renaissance Texts and Studies, 1989), 3-4.

⁴¹ Shumaker, *Renaissance Curiosa*, 44, 46.

⁴² Shumaker, *Renaissance Curiosa*, 44, 49.

⁴³ Shumaker, *Renaissance Curiosa*, 46, 48.

⁴⁴ *NP*, 204. (My emphasis)

⁴⁵ *NP*, 203.

⁴⁶ *NP*, 214: "It is a magic that is far removed from both the philosophical magic and occult philosophy of the Renaissance and the natural magic he seems to have derived from Roger Bacon."

⁴⁷ *NP*, 206.

⁴⁸ *NP*, 214. This is a simplification of some of the nuances of Clulee's argument. Later he submits that there are magical elements or tendencies in Dee's practices (212), but suggests that these can be traced to the influence of Kelley, who – Clulee claims – was more knowledgeable than Dee in "mediaeval manuals of ritual magic" (211). His claim that Dee ends up practising a kind of magic by default to Kelley's influence (214), is, I think, untenable.

⁴⁹ *NP*, 206.

⁵⁰ *NP*, 207.

⁵¹ Clulee notes the sixteenth-century vitality of this tradition, but does not relate it to Dee's conversations. See *NP*, 133-5.

⁵² Deborah E. Harkness, "Shews in the Showstone: John Dee's Angelic Conversations," *Renaissance Quarterly*, 49 (1996): 707-737 (709, 711). For more on Harkness's cultural contextualization of Dee's angelic conversations see "The Scientific Reformation: John Dee and the Restitution of Nature" (Unpublished PhD Thesis, University of California Davis, 1994).

⁵³ Harkness, "Shews in the Showstone," 709.

⁵⁴ Harkness, "Shews in the Showstone," 715-716. These claims are repeated in her book. See Deborah E. Harkness, *John Dee's Conversations with Angels: Cabala, Alchemy and the End of the World* (Cambridge: Cambridge University Press, 1999), 77, 96, 100-101, 117, etc.

⁵⁵ Harkness, "Shews in the Showstone," 718, 732.

⁵⁶ See my introduction to this volume, 9-10, *supra*.

⁵⁷ See, for example, *Conversations with Angels*, 40, where Harkness argues that Solomonic magical works "contribute little" to our understanding of Dee's angelic diaries. In my view, Harkness tends to exaggerate the differences between Dee's conversations and mediaeval magical practices by distinguishing too readily between "prayer" on the one hand and "conjunction" and "invocation" on the other. See, for example, *Conversations with Angels*, 96, 120, 123, etc.

⁵⁸ See Brian Copenhaver, "Natural magic, hermetism, and occultism in early modern science" in David C. Lindberg and Robert S. Westman, eds., *Reappraisals of the Scientific Revolution* (Cambridge: Cambridge University Press, 1990), 261-302.

⁵⁹ Yates, *Giordano Bruno*, 107.

⁶⁰ Yates, *Giordano Bruno*, 107. Cf. her contrast between Ficinian natural magic and the mediaeval magical tradition, *Giordano Bruno*, 80: "How elegant, how artistic and refined is this modern natural magic! If we think of the Neoplatonic philosopher singing Orphic hymns, accompanying himself on the lira di braccio [...] and then compare this Renaissance vision with the barbarous mutterings of some invocation in *Picatrix*, the contrast between the new magic and the old is painfully evident. [...] If we think of the flowers, jewels, scents with which Ficino's patients are advised to surround themselves, of the charmingly healthy and wealthy way of life which they are to follow, and compare this with the filthy and obscene substances, the

stinking and disgusting mixtures recommended in the *Picatrix*, the contrast is again most striking between the new elegant magic [...] and that old dirty magic.”

⁶¹ Yates, *Giordano Bruno*, 108.

⁶² Yates, *Giordano Bruno*, 102.

⁶³ See Marsilio Ficino, *Marsilius Ficinus Florentinus de triplici vita* (Paris, 1491), III, xvi, sigs. n.viii^f-iii^v. The reference to the “Arab fraternity” is at sig. n.viii^v.

⁶⁴ Yates, *Giordano Bruno*, 140, 145-6; idem, *Occult Philosophy*, 38, 116.

⁶⁵ Clulee, 138: “Trithemius’s sources were almost entirely mediaeval works of the notory art, such as the *Clavicula Salomonis*, the *Ars Notoria*, the *Liber Razielis* [...]. Another of Trithemius’s sources, [was] the Latin *Picatrix*.” See also Trithemius’s *Liber Polygraphiae* (Argentinae, 1600), 597 where he gives an “alphabetum Honorij cognomento Thebani” (i.e. the purported author of the Pseudo-Solomonic *Liber sacer*, also known as *The Sworn Book of Honorius*), commenting that “his operations had been clouded over by (or concealed in) foolish magic as it is revealed in Book Four of Petrus de Apono” (*cuius ministerio suas in magicis fatuitates abscondit, sicut Petrus de Apono restatur in suo maiore libro quarto*).

⁶⁶ Yates, *Giordano Bruno*, 107.

⁶⁷ *NP*, 132-3.

⁶⁸ Yates, *Giordano Bruno*, 83: “When Hermes Trismegistus entered the Church, the history of magic became involved with the history of religion in the Renaissance.”

⁶⁹ There are numerous extant transcriptions of Pseudo-Solomonic magical texts made in the eighteenth century. See, for example, the manuscript copies of the *Clavicula Salomonis Regis* and the *Sefer Raziel* collected by General Charles Rainsford (1727-1809), Lieutenant Governor of Gibraltar, in the library of the Duke of Northumberland at Alnwick Castle. See *Third Report of the Royal Commission on Historical Manuscripts* (London, 1872), 122-3.

⁷⁰ Johann Wier, *De Praestigiis Daemonum, et incantationibus* [etc.] (Basel, 1566), II, iii, in *Witches, devils and doctors in the Renaissance*, trans. John Shea (Binghamton: Mediaeval and Renaissance Texts & Studies, 1991), 104.

⁷¹ Wier, *De Praestigiis Daemonum*, II, iii, 104-5. Cf. II, v, 110: “Furthermore these magicians not only claim that eminent men, holy patriarchs, and angels of God are the authors of such wicked and execrable doctrines; they do not even blush to make a display of books passed down by Raziel and Raphael, the angels of Adam and Tobias – seeking by this ruse to give a more attractive appearance to their own monstrous creation [*Empusa*].”

⁷² Wier, *De Praestigiis daemonum*, II, v, 111.

⁷³ Wier, *De Praestigiis daemonum*, II, v, 112.

⁷⁴ D.P. Walker, *Spiritual and Demonic Magic from Ficino to Campanella*, Studies of the Warburg Institute, 22 (London: The Warburg Institute, 1958), 76, cit. Whitby, “Renaissance Scrying”, 26.

⁷⁵ *Lib. Myst.*, fol. 8^v.

⁷⁶ *De Heptarchia Mystica*, British Library, Sloane MS 3191, fol. 45^r.

⁷⁷ James A.H. Murray, *A New English Dictionary on Historical Principles; Founded mainly on the materials collected by the Philological Society*, 10 vols (Oxford: Clarendon Press, 1897-1928), “Exercise”, 10 a-f, III, 402; R.E. Latham, *Revised Mediaeval Latin Word List from British and Irish Sources* (London: Oxford University Press for the British Academy, 1965), “exercitus”, 177, and J.E. Niermeyer, *Mediae Latinitatis Lexicon Minus* (Leiden: Brill, 1976), “exercitium”, 392.

⁷⁸ Archbishop John Whitgift, *The defense of the Aunswere to the admonition against the Replie of T[homas] C[artwright]* (London, 1575), in J. Ayre, ed., *The Works of J. Whitgift*, 3 vols (Cambridge, 1851-3), II, 197. See also Patrick Collinson, *The Elizabethan Puritan Movement* (London: Jonathan Cape, 1967), Chapter 5, “Exercises, Conferences and Fasts”, 208-221.

⁷⁹ John Dee to Roger Edwardes, 12 July 1580, British Library, Cotton MS Vitellius CVII, fol. 315r. Edwardes’s “spiritual exercises” consisted in “labor[ing] the scriptures (without Interpreters) [...] to reade Godds booke *simpliciter*.” Roger Edwardes to John Dee, 31 March 1580, *ibid.*, fol. 312^{r-v}.

⁸⁰ See, for example, *Lib. Myst.*, fol. 124^r: “There were many other particulars of the Action w^{ch} might be noted.”

⁸¹ *Lib. Myst.*, fols. 122^v-123^r.

⁸² See Aegidio Forcellini, *Lexicon Totius Latinitatis*, 3 vols (Patavia, 1840), “Actio”, 2., I, 60. Whitgift, for example, talks about “ministering the sacraments, public prayers, and other such-like godly actions”, *Works*, II, 588.

- ⁸³ Charles Du Fresne Du Cange, *Glossarium ad scriptores mediae et infimae Latinitatis*, 10 vols (Paris, 1733-1766), "Actio", I, cols. 108-9.
- ⁸⁴ *Revised Mediaeval Latin Word List*, 5-6.
- ⁸⁵ See *Mediae Latinitatis Lexicon Minus*, "Mysterium", 697; Du Cange *Glossarium Mediae*, V, "Mysterium", 563-4; Latham, *Revised Mediaeval Word List*, "Mysterium", 310. For patristic usages see *Lexicon Totius Latinitatis*, III, "Mysterium", 326-7.
- ⁸⁶ *De Heptarchia Mystica*, British Library, Sloane MS 3191, fol. 33^r. See also *Lib. Myst.*, fol. 7^v, where he refers to "The Mysteries of <thy> truthes vnderstanding".
- ⁸⁷ On Dee's prophetic self-fashioning see Stephen Clucas, "Non est legendum sed inspiciendum solum: Inspectival knowledge and the visual logic of John Dee's *Liber Mysteriorum*" in Alison Adams and Stanton J. Linden, eds., *Emblems and Alchemy* (Glasgow: Glasgow Emblem Studies, 1998), 109-132, esp. 127-9.
- ⁸⁸ *Lib. Myst.*, fol. 8^r.
- ⁸⁹ In a note on a loose sheet bound between the *Liber Auxilij et Victoriae Terrestris* and the *De Heptarchia Mystica*, Dee seems to find corroboration for the heptarchical basis of his doctrine in the angelology of Clement of Alexandria: "In septenarijs totus Mundus circumiugitur omnium quae et Viua gignuntur, et quae nascuntur. Septem quidem sunt, (quorum est maxima potentia) Primogeniti Angeloru[m] Principes &c. Cleme[n]s Alex. Strom. lib. 6." *De Heptarchia Mystica*, BL, Sloane MS 3191, fol. 32^r.
- ⁹⁰ *Lib. Myst.*, fol. 80^r.
- ⁹¹ *Lib. Myst.*, fol. 51^r. The underlinings are in the original MS.
- ⁹² See, for example, *MH*, 5^v, 8^v, and 17^r.
- ⁹³ *MH*, 17^r. In mediaeval Latin "Mystagogia" signified "revelation", see Latham, *Revised Mediaeval Latin Word List*, "Mystagogia", 310.
- ⁹⁴ *MH*, 7^v.
- ⁹⁵ *MH*, 13^r.
- ⁹⁶ John Dee to William Cecil, 3 October 1574, British Library, Burghley Papers 1574-5, Lansdowne MS 19, fols. 81^r-83^r.
- ⁹⁷ John Dee to Roger Edwardes, 12 July 1580, British Library, Cotton MS Vitellius CVII, fol. 315^r.
- ⁹⁸ Cf. Dee's defense of "Thaumaturgike" or "Actes and Feates, Naturally, Mathematically, and Mechanically, wrought and contriued," as a practice permitted to the "Modest Christian Philosopher", in *MP*, sig.Aj^v - Aiiij^r.
- ⁹⁹ See *Ars notoria*, Bodleian Library, Ashmole MS 1515, Latin and English, sixteenth century, fols. 9^r, 24^r.
- ¹⁰⁰ Robert Turner, *The Ars Notoria: The Notory Art of Solomon* (London, 1657). It is not insignificant, perhaps, that Turner saw the "Notory Art" as a "holy and Sacramental Mystery," (*The Ars Notoria*, 16) rather than a form of "magic".
- ¹⁰¹ *NP*, 39-73.
- ¹⁰² Thorndike, *History*, II, 286.
- ¹⁰³ Gregory, *Regula pastoralis* (n.p., 1480), *Tractatus de cura pastoralis beati Gregorij pape*, cap. I, sig.a.j^r: "ars est artium regimen animarum".
- ¹⁰⁴ *Ars notoria*, British Library, Harleian MS 181, fol. 19^r: "ieiunabis in pane et aqua tribus diebus, non manducando, quosque in celo stelle videan[tur] [...] et da pauperibus".
- ¹⁰⁵ *Ars notoria*, BL, Harleian MS 181, fol.26^r "ieiunandu[m] est in ipsis diebus, quibus inspiciun[tur] figure".
- ¹⁰⁶ *Ars notoria*, BL, Harleian MS 181, fol. 57^r.
- ¹⁰⁷ *Liber Sacer*, British Library, Royal MS 17.A.XLII, fifteenth century, fol. 13^v: "Primo sit mundus operans non pollutus, et cum devocione faciat non astute non commedat neque bibat".
- ¹⁰⁸ *Liber Sacer*, BL, Royal MS 17.A.XLII, fol. 14^v.
- ¹⁰⁹ *Liber Sacer*, BL, Royal MS 17.A.XLII, fol. 13^v. Cf. *Liber Salomonis (Sefer Raziel)*, British Library, Sloane MS 3846, sixteenth-seventeenth Century, fol. 130^r: "he that shall write this booke oughte to be cleane & fasting & bathed & suffumed with precious aromatikes, that is with spices well smelling".
- ¹¹⁰ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 130^r.
- ¹¹¹ *Magical Tracts*, British Library, Sloane MS 3851, seventeenth century, collected by "one Mr Arthur Gauntlet, who professed Phisick, and lived about Graies Inn Lane" (fol. 2v). The quotes are from the "Instructions of Ptolomie", fol. 3^r.
- ¹¹² *Ars notoria*, BL, Harleian MS 181, fol. 19^r: "locu[m] secretu[m], videlicet in ecclesia[m], vel in atriu[m], vel in ortu[m]".
- ¹¹³ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 130^v.
- ¹¹⁴ *Liber virtutis*, British Library, Harleian MS 181, sixteenth century, fol.

¹¹⁵ *Ars Notoria*, BL, Harleian MS 181, fol. 26^r: “Item solus sit [...] qui opera[tur] in eis [...] nisi esset magister artis, qui instrueret operantem”. Nobody “other than the true partner of the teacher is allowed to be present whilst the orations are pronounced, or the figures are viewed” (*Aliu[m] vero sociu[m] praeter mag[istru]m non licet habere in inspectione figuraru[m], nec in pronu[n]ciatione orationu[m] suaru[m]*), *ibid.*

¹¹⁶ *Ars notoria*, BL, Harleian MS 181, fol. 76^r: “Et camera[m] habeas secreta[m], nitida[m], munda[m], ab immunditijs aranearu[m], et pulueris, et clausa[m]: Eisque solus dormiens in ea: Erit etia[m] seratus mundus; et in ea in modu[m] altaris mensula mundis lintheis cooperta, et super eam duo candelabra cu[m] cereis benedictis in *Purificatione* ardentes.” Although this quote is from a text (the *De arte crucifixi Pelagij Solitarij*) which belongs to another genus of magical art, it is nonetheless closely related to Pseudo-Solomonic practices. For more on the Pelagian “art of the crucifix” see Stephen Clucas, “*Regimen Animarum et Corporum*: The Body and Spatial Practice in mediaeval and Renaissance magic”, in Daryll Grantley and Nina Taunton, eds., *The Body in Late Mediaeval and Early Modern Culture* (Ashgate: Aldershot, 2000), 113-129 (esp. 116-119).

¹¹⁷ *Ars notoria*, British Library, Sloane MS 1712, thirteenth century, fol. 1^r

¹¹⁸ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 131^r. Cf. also fol. 129^r: “the 7 treatises of this booke be these. The first is said *Claui*, for that in it, is determined of *Astronomy*, & of the starrs for without them we may doe nothing”.

¹¹⁹ See, for example, *Ars notoria*, BL, Harleian MS 181, which gives detailed prescriptions concerning the correct phases of the moon (*lunationes*) for each segment of the magical operation it describes.

¹²⁰ See, for e.g. *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 131^v, which names “7 bretheren” and their planets: Sabaday (Saturn), Zedet (Jupiter), Madin (Mars), Hamina (Sun), Noga (Venus), Cocab (Mercury), and Labana (Moon).

¹²¹ *Ars notoria*, BL, Harleian MS 181, fol. 19^v: “verte faciem tua[m] versu[m] oriente[m]: et in terra[m] prosterne manus”.

¹²² See *Ars notoria*, BL, Harleian MS 181, fol. 19^v: “in terra[m] prosterne manus, dicendo 7. psalmos poenitentiales, cum .7. orationibus dominicalibus, et [...] totidem *Credo in Deu[m]*, humiliter implorando”.

¹²³ See *Liber sacer*, BL, Royal MS 17.A.XLII, fols. 29^r-31^r, which includes three orations dedicated to the Virgin Mary – “Ave Maria”, “Salve Regina” and “O gloriosa domina virgo”.

¹²⁴ See *Ars notoria*, BL, Harleian MS 181, fol. 20^r: “*Pater noster: Aue Maria: Et ne nos inducas &c [...]* *Pater de coelis Deus, miserere nobis: det sic tota litania est dicenda [...]*” and *Liber virtutis*, BL, Harleian MS 181, fol. 5^r: “*Miserere mei Deus*; all the verses, with *Gloria patri sicut erat. Kyrie eleson, [Christe] eleson, Kyrie eleson Pater noster* and *Aue Maria 3. Credo in Deum. Confiteor. Misereatur nostri.*”

¹²⁵ *Ars notoria*, BL, Harleian MS 181, fol. 18^r. See also the description of the art at fol. 56^v: “This art or operation consists in orations in which are invoked, recited and named the names of the holy ones dwelling in the celestial abodes of the living God.” (*istius artis vel operac[i]onis consistit in orac[i]onibus; inter quas no[m]i[n]ant[ur] recitant[ur] et inuocant[ur] n[omin]a sanctoru[m] Dei uiui in supernis sedibus residentium*).

¹²⁶ See for example, *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 129^v: “The name [of this book] expanded in Latin is *Angelus magnus secreti Creatoris*. That is to say the great Angell of the secret creator. And in hebrue Cephar Raziel that is the booke of hollines & of fullfillinge & it was the first booke after Adam written in language of Caldey & afterwards translated in hebrue”. See also the marginal glosses to *Ars Notoria*, Bodleian MS Ashmole 1515, sixteenth century, fol. 5^{r-v}, where the magical orations are described variously as “oratio hebraica”, “chald[ai]ca” or “Arabic[a]”.

¹²⁷ *Ars notoria*, BL, Sloane MS 1712, fol. 16^v.

¹²⁸ *Ars notoria*, BL, Harleian MS 181, fol. 39^r.

¹²⁹ *Ars notoria*, BL, Harleian MS 181, fol. 50^{r-v}: “q[uam]vis indignus sum, mihi concedas, et in mente[m] mea[m] confirma et corrobora,” and fol. 39^r: “da mihi ea quae [...] credo absque malignitatis intentione scientiam.”

¹³⁰ See for example, *Ars notoria*, BL, Harleian MS 181, fol. 37^r: “viuifica intellectu[m] meu[m] foecunda mihi memoria[m] mihi. Exalta co[n]scientia[m] mea[m],” and fol. 38^r: “augmentetur sensus meus, et memoria mea [...] aperta mihi scientiae ianua gratuletur cor meu[m], et confirmatu[m], et emundatu[m] per vos percipiet, et conseruet scientia[m] et sapientia[m] [...] da mihi ea quae desidero.”

¹³¹ See for example, *Ars notoria*, BL, Harleian MS 181, fol. 19^r: “addens vnique corpori spiritu[m] propriu[m] et veracem, ad custodiendu[m] illum, et defendendu[m] ab incursionibus spiritu[m] immundoru[m] et illusionibus eorum”, and fol. 20^v: “Obsecro te angelice spiritus; cui ego ad prouidendu[m]

com[m]issus sum; vt custodias me indefinenter; et protegas ab incursu diaboli, vigilantem, et dormientem, nocte et die [...] repelle a me omnem temptatione[m] Sathanae.”

¹³² See, for example, *Ars notoria*, BL, Harleian MS 181, fol. 46^r: “Deus exaudi preces meas; et adiuva me in opere sancto isto,” and fol. 48^r: “Te domine suppliciter imploro, deosco, flagito et supplico.”

¹³³ See *Ars notoria*, BL, Harleian MS 181, fol. 38^r: “mitte mihi sanctos angelos tuos de excelso coelo, qui custodiant me, et sensu[m], et memoria[m] et intelligentia[m] mea[m] et adimplea[m] praecepta tua” and fol. 55^r: “Funda Domine in me, illum quadrangulare philosophiae palaciu[m].”

¹³⁴ See Stephen Clucas, “Wondrous force and operation: magic, science and religion in the Renaissance” in Philippa Berry and Margaret Tudeau, eds., *Textures of Renaissance Knowledge* (Manchester: Manchester University Press, 2003), 35-57.

¹³⁵ See, for example, *Liber sacer*, BL, Royal MS 17.A.XLII, fol. 4^v: “the first chapter is of the composysyon of the greate name of god which the hebrues call sememphoras which doth consist of .72 [...] letters which is the beginning of the arte”, and *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 129^v, where it is claimed that it contains “all semoforax, that is the great name compleate with all his names whole & even & with his vertus and sacraments”. See also Johannes Reuchlin, *De arte Cabalistica libri Tres* (Hagenau, 1517), 58^v: “Sunt itaque lxxii nomina sacra quod unum Semhamphores id est sanctissimi Tetragrammati nomen expositorum d[icitu]r per invocationes angelorum ab hominibus deo deditis, deuotisque cum timore ac tremore sic enuncianda.”

¹³⁶ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 155^v.

¹³⁷ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 132^r.

¹³⁸ *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 155^v.

¹³⁹ See, for example, *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 155^v-156^r: “this is the name thou shalt name when thou wilt speake with angells & they thy question & thy worke without doubt shall fulfill”, and fol. 156^r: “these names thou shalt name when thou wilt that the Elements & winds fulfill thy will in all things.”

¹⁴⁰ See, for example, *Ars notoria*, British Library, Sloane MS 313, fourteenth-fifteenth century, fols. 2^v-4^v, and *Liber sacer*, BL, Royal MS 17.A.XLII, fols. 9^v et seq., which describes “the makinge off the seale off the true and lyuinge god.”

¹⁴¹ See, for example, *Liber Sacer*, BL, Royal MS 17.A.XLII, fol. 6^r, which refers to “a glasse wherein thou shalt see the whole worlde.”

¹⁴² See *Ars Notoria*, BL, Harleian MS 181, fol. 18^r: “incipit sanctissima ars Notoria [...] vt per eam omnes scientias liberales, mechanicas et exceptiuas, et earum facultates per breue spatium[m] temporis posset acquirere et habere.”

¹⁴³ See, for e.g. *Ars notoria*, BL, Harleian MS 181, fol. 30^v: “Non debent legi sed inspici tantum.” On the theme of magical “inspection” in the Pseudo-Solomonic tradition see Clucas “Inspectival knowledge and the visual logic of John Dee’s *Liber Mysteriorum*”, 115-121.

¹⁴⁴ See *Ars notoria*, BL, Harleian MS 181, fol. 38^r.

¹⁴⁵ *Ars notoria*, BL, Harleian MS 181, fol. 43^v, re. the “figure of the dialectical art” (*figura artis dyalecticae*), which allows one to “acquire and possess perfect knowledge [of dialectics] and retain it in the memory” (*acquirere, et habere, et memoriter retinere perfecta[m] scientiam*).

¹⁴⁶ *Ars notoria*, BL, Harleian MS 181, for example, gives the figures and orations for “artis Grammaticae” (fols. 25^r et seq.), and orations for “Dyalectica” (fols. 39^r et seq.), “artis Rethoricae” (fols. 46^v et seq.), “artis phisicae” (fols. 59^v et seq.), “artis musicae” (fols. 60^r et seq.), “artis arismetriae” (fols. 61^v et seq.) and “Astronomia” (fols. 65^v et seq.). The accompanying figures for dialectic through to astronomy are missing, although spaces have been reserved for their inclusion. This manuscript seems to be a late copy of a much earlier text, it has substantial points of textual overlap, for example, with *Ars notoria*, BL, Sloane MS 1712, (cf. fol. 16^v, and *Ars notoria*, BL, Harleian MS 181, fol. 39^r, for example). The thirteenth-century manuscript does, however, include figures for theology, geometry and jurisprudence, which are absent from the later manuscript.

¹⁴⁷ See *Ars notoria*, BL, Harleian MS 181, fol. 69^r et seq. for a description of the “figura generaliu[m]” or “Nota Dei”, and fol. 30^v for “4 signa a Deo Data Salomoni omni[bus] artibus communia.” For earlier examples of this “general figure” see *Ars notoria*, BL, Sloane MS 1712, fol. 20^v and Bodley MS 951, fifteenth century, fol. 10^v.

¹⁴⁸ *Liber sacer*, BL, Royal MS 17.A.XLII, fols. 5^r-6^v.

¹⁴⁹ *Lib. Myst.*, fol. 13^v.

¹⁵⁰ *Lib. Myst.*, fol. 55^r. Cf. also *T&FR*, 178, where Dee says “I do know assuredly that there is very much matter in this table”, and his angelic interlocutor replies “*It is true: for hitherto*, stretched the knowledge of Solomon,” and Dee notes in the margin: “*Solomon his knowledge*.”

¹⁵¹ *Lib. Myst.*, fol. 12^r. On the rabbinical tradition of Solomon’s magic ring and its alleged relation to earlier Parsi traditions, see Moncure Daniel Conway, *Solomon and Solomon’s Literature* (London, 1899), 185–6.

¹⁵² *Lib. Myst.*, fol. 12^r (marginal note): “Vide Reuchlini libru[m] de Verbo Mirifico de nomine PELE.”

¹⁵³ See, for example, the *De quatuor annulis*, British Library, Sloane MS 3847 sixteenth-seventeenth century, fols. 66^r–81^v, which presents a series of “seales” which bear a generic resemblance to some of Dee’s talismanic “tables” or “scutcheons”.

¹⁵⁴ *Lib. Myst.*, fol. 8^r. For a fuller account of Dee’s ascetic regime see Gabriel’s injunction on 13 October 1583 in *T&FR*, 39–40. Cf. *T&FR*, 53: “Fight [...] and cast off the world. Make flesh subiect, and strangle your Adversary. For unto such belongeth the entrance into my Chambers, and the use of my will”.

¹⁵⁵ *Ars notoria*, BL, Harleian MS 181, fol. 26^r.

¹⁵⁶ *Lib. Myst.*, fol. 51^r. Cf. also fol. 17^r, where Dee and Kelley are required to take a “vow [r]equired for secrecie”. Dee is frequently worried by domestic intrusions on his actions, and there are many references to the closing of outer doors, etc.

¹⁵⁷ *Lib. Myst.*, fol. 70^v. Dee is told that the 49 prayers of the book have “49 manner of Vnderstandings. Therein is comprehended so many languages They are all spoken at ones.” However, he is also told that “Vntill thou com[m]e to the Citie [i.e. the new Jerusalem] thou canst not behold the beawty thereof.” (Ibid.)

¹⁵⁸ *Lib. Myst.*, fol. 64^r.

¹⁵⁹ *Lib. Myst.*, fol. 74^r: “[EK] Prayed perfectly in this Angel’s language.”

¹⁶⁰ *Lib. Myst.*, fol. 80^r.

¹⁶¹ *Lib. Myst.*, fol. 70^v.

¹⁶² *T&FR*, 88.

¹⁶³ *Lib. Myst.*, fol. 24^r. This is a circular figure containing a cross, and the letters g, m, l, l, e and e (clockwise). The angels’ names are to be produced by combining each letter with the cross in turn: “7 secrett Angels proceeding from euery letter and cross so formed”. Cf. fol. 17^v et seq., in which 40 tablets carried by “40 white creatures” are identified as being “Nomen dei vel No[m]i[n]a Diuina”.

¹⁶⁴ See, for example, *Lib. Myst.*, fol. 25^r: “In 7 must you work all things”, fol. 28^v: “Let us praise the God of 7”. Cf. *Liber Salomonis (Sefer Raziel)*, BL, Sloane MS 3846, fol. 131^r: “the 7 wordes [of the key] be 7 angells which han might in the 7 heauens & in the 7 dayes of the weeke”. The *Sefer Raziel* is said to contain seven books (fol. 129^v), and there are seven “semaphoras” which “god the creator gaue to Adam in paradise” (fol. 155^v).

¹⁶⁵ *Lib. Myst.*, fol. 30^r. In many Solomonian texts there is a lengthy description of how to construct such a seal, see for example *Liber sacer*, BL, Royal MS 17.A.XLII, fols. 9^v et seq.: “here folowithe the makinge off the seale off the true and lyuinge god”.

¹⁶⁶ See *R&W*, 168 for details of Dee’s copy of Honorius Magister Thebarum’s *Liber Juratus* (*R&W*, no. DM70). This manuscript also bears the inscription “Sum Ben: Jonsonij liber”.

¹⁶⁷ *Lib. Myst.*, fol. 12^r: “I need to know, which of them I shall imitate: or how to make one perfect of them all”.

¹⁶⁸ *Lib. Myst.*, fol. 12^r: “De Sigillo Emeth vide Reuchlini Cabalisticæ Lib 3 et Agrippa[m] Lib. 3 cap. 11”.

¹⁶⁹ *Lib. Myst.*, fol. 51^r. Cf. *Liber sacer*, BL, Royal MS 17.A.XLII, fol. 5^r: “to knowe the seales [...] [and] offyce of euery angell [...] to obtayne all syences [...] and] to know all thinges present past and to come.”

¹⁷⁰ *Lib. Myst.*, fol. 57^v.

¹⁷¹ *Liber sacer*, BL, Royal MS 17.A.XLII, fol. 5^v.

¹⁷² *Lib. Myst.*, fol. 68^r.

¹⁷³ *Liber sacer*, BL, Royal MS 17.A.XLII, fol. 6^r.

¹⁷⁴ *Lib. Myst.*, fol. 36^v.

¹⁷⁵ *Lib. Myst.*, fol. 39^v.

¹⁷⁶ *Lib. Myst.*, fols. 7^{r-v}, and fols. 118^r–121^r. Cf. *Libri Cracoviensis Mysticus Apertorius, Julii, 12 1584*, *T&FR*, 219: “Behold, those that dig into Nature with dull mattocks, and dull Spades, are such, as of every congeled substance can imagin, but not judge: are foolish, and of the world: whose imaginations, are become the instruments of vanity [...]. Wo be unto them, for their disputations and doctrines, are dogma’s and dull [...]. But by him you are lifted up, that is the God of Justice, and the Discloser of his own secrets: and the headlong drawer of things to an end.” See also the spirit Madimi’s condemnation of the venality of

human scholarship, *T&FR*, 216: “Wo be unto the books of the earth, for they are corrupted; and are become a wrasting stock, and firebrand to the conscience.”

¹⁷⁷ *Mensis Mysticus Saobaticus, pars prima ejusdem*, *T&FR*, 91. Cf. *Lib. Myst.*, fol. 24^r, where Dee asks the angel Michael for “Perfect knowledg and vnderstanding”, noting in the margin: “My continuall and auncient prayer.”

¹⁷⁸ See *Ars notoria*, Oxford, Bodleian Library, Ashmole MS 1515, sixteenth century, fol. 9^r: “Of this Oration he sayth, yⁱ is the mistery thereof yⁱ it moveth even the caelestiall sp[er]its to doe some grett thing by p[er]mission of ye divine pow[e]r.”

¹⁷⁹ *Lib. Myst.*, fols. 119^r and 120^r. Cf. *T&FR*, 172.

¹⁸⁰ *Ars notoria*, BL, Harleian MS 181, fol. 68^r [my emphasis].

¹⁸¹ Desiderius Erasmus, “Vita D. Ioannis Phisceri Rofensis Episcopi ex D. Erasmi Rotherdami scriptis elicit”, in *Incomparabilis Doctrina, Trium item Linguarum peritissimi uiri D. Erasmi Rotherodami, in sanctissimorum martirum Rofensis Episcopi, ac Thomae Mori* (Haganau, 1536), sig. Bii^r: “uero singulari pietate atque eruditione”. Cf. sig. Biiij^r, where he describes Fisher as “Episcopus uerae pietatis unicu[m] Exemplar.”

¹⁸² See, for example, *T&FR*, 32: “We prayed the Psalm of thanksgiving 14 of Roffensis for E.K. his deliverance from Barma and his 14 companions,” and *T&FR*, 171-2: “as the Lord A[lbertus] L[asky] was reading *Rofensis psalm. de Fiducia in Deum*, suddenly upon E.K. his right shoulder did a heavy thing seem to sit, or rest, whereof he told the Lord A. L. And afterward was this voyce uttered by that Creature in *Latine*. Lasky, *veniet tempus, cum tu portabis versum sedecimum, illius. Psalmi undecimi, in vexillo tuo, & vinces inimicos tuos*. Then A. L. sought in *Davids* Psalter for the eleventh Psalm, and sixteenth verse thereof: and while he was so about that Psalm, The voyce said that he meant not that Psalm of *David*, but the eleventh Psalm of *Roffensis*: which Psalm the Lord A. L. was then in reading to E.K. and was about the verse, *Hic labor ac dolor, &c.* being the sixth verse.” See Fisher, *Psalmi et Precationi*, “Psalmus XI. De fiducia in Deum”, 67-72.

¹⁸³ John Fisher, *Psalmi seu Precationes D. Ioan. Fisheri Episcopi Roffensis. Accessit Imploratio diuini auxilij contra tentationem ex Psalmis Davidis, per Th. Morum* (London, 1572), Psalmus V, 44-49. For the relevant passage see 48: “Recte sapere & intelligere doceto [*sic.* for docete] me, / nam sapientia tua totum quod volo. / Da verbum tuum in ore meo, & in corde meo sapientiam tuam fige.” See Appendix 2 for the full text of Fisher’s fifth psalm as it was published c. 1525.

¹⁸⁴ Fisher, *Psalmi*, 44-6.

¹⁸⁵ *Lib. Myst.*, fol. 5^r. See Appendix 1 for the complete text of the oration. Although it dates “ab anno 1579”, Dee had obviously been using others for some time, as he refers to other prayers of this type, addressed to Raphael and Michael, which he had written in both Latin and English “circa annu[m] 1569”.

¹⁸⁶ *De Heptarchia Mystica*, BL, Sloane MS 3191, fol. 46^r.

¹⁸⁷ *De Heptarchia Mystica*, BL, Sloane MS 3191, fols. 61^r-80^v.

¹⁸⁸ *De Heptarchia Mystica*, BL, Sloane MS 3191, fol. 46^r.

¹⁸⁹ *De Heptarchia Mystica*, BL, Sloane MS 3191, fols. 45^v-46^r.

¹⁹⁰ See, for example, *T&FR*, 4: “Me protege [...] qua diabolus & Sathanicae fraudem,” and *T&FR*, 54: “We beseech him that we may [...] overcome all other Diabolical assaults or sophistical, or untrue perswasions,” and *T&FR*, 183: “Oratione contra Tentationes Sathanae.”

¹⁹¹ See *T&FR*, 175-180. The characters of the table were supposedly the “true Images of God his creatures” (175), which would allow Dee to “work all the world over at one time” (178). For a full account of the table’s putative properties see *T&FR*, 179-180.

¹⁹² *De Heptarchia Mystica*, BL, Sloane MS 3191, fol. 57^r: “Quater Tria, Nomina Dei, (ex quatuor lineis Spiritus sancti extracta), quae, omnes super Terram Creaturas, (tam Invisibiles, quam Visibiles).” See for example the invitation to the “six senior angels of the East” (SEX SENIORUM Orientalium Invitatio”, *ibid.*, fol. 59^r: “O vos sex SENIORES, Orientales [...] In Nomine eiusdem DEI, (Vnius et Trini) O vos (in quam) ABIORO, siue HABIORO, AAOXIAF, HTMORDA, HAOZPI, siue AHAOZPI, HIPOTGA et AVTOTAR [etc].”

¹⁹³ *Lib. Myst.*, fol. 8^r.

¹⁹⁴ *T&FR*, 62, 91. The “particularity” of these invitations refers to their being addressed to particular angels. See, for example, *T&FR*, 222 where Dee records a prayer to Uriel: “I invite Uriel, to illuminate us, direct us and console us, etc.” (*invito Vrielle ut nos illuminaret, dirigeret, consolaretur etc.*)

¹⁹⁵ See, for example, the prayer in *De Heptarchia Mystica*, BL, Sloane MS 3191, fol. 45 which begins: “O Almighty, Aeternall, the True and Living God: O King of Glory: O Lord of Hoasts,” which requests

“the obteyning of somme convenient portion of True Knowledg, and understanding of thy lawes and Ordonances.” Cf. also *Lib. Myst.*, fol. 42^r: “I [...] called vnto God, for his diuine help for the vnderstanding of his laws and vertues, knowing and vnderstand[ing] which he hath established in and amongst his Creatures, for the benefyt of mankinde, in his seruice, and for his glorie etc.” The underlining is in the original MS.

¹⁹⁶ See, for example, *T&FR*, 118: “Mitte lucem tuam & veritatem, O Deus &c.” and 102: “Precibus ad deum finitis, pro luce & veritate, in hanc formam, mitte nobis spiritum sanctum & veritatem tuam, ut sapienter, fideliter & constanter tibi seruiamus, omnibus diebus vitae nostrae. Amen.”

¹⁹⁷ *Lib. Myst.*, fol. 61^r.

¹⁹⁸ *T&FR*, 145. In the “Protestatio fidelis” (*Lib. Myst.*, fol. 7^r) Dee noted that God had sent “good Angells” to the Biblical prophets “to instruct them, informe them helpe them, yea in worldly domesticall affaires.”

¹⁹⁹ See *T&FR*, 162.

²⁰⁰ *T&FR*, 104-5: “Gab[riel] [...] *O thou eternal foundation and strength of all things, mortal and immortal, which delight in thy face and in the glorie of thy name*, Consider the foundations of our fragility, and enter into the weaknesse of our inward parts: for we are become empty; whose salt is not, nor hath any savour: Fortifie, and make us strong in thee, and in thy strength; Have mercy upon us, Have mercy upon us, Have mercy upon us; that in this world our strength may be in patience, and after this life, that we may ascend unto thee.” Cf. *T&FR*, 82, where Gabriel recites a similar prayer and orders Dee and Kelley to “Say so unto God kneeling.”

²⁰¹ *T&FR*, 196-7.

²⁰² *Lib. Myst.*, fol. 9^v.

²⁰³ *Lib. Myst.*, fol. 26^r. Cf. fol. 34^r: “Pray and that vehemently, For these things are not reuealed without great prayer”.

²⁰⁴ Anthonic Gilbie, *The Psalmes of Dauid, truly opened and explained by paraphrasis [...] set foorth in Latine by that excellent learned man THEODORE BEZA. And faithfully translated into English* (London, 1581), sig. a3^v.

²⁰⁵ *A Treatise made by Athanasius the greate wherin is set forth how and in what manner ye may vse the psalmes, according to the effect of mynde*, in Thomas Sternhold and John Hopkins, *The Whole booke of Psalmes collected into Englyshe Meter* (London, 1564), sigs. Aviii^r-Bv^v. On the tradition of using prayer for practical and operative purposes see Keith Thomas, *Religion and the Decline of Magic, studies in popular beliefs in sixteenth- and seventeenth-century England* (London: Weidenfield and Nicolson, 1971, repr. Harmondsworth: Penguin Books, 1991), 45-9, and 133-151, and Eamon Duffy, *The stripping of the altars, traditional religion in England c.1400-c.1580* (Newhaven and London: Yale University Press, 1992), Chapter 8, “Charms, Pardons and Promises: “Superstition” in the Primers”, 266-298.

²⁰⁶ James Anderson, ed., *Commentary on the Book of Psalms. By John Calvin. Translated from the original Latin, and collated with the author's French version*, 5 vols (Edinburgh, 1845-9), I, xxxviii.

²⁰⁷ Calvin, *Commentary on the Book of Psalms*, III, 67-8

²⁰⁸ *T&FR*, 82.

²⁰⁹ *T&FR*, 74: “the Lord appeared unto them in a vision: But he cometh when you are awake: Unto them he came unlooked for, unto you he cometh requested.”

²¹⁰ *T&FR*, 88.

²¹¹ See, for example, *T&FR*, 40.

²¹² *Lib. Myst.*, fol. 92^r. Cf. *T&FR*, 67: “O Jesu Christ, we have committed our selves into thy hand; and do submit our wills to thy governement.”

²¹³ *T&FR*, 58.

²¹⁴ *Lib. Myst.*, fol. 75^r.

²¹⁵ *Lib. Myst.*, fol. 39^v.

²¹⁶ *Lib. Myst.*, fol. 55^v.

²¹⁷ *Lib. Myst.*, fol. 91^r.

²¹⁸ *T&FR*, 188.

²¹⁹ *Lib. Myst.*, fol. 43^v: “What say you concerning the Chamber, for our practise may my farderest little Chamber, serue, yf the bed be taken downe.”

²²⁰ See, for example, *Lib. Myst.*, fols. 42^r, 79^v, 98^v, etc.

²²¹ *Libri Mystici Apertorii Cracoviensis sabbatici, An. 1584*, in *T&FR*, 115.

²²² *Lib. Myst.*, fol. 103^r.

²²³ *Lib. Myst.*, fol. 105^v.

²²⁴ *T&FR*, 138.

²²⁵ See, for example, *T&FR*, 186.

²²⁶ See *Lib. Myst.*, fol. 18^v: “Herevppon we prayed a psalme; <my skryer> saying one verse, and I the other etc.”

²²⁷ *T&FR*, 146. “Ex Psalterio post 67 Psalmum.”

²²⁸ *T&FR*, 67

²²⁹ *T&FR*, 82: “Oratione Dominica finita, & brevi oratione Psalmi 33. inspecto Chrystallo apparuere utrique *Gabriel & Nalvage*.”

²³⁰ *Lib. Myst.*, fol. 89^v.

²³¹ *T&FR*, 101. See Fisher, *Psalmi*, 60-63: “Psalmus Novus. Contra inimicos.”

²³² *T&FR*, 83: “With great difficulty this Letter was discerned [...] Nalvage denied it to be an X. and said he knew not yet the mystery: say the Lords prayer, for I cannot open it [...] At length he said it was V.”

²³³ *T&FR*, 186.

²³⁴ *Lib. Myst.*, fol. 98^v.

²³⁵ *T&FR*, 211: “Oratione Dominica finita, & variis ejaculationibus factis tam ad Gabrielem, quam Nalvage, Ave, Mapsma & Ilemer, quam maximè ad Deum ipsum pro sua lumine, auxilio & protectione; tam ipsa actione, quam itinere praesenti, futuro, versus aulam Caesaris.”

²³⁶ *T&FR*, 62: “prayers of the 7 Psalms, and my particular invitation and calling for God his help, and the ministry of his good Angels.”

²³⁷ *T&FR*, 89: “a short prayer to God for remission of sins, and sending of his graces, and his good ministers assigned for our instructions: and for the avoiding away of the great enemy &c.”

²³⁸ See *T&FR*, 210: “I made a short discourse to God of my sincere and just dealing”, and *ibid.*, 73: “divers prayers and contestation of our humility, obedience and credit in these Actions.”

²³⁹ *T&FR*, 165: “prayers due, and thanks to the almighty for his great mercies and power shewed in the conversion of E.K [...] and divers our short discourses of faith, hope, patience, constancy, humility, and other duties requisite to this action.”

²⁴⁰ See, for example, *T&FR*, 111: “short prayers for the success of Albert Lasky [...] queries and requests concerning his rights of inheritance, and other very brief ejaculations, for success in this action.” (*precatiumcula pro prospero successo A[lberti] L[askii] [...] quaeritantis & petentis jus suum hereditarium, & aliis brevissimis ejaculationibus, pro prospero successu in hac actione.*)

²⁴¹ *Lib. Myst.*, fol. 68^v. Cf. Bodley MS 951, *Ars notoria*, fol. 19^v: “Ph[ilosophi]ce dicas istam orationem”.

²⁴² *T&FR*, 219.

²⁴³ John Fisher, *Tractatus de necessitate orandi*, in *Ioannis Fischerii, Roffensis in Anglia Episcopi Opera* (Wirceburg, 1595), col. 1718: “Sunt enim tria praecipua fructum genera qui nobis ex oratione proveniunt. Et primum sane, meritum ipsum est [...]. Alterum est rei (quam orantes postulamus) impetratio. Tertium est mirae cuiusdam dulcedinis gustus quo dum oramus afficimur.”

²⁴⁴ Fisher, *De necessitate orandi*, “De rei postulatae impetratione, qui secundus fructus dicebatur”, cols. 1719-1720.

²⁴⁵ Fisher, *De necessitate orandi*, col. 1720: “Nos vtique quoties recte operamur, in Dei manu positi sumus, quemadmodum in fabri manu tenetur malleus. Et vt faber inter operandum suo malleo velut instrumentum quodam vtitur, sic Deus nobis tanquam instrumentis vtitur, quoties recte operamur. Nam quaecunque per nos recte agi videntur, non ipsi ex nobis sed Deus in nobis operatur.”

²⁴⁶ Fisher, *De necessitate orandi*, col. 1721: “Si precatio igitur cuiusuis super humilitatis basi fundata fuerit, & pro seipso ad Deum fusa sit, nihilque postulans, quod proprie saluti repugnet, pergat in nomine Domine quisquis eiusmodi fuerit, nihil haesitans, quin (quod ita postulat) sit impetraturus.” Like Dee, Fisher cites the authority of the New Testament in support of this belief: “Iacobus pollicetur: Postulet (inquit) in fide nihil haesitans & dabituri ei. Et Dominus item in Evangelio: Quicquid (inquit) orantes petitis, credite quia accipietis & fiet vobis.”

²⁴⁷ Julius Sperber, *Kabalisticae Precationes, siue Selectiores Sacrosancti Nominis Divini Glorificationes. E sacrarum Bibliorum fontibus, & praesertim ex medulla Psalmorum Davidis haustae, & ita concinnatae, vt ijs Deus opt. Max. facilius placari, & ad exaudiendum atque auxiliandum melius commoueri, Mens etiam orantis ardentius in Deum eleuari possit* (Magdeburg, 1600). See especially, “Postulatio pro sapientia impetranda”, 136-141 and “Gratiarum Actio pro sapientia”, 141-146.

²⁴⁸ See, for example, Edward Dering’s *Godly Priuate Praiers, for Householders to meditate vpon, and to saye in theyr Families* (London, 1575), “A prayer to be saide before the studying or reading of holie Scripture”, sig. Dir-v: “O Father, this power of full knowledge & perfect reuelation, passeth all power

naturall, and remaineth onely in thy power, & the light of thy spirite: O Lord doo thou whatsoeuer it shall please thee to open vnto mee [...] so much of the light of thy countenance as may be most for thy glory and our comfort.”

²⁴⁹ See Sperber, *Precationes*, 136, where he quotes the same text as Dee uses in his “Protestatio fidelis”, James I, 5: “Si quis autem indiget sapientia, postulet à Deo, qui dat omnibus affluenter, & non impropere.”

²⁵⁰ Sperber, *Precationes*, “Ad Lectorem”, sig. *3^v.

²⁵¹ Sperber, *Precationes*, sig.*7^v: “Homo se ad acquirendam DEI sapientiam digne & iustè prae preparare, eamque vna cum alijs tam corporalibus quam spiritualibus bonis a DEO impetrare, debeat: Qua impetrata postea facilius erit: Deum ac interiorem hominem (id est Animam hominis) verè cognoscere; Futura praevidere: Mystera in sacris Eloquijs abscondita intelligere: secreta inuestigare: veris gloriam nomenque ac memoriam perpetuam acquirere: Aegrotos curare: Miracula edere: Visiones ac Reuelationes accipere [...] In excessu mentis esse, id est, ad coelum eleuari vel ascendere, cum ipso DEO vniri seu coniungi, & à Spiritu Sancto illuminari.”

²⁵² For an example of this traditional form of instrumental prayer see *T&FR*, 210, where Dee prays for his son Rowland to recover from illness, making a bargain with God that he will only eat one meal on Saturdays for the rest of his life, if he spares his son’s life. On petitionary prayer and the “vow of reciprocal service” see Thomas, *Decline*, 49.

²⁵³ *MP*, sig. *j^r.

²⁵⁴ *Lib. Myst.*, fol. 36^v.

²⁵⁵ *Lib. Myst.*, fol. 101^v.

²⁵⁶ *Lib. Myst.*, fol. 79^v-80^r.

²⁵⁷ *T&FR*, 184.

²⁵⁸ Whitby, “Renaissance Scrying”, 30-31.

²⁵⁹ Simon Forman, “An excellent booke of the arte of Magicke, first begoone the xxiith of Marche Anno Domini 1567”, British Library, Add. MS 36,674, fol. 47, cit. Virginia F. Stern, *Gabriel Harvey: His Life, Marginalia and Library* (Oxford: Clarendon Press, 1979), 242: “Nova methodus, et praxis magica Academici philotechni [...] (Ad artem notoriam inspiratam.) Speculum omniscium.” See also the copious sixteenth-century annotations to the fifteenth-century *Ars notoria*, Bodley MS 951. On Forman see Lauren Kassell, *Medicine and Magic in Elizabethan London: Simon Forman – Astrologer, Alchemist, and Physician*, Oxford Historical Monographs (Oxford: Clarendon Press, 2005).

²⁶⁰ The mathematician Andreas Dudith, for example, writing to Tadeáš Hájek in 1587, was bewildered at Dee’s activities: “De Anglis multa audivi; illud unum mihi et stupendum videtur et parum credibile: quod aliqui certo affirmant eos colloquia cum angelis nescio quibus miscere.” Dudith to Hájek, 3 January 1587, Ostrejov Astronomical Library, MS Akc. 1949/594 (Photograph of Wrocław University Library MS R 247), eighteenth-century copy by Samuel Benjamin Klose. I am grateful to Dr Robert Goulding for providing me with transcriptions of this correspondence. For other instances of contemporary scepticism regarding Dee’s conversations see Shumaker, *Renaissance Curiosa*, 48-9.

²⁶¹ Heinrich Khunrath, *Amphitheatrum Sapientiae Aeternae solius veræ, Christiano-Kabalisticum, Diuino-Magicum nec non Physico-Chymicum, Tertrivnum, Catholicon* (Hanau, 1609), 147 (sig. T2^r, mispaginated as 145): “HYPERPHYSICOMAGEIA [...] est cum Angelis bonis, flammeis DEI ministris, sub modo delegatæ à DEO administrationis, tam vigilando quam dormiendo, mediate & immediatè, pia & vtilis conuersatio.” I am grateful to Peter J. Forshaw for drawing my attention to Khunrath’s “angelic conversations”. For more on Khunrath’s theosophical magic (and a complete translation of the *Amphitheatrum*) see Peter J. Forshaw, “*Ora et Labora*: Alchemy, Magic and Cabala in Heinrich Khunrath’s *Amphitheatrum Sapientiae Aeternae*” (Unpublished PhD Thesis, University of London, 2003).

²⁶² Khunrath, *Amphitheatrum*, 144. See esp.: “quod studium apud Hebraeos Cabalae summe perfectum & absolutum, cum in Diuinorum cultu, Spiritualium tractatione atque cum iis conuersatione, & Naturalium inuestigatione, pie ac sapienter consisteret.”

²⁶³ See for example Whitgift’s defence of certain kinds of petitionary prayer (including prayers for protection during storms) against the criticisms of the puritan Thomas Cartwright in *The defense of the Answer to the admonition against the Replie to T[homas] C[artwright]* (London, 1574), Tract. IX, Cap. ii, first division: “An examination of the particular faults, either in matter or form, wherewith the Book of Common Prayer is charged.”

²⁶⁴ Edwardes promises Dee that he will explain the details of the apocalyptic prophecies to him: "I shall open vnto you all things for myne is the speciall office and Auctoritie to doe it eueue to open the booke of the Covenant which was [...] close sealed." Roger Edwardes to John Dee, 16 July 1580, British Library, MS Cotton Vitellius CVII, fol. 328^v. In his first letter to Dee, dated 31 March 1580, he alludes sympathetically to Dee's angelic visions: "what the common capacities of the lerned ar to attayne to the excellencye of special spirites, that is well knowen, and when they cannot apprehende the high wiesdome and misteries of God, then falle they to maligne and to contempne, the vesseles that god vseth at his owne good choise and pleasure" (ibid., fol. 312^v).

²⁶⁵ *MP*, sig. A.j^v.

²⁶⁶ John Dee to William Cecil, Lord Burleigh, 16 February 1562/3, London, Public Record Office, State Papers Domestic, 12/27, item 63.

²⁶⁷ See, for example, the conventional treatment of this theme by Dee's contemporary William Perkins, *A Treatise of the vocations, or callings of men, with sorts and kinds of them and the right vse thereof* (Cambridge, 1603).

²⁶⁸ William Perkins, *A Warning against the Idolatry of the last times* (Cambridge, 1601), reprinted in *The Workes of that Famous and Worthy Minister of Christ in the Uniuersitie of Cambridge, Mr William Perkins*, 3 vols (London, 1626-31), I, 716.

²⁶⁹ See Wlad Godzich, "Foreword. The Further Possibility of Knowledge", in Michel de Certeau, *Heterologies. Discourse on the Other*. Trans. by Brian Massumi (Manchester: Manchester University Press, 1986), ix: "The disciplinary outlook [...] permits each discipline to function as if the problem of fragmentation did not arise since the concepts that it mobilizes and operations it performs are adequate, if not isomorphic to its object – an elegant variant of the Parmenidean principle of the identity of thought and being. This may well account for the blindness of the disciplinary perspective to the problem of fragmentation: it is constitutive of that perspective."

²⁷⁰ Yates, *Occult Philosophy*, 82.

²⁷¹ Yates, *Occult Philosophy*, 86.

²⁷² Yates, *Occult Philosophy*, 81.

DEBORAH E. HARKNESS

THE NEXUS OF ANGELOLOGY, ESCHATOLOGY,
AND NATURAL PHILOSOPHY IN JOHN DEE'S
ANGEL CONVERSATIONS AND LIBRARY

In Cracow on 24 May 1584 John Dee went from the room where he usually conversed with angels to fetch his assistant, a scryer and alchemist of mysterious antecedents named Edward Kelley.¹ Kelley was shut up in his personal study in the house they shared, and was obstinately refusing to come out and join Dee around the crystal showstone which gave them access to the fascinating world of angels. Kelley's reluctance may have been expected since on the previous evening he had expressed distaste for their angelic instructors, and even went so far as to doubt their revelations concerning a true, uncorrupted geography which promised to help Dee master the intricacies of the terrestrial world. Dee and Kelley had been partners in the angel conversations since March 1582, and though Edward Kelley had experienced misgivings before about the worth of the angels' lengthy and time-consuming messages, his adamant refusal to return to the stone and the angels was somewhat unusual.²

If Kelley's refusal to scry was unusual, his subsequent behaviour was unprecedented in their relationship. A short time later, after Dee had returned alone to his own study, Kelley appeared brandishing a volume of "Cornelius Agrippa his works." He then proceeded to read out of the book the names of various terrestrial regions which Agrippa had collected out of Ptolemy, but which bore a disturbing resemblance to the "uncorrupted" and divinely-revealed geography conveyed only the day before by the angels. What are we to make of this confrontation between Dee's angelic revelations and his scryer's presentation of Agrippa's Ptolemaic geography?

This episode in the long and often sordid relationship between Dee and his scryer has typically been seen as particularly damaging evidence both of Kelley's duplicity and Dee's extreme gullibility. I would like to suggest an alternative interpretation, one that is based on Dee's reaction to Kelley's announcement rather than our own. It is clear from the transcript diaries that Dee didn't lose his composure, he expressed no shock, dismay, surprise and, most importantly, no doubt concerning the reliability of their angelic instructors after Kelley's dramatic gesture. Instead, in a tone which hints at pity, Dee chided Kelley for thinking that their angelic instructors were not to be trusted simply because they gave them "a description of the World, taken out of other Books." Dee expressed pleasure with his scryer's find, saying "I am very glad that you have a Book of your own, wherein these Geographical names are expressed, such as (for the most part) our Instructors

had delivered unto us.” Dee, it turns out, had also been searching for references to the angelic geography in everything from Mercator’s “description Geographical of the whole earthly Globe” to a geographical work by Pomponius Mela “set forth in English with the Chartes thereunto belonging, fairly described by hand.”

I chose this brief interlude in the angel conversations, this battle between books and revelation, because it brings us face-to-face with many of the thorniest issues confronting Dee scholars who attempt to decipher the significance of the angel conversations within the context of Dee’s other, more orthodox, intellectual interests.³ The modern mind finds itself at a loss to explain why a natural philosopher such as Dee, with a superb education and a strong interest in the observation of nature, would resort to divine revelation. Yet it is equally mystifying to us that Dee, having made such an effort to communicate with the celestial hierarchies, would then turn to the world of books to help him master those same revelations.

Today, however, Dee scholars have an unprecedented opportunity to resolve the dilemmas embedded in this story, particularly the odd relationship between Dee’s scholarship as revealed to us in his library, and the information the angels shared with Dee and Kelley. Both the library and the angel conversations have occupied a similar place in the historiography surrounding Dee – their importance has long been acknowledged, but their contents have not been fully understood. Thanks to the work of Christopher Whitby, Nicholas Clulee, Julian Roberts, Andrew Watson, and William Sherman, however, both the angel conversations and the library are beginning to yield their secrets.⁴ We now have a greater appreciation of how the angel conversations fit into broader cultural and intellectual contexts, especially other magical systems. We also now appreciate the significant place that the library occupied in the formulation and expression of Dee’s interests. Today I hope to continue to probe the connections between these two seemingly contradictory aspects of Dee’s intellectual life by suggesting that the gulf between revelation and the knowledge found in books is not as vast as we might expect.

In fact, the library provides the ideal starting point for an investigation of the angels’ revelations because both the library and the angel diaries represent an enormous investment of Dee’s intellectual energies and material resources. By the time Dee began contacting angels – certainly by 1581 and possibly in the late 1560s, as Clulee has suggested – he had amassed the finest personal library in England.⁵ Within Dee’s library existed a forest of ideas. Treatises on military engineering and Greek literature jostled on the shelves with books on the Jewish cabala, astrology, optics, and obscure ancient languages. As we know from the recovery efforts of Roberts and Watson, Dee did not simply own these books. In many cases there is evidence from marginalia and annotations that he had read and carefully digested their contents, adding his own opinions as warranted.⁶ In his library Dee was able to come into contact with wisdom that had been handed down through the ages, sometimes in need of repair and restitution as every good humanist of the time knew, but in many cases still retaining traces of God’s divine inspiration – the root of all earthly wisdom.

By 1579, however, Dee had entered into a period of intellectual crisis so profound that he began to doubt whether the information he could find in his books could really help him to achieve certain knowledge. In a prayer from that year which occupies the first leaves of the earliest surviving angel diary Dee shared his despair with God and reminded Him of his long-held and fervent desire for “pure and sound wisdom and understanding” as well as his dedicated study of nature for “many years, in many places far and near, in many books and sundry languages.” Finally, however, Dee admitted he had reached a scholarly impasse and “could find no other way to true wisdom” without the gift of divine revelation.⁷

In this prayer Dee explains why he turned from his books to the heavens, but two other questions still face us. First, what was there about the late 1570s that led Dee to seek revelation? And second, why did Dee seek to converse specifically with angels, rather than directly with God through mystical contemplation? The answers, I would argue, can be found in Dee's great library – from which he may well have turned, but was never able to divorce himself completely. There are two classes of books in Dee's library that can shed light on these questions: books concerned with angelology and books dedicated to eschatology. I will also suggest that it is Dee's library catalogue and early library lists which provide a map of sorts which can help to explain Dee's progress from an optimistic Cambridge undergraduate in the 1540s to a disappointed and increasingly desperate natural philosopher still in search of answers to his deepest questions in the 1570s and 1580s.

If we turn to the first question – why in the 1570s did Dee seek revelation? – and then open the library catalogue, it becomes clear that Dee owned a number of titles concerned with the end of the world and how best to decipher the natural signs that might foretell this event. Dee purchased, for example, the Harvey-Spenser letters which refer to the London earthquake of 1580, Cornelio Frangipani on the new star of 1572, and Cyprian Leowitz on grand conjunctions as well as other similar works.⁸ This interest of Dee's, which may first have manifested itself in library purchases, is also evident in the angel conversations of the 1580s. As early in their relationship as 23 March 1583 Dee and Kelley were listening to revelations concerning the long-awaited apocalypse, and warnings about the end of days continued until their partnership was finally dissolved.⁹

Both Clulee and Whitby have remarked upon the apocalyptic tenor of Dee's angel conversations.¹⁰ I would go further and argue that it was the specifics of late sixteenth-century apocalypticism that provided the essential context for Dee's fervent prayers to God to send to his aid “good spiritual ministers and angels [...] who may fully and perfectly inform me in the true and exact knowledge and understanding of your great mysteries and works (concerning all your creatures, their natural properties, and best employments).”¹¹ When Dee turned his eyes from his books to the heavens in prayer, most of Western Europe had their eyes fixed anxiously in the same direction. As the 1570s turned into the 1580s western Europeans were able to catalogue an alarming number of comets, new stars, earthquakes, grand conjunctions and other strange natural events that seemed to offer irrefutable

proof that something cataclysmic was about to happen in the terrestrial sphere. Author after author cried out for people to take notice that the world was growing weary and decaying, just like the texts in Dee's library. Nature had lost its original meaning, they argued, and had become corrupted through original sin. Humanity drew further away from divinity as each day passed. For Dee, intent on serving God by understanding His greatest visible work – the Book of Nature – this widespread attention to decay made his inability to open the secrets of nature all the more frustrating and frightening.

Much of Dee's frustration stemmed from the fact that he was not only interested in the end of his world, but in the beginning of a better, purer, and restored world where humanity, divinity, and nature would live in harmony and communication. The model for this post-apocalyptic world was the Edenic past – the life that Adam and Eve had in Paradise before original sin brought corruption and decay into the world. Dee believed that it might be possible for humanity to return to this state, and also that it might be possible to restore the natural world. The "reformation of the world" figures prominently in the angel conversations of the 1580s when Dee was given a vital role to play in the new age of peace, prosperity, and communication between God and his creation. Biblical references are sprinkled liberally through the angel diaries, further evidence that the world of books had a role in the angel conversations along with revelation.¹² In page after page of the angel conversations Dee demonstrated that what he was trying to achieve was a grand synthesis of previously revealed information and the newly revealed angelic messages.

Despite the frustration generated by years of study, Dee could not, finally, put aside his books completely, but drew them into his interactions with angels to complement and increase his understanding of God's instructions for the future. There were even occasions when the angels instructed Dee in the significance of items already in his collection, most notably the mysterious book *Aldaraia* also known as the *Book of Soyga*. The first reference we have to this work appears in Dee's personal diary on 17 January 1582, and the *Book of Soyga* is mentioned in the angel diaries a few months later on 10 March 1582.¹³ On that date Dee asked the angels "ys my boke, of Soyga, of any excellency?" The angel Uriel replied that it was a book that "God's good angels revealed to Adam in Paradise." Dee was understandably absorbed in deciphering his "Book of Soyga" because it represented another book where God's plan for the cosmos – or at least parts of that plan – had been revealed, recorded, and preserved for future generations. That Dee had an Edenic book – part of Adam's lost knowledge of the world – also meant that he had another key revelation that might help in the redemption and restitution of the world.

The book was later discredited by the angels, and was lost or stolen around 18 April 1583.¹⁴ Dee recovered the work on 19 December 1595, and after Dee's death Elias Ashmole reported that the Duke of Lauderdale had "a folio MS. which was Dr. Dee's with the words in the first page: 'Aldaraia sive Soyga vocor.'" ¹⁵ It was believed that this manuscript was lost, but recently I located two sixteenth-century Latin copies, one in the Bodleian Library at Oxford and one in the Sloane Manuscripts at the British Library.¹⁶ That the manuscripts are Latin appears to contradict

Dee's description of the work as "Arabik," although it is still possible that Dee was using the term Arabic to refer to its antecedents, and not its actual language. Other features of the description are consistent with the two Latin copies, including Dee's reference to the book's tables of letters and numbers which are strikingly similar to the tables found in a book revealed to Dee by the angels, the *Liber Logaeth*.¹⁷

Why, however, did Dee focus so much on specifically angelic revelations? One immediate response might be to point back to Dee's knowledge of apocalypse, for increased communication with God through angels or other messengers was one of the most commonly anticipated signs that the world was ending. We can, however, open the library catalogue once more for additional insights. First, the catalogue reveals that Dee's interest in angels was not sudden – there is evidence from as early as July 1550 when he purchased a copy of Pompilius Azalus's encyclopaedic treatment of the natural world, *De omnibus rebus naturalibus* (Venice, 1544), that the world of angels was deeply compelling to him.¹⁸ This work, though not primarily concerned with angels, does, as its title proudly suggests, attempt to explicate all features of the cosmic system including angels. Dee thoroughly underlined and marginally annotated passages relating to the angels' functions as ministers of God in the natural world, including their role as guiding spirits. This was not the last library purchase that had to do with angelology. By the time Dee made a list of his growing library collection in 1557, he had acquired a comprehensive assortment of classical, Christian, and contemporary works germane to angelology including Ficino's collection of neo-Platonic texts which contained treatises on spirits, dreams and divination, a collection of the works of Dionysius the Areopagite including treatises on "The Celestial Hierarchy" and "The Divine Names," Tommaso Rangoni's study of spiritual visitations, and complex works which combined Christian angelology with esoteric Jewish cabala such as Francesco Giorgi's *De harmonia mundi*, Agrippa's *De occulta philosophia*, Reuchlin's *De verbo mirifico*, and Trithemius' *De septem secundeis*.¹⁹

Not all of these works have been recovered, and not all which have been recovered are signed or annotated. Despite these limitations, however, it is clear that Dee read several of these works about angels very carefully, most notably items in the Dionysian corpus. Both the "Celestial Hierarchy" and "The Divine Names" reveal corollaries between Dee's library books and the revelations of the angel conversations. Throughout the angel conversations for example, Dee noted carefully the appearance of each angel as Kelley conveyed it to him.²⁰ In the "Celestial Hierarchy" Dee underlined Dionysius's descriptions, emphasizing the angels' many feet and their tendency to appear in the guise of a lion or a horse.²¹ Other simple annotations – underlinings and marks of emphasis – demonstrate Dee's familiarity with the organization of the celestial hierarchies and their relationship with the Deity.²²

More complex cross-referencing took place in the margins of Dee's books, as well. In Dionysius's treatise "The Divine Names," for example, Dee noted the name "Pele" in the margins against a passage that referred to the marvellous name of God which is above all other names.²³ The name "Pele" does not in fact appear in the Dionysian corpus, but it did figure in an angel conversation which took place on 14

March 1582.²⁴ On that day the angel Michael revealed to Dee the design for a ring not seen on earth since the days of Solomon, which Solomon used for “divine works and wonders.” The ring was inscribed with the name Pele, and Dee noted in the margins “See Reuchlin’s book *De verbo mirifico* about the name PELE.” Unfortunately, Dee’s powers of exact recall were faulty – the name does not, as Whitby points out, actually appear in *De verbo mirifico*. In the pages of the Dionysian corpus, however, the connection between marvellous powers and the name Pele were clearly described.

Dee’s angel conversation of 14 March 1582 continued with further bibliographic references. Dee noted that he needed to look in Reuchlin not only for the name “PELE” but also for the name “NA” which the angel Michael told him was a divine name to use in times of trouble. Even the angel Uriel appeared briefly and told Dee that some called him Nariel – Dee noted that this information could be found in Agrippa’s *De occulta philosophia*, Book III, chapter 24. Finally the angel Michael revealed a design for a seal – referred to as the “Sigillum Dei” or seal of God – whose true name was “Emeth”. Dee, his bibliographic abilities unwavering, gave two citations for this revelation: one referring to Reuchlin’s *De Arte Cabalistica*, and another to Agrippa’s *De occulta philosophia*.

It is no wonder, then, that Dee was consulting Mercator and Mela for help with his angelically revealed geography – books and revelation jostled on the pages of Dee’s angel diaries just as Greek and astrological texts jostled on the shelves of Dee’s library. This juxtaposition forces us to reconsider once more the status of Dee’s angel conversations in relation to his other intellectual projects. Many more connections exist between the angel conversations and the library: alchemical, cabalistic, linguistic, and cosmological, to name only a few. The angel diaries and the library offer us a new opportunity to assess the conceptual boundaries of Dee’s natural philosophy. Those boundaries are destined to shift and challenge us once this new information about Dee’s ideas and the connections he himself made between seemingly different intellectual enterprises comes into the light.

NOTES

¹ Dee’s angel conversations are now accessible through scattered and imperfect manuscripts at the British Library, London and the Bodleian Library, Oxford: British Library, Sloane MSS 3188-3189; British Library, Sloane MS 3191; British Library, Cotton MS Appendix XLVI, 2 vols.; British Library, Add. MS 36674; and Bodleian Library, Ashmole MS 1790. Printed editions of selections from the manuscripts are available, but their reliability varies. Meric Casaubon was the first to print excerpts from the angel diaries in 1659, (*T&FR*), but the work includes only conversations dated after 1583 and is not without textual inaccuracies. Elias Ashmole, the seventeenth-century collector who was deeply interested in Dee, made corrections in the Casaubon edition, Bodleian Library Ashmole MS 580. The earliest angel diaries, which date from 1581 to April 1583, have received much less attention. A complete edition of the earlier diaries was available only in manuscript until Christopher Whitby’s careful transcript of *John Dee’s Actions with Spirits*, 2 vols (New York: Garland Press, 1988), made them available to a wider audience. For this episode, see *T&FR*, 158-159.

² For more on the relationship between Dee and Kelley, see *NP* especially 204-214; Peter French, *John Dee: the World of an Elizabethan Magus* (London: Routledge, 1972), especially 113-122; Deborah E. Harkness, *John Dee’s Conversations with Angels: Cabala, Alchemy and the End of Nature* (Cambridge:

Cambridge University Press, 1999); Deborah E. Harkness, "The Scientific Reformation: John Dee and the Restitution of Nature" (Unpublished PhD thesis, University of California, Davis, 1994), 329-342. Kelley's often disruptive presence in the Dee household is recounted in Deborah E. Harkness, "Managing an Experimental Household: the Dees of Mortlake and the Practice of Natural Philosophy," *Isis*, 88 (1997): 247-262.

³ The angel conversations have not received as much scholarly attention as other aspects of Dee's life and career, and reconciling the "mathematical" Dee with the "magical" Dee has proved particularly difficult. See NP, 203-230; French, 110-125; Harkness, *Talking with Angels*; Wayne Shumaker, *Renaissance Curiosa* (Binghamton: Medieval and Renaissance Texts and Studies, 1982), 1-52; Whitby's "Introduction" in the first volume of *John Dee's Actions with Spirits*.

⁴ Whitby focuses primarily on the angel conversations themselves in his *John Dee's Actions with Spirits*. Clulee, Roberts and Watson, and Sherman, however, were the first systematically to use the contents of Dee's library to illuminate his thinking on a wide range of issues. For further insights into the ways in which Dee's library shaped his intellectual program see NP; R&W; William H. Sherman, *John Dee: the Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995). Recently, I have used the library specifically to shed light on the angel conversations. See Harkness, *John Dee's Conversations with Angels*.

⁵ NP, 141.

⁶ For a detailed discussion of Dee's annotation practices, see Sherman, 79-100.

⁷ Dee in Whitby, II, 8-12.

⁸ Dee's library books concerning the new star were: Marcus Manilius, *Astronomica* (Basel, 1533), R&W, no. 251, which contains annotations by Dee; a work by Dee's landlord in Prague, Tadeáš Hájek, *Dialexis de nova stella* (Frankfurt, 1574), R&W, no. 438; Theodorus Graminaei, *Erklerung oder Auslegung eines Cometen* (Cologne, 1573), R&W, no. 703; Jeronimo Munoz, *Du nouveau comete de l'an 1572* (Paris, 1574), R&W, no. 842; Georg Busch, *Die andere Beschreibung von dem Cometen welcher in 1572 Jar erschienen* (Erfurt, 1573), R&W, no. 1291; two copies of Cornelius Gemma and Guillaume Postel, *De peregrina stella 1572* (Basel, 1572/3), R&W, no. 1876; Cornelio Frangipani, *Sopra la stella dell' anno 1572* (Venice, 1573), R&W, no. 2137; Augustus, Elector of Saxony et al., *De publica poenitentia [...] exorta peregrina stella 1572* (n.p., 1578), R&W, no. 2217; Joannes Sommerus, *Refutatio scripti Petri Carolii editi Wittebergae* (Cracow, 1582), R&W, no. D20; for the Harvey-Spenser letters, see, R&W, no. 1720; for Dee's copy of Leowitz, see R&W, no. 631.

⁹ Whitby, II, 220-238.

¹⁰ NP, 220-230; Whitby, I, 161-177.

¹¹ Dee in Whitby, II, 5-6; translation by Whitby from the Latin. The literature on early modern eschatology and apocalypticism continues to grow. A selection of relevant titles would include: Bryan W. Ball, *A Great Expectation: Eschatological Thought in English Protestantism to 1660* (Leiden: E. J. Brill, 1975); Robin Bruce Barnes, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation* (Stanford, CA: Stanford University Press, 1988); Richard Bauckham, ed., *Tudor Apocalypse: Sixteenth-Century Apocalypticism, millenarianism, and the English Revolution* (Oxford: Oxford University Press, 1978); Norman Cohn, *The Pursuit of the Millennium: Revolutionary Millenarians and Mystical Anarchists of the Middle Ages* (New York: Oxford University Press, 1970); Katharine R. Firth, *The Apocalyptic Tradition in Reformation Britain 1530-1645* (Oxford: Oxford University Press, 1979); Richard Foster Jones, *Ancients and Moderns: a Study of the Rise of the Scientific Movement in Seventeenth-Century England* (Berkeley, CA: University of California Press, 1965); C.A. Patrides and Joseph A. Wittreich, Jr., eds., *The Apocalypse in English Renaissance Thought and Literature* (Ithaca, NY: Cornell University Press, 1984); Laura Ackerman Smoller, *History, Prophecy, and the Stars* (Princeton, NJ: Princeton University Press, 1994); Ernest L. Tuveson, *Millennium and Utopia: a Study in the Background of the Idea of Progress* (New York: Harper and Row, 1964). For an analysis of how apocalyptic ideas helped to shape Dee's angel conversations, see Deborah E. Harkness, "Shows in the Showstone: a Theater of Alchemy and Apocalypse in the Angel Conversations of John Dee", *Renaissance Quarterly*, 49 (1996): 707-737.

¹² See, for example, T&FR, 59-60, 213.

¹³ Dee's marginal notes in the *Ephemerides* of Stadius (Cologne, 1570), now Bodleian Library, Ashmole MS 487, entry for 17 January 1582; Dee in Whitby, II, 16-20. The scholarly edition of Dee's personal diary, *Private Diary*, does not include this reference. The inaccuracies that pepper Halliwell's edition have long hampered Dee scholars. William Sherman's forthcoming edition of the diary (also for the Camden Society) will become the standard text.

¹⁴ Dee in Whitby, II, 327-339.

¹⁵ *Private Diary*, 54. For a discussion of Ashmole's remarks see Whitby, I, 146-47; Harkness, *Scientific Reformation*, 317-318.

¹⁶ British Library, Sloane MS 8 and Bodleian Library, Bodley MS 908. I am indebted to Julian Roberts and Andrew Watson for discussing these finds with me and offering their expertise concerning the possible ways in which the books came to be in the possession of these libraries. Roberts believes that the Sloane manuscript at the British Library was probably that mentioned by Ashmole and sold in the Lauderdale sale of 1692. The Bodleian copy was given to the Library in 1605 by William Dunn, an alumnus of Exeter College.

¹⁷ The *Liber Logaeth*, or "The Book of the Speech of God," was the first book revealed to Dee and Kelley. It is now British Library Sloane MS 3189. For a discussion see Whitby, I, 143-44; Harkness, *Scientific Reformation*, 313-314; on Dee and the *Soyga* tables, see Jim Reeds, "John Dee and the Magic Tables in the *Book of Soyga*" in the present volume.

¹⁸ *R&W*, no. 134; now at Emmanuel College, Cambridge. The work is heavily annotated in Dee's hand in the sections on angels, especially 15^r-19^v.

¹⁹ Sadly, Dee's copies of these works have not all been recovered. Dee's extant copies are: Dionysius the Areopagite, *De mystica theologica* (Rome, 1525), *R&W*, no. 271, now Cambridge University Library, H*8.22 (c); Dionysius the Areopagite, *Opera* (Venice, 1556), *R&W*, no. 975, now Magdalene College, Cambridge, D.7.10; Tommaso Rangoni, *De visitatione* (Venice, 1553), *R&W*, no. 482, now Cambridge University Library, N*10.27(D). Most of Dee's Christian cabalistic works remain unrecovered: Henricus Cornelius Agrippa, *De occulta philosophia, libri tres* (Lugduni, 1543), *R&W*, no. 742; Francesco Giorgi, *De harmonia mundi* (Paris, 1545), *R&W*, no. 221; Johannes Reuchlin, *De verbo mirifico* (Cologne, 1532), *R&W*, no. 1043. One notable exception is Johannes Trithemius, *De septem secundeis*. Dee owned three copies: one copy of the 1545 Frankfurt edition (*R&W*, no. 678) now at the Cambridge University Library, Dd*4.511(E); and two copies of the 1567 Cologne edition (*R&W*, no. 969 and *R&W*, no. 1884), one of which is now at the Royal College of Physicians, D 146/2, 21C.

²⁰ Almost every conversation includes detailed descriptions; see, for example, Dee in Whitby, II, 139 and *T&FR*, 5. For a detailed discussion of the significance of these visual clues in the angel conversations, see Harkness, "Shows in the Showstone".

²¹ See Dee's copy of Dionysius the Areopagite, *Opera*, 48^v-54^v.

²² See, for example, Dee's annotations in his copy of Dionysius the Areopagite, *Opera*, sigs. B2^v, B3^r, and F6^v.

²³ Dee's annotations in his copy of Dionysius the Areopagite, *Opera*, 146^r.

²⁴ Dee in Whitby, I, 28-34.

PART FIVE: DEE AND KELLEY

SUSAN BASSNETT

ABSENT PRESENCES

Edward Kelley's Family in the Writings of John Dee

Edward Kelley has generally had a bad press. Frances Yates dismisses him as “a fraud who deluded his pious master”,¹ Charlotte Fell-Smith describes him as “an adventurer” with an “uncontrollable nature and overbearing ways”.² The generally accepted version of the Dee-Kelley relationship, based on Weever’s *Discourse of ancient Funeral Monuments*,³ sees Kelley as devious and fraudulent, a version borne out by the narrative offered in the *True & Faithful Relation*, with Meric Casaubon’s polemical preface that provides accounts of quarrels between the two men, Kelley’s temper tantrums and ungodly behaviour, his obsession with money and his generally volatile behaviour, that contrasts with Dee’s apparent steadfastness. But the problem with this version of events is that if Kelley is cast in the role of the deceiver, then Dee must be cast in the role of the deceived. Peter French sums up the dilemma quite well, as he considers the history of the summoning of spirits as related by Dee and by subsequent historians:

An insoluble problem concerning these actions, or spiritual conferences, presents itself. Did Kelley know Agrippa’s work so well that he was able to regurgitate the angel-magic of the *De Occulta Philosophia* and dupe his pious and credulous master? Or did Kelley have some form of mental illness that made him think he actually did see angel visitants? [...] Though Kelley has usually been pictured as a blatant charlatan – even worse than Dee – it is very difficult to believe that he saw nothing at all.⁴

Whatever he may or may not have seen, biographers wrote of him in lurid colours. From the hyperbolic style of Charlotte Fell-Smith, who announces that “the whole of Kelley’s story is so wildly and romantically coloured, it is so incredible and so full of marvels, that it is extremely difficult to know what to believe”⁵ to *The Dictionary of National Biography*, accounts of the life and death of Edward Kelley are heavily prejudiced in his disfavour.

Part of the problem is that so much information about him is missing. There is no record of his Oxford career, (which may be because the alumni lists of Gloucester Hall are missing) which has led to the assumption that he left without a degree. This is curious, since the record of his brother Thomas’s Oxford sojourn is unproblematic, and Thomas matriculated at Jesus College in 1582. The myth of Kelley’s alias as Talbot is linked to the absence of Oxford records, and since there appear to have been several Irishmen named Talbot whose dates could have fitted in the Gloucester Hall lists and a Talbot appears in Dee’s diary in 1582 shortly before the initials E.K. start to recur in that text, the assumption that Kelley used this alias

gained credence.⁶ Like the rest of Kelley's biography, though, there are conflicting versions. There are two Edward Kelleys listed in the Worcestershire records, Edward son of Patrick Kelley, christened on 2 August 1555 at St Swithin's, Worcester, and another Edward, also son of Patrick, christened on 5 October 1561 at St Helen's, Worcester.⁷ Thomas, the brother who accompanied him to Prague was born in 1564. Dee's diary gives Kelley's date of birth as 1 August 1555, which would appear to fit with the first Edward listed.⁸

The circumstances of his death are equally unclear. Dee's diary records news of Kelley's death on 25 November 1595, which is at least two years too early.⁹ Karel Hrdina and R.J.W. Evans record Kelley as having been imprisoned at Krivoklat in Bohemia between 1591-1594 for killing Jiri Hunckler, an imperial official in a duel, but on his release in 1594 he was pardoned and his lands restored (he had been knighted by the Emperor Rudolph II in 1589, taking the title of Sir Edward of Imany).¹⁰ In 1596 he was imprisoned again, this time at Most (Brux) in northern Bohemia where he held lands. His property was confiscated and sold to the imperial vice-chancellor, Krystof Zelinsky of Sebuzin (a Protestant who fell from grace in 1599 and was dismissed). In 1597, apparently following an unsuccessful escape attempt, he died.¹¹

The relationship between Dee and Kelley, according to Dee's diary, began in 1582. The two men travelled to Poland in 1583, moving on to Prague and thence to Trebon in Southern Bohemia in 1586, where they were under the protection of Vilem Rosemberk.¹² In 1589 Dee returned to England, Kelley moved back to Prague and their lives diverged. Kelley's decision to remain in Bohemia has sometimes been interpreted, by such partisan biographers as Charlotte Fell-Smith, as his fear of returning to England to be exposed as a fraud, but this somewhat xenophobic interpretation that sees Rudolph and the powerful Rozemberk as Kelley's gulls does not have much substance. Kelley did impress the Emperor, as his lands and title show, but he was also taken very seriously by prominent figures in the court of Elizabeth. When Kelley's relations with the Emperor deteriorated in 1591, a letter from an English agent in Frankfurt to Edward Wotton records that his household had been arrested and tortured, and "a great gard had been placed over the Lady Kelley and Mr Dyar."¹³

Sir Edward Dyer is recorded as having been a client and friend of John Dee's as early as 1566. Dyer visited Dee at Mortlake along with Sidney and Leicester in 1577 and was godfather to Dee's son Arthur in 1579.¹⁴ In 1588 Dyer visited Trebon, accompanied by Francis Garland (whom Kelley thought was a spy) and Edmund Cooper, Kelley's brother-in-law. He appears to have been sent by Lord Burghley to persuade Kelley and Dee to return to England, though he seems to have angered Dee who noted on 22 July (in Greek) that "Mr Edwarde Dier did injure me unkindly."¹⁵ Next day there was a reconciliation between the two men, thanks to the mediation of Kelley. Dyer spent several months with Kelley in Prague in 1591, acting upon his instructions from Burghley of 1588:

if you cannot obtain Sir Edwd. Kellie's return personally, yet that you would for maintenance of your credit, procure some small portion of the powder, to make a

demonstration in her majesty's own sight of this very perfection of his knowledge. But if I might have my wish, next to his coming home, I wish he would, in some secret box, send to her majesty for a token some such portion, as might be to her a sum reasonable to defer her charges for this summer for her navy, which we are now preparing to the sea, to withstand the strong navy of Spain, discovered upon the coasts between Britain and Cornwall within these two days.¹⁶

To Kelley directly, when the first appeals failed, Burghley wrote in 1589 in more forthright terms:

I would not have you ignorant that sundry men, being not acquainted with these your faithful offers and purposes [the messages of good intent Kelley had sent through Dyer], let it not in some sort, (since you came not with Mr Dyer) to divine variously of your stay. Some saying, that you do forbear to come because you cannot perform that indeed which hath been reported of you. Some, that you are inticed by such as bear not the queen nor this realm any good will, (not to come to benefit her majesty). Some allege, that your own profession of religion doth not agree with ours here. Yea, some, that are maliciously disposed, say that you are an imposter with your sophistications, as many heretofore, both here and in other countries, have been proved; and that you would fear to be proved such an one here, because of usurers severe punishment.¹⁷

The correspondence, and the use of Dyer as emissary to Kelley, would seem to imply that Burghley at least took Kelley's scientific claims seriously, or that he preferred to have him on English soil instead of in the open city of Prague, able to confer with a whole range of contacts from all over Europe. Moreover, once the relationship with Dee ended, so too do accounts of Kelley's contacts with spirits disappear, to be replaced with more overtly political intrigue. Burghley and Dyer were interested in Kelley's alchemical skills, not in his spiritual ones, and the amount of property he amassed in Bohemia (including a goldmine that was purchased by the Polish alchemist, Sendivogius) bears witness to the extent to which he had integrated himself into the life of the imperial court. His brother Thomas was married in 1587 to Ludmilla z Pisnice, daughter of a Bohemian knight and sister to Jinrich z Piznice who rose to become deputy Chancellor of the realm. Kelley had family connections to the emergent figures of the new Bohemian middle class.

The picture of Kelley starts to shift if we look at it from the Czech perspective and not through Dee's eyes. The picture painted by Dee is full of ambiguities and uneasiness, and perhaps nowhere more obviously than in the story of the exchange of wives. As detailed in *A True & Faithful Relation*, on 18 April 1587, Madimi proposed that the two men should have, as Dee puts it, "had our two wives in such sort, as we might use them in common", though he declares himself unsure as whether the "sense were of carnal use."¹⁸ Dee's notes tell us that when he broke the news to his wife, Jane Dee, "she fell a weeping and a trembling for a quarter of an hour".¹⁹ Nevertheless, a contract between the four was drawn up, dated 21 April 1587. What Joanna Kelley thought of the arrangement is never recorded, though there is an exhortation for her to be granted children with Kelley, following a statement by one of the spirits to Kelley on 4 April 1587 that "barrenness dwelleth with thee, because thou didst neglect me and take a wife contrary to my commandments." Kelley's wife disappears from Dee's narrative on 17 Oct 1588, riding away from Trebon to Prague.

Charlotte Fell-Smith, much given to expressing unsubstantiated opinions (she describes Father Pucci as “an anglicised Italian pervert”)²⁰ describes Joanna Kelley as follows:

Had it not been for the Dee’s kindness to her, and especially Jane’s, poor neglected Joan Kelley would have had but a sorry time. She was only twenty-four; lively and docile, she seemed to please everyone but her husband. Pucci, with perhaps a little flattery, calls her a “rarum exemplum juvenilis sanctitatis, castitatis, atque omnium virtutem.”²¹

Joanna Kelley first appears in Dee’s diary in the entry for 7 July 1583. She is mentioned again on 18 August, when Dee notes “A great tempest of wind at midnight. Maxima erat E.K. cum uxore eius.”²² He is more explicit about the disharmony between Kelley and his wife in *A True & Faithful Relation*. On 4 July 1583 he records Kelley as saying “I cannot abide my wife, I love her not, nay I abhor her; and there in the house I am misliked because I favour her no better.” Dee records his own conversation with Jane: “Jane, this man is marvellous out of quiet against his wife for her friends their bitter reports against him behind his back, and her silence thereat.”²³ In *A True & Faithful Relation* Dee records that on 5 June 1583 Kelley was in a rage after hearing from his brother Thomas that his wife “was gone from Mistress Freeman’s house at Blockley [...] and was at home with her mother at Chipping Norton.”²⁴

There is no evidence of when Kelley married Joanna Cooper. Fell-Smith, who is extremely unreliable, confidently relates how the spirits told Kelley to take a wife in April 1583, but that he was reluctant to do so, and quotes a non-existent reference that she claims is recorded in *A True & Faithful Relation*.²⁵ Many of the references to Kelley’s relationship with his wife in Dee’s writings appear to indicate that the marriage was problematic. It is interesting to speculate, given Kelley’s rebelliousness as depicted in Dee’s writings and his ability to outmanoeuvre the combined pressures of Dyer and Burghley a few years later, on the reasons why he married Joanna Cooper from Chipping Norton, whose date of birth Dee records as 23 June 1563 and who appears to have had neither money nor influence to bring as a dowry.

Let us leave that question in the air, and turn instead to a completely different narrative. In the cloisters of St Thomas Church, Prague there is an engraved tombstone to Elizabeth Jane Weston, which describes her as a noble Englishwoman, flower of Minerva, delight of the Muses, paragon of women.²⁶ Elizabeth Weston is best known as Westonia, author of *The Parthenicon*, an autobiographical collection of poems and letters written in Latin, first published in 1606,²⁷ who died at the age of 30, after giving birth to seven children, only three of whom survived. During her brief life she was highly regarded as an intellectual prodigy, respected by Humanist scholars and thinkers across Europe. She married Johannes Leo, a lawyer at the imperial court and the one extant portrait of her, in the Hessisches Museum, Darmstadt (Plate 16) shows a patrician figure, richly dressed, with dark hair and an intense, serious gaze.²⁸ Her poetry is equally serious: throughout her work there is strong line of grievance, and the influence of Ovid’s *Tristia* is marked. This elegiac note of loss, linked to the theme of exile, has been used by biographers in their attempts to trace her origins: a noble Englishwoman whose poetry recounts how she



Plate 16: Portrait of Elizabeth Jane Weston by an anonymous Dutch artist. Reproduced by courtesy of the Hessisches Landesmuseum, Darmstadt.

lost her father and was sent into exile in Bohemia, the land where she grew up. The generally agreed account of her family gives her a recusant background. Fuller in his *Worthies* places her in Surrey, where there was a family of eminent Westons, and subsequent biographers have followed this suggestion.²⁹

But Fuller merely guesses where she might have come from. He comments that her fame was “more known in foreign parts than at home”, and adds:

I am ashamed that for the honour of her sex and our Nation I can give no better account of her. However, that her memory may not be harbourless, I have lodged her in this County (Surrey) – where I find an ancient and worshipping family of the Westons flourishing at Sutton, ready to remove her at the first information of the certain place of her Nativity.³⁰

From the work of Czech scholars such as Hrdina, Ryba and Petru it is clear that Westonia was not connected to the Westons of Sutton.³¹ Tracing the lines through her poetry, making connections between dates, the suggestion was first posited by Hrdina in 1928 that Westonia may have been associated in some way with Edward Kelley. The dates fitted: Kelley’s death in 1597 coincided with the dramatic rush of poetry and letters by Westonia pleading the case for restitution of her family property from the emperor. Clearly something significant triggered this flood of appeals to powerful allies. Elizabeth Weston was not someone to keep silent when need arose: the edition of her *Parthenicon* held in the British Library contains a handwritten poem, assumed to be by the author, complaining about the treachery of editors who omitted some of her best work and inserted their own instead.³² When James I came to the throne in 1603, Westonia wrote a letter, included in the *Parthenicon*, demanding justice.³³ Johannes Leo, her husband (who was also an agent for Anhalt) fought her case through the courts.

The hints of a link between Westonia and Kelley become clear in a small collection of poems published on the occasion of her mother’s death in 1606, *In obitum nobilis et generosae foeminae, dominae Ioannae p[ost] m[ortem] magnifici et generosi domini Edovardi Kellei de Imany, equitis aurati sacraeque Caesare Maiestatis consilarii, derelicta viduae, matris suae honorandissimae charissimaeque, lachrymaebunda effudit filia*.³⁴ In her long poem, Westonia relates how her father died when she was only six months old; then both her grandmothers died, followed some time after by the man she loved as a second father. After that great loss came the death of her brother, of her two infant sons and finally of her mother. Her poem is a great cry of grief, as the poet recalls the mother who made the sign of the cross on her daughter’s forehead at night, the bitterness of hopes constantly raised and then cruelly destroyed. The manuscript also contains poems in praise of Joanna Kelley by Carolides of Karlsberg and Nicholas Maius.³⁵ All establish beyond any doubt that Westonia’s mother was Joanna Kelley, widow of the late Edward Kelley, revered as a loving stepfather who carefully cultivated the education of the woman who turned out to be a Renaissance prodigy.

Accepting this narrative causes several problems. Louise Schleiner, who agrees with my linking of Kelley and Westonia through Joanna Cooper, nevertheless rejects the hypothesis that Joanna Weston and Joanna Cooper might have been the

same woman. She argues that Kelley must have met and married for a second time in the late 1580s, and she notes that there is no mention of Elizabeth or her brother John Francis in Dee's writings, which is correct.³⁶ But the Oxfordshire county records confirm the Joanna Weston-Joanna Kelley connection: on 28 June 1563 Joanna, daughter of Thomas Cooper was baptized at the Parish Church of St Mary the Virgin in Chipping Norton. The same register records the marriage of Joanna Cooper to John Wesson [*sic*] on 27 June 1579, the baptism of their son John on 23 July 1580 and of their daughter Elizabeth at some point between the legible entries of 4 March and 31 October 1581.³⁷ On 6 May 1582, with timing that confirms Westonia's version of events, the burial of John Weston, clerk, is recorded at Chipping Norton. Whether significant or not, the mysterious Mr Talbot vanished from Dee's diary on 4 May 1582, and reappeared on 13 July.³⁸ He is not mentioned again, though E.K. enters the narrative on 22 November 1582.³⁹

What then are we left with? The evidence for Kelley only having one wife is overwhelming, but we now know that she had two children by one John Weston, who lived for a short time with their grandmothers. There is a prayer for Joanna Kelley to have children recorded by Dee, but it is oddly phrased, with emphasis in the Latin that suggests that what she is asking for is to have children with her present husband, i.e. with Kelley.⁴⁰ Westonia's affection for her stepfather as manifested in her poetry and her letters (particularly those to her brother who was studying at Ingoldstadt) shines out from her writings.⁴¹ Moreover, the attention paid to the education of the two children of the unknown John Weston and Joanna Cooper-Kelley reveals a high degree of commitment and expense on the part of Edward Kelley. Westonia's learning was deemed unusual in such a young woman, as witnessed by many contemporaries, and she probably shared her stepfather's interests in alchemy. The prefatory poem to Oswald Croll's *Basilica Chymica* of 1609 was written by Westonia.⁴²

The most curious aspect of the Westonia-Kelley story is the striking absence in Dee's writings of any reference to Kelley's stepchildren. This led me at first to speculate that he had deliberately concealed them from Dee, but this seems unlikely given the network of connections Kelley and his family had in Prague, and given also that Dee's diary confirms that both Kelley's brother Thomas and Joanna's brother Edward were regularly in Bohemia with them.

It is also the case that Dee's diary and *A True & Faithful Relation* are not straightforward linear narratives. Whatever else they are, they are not texts that can be read as historical accounts; they are full of omissions, contradictions, discrepancies, gaps. They raise more questions than they answer. Reading Dee's texts looking for clues to the Kelley-Westonia relationship has proved tantalizingly frustrating. The high level of education received by Westonia and her brother leads me to feel that these two children must have been educated along with Dee's own children, and there is one tenuous clue that might bear out such an hypothesis. In the Diary entry for 7 August 1588 Dee notes:

Aug 7th, this day I covenanted and hyred John Hammond, jentleman, to serve me in his honest servyces for one yere, and to have 30 dolers for his full and all manner of wages.⁴³

The entry for 21 August 1589 notes: “John Hammond to Stade”, and after this he disappears from Dee’s narrative.⁴⁴

In Westonia’s *Poemata* there is a poem addressed to the noble and educated man, Johannes Hammonius, described as her good friend and previously her most assiduous Master.⁴⁵ It is a short piece, heavily reliant on Ovid, but praises the skills of John Hammond who taught her all she knows about her art. This John Hammond may well be the same man who was a fellow at Trinity College Cambridge in 1579 and who then qualified as Doctor of medicine in 1605, moving on to become physician to James I and to Prince Henry.⁴⁶ The coincidence of Westonia’s master having the same name as the tutor employed by Dee to teach his children cannot be ignored.

In the absence of certain information, one drifts inevitably towards speculation. The stories are full of holes, and there is strong temptation to fill in the gaps. The point I have now reached, however, is to treat the negative accounts of Kelley with some scepticism and to view the Kelley-Dee connection more critically in the light of the Bohemian materials. A vital link in the chain would be provided if we knew who John Weston was, for then we might find answers to other questions, such as why Kelley felt compelled to marry his wife when he seems to have had such negative feelings about her, why he chose to educate her children to such a high level, why there is such silence about Kelley’s children in Dee’s writings. I find myself moving toward a reading of Dee’s version of his relationship with Kelley that is not altogether favourable to Dee – perhaps Kelley’s successes in Bohemia and his rapid upward social movement brought out feelings of resentment in Dee. Certainly all of them, Dee, Kelley and Westonia were obsessed with money and had constantly to compromise and to conceal in order to ensure survival and remain in favour with their patrons. It is the rediscovery of those processes of concealment that make this task of tracing patterns so difficult and yet so compelling.

NOTES

¹ Frances Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964), 149.

² Charlotte Fell-Smith, *John Dee 1527-1608* (London: Constable and Company Ltd, 1909), 91-2.

³ John Weever, *Ancient Funeral Monuments with in the vnited Monarchie of Great Britaine, Ireland and the Ilands adiacent with the dissolued Monasteries therein contained* (London, 1631), 42-3.

⁴ Peter J. French, *John Dee, The World of an Elizabethan Magus* (London: Routledge, 1972), 114.

⁵ Fell-Smith, 76.

⁶ See *Private Diary*.

⁷ Worcestershire section, *International Genealogical Index*.

⁸ *Private Diary*, 1. The horoscope appears in Oxford, Bodleian Library, Ashmole MS 1788, fol. 140.

⁹ *Private Diary*, 54.

¹⁰ See Karel Hrdina, “Dve práce z dejin českého humanismus”, *Listy filologické*, 55 (1928): 16-19; R.J.W. Evans, *Rudolf II and His World* (Oxford: Clarendon Press, 1973).

¹¹ See Arthur Edward Waite, “Biographical Preface”, *The Alchemical Writings of Edward Kelley* (London: Robinson and Watkins, 1973), xxxix.

¹² *Private Diary*, 21-22.

¹³ John Strype, ed., *Annals of the Reformation and Establishment of Religion*, 4 vols (Oxford, 1824), III, pt.2, 621-5.

¹⁴ *Private Diary*, 2, 6.

¹⁵ *Private Diary*, 28. We may speculate on why Dee made this entry in Greek cipher. One possibility is that he used Greek deliberately, since Kelley did not know the language, to prevent Kelley from reading what he had written.

¹⁶ British Library, Cotton MS Titus B, II, as quoted in *Annals of the Reformation*, III, pt.2, 618-20.

¹⁷ *Annals of the Reformation*, IV, 3-4.

¹⁸ *T&FR*, Actio Tertia, 1587, 12.

¹⁹ *T&FR*, 14.

²⁰ Fell-Smith, 166.

²¹ Fell-Smith, 182. No source is given for the Pucci quote.

²² *Private Diary*, 21.

²³ *T&FR*, 30-31.

²⁴ *T&FR*, 6.

²⁵ Fell-Smith, 79: "Kelley was now about twenty seven years old, and unmarried. He was bidden by the spirits on April 20 to take a wife, "which thing to do", he told Dee, "I have no natural inclination, neither with a safe conscience may I do it." But Michael had made him swear on his sword to follow his counsel, so he married reluctantly not long after, Joan, or Joanna, Cooper, of Chipping Norton, who was eight years his junior, and about nineteen." There is no record of this statement by Kelley either in *A True & Faithful Relation* or in Dee's diary.

²⁶ Nobilitate patriae praeclara Britanniae
Seculi nostri Sulpitiae
Cui nomen sunt litterae illibati
Minervae floris
Suadae decoris
Musarum delicii
Foeminarum exempli

²⁷ Westonia's first collection of verse, the *Poemata* was printed at Frankfurt-am-Oder in 1602. *Parthenicon libri iii* was printed in Prague either in 1605 or 1606. The most widely known collection is the second edition of *Parthenicon* which was printed in Prague in 1606.

²⁸ For a discussion of this portrait, and a reproduction see: An Zwollo, "Pieter Stevens, Addenda zu seinem Werk, mit einem Anhang über ein Porträt der Westonia", in *Prag um 1600: Beiträge zur Kunst und Kultur am Hofe Rudolfs II*, ed. by Eliška Fučíková (Freren/Emsland: Luca Verlag, 1988), 326-335.

²⁹ See: Elizabeth Weston, in *DNB*, 1270-71; S.A. Allibone, ed., *Critical Dictionary of English Literature and British and American Authors* (London, 1882), 830; George Ballard, *Memoirs of Great British Ladies who have been celebrated for their writing and skill in the learned languages, arts and sciences* (London, 1775), 173-175; R.J.W. Evans, *Rudolf II and His World* (Oxford: Clarendon Press 1973).

³⁰ *The History of the Worthies of England*, Endeavoured by Thomas Fuller (London, 1662).

³¹ See Karel Hrdina, "Dve práce z dejin českého humanismu", *Listy filologické*, 55 (1928): 16-19; Bohumil Ryba, "Westoniana", *Listy filologické*, 56 (1929): 14-28; Eduard Petrá, "Alzbeta Jane Westonia a její místo v české literatuře", *Ceska Literatura*, 33:5 (1985): 424-38.

³² See Elizabeth Weston, handwritten address to the reader dated 16 August 1610, in a copy of *Parthenicon* (Prague, 1606) in the British Library (Shelfmark C.61.d.2).

³³ *Sereniss. ac Potentiss. BRITANNIAE IMPERATORE IACOBO I. Scotiae, Hybernae ac Franciae REGI*. Letter with accompanying poem, dated 20 June 1609.

³⁴ For a discussion of the implications of *In obitum*, see Susan Bassnett, "Revising a Biography: A new interpretation of the life of Elizabeth Jane Weston (Westonia), based on her autobiographical poem on the occasion of the death of her mother," *Cahiers Elizabethains*, 37 (1990): 1-8.

³⁵ The *In obitum* manuscript contains three items: a long poem by Westonia, "Mortis inxpletæ quæ vis & quanta potestas", Nicholas Maius's epitaph, "Philosopho conjunx fuero qua Iana Kelæo" and Carolides's epitaph, "Hoc sita sub saxa est, animi Matrona viralis." The text is undated, but presumed to have been printed in Prague in 1606. The author consulted it in the Strahov Library, Prague, in 1988, but since that date scholars seeking to read it have been unable to trace it.

³⁶ Louise Schleiner, "Elizabeth Weston, Alchemist's Step-daughter and Published Poet," *Cauda Pavonis* 10:2 (1991): 8-19.

³⁷ There is a discrepancy between this date and that given on her tomb in Prague as 2 November 1582.

³⁸ *Private Diary*, 15-16.

³⁹ *Private Diary*, 17.

⁴⁰ In *T&FR*, 30-31 there is a Latin prayer for Joanna Kelley that asks for fecundity "cum hoc ejus marito". In the entry for 21 April 1587, Kelley is informed that "thou shalt have *the womb which thou hast barren, and fruitless unto thee*". The phrasing of both these entries is ambiguous: it could signify that Joanna Kelley was barren, or it could signify that she was unable to conceive with Kelley, with *this* husband, as opposed to her previous husband.

⁴¹ The correspondence between Westonia and her brother is published in *Parthenicon*: E. J. Westonia, Ioanni Francisco Westoniio, fratri suo germano, S. P. D., 6 Jan. 1597; Ioannes Franciscus Westonius, suae suavis. Sorori, E. I. Westoniae, S. P. D. 24 April 1597; Idem Westonius eidem sorori S. P. D. 14 Aug 1597; E. I. Westonia, fratri suo Ioan. Fr. Westonio S. P. D. 2 Oct 1597; I. Franciscus Westonius sorori suae E. I. Westoniae S. P. D. 12 Oct 1598, B 7-10.

⁴² Oswald Croll, *Osualdi Crollii Veterani Hassi, Basilica Chymica continens. Philosophicam propria laborum experientia confirmatum descriptionem et usum Remediorum Chymicorum Selectissimorum e Lumine Gratiae et Naturae Desumptorum* (Frankfurt am Oder, 1609).

⁴³ *Private Diary*, 28.

⁴⁴ *Private Diary*, 31.

⁴⁵ "Ad Nobilem & literatum virum Dn. Ioannem Hammonium, amicum suum colendum, & Magistrum olim studiosissimum, gratiarum actionis ergo", *Poemata* (Frankfurt am Oder, 1602).

⁴⁶ See *Alumni Oxonienses: The Members of the University of Oxford 1500-1714*, ed. Joseph Foster, 4 vols (Oxford, 1891-2), II, 640.

JAN BÄCKLUND

IN THE FOOTSTEPS OF EDWARD KELLEY

*Some Manuscript References at the Royal Library in Copenhagen
Concerning an Alchemical Circle around John Dee and Edward Kelley.**

My primary aim in this paper is to present a group of manuscripts in The Royal Library in Copenhagen which in one way or another are intimately related to the alchemical quest of a group of historically little-known persons associated with Edward Kelley and John Dee. My secondary aim will be to question the established opinion that Edward Kelley's alchemical and allegedly fraudulent career at the court of Rudolph II in Prague was so chaotic and adventurous that it led to his imprisonment and subsequent death in 1595 from injuries he is said to have suffered whilst attempting to escape. This is the common story, given for instance by Elias Ashmole, Anthony à Wood, and in the *Dictionary of National Biography*.¹ Let us first address the matter of Kelley's career in Prague.

I

We know that between 1583 and 1589, John Dee and Edward Kelley were travelling in Poland and Bohemia, occasionally staying at the court of Emperor Rudolph II in Prague. They both settled in Trebona in Bohemia, though Kelley seems to have been less sedentary than Dee. In the published edition of Dee's diary, Kelley's and other persons' travels to Prague are recorded, while Dee does not mention going there himself.² Instead Dee left Trebona for Nürnberg, Frankfurt am Main, Bremen, and finally England. Though Dee visited Prague and Rudolph at least once in 1584 during his stay in Bohemia,³ it is nevertheless obvious that it was mainly Kelley who undertook alchemical activities in Prague. To my knowledge, information about Kelley's activities from 1589 onward can be extracted solely from sources who were themselves "alchemically-initiated", and thus – if not unreliable – then at least far from informative. Ashmole, who seems to have had access to more information than we have at present, states therefore that "Whiles they lived at *Trebona*, *Sir Edward Kelley* went divers times to *Prague*, and the 15. of *Ian*. 1587, he went into *Poland*, but returned the 9 of *Febr.* after. And 'tis probable these *Journeys* were made in quest after some famous *Chemists*",⁴ but

* I am greatly indebted to Dr Stephen Clucas for his scrupulous proof-reading of my transcriptions in the descriptive part of this essay against the original manuscripts in Copenhagen, without which many errors would have passed. For any remaining errors and interpretations, however, the sole responsibility is mine.

even Ashmole seems to be uninformed about what Kelley, Carpio and Garland (names which are mentioned in Dee's diaries) actually did in Prague and Poland. However, Ashmole does recount a transmutation – though without revealing his source: "I also finde this *Note of Doctor Dee's*, Jan. 5. 1586. *Donum Dei* 2. ounces. E. K. Moreover, for neerer and later *Testimony*, I have received it from a credible *Person*, that one *Broomfield* and *Alexander Roberts*⁵ [both of whom are mentioned in Dee's diaries], told him they had often seen *Sir Ed: Kelly* make *Projection*, and in particular upon a piece of *Metall* cut out of a *Warming pan*," and Ashmole continues shortly after: "The aforesaid *Person* hath likewise seen in the hands of one *Master Frye* and *Scroope*, *Rings of Sir Edward Kellyes Gold*, the fashion of which was onely *Gold wyre*, twisted thrice about the *Finger*: and of these fashioned *Rings*, he gave away, to the value of 4000l. at the *Marriage* of one of his *Servant Maides*."⁶

There is, however, another source which seems to have some information about Kelley's alchemical activities. Unfortunately for us, this source is as "initiated" and discreet as Ashmole. I am referring to the American alchemist John Winthrop Jr. (1606–1676), who is the subject of a very informative study by Ronald Sterne Wilkinson.⁷ Winthrop took issue with Samuel Hartlib against Gabriel Platt's *Caveat for Alchymists*, and, in a letter to Hartlib, he wrote:

One thing that mr. Gabriell Platt in one of those little treatises brands Sir Edward Kelly with as the grand imposter of the world I cannot but take notice of, and inform your selfe (to whom I perceive mr. Plat hath addressed that relation, as per the title of the booke appeares) that I can give many very probable reasons to evince that Sir Edward Kellyes projections were not cousening projections but reall [...]. I shall only mention one particular which I had from one who was very intimate with Rudolphus the Emperour who had it from the Emperours owne mouth. That the said Rudolphus with his owne hands and all materialls and instruments for fusion provided by his apointment (*Inscio Kelleo*) transmuted nine pounds of quicksilver into pure gold with so little of the powder taken upon the point of his knife with his owne the Emperours hand out of a paper opened by Sir Edward Kelly at the further end of the room, he the said Kelly not coming neere the place where the fire was.⁸

The person "very intimate with Rudolphus the Emperour" could very well have been the "philosopher and naturalist Cornel[ius] Drebell",⁹ whose son-in-law, Dr. Kuffler (1595–1677), was a close friend of Winthrop's. Cornelius Drebbel lived between 1572 and 1634, and from 1610 until Rudolph's death in 1612 was in Prague, where he conducted alchemical experiments before the Emperor, who then probably told him of the transmutations of Edward Kelley. This hypothesis is confirmed by a note by Samuel Hartlib, commenting on Winthrop's previous letter, saying that "Sir Edward Kelly is better known to many other judicious men, what he hath performed than Gabr. Plat. [...]. Dr Kuffler confirms your judgement about the truth in Kelly".¹⁰ What makes Drebbel interesting in connection with our manuscripts, however, is that he wrote in Dutch and died in London. But these few anonymous sources are almost the only ones we possess regarding Kelley's late career at the court of Rudolph.

The uncertainty is further emphasized by the accounts of the date and circumstances of Kelley's death. I have found three or four different versions of his

death, but I am convinced that a few more could be found. The most frequently quoted account, given by Wood, in his *Athenæ Oxoniensis*, states that Kelley died in October 1595,¹¹ and this fits relatively well with Dee's entry at the bottom of the page for November that same year: "25 – Newes, that Sir Edward Kelley was slayne".¹² Ashmole's version is the story which, with some variations, is the most widely known: "he was clapt up againe into *Prison*, and attempting to make his *Escape* out of a high *Window*, by the teering of his *Sheetes*, which were tyed together to let him downe, he (being a weighty Man) fell and broke his *Legg*, and thereof *dyled*".¹³ Unlike Wood, Arthur Edward Waite gives the death date of Kelley as 1597, "when he attempted to escape by a rope, but, falling from a considerable height, sustained such injuries as resulted in his death at the age of forty-two",¹⁴ according to Waite, his second imprisonment was "in the castle of Zerner". Wood relates: "John Weever says that Queen Elizabeth sent, very secretly, Captain Peter Gwinne, with some others, to persuade Kelly to return to his native country. It is then said that attempting to escape from a wall *of his own house* at Prague, he fell, etc. [...] His house is said to bear his name to this day, and was once an old sanctuary."¹⁵

All these stories of Kelley's death are curious indeed, as we now know from the study of Evans, who bases his accounts mainly on Czech sources, that Kelley, was, in all considerable probability, alive as late as 1597 or 1598; and the document to which Evans refers makes no mention of Kelley's death or imprisonment, but quite to the contrary identifies Kelley as "dem Gestrengen Edlen Ernnesten Ritter unndt Herrn Edwardo Kelleo von Imanij undt auff New Lüben, [...] auffm Brüxner (= Most) Schloss".¹⁶ There are several things that simply do not fit: first, from whom does Dee receive the (probably) false news of Kelley's death? As is apparent from his diaries, Dee was rather well-informed about Kelley's activities on the continent, and, in addition to Edward himself, he also corresponded with his brother, Thomas Kelley, as well as Francis Garland, Albert Laski, one Rowley, and certainly some others (such as Dyer and Burleigh), who were in personal contact with Edward Kelley during these crucial years 1589-1595.¹⁷

It seems unlikely that Kelley's career was as fraudulent as is usually believed, since in 1589 or shortly thereafter he seems to have been knighted by Rudolph;¹⁸ in his diaries, Dee from that time onward consistently mentions Edward Kelley as "Sir Edward Kelley". Furthermore, from the years 1594 and 1595 there are, at least to my knowledge, no contemporary or near contemporary records of any imprisonment or arrest, either in his own house or in any castle, which of course does not mean that this did not occur;¹⁹ and even if Kelley was in prison or had been arrested by order of the Emperor, as a note in Dee's diaries of 4 October 1593 unambiguously states: "Libertie E: K:", and on top of the same page: "4. Sir Edward Keley set at liberty by the emperor",²⁰ he must nevertheless have regained the confidence of the Emperor rather quickly, as Dee notes on the 12 August the following year: "I receyued Sir Edw: Kellyes letters of the Emperor inviting me to his servyce again".²¹ Finally, we should pay attention to the fact that the only records of Kelley's death come from England, i.e. from Dee, Wood, and Ashmole, all of whom had to rely on other sources, unknown to us, while no other known record

makes any mention of that occurrence. In view of this, I would not take for granted the commonly accepted account of the date and the circumstances of Kelley's death. First, we do not have the slightest idea as to where the information on Kelley's death actually originates. Probably, the source was one or several of Kelley's colleagues, perhaps the Garland brothers, Dyer or Burleigh, or one of his alchemical friends not known to us, but: it could also be Kelley himself, as he had previously done something similar when he is said to have disguised himself as "Edward Talbot" due to some troubles with the authorities for counterfeiting money and digging up corpses before his association with Dee.²² Considering the lack of evidence, further speculations on this matter hardly seem justified, but it should however be kept in mind that fictitious and metaphorical "deaths" (not to mention "identities") are far from uncommon in the history and literature of alchemy.

II

Let us now take a look at the manuscripts in the Royal Library in Copenhagen which seem to have a connection to either Edward Kelley himself or to an English alchemical circle around him and John Dee. Even though they may not shed any new light on our obscure subject, they will, however, pose some new questions of relevance to the crucial years in Prague from 1589 until the death of the Emperor in 1612.

I would like to start with Old Royal Coll. 240 fol., written by 6–9 different English hands.²³ This manuscript seems to be made up of nine different books, written between 1550 and 1600, and bound together immediately after 1600. On the spine is written with a contemporary hand: "Liber Christopheri Taylour" and the "Monas hieroglyphica"-figure, which links this manuscript to a Dee-influenced circle. It is also interesting to note that this is a much earlier, and previously unknown, use of this mark of ownership, with which the aforementioned John Winthrop jr. later used to mark his books.²⁴ On the back cover a provenance signature: "Mr Powell" (most likely Griffith Powell, who lived between 1561 and 1620, and who seems to be the Powell jr. who made acquaintance with Dee and Walsingham around 1582).²⁵ The latest tracts, bound in the beginning of the manuscript, start with an English translation of Isaac Hollandus, with the date: "ffinis. / 22 maij / 1600 /". This is followed by an anonymous tract, possibly by the same author as the previous one: "Axiomata Philosophica Rules of Philosophers", fols. 69-70. Thereafter follows – on fols. 70-71^v – "The Physycall chemyck of Trythemius". On fols. 71v-74v, there is another Isaac Hollandus tract, with the title: "A Fragment of Isaach Holland concerning the Philosophers stone". On fols. 74v-75v: "23 A Portu St. Maria Aquitanus: Questiones & Answers Philosophicall by 23 of St. Mary Port in Aquitan", with the signature: "Pænotus A Portu Aquitanus | .V.M.D." after the explicit. On top of several of the tracts – throughout the whole manuscript – we find the annotation "Liber Christopheri Taylour", maybe referring to either the source of the material or a later provenance.²⁶ In any case, they are signatures of provenance and not of "scripsit", as one of the tracts with the "Liber Christopheri Taylour" signature is written and dated by Thomas

Newton. Though the contents seem to indicate a continental origin, this manuscript was obviously bought in England, as inferred by a note on the inside of the front cover “sum Habrechti qui me emit Londini 1616· 10 Martij pro ·4· Coronichi ·2· s 6[d]”.²⁷

Closely connected with the previous manuscript (with regard to provenance as well as to content) is Old Royal Coll. 1727 4°, written – according to the dates given in the manuscript – during the years 1593 to 1595 and bound in contemporary vellum. On the inside of the front board is a provenance signature: “Lond. Js. Habrechtt 1613”. This manuscript contains 27 items, all in English, beginning with Benedict Figuli [Benedict Töpfer] *Auriga benedictus* (fols. 1r-8v), and followed by twenty tracts, mainly from English philosophers (Thomas Charnock, George Ripley, and Roger Bacon among others) and, among other anonymous tracts and translations of Arnold Villanova, an English translation of Isaac Hollandus’s *Septem condiciones huius Materiae* (fols. 99-100v). But the most interesting feature of this manuscript is not the tracts but the long passages of notes, recipes, booklists and other memoranda and idle scribblings, i.e. items 2, 4–7, and 27. These parts of the manuscript contain a number of names, unfortunately often erased or crossed out so that they are practically illegible,²⁸ and when not illegible seemingly written in code. I have found no biographical information on several of the names that I have been able to read, e.g.: “Tisdale”, “Kessler”, “Turpin”, “Fouler”, “Smith”, “Edgcome”, “Bartholomeus”, and “Poole”. Other “names”, always following determined cancellations, for instance “of mr [percivale] kogpiavno”, “of captayne [davltre] Tvandgo”, “of mr [poole] keeno”, “of mr [dickenson] Tippolfel” or “of mr [miller] Minnog” are obviously written in code.²⁹ But other names, like “Garland”, “Digges”, “Hill”, and of course “Dee” on fol. 132, do suggest that this manuscript stands in some relation to English alchemists active in Europe. It is well within the bounds of possibility that the “Garland” mentioned mainly on fols. 15v-18 is identical with the friend of Kelley and Dee whose name frequently appears in Dee’s diaries (or with his brother). If so, then the “Nicolas Hill” mentioned on several occasions between fols. 21v-29v, would be Nicholas Hill, the English philosopher, about whom very little is known.³⁰ Hill was born in 1570 or 71 and died in 1621; in 1578 he entered Merchant Taylor’s School and matriculated as a scholar of St. John’s College Oxford in June 1587, and on 30 June 1590 he was elected a Fellow of his college, but was removed before 1592, apparently because he entertained Lullian ideas and perhaps for being too explicitly Catholic in his religious leanings.³¹ Of Hill’s whereabouts and activities the following years up until his death almost nothing is known apart from undocumented rumours. Evidently he did not travel abroad in the 1570s and function as secretary for Edward de Vere, the Earl of Oxford, as often said,³² but he seems to have lived under the patronage of Henry, the Earl of Northumberland in the 1590s and might very well have travelled on the Continent in the early 1600s, either to publish his work in Paris in 1601, or leave England due to some involvement in the conspiracy of Sir Robert Basset.³³ After his death, Hill left a number of texts about the essence of God, eternity, the infinity of matter and the like to his widow,³⁴ but only one of his works was published in his lifetime: *Philosophia Epicurea, Democritiana, Theophrastica proposita simpliciter non edocta* (Paris, 1601). Being influenced by Lullian and Brunian ideas as well as hermeticism,

and his connection with the Northumberland circle, the identification of Nicholas Hill with the one in this manuscript seems tenable.

If these conjunctions and conjectures are reasonable it would suggest that the “Mr. Digges” mentioned on fols. 18v and 21, could be identical with the Thomas Digges who died in 1595 and who was one of the more celebrated mathematicians of his time as well as a close friend of Dee’s.³⁵ It is interesting, then, that the notes in which his name occurs both date from precisely 1595, the year of his death; and the notes relating to his name also seem to be listings of his belongings, as on fol. 21: “the bookes of mr digges”, or, on fol. 18v: “A note of mr digges his worke, after his preparatione of his two Materials Sol and Mercury”. Like the aforementioned manuscript this one is also signed “Christopherei Taylour” at the top of some of the tracts.³⁶ As to the provenance of this manuscript, my guess would be that it was written in England, like the aforementioned one, but we should carefully consider the fact, known from Dee’s diaries, that at least one of the Garlands was in Prague around these years (1593–1595), and that the manuscripts could very well have been written by an Englishman on the continent and brought to London at the time of Emperor Rudolph’s death.

The name of Garland also figures in another manuscript, Old Royal Collection 1749 4°, in one hand, signed and dated on fol. 40v: “[...] Here endeth the practise of mr John Englishman deacon, and copied by me J: Metcalfe on the 11· & 12 daie of October 1594.”, and which on the front cover says: “mr garland the 12th Aprill 1595 | the 2d | of John Englyshman & y^e later end, y^e questions | of Henry tyler | of John Englyshe”. This manuscript only consists of two tracts, the first signed at the top by the intriguing “Liber Christopherei Taylour” (as manuscript 240) in another hand, the second, on pp.41^v-43, with an “ex libris” added later by the same hand who wrote the “Christopherei Taylor” signatures, but here it says: “Out of mr Garlandes book of y^e Earle of Trevisan./”.

Another manuscript, Old Royal Coll. 242 fol., dated 1579 and 1589, has a similarly interesting though uncertain provenance. After the explicit of the first tract, “Opus Isaaci Hollandi Vegetabil”, we read “a copie followinge the exemplaire cominge from coullongne / de / D / Brickman 1575 a Londres le ixth of april 1579”. “Brickman”, is the English spelling for “Birckmann”, and a reference to Birckmann’s in Cologne,³⁷ the book-dealer from whom Dee bought many of his books from 1564 onward.³⁸ This first tract could therefore very well have been copied from a book belonging to Dee. The manuscript also includes “Isaac Hollandus, Septem conditiones huius materie” (with the signature “Liber Christopherei Taylour”), “A correctory made by Richard the Englishe man How Arte followeth nature”, and a text of Edward Kelley’s, here with the title: “The praise of vniti for friendships sake made by astranger to further his frende his conceyts. 1589”, with the incipit “The heavenly cope hath in him natures foure | To hidden but the rest to sight apeare [...]”, and after the explicit, we read: “Sir Edward Kelle. Finis” (Plate 17). This text was included in Ashmole’s *Theatrum chemicum britannicum*, which was published in 1652, with the following title, and a dedication which is absent in our version: “Sir Ed: Kelley concerning the Philo-

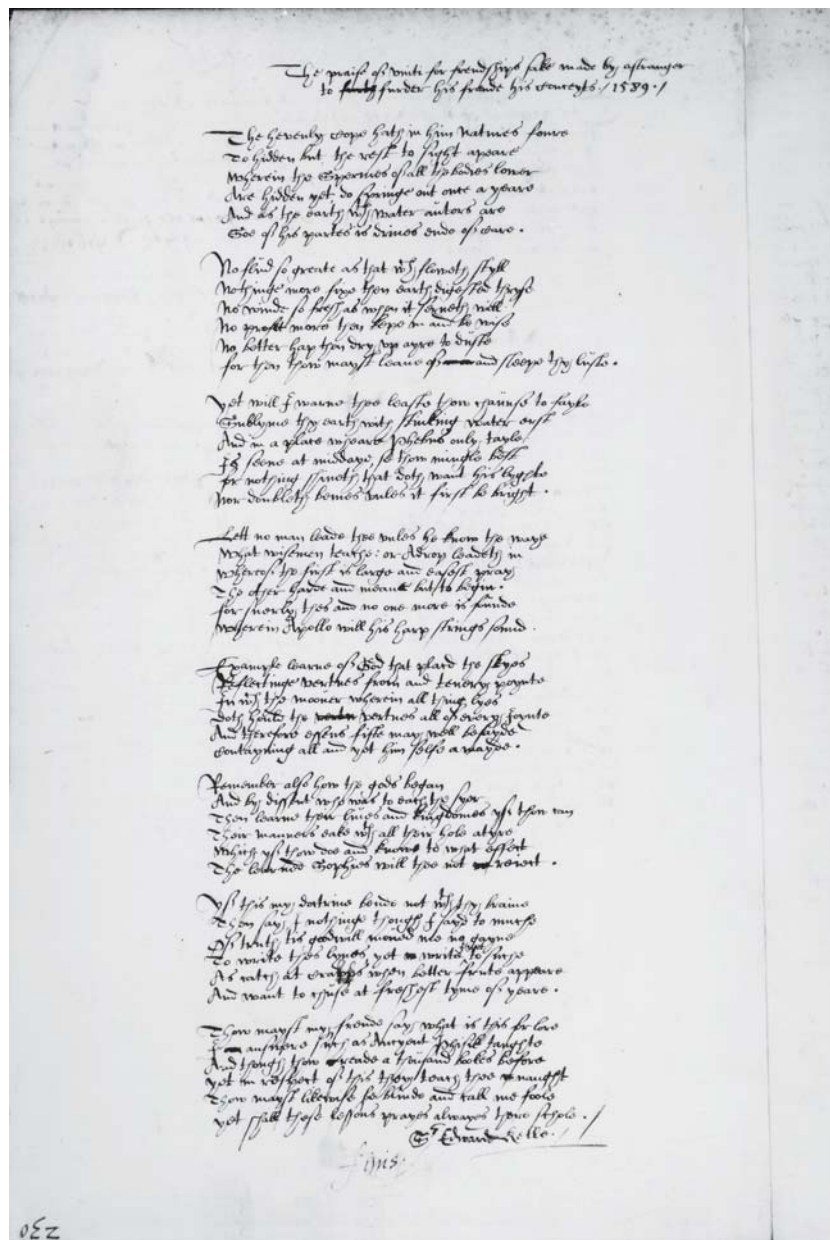


Plate 17: Edward Kelley's 'The praise of vniti for frendships sake' (dated, 1589). Copenhagen, Royal Library MS, GKS 242, fol. 37^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

sophers Stone written to his especiall good Freind, G. S. Gent”.³⁹ Even though published, this manuscript text of Kelley’s metrical tract is of particular interest, as it is dated 1589, the year that Kelley definitively left Trebona for Prague and Dee returned to England. Accordingly, I find it not unreasonable to assume that the first part of this manuscript was written in England and the last part, dated 1589, was written in Bohemia. This assumption is made pending a more thorough examination of the paper and other physical evidence which might either corroborate or invalidate this hypothesis. Apart from the final parting of Kelley and Dee in 1589, this year is important in Kelley’s career in another respect as well, as it was presumably sometime between February 1589 and January 1590 that Kelley was knighted by the Emperor. If then this dating and signature on fol. 37^v is not added later (which the hand and the rest of the material in the codex does not suggest), then this could very well be a holograph of Edward Kelley himself, and, equally important: if *not* a holograph of Edward Kelley, then (still if the hand is contemporary with the date) it must have been written by someone rather close to him in Prague (i.e. knowing his recently acquired title and having access to his papers). Nevertheless, to me the signature “Sir Edward Kelle” looks like an autograph and not like an author’s name given by a scribe, in which case it would be more natural to place it by the title as is usually done.⁴⁰

As will be shown later, the next manuscript, Old Royal Coll. 246 fol., was definitely written in Prague. It contains four tracts written and signed by one hand: “A Discours of the Quintessence (or rather the Mercury of Lune) / owt of a booke written by Mr. John Tychborn”, “Elixir de Monsier Violet”, “In nomine Domini nostri JESU CHRISTI Amen” (in Italian), and the same in an English translation. This tract (as the Italian original preceding it) is written with the explicit address to the Emperor: “I have thought good to shew only with briefnes of hart to your Imperiall Mayesty the true way ...” (fol. 6). Three of the tracts are signed, the first, “R. K. I wrot this A° 99 Sept[embr]is. Owt of a Booke written by Mr John Tychborn, about an. 1560” (Plate 18), the second: “A° 99. Oct[obr]is 12 finis huius Tractatus Ex chartis Sir Edw. K.”, and finally: “Ex chartis Sir Ed. K” (Plate 19). Due to the identical manner of the signatures it would be tempting to regard this manuscript as a holograph by Edward Kelley from 1599, and the first signature “R. K. I wrot this”, as a mere misspelling; and even though the signature “R.K.” occurs only once, and never in connection with the more unambiguous Edward Kelley-signatures, I find it safer to assume that this manuscript was written in 1599, by a person in Prague (the same hand has signed the Old Royal Coll. 1723 4° in Prague, as will be shown later) with the initials R. K.,⁴¹ and that the other two tracts in this manuscript are thus copied from “the papers of Edward Kelly”. It is clear, however, that the unidentified scribe R. K. must have been in relatively close contact with Edward Kelley or the alchemical circle around him in Prague, as he has obviously had access to Kelley’s papers.

As far as I can see, what appears to be the same hand has also written part of Old Royal Coll. 1723 4°, dated 1612 and 1613, with the signatures “Ex libro Johannis Carpionis de Kaprstein / Martis 28 Anno 1612” (Plate 20) and “Reliqua verò antecedentia ex manuscripto libro magna vetustissimo (et omnio de rebus vel

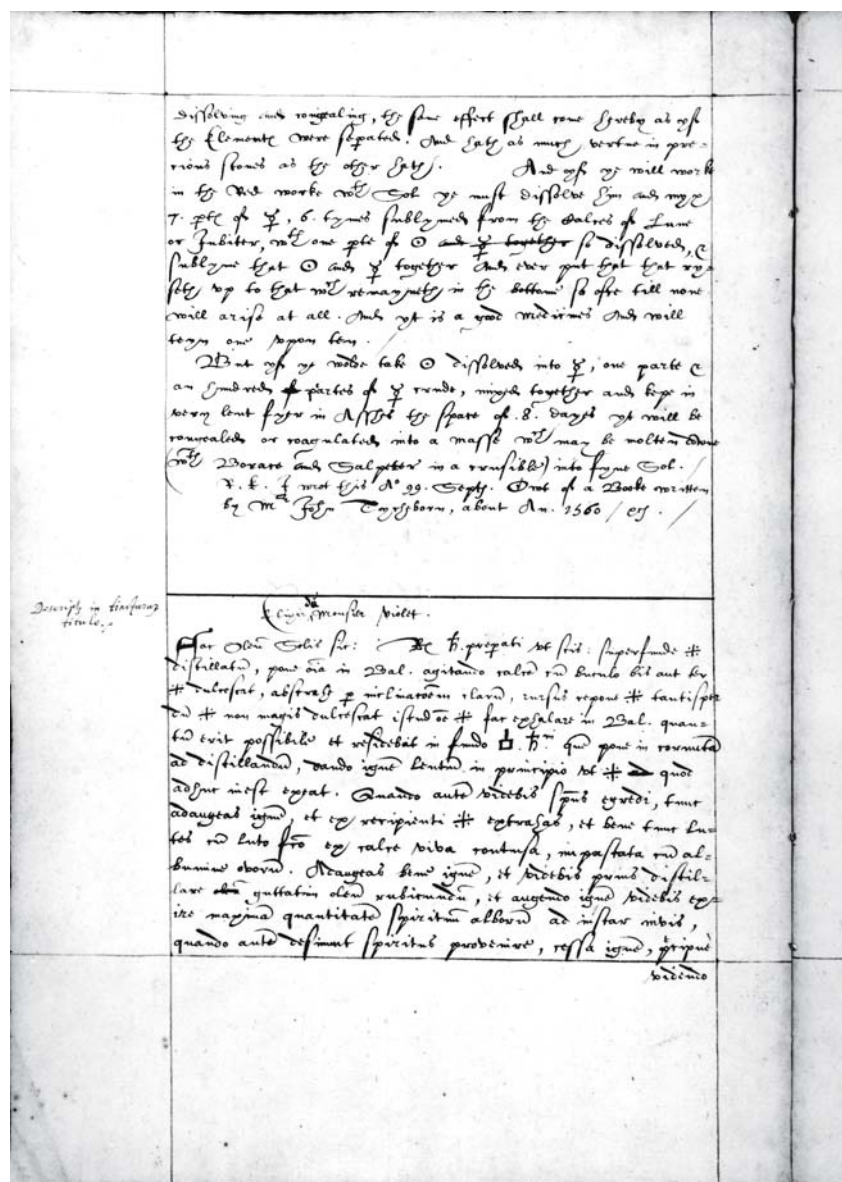


Plate 18: Attribution of manuscript treatise to 'M^r John Tycheborn'. Copenhagen, Royal Library MS, GKS 246, fol. 1^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

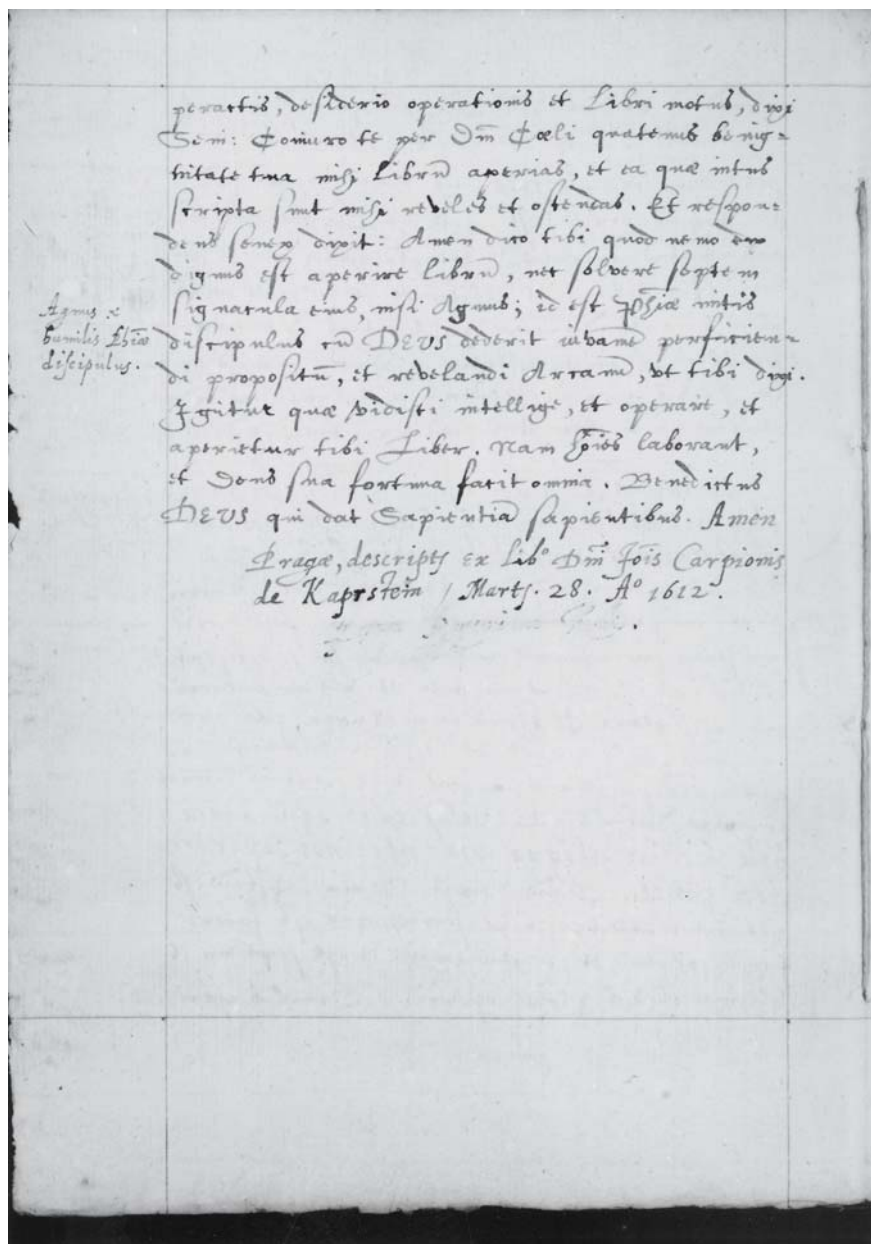


Plate 20: Attribution of manuscript treatise to 'Iohannis Carpionis de Kaprstein'. Copenhagen, Royal Library MS 1723, fol. 20^v. Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige Bibliotek).

operibus Raym. Lullij) scripsi, apud Amicorum optimum D. Johannem C. Pragæ. Anno nostræ Salutatis 1613 Martis 28” (Plate 21), confirming that this scribe was active in Prague, and furthermore “apud amicorum Johannem C[arpionem]”, i.e. John Carpe, with whom Kelley travelled several times to Prague. The last historically established trace of Carpe is the previously mentioned entry in Dee’s diary, recording the departure of Kelley, Garland, and Carpe to Prague.⁴² After the John Carpe signature there is an erased name which very well could be read as “Roger Kock”, a Germanized spelling of Dee’s laboratory assistant Roger Cook (b. 1553).⁴³ Cook worked with Dee from 1567 to 1581, then left him after a violent quarrel, but eventually returned to Dee’s service in Manchester in 1600, and in 1606 he was building a still-house for the Earl of Northumberland. Especially interesting in our connection is that he is probably to be identified as the Roger Cock who was assisting Cornelius Drebbel as an alchemist at the court of Rudolph II up to the time of the Emperor’s death.⁴⁴ Not irrelevant in this connection is that it appears that the “John Carpe” signatures in the manuscript were added some years later by the same hand (which could explain why both are dated the 28 March, but of different years). This does not necessarily mean that the dating is inaccurate. In any case, this signature (John Carpe in Prague 1612 and/or 1613) as well as the, in my opinion, identical English hand do in fact strongly suggest that the production of English alchemical manuscripts stemming from a circle around Dee and Kelley in Prague did continue up to the year of the Emperor’s death in 1612. As we have seen, John Carpe was with Francis Garland and Edward Kelley in Prague in the years 1588-89, and, though Dee’s correspondence with Burleigh, Garland, Carpe and others with links to Prague seems to have ceased by 1595, the alchemical activities intimately connected to Kelley’s activities there obviously continued a good many years after 1595.

We possess yet another manuscript in the same hand: Old Royal Coll. 245 fol., written partly in German, partly in Dutch, with shorter sections in English and Latin, consonant with the assumption that this manuscript springs from the multilingual milieu of Prague. The manuscript is dated “Ex Libro Loogenhagij 1601”.⁴⁵ Aside from a number of obvious similarities, this assumption is supported by another fact: both manuscripts contain texts by the otherwise totally unknown alchemical writer John Tychborn (possibly related to the Tichborne family).⁴⁶ Here we have three texts, the greater part taken “ex libro Loogenhage”: “De vitriolo”, “A Discourse of Antymony, wrytten by Mr John Tychborn of London (Anno Domini 1560) After a duch Booke pertayning to Mr Albert of Brydewell”, and “De Antimonio vel Stibio”, which is a compilation of recipes gleaned from various authors. An interesting feature of this manuscript and Old Royal Coll. 1723 4° is that both have “flower signs” in the margins. From Julian Roberts and Andrew G. Watson we know that identical “flower signs” were employed by Dee.⁴⁷ Obviously, these signs were also in use by members of the alchemical circle around him.

The last of the Copenhagen manuscripts that I find relevant in this connection is also the most intriguing, although at the same time it is that which yields the least factual information. The manuscript in question is Old Royal Collection 247 fol., written by one English hand, with a title page: “Apotelesmata | The Phylosophical

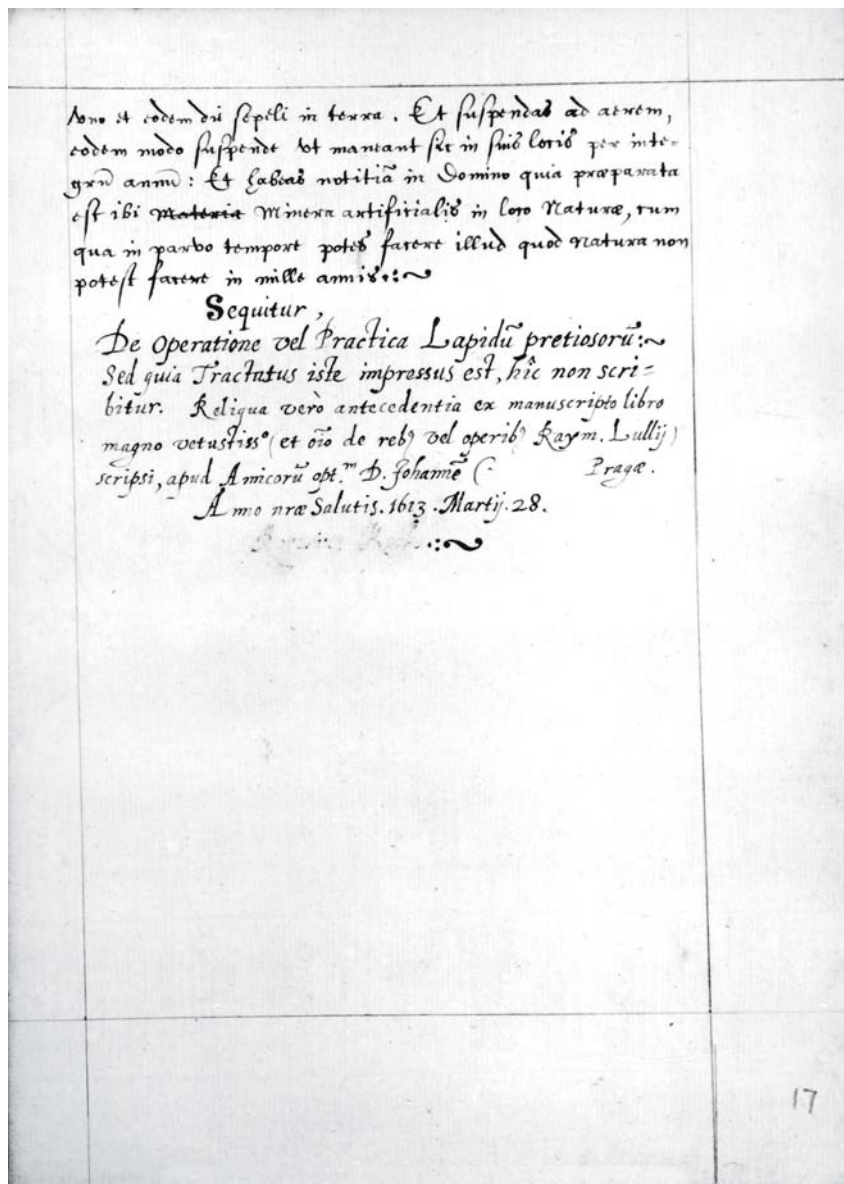


Plate 21: Note concerning a Lullian manuscript owned by 'D. Johanne[m]
 C[arpionem]', Prague 1613. Copenhagen, Royal Library MS 1723, fol. 17r
 Reproduced by permission of the Royal Library, Copenhagen (Det Kongelige
 Bibliotek).

effects of Mercurye | in his Tryvmphe | concernynge | The trew & cheyfe
medycyne of the most | avncyent Phylosophers. In whiche is | containd the
openynge & keye | of the whole worke, done by | Arioponus Cæphalus of Eutopia”,
with a dedication: “To the most myghty & Invincible Emperour | Rvdolphus 2.
Always Avgvstus. | M. C. M. D. the least of the | phylosophers. | ffrom forth the
most Inward affectyon of a devoted mynd, and humble observance, doth dedycate,
consecrate, and submytt This present worke”.

Two Latin tracts have been published by this Arioponus Cæphalus of Eutopia, one with the title: *Mercurius Triumphans & Hebdomas Ecologarum Hermeticarum* (Magdeburg: Andreas Seydner, 1600).⁴⁸ The other work is *Apotelesmata Philosophica, Mercurii Triumphantis* (Magdeburg: Andreas Seydner, 1601).⁴⁹ I have previously vaguely suggested that the manuscript could have been composed or copied by Edward Kelley, but at the time I was not aware of the existence of the two printed editions – though both are included in Ferguson – and as I have not yet had the opportunity to collate these editions with our manuscript, I cannot say how the manuscript, numbering only 14 leaves, corresponds with the two editions respectively comprising 144 pages in octavo and 72 pages in quarto, but it is undeniable that elements from both printed titles appear on its own “titlepage”. Pending a collation with the printed editions, we can at least note that this tract, as the previous ones, suggests a connection between the continent (possibly Prague, the hand being very similar to that in 245 fol., 246 fol., and the “apud amicorum optimum D. Johannem C.” of Old Coll. 1723 4°), and a group of English writers, scribes and/or friends of alchemy. That this tract was in fact written, or later owned, by someone in the aforementioned circle, possibly around the time of Dee’s and especially Kelley’s travels from 1585 until at least 1597, follows from the signature on the upper part of the title page: “Liber Christopheri Taylour”.

Taken individually, these manuscripts can hardly be said to prove anything, but considered as a whole, they suggest a pattern which could be a promising approach to research on the late career of Edward Kelley. If I may summarize: these eight manuscripts may be divided into two main groups, which could be labelled the “R.K.” group and the “Christopher Taylour” group. Of the “R.K.” group, two of the manuscripts, 245 and 246, are obviously written by the same English hand, in Prague, 1601 and 1599. Both contain tracts from the otherwise little known alchemist John Tychborn. The scribe, with the initials R.K., must have been rather close to Edward Kelley, as he or she by some means had access to Kelley’s papers. In my opinion this scribe is to be identified with hand II of manuscript 1723 (fols. 9–20^v). If so, this R.K. refers to one of Kelley’s alchemical travel companions in Bohemia, John Carpe, as “the best of friends”, which implies that R.K. and John Carpe both were active in Prague up to the time of the Emperor’s death. As hand II (i.e. R.K.) comprises only the half of quire C and hand III of the same manuscript continues directly after on leaf C₅ and ends on leaf D₈, hand III ought either to be the same person as hand II, or another person working together with hand II/R.K. on this manuscript book in Carpe’s house. This R.K. further seems to have been familiar with John Dee’s methods of annotating books, which follows from the

“flower signs” in the margin throughout manuscript 245, as well as in manuscript 1723, a fact that strengthens the identification of hand II with the signature R.K.

Two manuscripts in the “Christopher Taylour” group seem to have been written in Prague, 242 (partly) and 247; the relevant part of manuscript 242 is dated 1589 and manuscript 247 is written about 1600. But the first part of manuscript 242 is obviously written in London 1579 from a copy from the bookseller Birckmann. As we can regard the number of Englishmen interested in alchemical books and in contact with Birckmann in Cologne in 1579 as limited, we can assume that it was written by someone in the John Dee circle.⁵⁰ Furthermore, given the alchemical verses, dated 1589 and signed “Sir Edward Kelle”, possibly a holograph, and given the circumstances of the name and the year, which implies Prague, the provenance of this manuscript is as close to Edward Kelley as it can be without conclusive evidence. Still without conclusive evidence, this provenance is strengthened by the rest of the manuscripts which have the “Liber Christopheri Taylour” signatures, and which, apart from manuscript 247 (the Arioponus Cæphalus tract), all contain reference to persons in contact with Dee and Kelley: Mr. Powell (manuscripts 240 and 1727), Nicholas Hill and Digges (manuscript 1727), Garland (manuscripts 1727 and 1749), and further the “Monas hieroglyphica” sign on the spine of manuscript 240.⁵¹

The link between these two groups of manuscripts is that both are connected to alchemical activities in Prague during the years 1589-1612, and both are closely connected to Edward Kelley’s alchemical friends and travelling companions from 1589 onwards. The crucial question, not only in relation to the Copenhagen manuscripts, but more importantly, to Kelley’s and others’ activities in Prague between 1589 and 1612, must then be the identity and biography of R.K. and Christopher Taylour.

APPENDIX

A DESCRIPTION OF THE ROYAL LIBRARY MANUSCRIPTS.

Old Royal Coll. 240 fol.

English, last third of the sixteenth century, dated 1567 and 1600, paper, in-fol. 29-31 × 19-20 cm, made up of nine books: [A]¹² [B-E]⁸ [F]⁶ [G-H]⁸ [I]⁸ (I₁+2) [K]⁴ (80 leaves); [L]¹⁰ [M-Q]⁸ [R-X]⁶ (80 leaves); [Y]² [Z]³² (-Z₃₂) (33 leaves); [Aa]³⁰ (-Aa₂₉₋₃₀) (28 leaves); [Bb]⁶ [Cc]⁴ (10 leaves); [Dd]³⁰ (30 leaves); [Ee-Gg]⁸ [Hh]⁴ (Hh₂+2, 2+Hh₃, -Hh₄) (31 leaves); [Ii]⁸ (8 leaves); [Kk-Ll]⁶ (12 leaves). In total: 312 leaves + Flyleaf and Endleaf. No folio numbers, but quires [Z] and [Aa] with their own foliation: 1-30 [31], and 1-28 respectively, and quires [Bb-Cc] with own pagination 1-4 [5] 6 [7] 8 ... [19] 20. Due to extremely tight binding I have not been able to describe how quires [Ee-Gg] are made up, but

from the watermarks I can conclude that they are not gathered as ordinary eights. Bound in contemporary vellum, between 1600 and 1616, but probably immediately after 1600. On the spine: “Liber Christopheri | Taylour | [Monas hieroglyphica]. Old signature on front cover: “14”, and, by another hand: “quo mihi fortuna, si non conceditur vti?”. On the back cover: “M^r Powell./”, and another sentence: “Scientia non habet inimicum, nisi ignorantem./”, and, by another hand: “aeyreus”. A provenance signature on the inside of the front cover reads: “sum Habrechtj q[ui] me emit Londinj 1616· 10 Martij p[ro]·4· Coronichi ·2·s 6[d]”. On flyleaf: “Opus Isaaci Hollandi Mineral”.

Paper: 5 different papers (quire Ii without watermarks, quire Y unidentifiable). **A]** (quires A–K): chainlines 22 mm, watermark: pot with two handles with grapes on top 57 × 18 mm (Not unlike Briquet IV, 12.885, i.e.: C.M. Briquet, *Les Filigranes*, 4 vols (Leipzig: Karl W. Hiersemann, 1923), hereafter referred to as “Briquet” followed by a volume number. **B]** (quires M–T) chainlines 22 mm. Grapes 35 × 18 mm. (as in Briquet IV, 13.065 or 13.066, but far from identical). **C]** (quires A, L, V–X, Z–Aa–Cc, Ee, Hh, K–L) types of pots with one handle and a four-petalled flower on top, and some signs on the lower part of the pot (of which there exists a great variety, often of French or Flemish origin, cf. Briquet IV, 12.505–12.818); C₆₇: height 67 mm (quire X), not in Briquet. C₆₄: 64 × 24 mm (quires Z, Aa), with a “B” on the lower part of the pot, not in Briquet. C₆₁: with “D” and “reversed P” on the urn, height: 61 mm (quire V), identical with Briquet IV, 12.721 (Moscow 1594). C_{58a}: 58 × 26 mm circle, triangle above a “B” on the pot (quires A & L, M_{1/8}), not in Briquet. C_{58b}: circle, quadrate, and triangle, no letters (quires Bb–Cc), not in Briquet. C_{58c}: 58 × 25 mm (another variant) (quires Ee & Hh). C₅₀ height 50 mm, no flower at top (Kk–Ll). **D]** standard, bottom to top: two feet, a rod, a schematised man in a globe, a rod, on which a schematised man is sitting with arms and legs stretched out. 56 × 15 mm (quires Dd). I have found no similiar type of watermark in Briquet. **E]** a crudely drawn pot with two handles, on top a three-petalled flower. 60 × 31 mm (quires Ee–Gg). Not in Briquet.

Nine hands: Hand I (fols. 2-80^v). Hand II (fols. 81-160). Hand III (fols. 161-162). Hand IV (fols. 163-221), signed: “Thomas Newton 1567”. Hand V (fols. 222-231). Hand VI (fols. 232-261). Hand VII (fols. 262-291^v). Hand VIII (fols. 293-300). Hand IX (fols. 301-312). Some of these hands could however be identical.

1. fols. 2–69 (fol. 1 *blank*) [Isaac Hollandus. Opus minerale] *Tit.*: The book of the conditions or qualities of the Physical stone *with preface-title*: The p[re]face of the booke of the condytions or qualytyes | of the Physycall ston. | Wherin is rehearsed the seu[er]all labors of sondry | men, as also the Aucthors intent. *Inc. Pref.*: All that labor in the art Chemyck, propose to them selves one scope & ende ... *Expl.*: ... I will therfore adioyn both chapters. *Libro De inuentione veritatis. Inc. Text*: The fyrst chapter, of the booke of Invention | of the truthe or perfection. | Concernyng the syx p[ro]p[er]ties of those thyngs out of w[hi]ch the medycyne is drawne/. ... *Expl.*: ... and worde of art, that hetherto have bene had in hyghe esteme, and by all meanes possyble concealed. / ffinis. / 22 maij / 1600 /. *Fol. 69^v blank. Note that a*

recent foliation in pencil at the lower right on a few folios ignores the first blank in its numbering.

2. fols. 70-71 *Tit.*: Axiomata Philosophica | Rules of Philosophie *Inc.*: Albert in his booke of myneralls sayth that gold is eu[er]y where to be fovnd because there is not any thyng ... *Expl.*: ... The works of nature & art are all one in essence, only they dyffer in forme, because the works of nature are Invysyble & secrete. finis.

3. fols. 71-72^v *Tit.*: The Physycall Chemyck of | Trythemius *Inc.*: It is certayn that in all thyngs p[ro]duced by nature, there is bothe hygher & lower vertues /. ... *Expl.*: [...] inceratyon calcynatio[n], w[hi]ch are all one, & operation, in one vessell. finis. *Post expl.*: That the studyous of this art myght be eased fro[m] the readyng of many bookes I intend here to wryte brefely of the orygynall & matter of mettalls, vppon or above w[hi]ch the spagyryck powreth or fuseth his radycall pryncyples, Then only favo[ur] my endevors & studyes & conster them to the best. ffarewell. B P[ænotus?] a Portu Aquitan | S M.

4. fols. 71^v-72^v *Inc.*: The very pryncypall cause & matter of mettalls ... *Expl.*: ... than shalt be a blessed & happy Physytion See then dyrect w[i]th all thy endevo[r] thy vows in hym. finis.

5. fols. 72^v-75^v *Tit.*: A Fragment of Isaach Holland | concernyng the Ph[ilosop]hers stone *Inc.*: When thou Intendest to make p[ro]jection vppon [Venus] for redd remember to sublyme [...]. *Expl.*: [...] vntill it be subtyle & then kepe it. | the lords name be prayed. Amen. finis.

6. fols. 75^v-76^v *Tit.*: Questyons & Answers Phylosophycall by B of St. Mary Port in Aquytayn. *Inc.*: The Phylosophycall p[re]paration of mercurye is that his leaden duskyness be all taken away [...]. *Expl.*: [...] This is <not only> my opynyon, <but alsoe a> true Invincyble <& aproued> Iudgement. finis. *Post expl. with the "signature"*: B Pænotus A Portu Aquitanus | .V.M.D. *With corrections by another hand.*

7. fols. 77-77^v *Tit.*: Iterum de Mercurye. *Inc.*: There be 3 thyngs w[hi]ch hynder the earth [...]. *Expl.*: [...] or takes heede by an other mans losse. ~~finis~~

8. fols. 77^v-79^v *Tit.*: Lvij rules or cannons of Phylosophye. *Inc.*: Bodyes in there composytyon or compovndyng do dyffer [...]. *Expl.*: [...] prayse hono[r] & glorye thorow Iesus Chryst / Amen.

9. Fol. 80^r: [Untitled fragment] *Inc.*: A disease is an accident therefore it must be in some subject that is the diseased man [...]. *Expl.*: [...] there shoold haue byn noe evill, and soe, noe Knowledge of evill: And soe noe comanndem[en]t to forbydd it. Salvo meliori Iudicio. *Catchword [in another hand]*: The lyttle key.

10. fols. 81-154 [Lull, *Clavicula*] *Tit.*: The lyttle Key of Raymond Lully | of Maiorq[ue], which is also called his | Apertorye is heere expovnded, | In w[hi]ch whatsoeu[er] is requyred in | the art Chemyck is openly | & playnly sett out. *Inc.*: We have called this o[u]r worke a Lyttle Keye, ffor that w[i]thout this p[re]sent booke there can none vnderstand [...]. *Expl.*: [...] suffyciently declared above or before. finis.

11. fols. 154-159 [Anonymous tract on preparation of the philosophers stone] *Tit.*: Of entrance, somewhat out of others. *Inc.*: Many knowe (sayth a certayn Auctor) the p[re]paration of the stone, but few know the entrance. / Take therefore one parte of the redd medycyne p[re]pared [...]. *Chap. fol. 155*: Concernyng Abbreviatio[n] or shortenynge of the Worke. *Chap. fol. 157*: Of the vse of the

stone when it is made./. [...]. *Expl.*: [...] more then a man can thynke, (but suche testymonye comes not fro[m] the Empero[ur]s courte &c) This is suffycyent. finis. *Fol. 159^v blank.*

12. [Miscellaneous recipes] fol. 160. *Inc.*: to candy any kynd of rootes [?] & flowers, | to make prynted Condienyock the collo[ur] of a Rubye [...]. *Expl.*: [...] this in 24 howrs/ w[i]th Infynyte others &c/ *Fol. 160^v blank apart from catchword at foot of page*: “A prescious water of”.

13. fol. 161^{r-v} [Alchemical tract, inscribed: “Liber Christopheri Taylour.”] *Tit.*: A prescious water of this Arte of Alkemy. *Inc.*: Take vitriall romayne that is gryne Sal nitre & sal Armoniake, put them to destill in the strongest that you can git w[i]th alembicke vppon the hedde of hit [...]. *Expl.*: [...] but let him remayne in water still, This prescious water kepe well and close, laudes deo amen, finis. *Post expl. fol. 161^r*: The remembraunce of my laste compounde don and fynished in Mr. Elliotes house. being the xij of December, the Son entring in Capricorne. Of o[u]r Lorde · 1567· Of earthe & water comes · 7· o[u]nc[e]s. *fol. 161^v*: [Miscellaneous notes on “sol” and a fragment of alchemical verse]

14. fols. 162-192 [Lull, *Ars intellectiva*] *Titlepage fol. 162^r*: ARTE INTELLECTIVE | OF RAYMVND | AND ALSO THE | PRACTICK [and three miscellaneous fragments]. *Fol. 162^v blank*; *fol. 163^r inscribed in marg.*: Liber Christopheri Taylour./ *Title*: The Intelletive arte of Raymunde | lullie vppon the ph[ilosoph]ers stone *Inc.*: There are manye p[er]sons w[hi]ch erre throughout the whole worlde, strayinge from the worke of nature for lacke of knoledge & witte because they have not studied philosophie [...]. *Expl.*: [...] Therefore lyft vp thyne hearte to God almightie. Finis. *Post expl.*: Although this boke be intituled Ars intellectiua yet Raymund in his Vade mecu[m] or clause of his Testame[n]t in the third practicall prynciple in the Chapter That earth ought to be of two bodies in the end before the chapter what y^e matter of the stone is & what thinges are requyred to it &c, doth call this boke Tractatus de intentione Alchymistaru[m] or a treatyse of y^e intentes of Alchymistes, for there he doth remitt thee for measure of reduction to the chapter of practicall congelacion by the way of Reduction which foloweth in the second boke. | finis per me | Thomam Newton” *Fol. 193^{r-v} blank, except for a note on fol. 193^r*: dislocation or displacinge yt is to wit, Elementarye, as y^e sophisticalle resolucion is done in comen water – 11· a *

14. fols. 194-221 [Lull, *Practica*] *Tit.*: The Practicke | of Raymund Lullie. *Inc.*: Corruption & depurac[i]on are done together by taking away part of the cause or corrupt essence. [...]. *Expl.*: [...] the vertue of the contrarye is tryed & purefyed, as gold doth in his proper furnesse. *Sign.*: finis, quod Thomas Newton. 1567., *fol. 221^v blank.*

15. fols. 222-23 [Alchemical tract endorsed: “Liber Christopheri Taylour.” at head of fol. 222^r] *Inc.*: Mettals are ingendred of subtyll fuemes dissolved by quicksiluer, [...]. *Expl. fol. 225*: [...] and yf thoue <vpon> the sonne whose mother ys mænstrous thoue shalte be leprous. ffinis. *Title fol. 225^v*: The second parte of the rosarie | 1 Chapter | *Inc.*: By this ffirst booke yt ys proceed, that the workinge of owre medicine [...]. *Containing 16 chapters, expl.*: [...] wisdome, by our onelie redemer Jesus Christe · Rosarii finis. *Fol. 232^{r-v} blank.*

16. fols. 233-261 *Tit.*: Rosarius [+ “3 parte of alyrog” *sign*: compound of traditional symbols for mercury and venus surrounded by 4 points at N, S, W, and E] *Inc.*: After Geber Cblcznbczpn [deciphered by another hand: “calcinacion”] is

the purificac[i]on of a thinge by the fier or makinge a <powder> by pryvac[i]on of humydyte consolidating or knittinge the partes makinge yt to flowe. [...]. *Expl. fol. 236*: [...] the governance thereof vnto the consumac[i]on or end. *Fol. 236^v blank*. *Fol. 237*. *Title*: The Rosary | The greate Rosarye [The word “Treuisa[n]” added by another hand. Inscribed at head of the folio: “Liber Christopheri Taylour.”] *Inc.*: Desierous desier & price inestimable of all ph[ilosoph]ers but not playnelie [...]. *Expl.*: [...] w[hi]ch is blessed for ever more worlde w[i]thoute ende/ Amen ./” *Fol. 261^v blank*, with catchword: “Stella complexionis”.

17. fols. 262-286 *Tit.*: Stella complexionis p[er]fecti ma= | gisterij vell inv<e>stigationis Lapidis. [Inscribed at the head of fol. 262^r: “Liber Christopheri Taylour”] *Inc.*: The liberall arte or delightfull documentes of all the ph[ilosoph]ers that is to say, the conclusion of the p[er]fect maistrie shoulde be purchased by the lovers hereof, [...]. *Expl.*: [...] ffor the w[hi]ch thinge, praise be geven to the most highest, w[hi]ch hathe geven suche knowledge to me vnworthye & a synner. Amen. *Post expl.*: Heare endeth the smalle booke called the Starre of complexcion of Alchimye made by John Bubelem of England. In the yeare of our lorde ·1384· finis.

18. fols. 287-291^v. *Tit.*: Heere Begineth the water of Everlasting Lyffe. [Inscribed at the head of fol. 287^r: “Liber Christopheri Taylour”] *Inc.*: In the Name of the holye Trynitye Amen. Yee Brothers w[hi]ch are the searchers of the science of Alkamy seek y^e no more [...]. *Expl.*: [...] allwayes thow doest converte y^e extracted moyste vpon his drye. f[inis]. Nunc de vase sequit[ur]. *Fol. 292^{r-v} blank*.

19. fols. 293^r-300^v [Arnold da Villanova, *Questiones*] *Tit.*: The questions and demaundes of the Archbishop of Reynes w[i]th the answers of Guilla[m] de Cenes. | Questions essentiall. *Inc.*: 1. Ffyrst reverend father thowe demaundest of me [...]. *Expl.*: [...] and praise of almightie god lord and king world w[i]thout end. *Post. expl.*: This arte or most secreat scyence was accomplished done and ended at Roane a mile bysides Paris the friday being in the yeare of our lo: god 1216· and had this in co[m]municat[i]on w[i]th the sayd reverend father the Bishop of Reynes by the saide G[ui]lla[m] de Cenes.

21. fols. 301-312 *Tit.*: The Crowne of the Ph[ilosoph]ers which is sayd | to be the onlye Pathe of ther Norishinge | waters, wiche is all Crvde & beinge made | moste thine castethe awaye the vnpurenes ther of <w[i]th a paire of Iron scisers> beinge powdered <it> is put into his | Large pallace wherof iij parts are <esteemed> emptie | and ther it <should be> Imprisoned w[i]th Hermes | seells beinge shutt w[i]th a hott payre of | yron tongs. The Glose ffolloeth [Inscribed at the top of fol. 301^r: “Liber Christopheri Taylour”] *Inc.*: This Crowne is called the crowne of wiese men because it makethe a circular Rowndnes as a crowne dothe, for a Crowne dothe circularly go abowte the hed w[hi]ch is the [...]. *Expl.*: [...] huiusmodi mensura est verus circuitas rei mensuratae etc./ preceded by seven geometrical figures. *Fol. 312^v blank* apart from a grammatical jotting. Endleaf and inside of back cover blanks.

Old Royal Coll. 242 fol.

English, late sixteenth-century, paper, in-fol, ca. 39 × 23 cm: [A]¹⁰ [B]¹⁶ (-B₁₆) [C]¹² (+B₁₆) D⁸ E¹⁰ (2+E₁) (58 leaves) 1 English hand. Dated 1579 and 1589.

All leaves numbered (if the book is placed upside down) as fols. 209-266. Unbound. Paper: Watermark: PS in coat-of-arms with crown 31 × 20 mm. (Briquet III, 9668. French, 1550s or 1560s).

1. fols. 1-27 [Isaac Hollandus. *Opus vegetabile*] *Inscribed at head of fol. 1^r*: “Liber Christopheri Taylour” and (in same hand) marginal gloss: “Opus Isaaci Hollandi Vegetabil.” *Tit.*: The firste p[ar]te of Jn^o [Johann] Isacks | vegitable woorkes | Of the vegitable stonne owte of wyne | the firste chapter. *Inc.*: ffor to coome to this suddene medicyne w[hi]ch heallethe all diseases & to renewe age & to keape them in their good estate, vntill the laste tyme of their lief [...]. *Expl.*: [...] shalbe made owte of svgre, for of sugre wilbe a noble stonne vegitable, as shalbe shewed here after, finis. *Post expl.*: A copie followinge y^e exemplarie cominge from couloigne / de / D / brickman 1575 A londres le ixth of aprill 1579.
2. fols. 27^v-28 [Isaac Hollandus, *Septem conditiones*] *Inscribed at head of fol. 27^v in another hand*: “Liber Christopheri Taylour.” *Tit.*: Septem conditiones huius materiae *Inc.*: The firste condic[i]on is this that if ther be any kynde of <Argente vive> that shulde be converted in auru[m] puru[m] or Argentu[m] puru[m] it behoveth firste [...]. *Expl.*: [...] our stone and our Kinge is Coronat w[i]th a dyadem and may be mvltiplied w[i]thout end. finis.
3. fols. 28^r-37^r *Tit.*: A Correctory made by Richard the Englishe man | Howe Arte follo[w]eth Nature | The firste Chapter. *Inc.*: ffor as mucche as the Amendement of thinges Augementeth and encresseth the nature of the thinge [...]. *Expl.*: [...] withe the adiunction of ferment finis *With some verses by another hand*: Ferte sacrum fauno folijs oleaster amaris | Sic steterat nautis olim venerabile lignum | Seruati ex vndis vbi figere dona solebant | Laurenti diuo et votas suspendere vestes } Carmina Edwardi Kelle· Militis · /
4. fol. 37^v [Verses by Edward Kelley] *Tit.*: The praise of vniti for frendships sake made by a stranger | to funder his frende his Conceyts. / 1589·/ *Inc.*: The hevenly Cope hath in him Natures fowre | To hidden but the rest to sight apeare | [...]. *Expl.*: [...] Yet shall these lessons prayes alwayes there schole. / S[i]r Edward Kelle. finis.
5. fols. 38^r-40^v. *Inc.*: Water, erthe, Aire, and fyere, moyste and drye fixe and fleyinge, bodye & sp[iri]t [...]. *Expl.*: [...] into red sulfur & that congeleth not w[i]th red sulfur sufferinge fyere by decoction into Sol hath no way to red / Laus hono[r] deo. finis.” *This tract quotes Empedocles, Lumen luminum, Rasis, Hermes, Zeno, Alex[ander], Lilly, Rosinus, Morienus, Phiazas, Geber, Alphidius, Rosarius, Raymund, Paganus.*
6. fols. 41-44^v [*Dicta philosophorum*] *Inc.*: Here begin[n]eth the tretys of Hermes called A[r]istote[ll], and senio[r] of secretts that I reporte in this writtinge to be p[re]ferred above all other as of the tretys of magnesie, or Huntinge of the Lyon, or of the stone of the Egill [...]. *Expl.*: [...] Therefore loke that yow dissolve bodyes in their liquor w[hi]ch is called in latyn (Inr____) w[hi]ch is the water. Deo gratias. Finis. *Contains three chapters, cf. fols. 45^v-48^v, which contains chapters [3], 4-5. Quotes: Calid, Hermes, Senior, Barabas, Alexander, Ovid, Aristotle, Socrates, Joseus, Rosary, Pythagoras, Democritus. Cf. Oxford, Bodleian Library Ashmole MS 759, fols. 136-146^v. [Singer 22].*
- 6b. fols. 45-48^v [*Dicta philosophorum, cont.*] *Inscribed at head of fol. 45^r in another hand*: “Liber Christopheri Taylour”. *Some alchemcial verses positioned as*

an “intital”: “Est vna res vilis, licet vbique reperta | quatuor incerta naturis, nube referta, [...]. *Expl.*: [...] si sic procedis, tunc infinita videbis *The continuation of chapter 3 of Dicta philosophorum. Inc.*: The stone of all ph[ilosoph]ers is but one thinge and ther in do accordde alle Ph[ilosoph]ers whereof *Hermes* father all seythe that [...] *Expl.*: [...] Ioye praysinge to our deere Lorde Jesu Cryste nowe & ever Amen. /finis/. *Consists of chapters [3], 4-5. cf. fols. 41-44^v, which contain chapters 1-3. Quotes: Hermes, Alphidius, Lilly, Geber, Rosary, Lumen, Novella mar[gar]ita, Gregory, Zenon, Rasis, Morien, Empedocles, Aristotle, Arisleus, Horfolius, Senior, Markus, Avicenna, Calid, Aros, Maria.*

7. fol. 48. *Tit.*: In quatuor verbis totum consistit *Inc.*: The firste is of the bringinge of a body agen into m[er]curye, [...]. *Expl.*: [...] wiche is his ferme[n]te y^e ells do nowght. finis.

8. fols. 48^v-49 *Inc.*: Auicen saythe that ther be greate secretts in the Ph[ilosoph]ers Saterne in that ther be in him [...]. ¶ Beholde m[er]curye that hath in it self body sowle & spirett [...]. ¶ Our Sol is made of our Bras [...]. ¶ Take Erthe of erthe of erthe erthes brother in grene hew clearly distilled & dissolue yt of ·12· pou[n]ds & put yt [...]. *Expl.*: [...] do ye w[i]th as it shewid in & other worke trefinge vppon this matt[er].

9. fols. 50-51^v *Inc.*: Truthe that euer Lastethe wiche is gode [...]. *Expl.*: [...] Avycin / p[ri]mu[m] quod debet facere est ut sublimes mercuriu[m] & tunc mitto in hoc mercurio. *Fols. 52-58 blank.*

Old Royal Coll. 245 fol.

Latin, Dutch, German and English, early seventeenth-century, paper, in-fol., ca. 31 × 20.5 cm: [A]⁸ (-A₇) [B]⁸ (15 leaves), written by one English hand. Dated: “Ex libro Loogenhagij 1601”. Bound in modern green boards by the Library. Text 21.5 × 14 cm., 35 ll., margins: 20 : 25 : 43 : 58 mm. Paper: vertical chainlines 20 mm, watermark: grapes 36 × 20 mm (except for size identical to watermark type **B** (35 × 18 mm) of manuscript 240).

1. fols. 1-6 [Alchemical fragments] *Tit.*: De vitriolo | De vitrioli Spiritu in caduco. Cuius | Theophr. meminit. Wolckanw. *In marg.*: Ex libro Loogenh[a]gij *Inc.*: R[ecipe] blawen vitriol, calcinier in gemechlich mit linden fewer byß er weyß werde. Als balt er calciniert vnd noch warm ist, sol man ihm in ein Retorts thun [...]. *Chap., fol. 2^v*: De Auro | Solis vel Auri solutio. *Post expl., fol. 3*: Huiusque de Vitriolo: Ex lib. Loogenhage. *Title, fol. 3^v*: De Sulphure [*in marg.*: Ex lib. Loogenhage.] *Chap., fol. 4v*: De Margaritis vel Perlis. *Post expl., fol. 6*: [...] Huiusque ex libro Loogenhagij A^o 1601. Jan. 12. *In marg.*: Finis libri Loogenhagij [followed by a “flower sign”]. *Fol. 6^v-7^v blanks.*

2. fols. 8-14 *Tit.*: De Antimonio vel Stibio *Inc.*: Aliqui asserunt Stibium esse Masculinum et foemininum. Masculinum dicitur cui nihil nigredinis in est [...]. *Expl.*: [...] habebis summum et preciocissimum Aurum potabile. | Huiusque de Antimonio, ex Lib^o Loogenhage. *In marg.*: Finis libri Loogenhage, de Antimonio.

3. fols. 14-15^v *Tit.*: A Discourse of Antymony, wrytten by Mr John Tychborn of London (Anno D[omin]i 1560) After a duch Booke pertayning to Mr Albert of

Brydewell. *Inc.*: Stibium and Stibi, so called of *Dioscorides* and other Grecians [...]. *Expl.*: [...] expulsiſng choller and flegme. / [*Catchword.*] Of the

Old Royal Coll. 246 fol.

English, late sixteenth-century, paper, in-fol., ca. 30.2 × 20.3 cm: [A]¹⁰ (10 leaves). Written by one hand (the same as manuscript 245). Dated 1599. Bound in modern green boards by the Library. Text 22.2 × 14 cm., 34/35 ll., margins: 20 : 20 : 42 : 61 mm. Paper: vertical chainlines 19-20 mm, watermark: pot with one handle and crown 50 × 17 mm. (close to C₅₀ of manuscript 240, quires Kk–Ll) *Fol.* 1^{r-v} blank.

1. fols. 2-2^v [John Tycheborn, *A Discours of the Quintessence*] *In top righthand margin*: o[mnia] s[un]t in latin[um] versa & in locos translata. *Tit.*: A Discours of the Quintessence (or rather the [Mercury] of Lune./ owt of a booke written by Mr. John Tycheborn *Inc.*: R[ecipe] Tartar calcyned and Salarmoniack an^a. And put them with the calces of Lune in the best distilled vineger [...]. *Expl.*: [...] yt will be congealed or coagulated into a masse which may be molten downe (with Borace and Salpeter in a crusible) into fyne Sol./ *Post expl.*: R. K. I wrot this A^o 99. Sept[embr]is. Owt of a Booke written by Mr John Tycheborn, about an. 1560./ etc.
2. fols. 2^v-3^v *Inscription in margin of fol. 2^v*: “Descriptum in tincturus titulo” *Tit.*: Elixir de Monsier Violet *Inc.*: ffac Oleu[m] Solis sic: R[ecipe] [Saturni] prae-p[ar]ati vt scis: superfunde [...]. *Expl.*: [...] et sic habebis medicina[m] cuius pars vna ad M.18. partes, et laudetur Altissimus. ecs. *Post expl.*: A^o 99. Oct[obr]is 12 finis huius Tractatus Ex chartis Sir Edw. K.
3. fols. 4-7 *Tit.*: In nomine Domini nostri JESU CHRISTI Amen. *Inc.*: Conoscendo che molti e molti si sano affaticati, et che [...]. *Expl.*: [...] pertinente alla vera transmutatione de metalli. finis. *Post expl.*: Ex Chartis S[i]r Ed. K.
4. fols. 7-10^v. *Inscribed fol. 7^r*: “The same translated into English”. *Tit.*: In the name of our Lord Jesus Christe. Amen. *Inc.*: Knowing that divers and sundry have taken paynes and have spent the best parte of there yeres to attaine to the hydden science, [...]. *Expl.*: [...] And this is one of the particular Secrete of Philosophers pertayning to the true transmutation of Mettals./ finis. *Post expl.*: Ex Schedulis annexis ¶ After take one pound of Vitriol Romaine, one pound of Sal Niter, [7 ll.]

Old Royal Coll. 247 fol.

English, late sixteenth- or early seventeenth-century, paper, in-fol., 31 × 20.2 cm: [A]⁶ [B]⁸ (14 leaves), page number on pp.5, 9, 17 and 23 (the last erroneously as “25”). Written by one English hand. Bound in modern green boards by the Library. Text 27 × 14.7 cm., 48/61 ll., margins (drawn in red): 11 : 16 : 44 : 20 mm. Paper: vertical chainlines 22 mm, watermarks **A** pot with one handle, crown and four-petalled flower above crown 64 × 24 mm (seems to be close to C₆₄, quires Z and Aa, of manuscript 240); **B** grapes 42 × 20 mm. (cf. quires M–T of manuscript 240 and manuscript 245).

fol. 1-14^v [Arioponus Cæphalus of Eutopia, *Apotelesmata*] *Inscribed at head of fol. 1^r*: “~~Liber Christopher Taylour.~~” *Tit.*: Apotelesmata | The Phylosophycall effects of Mercurye | in his Tryvmphe | concernynge | The trew & cheyfe medycyne of the most | Avncyent Phylosophers. In whiche is | containyd the openynge & keye | of the whole worke / done by | Arioponus Cephalus of | Eutopia. | To the most myghty & Invyncible Emperour Rvdolphus 2^o. Always Avgustus. | M[artinus] C[opus] M[edecinae] D[octo]r the least of the phylosophers. | ffrom forth the most Inward affectyon of a devoted | mynd, and humble observance, doth dedycate, | consecrate, and Submytt This p[re]sent | worke. | The ffyrst booke of the Philosophicall | effects of Mercury Tryvmphant | concernynge the great & cheyf | medycyne/ | Apotelesma | 1 | *Inc.*: The most hyghe God in the begynnynge created heaven & earthe: [...]. *Expl. fol. 3^r* (*Apotelesma* 61): [...] magycall Anatomye and Phylosophycall Pyronomye/ finis. | The second booke of the Philosophicall effects or events of Mercury Tryvmphant of the great medycyne | Apotelesma | .1. | The fyrrst & common cause of all Mettalles [...]. *Expl. fol. 5^r* (*Apotelesma* 55): [...] the estymation of all men/ finis | The Thyrd booke [...] *Inc.*: Natvre is a certayn Semynary power [...]. *Expl., fol. 8v* (*Apotelesma* 91): [...] Error & extremely seduced../ finis. | The 4th booke [...] *Inc.*: The vse & practyse of this o[u]r worke [...]. *Expl. fol. 11^v* (*Apotelesma* 71): [...] to theyr full perfectyon/ | The fyft booke [...] *Inc.*: After that the stone hath taken on it a [...]. *Expl. fol. 14^v* (*Apotelesma*, 102): | Wherout so great mysteryes of nature do yet more playnlye & more evydently appeare.

Old Royal Coll. 1723 4^o.

Latin, early seventeenth-century, paper, in-4^o, ca. 21 × 15 cm.: [A–D]⁸ (32 leaves), written by three hands. Unbound, second leaf of front cover cropped after B₈, first leaf of back cover cropped before D₁. On front board old sign.: “N. 54.” & “6”. Paper: Quire A: vertical chainlines 24-25 mm, watermark: heraldic shield with four compartments, upper left four vertical lines, upper right lion (?) [Lower: double-headed eagle and tower (?)]. On top a crown ca. 100 × 62 mm. Quire B–D: Watermark: two symmetrical towers with one window each flanking a simple triangular building with one rounded door, width between towers: 43 mm. (Close to Briquet, 15.943: Prague 1573, but cf. Gerhard Piccard, *Die Turmwasserzeichen. Findbuch III* (Stuttgart: Kohlhammer, 1970), X, 183-84, 193-95, or 202-207, Ravensburg, 1583-98. This firm had two papermills in Bohemia: Prague and Trautenau). Cover: vertical chainlines 21 mm, watermark: pot with one handle, crown and a four-petalled flower above crown 64 × 24 mm (seems to be close to quire A of manuscript 247, and possibly also to quires Z and Aa of manuscript 240).

Hands: I: (with separate foliation), quire A; II: fols. B₁–C₄, not unlike Old Royal Coll. 244 & 245; III: C₅–D₈.

On front cover, list of contents: TRACTATVS | Varij, de Lapide | I. Processus Raym: Lullii, Abbati Angelo, itineris | comiti com[m]unicatus, in monasterio

Angliæ | repertus | II. Ejusdem tractatus de investigatione secreti occulti, | ad Celestinum discipulum suum, quem edidit | Anoniæ, in Coenobio fr. Prædicat- a[nn]o 1319· | III. Epistola totam artem complectens. | IV. Alphidii philosophi liber, dictus Domus thesau- | rorum. | V. Dicta Hermetis & Ortolphi, philosophorum. | VI. Hermetis Regis Græcorum, dicta.

1. fols. 1-7^v (pp. “1”-“14”) *Tit.*: PROCESSUS RAYMUNDI LULLII, AB= | bati Angelo, comiti itineris communicatus, in Monasterio Angliæ re= | pertus. (Alchimia hæc est perfectio & Veritatis ratione perspicua expertictæ vocabula omnia [...]. *Expl.*: [...] eiusque nomen est libro vitæ dabatur. FINIS). Fol. 8^{r-v} (Ag) blank.

2. fols. 9-17 *Tit.*: In nomine Santæ & Individuæ TRINITATIS. | Incipit Tractatus de Investigatione Secreti occulti | Raymundi: Ad Celesti[n]um discipulu[m] suum, que[m] edidit | Anoniæ, in Cenobio Fratri[m] Prædicatorum. Anno | Do[mi]ni 1319·/ Super totum Opus maius Compendium. *Inc.*: Quia homo est magis nobile A[n]i[m]al de Mundo, sua industria armatus, se[cundu]m quod ipse per suam Na[tura]m dominatur omnibus [...]. *fol. 13^r*: Sequitur secunda divisio Compendij, et est Alphabetum. *Expl.*: [...] cum qua in parvo tempore potes facere illud quod Natura non potest facere in mille annis. *Post expl.*: Sequitur, De Operatione vel Practica Lapidu[m] pretiosoru[m]. Sed quia Tractatus iste impressus est, hic non scribitur. Reliqua vero antecedentia ex manuscripto libro magno vetustiss[im]o (et omnino de reb[us] vel operib[us] Raym. Lullij) scripsi, apud Amicoru[m] optimu[m] D. Johannem.) Pragæ | Anno n[ost]ræ Salutis· 1613· Martij· 28· *Erased signature*: Rogero Kock [?] *Fol. 17^v blank*.

3. fols. 18-20^v [*De Occulta Philosophia Epistola*] *Tit.*: Epistola totam Artem complectens. | [interlined by a later hand:] “G. Riplæi Angli.” [*in marg., by a later hand:*] “Extat in Theatri Chemicum Volum· 3· fol· 855·” [*The anonymous “De Occulta Philosophia Epistola” is published in Zetzner’s Theatrum chemicum, vol. III, pp. 852–856.*] *Inc.*: Vidi senem in vna claritate fulgentem, surgentemque, in manu sua libru[m], claru[m] signaculis sigillatu[m] [...]. *Expl.*: [...] et Deus sua fortuna facit omnia. Benedictu[m] DEVS qui dat Sapientia[m] sapientibus. Amen | Pragæ, descript[i]s ex lib[r]o D[omin]i Jo[hann]is Carpionis | de Kaprstein / Mart[i]s· 28· A[nn]o 1612· *Erased signature*: p[er] Rogerius Cooke [*speculative reading based on fol. 17*]

4. fols. 21-33^v *Tit.*: Alphidij Philosophi liber, dictus | Domus Thesaurorum. *Inc.*: Primum huius libri, o Theophile, constat Eulogium aperire nescientibus, quæ studi- os[us] ph[ilosoph]orum chorus agere consuevit, eo quod mane in vesperum, lucem in tenebras, lucidum in obscurum transmutant [...]. *Expl.*: [...] Et sufficiat tibi hoc in omnibus. FINIS.

Old Royal Coll. 1727 4°: Farrago chymico-alchymiam XVI.

English, late sixteenth-century, paper, in-4°, ca. 22.2 × 16.5 cm: [A]⁶ (-A₁) [B-S]⁸ [T]⁴ [V]⁸ (-V₅) (152 leaves). Foliation: 1-43, 45-134, thereafter pagination: 135-150; 163-178, 181-186. Bound in contemporary vellum, provenance signature on the inside of the front board: “Lond. Js. Habrecht 1613”. The fly leaf also contains

Harbrecht's device [his initials I.H. flanking the combined astrological symbols for Libra and Sagittarius]. The MS is written by several (5-10) hands. Made up of one type of paper, with a lion watermark, height: 30 mm, as in Briquet III, 10.530, 10.546 or 10.563, but not identical with any of them.

1. fols. 1-8^v [Lullius, *Accurtationes*] *Tit.*: Accurtac[i]ones et practica Raymundi [*in the marg. by a later hand*: Auriga Bene- | dictus Spagiricus | Figulj *thereafter by the first hand*: Thomas | Son] *Inc.*: 1. Ad laudem dei et eius eternam gloriam et honorem amen. In the beginnunge you shall vnderstand y^t ould ph[ilosoph]ers [...]. *Expl.*: [...] till yt be passed through the wheele of philosophi. *Post expl.* [*another hand*]: Huiusque fingit Interpretatio figulj. Alia insup[er] addit Raimundi experimenta hic non expressa. *Followed by a crossed-out text. In the upper left corner, heavily crossed out by two different hands*: I received this [...] of [...] 10th of | october 1593
2. fol. 8^v: [Varia alchemica] *Notes and memoranda of Diary – or manual – like character. The text is heavily crossed out when it comes to names of persons and substances, though with legible datings*: 15th [...] 20th [...] 21 [...] march 6 [...] 8 [...] 16 [...] 22 [...] 25 [...] march 3d [...] Aprill 21.
3. fols. 9-15^v [Thomas Charnock, *Breviarum naturalis philosophia*] *Tit.* *by a later hand*: BREVIARIVM NATVRALIS | philosophia | Thomæ Harryson, alias Charnoki. | Nunqu[am] translatum vel imp[re]ssum *Tit.*: A booke named the breviary of naturall Philosophy compiled by the vnletteryd scoller Thomas *Harryson [*marg*: *Charnoke] student in the most worthy scyence of Astronomy and Philosophy Anno Domini o[ne] thousand V^c L & vij <1557> the first daye of the new yere prayse be vnto the god in heaven this treatis begone as after shall appeare. | Exitus acta probat, finis bene cepta coronat *Intro.*: The Booke speaketh. | Come hether my children of this dissipyne [...]. *Expl.*: [...] What instrumentes for o[u]r Arte yow neede to p[re]pare. *Præf.*: The preface to the Reader | Go forth lytle booke in volume but small [...]. *Expl.*: [...] mayst yt obtayne, | Finis qu[od] Harrison., [*another hand*: Charnoke./ | 1557./] *Chap 1. Inc.*: Now will I declare [...]. *Chap. 5, expl. [abrupt.]*: his dooinges I ha<r>d y^e resytinge | [*catchword*] Bothe of prose and [...] [*in the margin, in another hand*: Idle talke].
4. fols. 15^v-18 [Notes of "mr Garland"] *fol. 15^v*: *An account of substances and instruments purchased, with prices in pounds shillings and pence. Heading (deleted)*: ~~A note of such glasses and other thinges [...] w[ith] the prises of them.~~ *Dated*: · 26· august· 1595· *Further down on the page*: 15th of october 1595· *Fol. 16 heading*: by Mr garland *Dated*: decembris 6th 1595 *New heading*: of Mr Perevall [?] *New section*: de occulta philosophia et charecteribus | Cornelius Agrippa de occulta ph[ilosoph]ia *New section*: mr tisdale bought [...]. *Fol. 16^v heading*: of Mr garland/ | to lute in drye fires *Inc.*: Take potters claye, flakes, filings [...] to lute in wett fires *New section, inc.*: one parte of the sulp[hur] of vitrialle [...] the delayinge of gold *Fol. 17 heading*: of Mr garland [*in the margin*: "mr garland"]. *Inc.*: did put merc[ury] in a glas on a trivet [...]. *Heading*: To refine cop[er] *Inc.*: melt one pounce of cop[er], [...] but mr poole sayd that an ounce was sufficient to purge a li. Of cop[er]. [...]; *fols. 17^v-18*: *An index of topics of a manuscript "booke" with folio locations*: out of the lo[n]ge booke

5. fols. 18^v-21 [Notes on alchemical topics by “mr digg[e]s” &c.] *Fols. 18^v-20. Heading:* A note of mr diggs his worke, after his preparatiōe of his two Materialls Sol and Mercurye./ *Inc.:* he was of opinion of the 24 p[ro]portion And sayde that Maria wrate it thus / [...]. *Some passages crossed out; fol. 20^v:* A laboratory journal: 1595 the 22 of march [...] *running to:* 1596 on sunday moreninge beinge the 28 of novemb[er] ~~xxx~~ *Fol. 21. Heading:* Trevesane [= *Bernardus Trevisanus?*] p[ro]fited by readinge these booke | Arenold de nova villa, | The booke of the woords that maria the p[ro]phetis wrate | The booke of Alle trewth./ of natures p[ro]p[er]ties/ | And the <booke of> Woords of pa[ra]celsus/ [...]. | Johannes pantheus (Agaynst alkamy) *Heading:* the booke of mr diggs *following a book-list.*

6. fols. 21^v-29^v [Notes of Nicholas Hill] *Fol. 21^v:* And these also of mr hill *A list of books by Trithemius, Theophrastus and Raymund Lull, several hands; new section:* directio· Is y^e motion of a planet, his epicycle & [...] retrogradatio· [...] statio· [...] *and other philosophical and astrological notes. Fol. 22: Heading in upper left marg.:* I receiued these nots of Mr Hill the 28 of Auguste 1595 *Inc.:* Signifeinge of things by l[et]t[er]es | Signifeinge by one le[t]t[er]e diu[er]s things in diu[er]s places *In marg.:* The concealinge arte of Raymunde consisteth in [...]. *Fol. 22^v:* Alchemical notes: [Mercury] will in 3 dayes in atkindu [*i.e. a cipher for an unnamed solvent*] dissolue into water, [...]. *Fol. 23: Heading in upper left margin:* The 30th of Auguste· 1595 *Heading:* Nicolas hill gaue me all these noats | ~~and I will [...?]~~ | Sadle./ *Inc.:* Homogeneitie. [...] Heterogeneitie [...] &c.; *fols. 23^v-24: Heading in upper left margin:* The 31th of Auguste 1595. *Inc.:* Illuminati doctoris magistri Raimundi Lullij ars magna gen[er]alis et vltima. | Everie arte hath his owne principles [...]. *In right upper corner:* Sadle. *Fol. 24, At the top:* Sadle *Inc.:* sophistry is to be p[re]ferred before positieue philosophy ... *New heading:* Vita brevis ars longa experientia fallax occasio praecepta [...]. *Fol. 24^v:* *Heading in upper left marg.:* The 1th of September 1595 *Heading at the top of the page:* of mr hill *To the right:* Sadle *Inc.:* Materia prima, is that w[hi]ch hath the firste stroke in composic[i]on and is the laste [...]. *At the bottom of the page:* Remember | The Cause of th’adamants drawinge of iron vnto him / [...]. [5 ll.] *Fol. 25^v:* out of eu[er]y thinge may be drawn the ·4· elements/ [...]. [15 ll.] *Heading:* of mr hill. Sadle. *Fol. 25^v:* *Heading:* The 2d of September 1595. Sadle. *Inc.:* We muste considre one and the selfe same thinge [...]. [10 ll.] *Fol. 26: Heading:* this in a lettre of mr hills. Sadle. [A list of Lullian principles] *Inc.:* B bonitas, differentia [...] &c., *fol. 26^v:* what honesty. [...] there are in all metalls [mercury] sulp[hur] & salt [...] *fol. 27^v:* *Inc.:* It is an vnpossible thing for a determinate effect [...]. Note-/ mr hill sayd [...] me what is the cause of the meltinge of lead [...]. *fol. 27^v:* *Inc.:* The bodyly part of the elixir must be reconciled to the soule [...]. *Fol. 28^v:* *Inc.:* the spirites of the lest red <or white> wine, drawn and 3 or 4 tymes rectified is then fitt to be put to his circulat[i]on [...]. *Two closely written pages. Fol. 29^v:* *Inc.:* Genus is a name commune to many kindes | Species is a name communicated to many particu<lars> [...]. *Plus other explanations of termes and shorter notes. Several hands. At the bottom 3 ll. of Greek.*

On fol. 29^v. 2 ll. of Hebrew; fol. 30: Tables for Lullist “rotae”, several hands; fol. 30^v: *Heading:* mr hills that | first there must be calcination | then dissolution | then separation [...].

7. fols. 31-34^v [Notes of “mr Foulter”] *In upper left marg.*: I receaved these notes of mr foulter the .13. of october 1593. *Heading at the top of the page (crossed out)*: At greenw[i]ch the ____ of maye 1595 | I crossed these termes, to the beginnunge of hermes | takinge them to be but sophyticac[i]ons/ *Inc.*: Receue 2a of calcined terter· put thereto 3 [...]. *Expl.*: [...] of the ryght borax *Fol. 31^v*: *Heading*: of Salt for auru[m] potabile is thus p[re]pared *Inc.*: Take the tarter of thicke red wine, [...]. *Fol. 33-34^v*: *In upper left marg.*: Stet./ *Heading*: Laus deo amen *Inc.*: Sith yt is <soe>, that many men haue perished in laboring about the p[er]fecc[i]on and cleere truth of this science, to the w[hi]ch as yet wee could neu[er] come [...]. *In right-hand margin in another Italic hand.*: some Also crossed this. *Expl.*: [...] will that I maye p[er]forme the same, To whome be all, hono[u]r and glory worlde without ende Amen *Fols. 34^v-35^r*. *Tit.*: The white worke. *Inc.*: The white worke is this, dissolue [...]. *Expl.*: [...] in his keping.”

8. fols. 35-36 [George Ripley, *Vade mecum*] *Tit.*: By y[ou]r pore Chaplayne Sir George Rypley Cannon of Brydlington *Inc.*: Sir when yow haue dissolued marcury in A Corrosyve of vitryoll and salt peter, and distilled the Corrosyve therefro[m] [...]. *Expl.*: [...] the olde Edward none better | [*by another hand*]: Rex [Christe] dictus sit om[ni]bus b[o]n[i]tas q[uod] Rippley *Heading*: Tempus vnus mensis” *Inc.*: And yf yow thincke to laboure abowt the Elixer vite [...]. *Expl.*: [...] as travell emonge hott wyne | Explicit ... Sedon George Ripley. *Post expl. (in another hand)*: Nunquam op[er]ieris cu[m] corosiua, donec rectificetur a sale & combustio sep[ar]etur a fecibus tunc solue corpus in limpidem aqua[m] cu[m] qua in cera Amalgama[m] et calces corpo[rum] Imperfecto[rum] et poste complet[ur] Imbilit[i]ones etc [...] alma[m] abreuia[m] opus expertis artis nome[n].

9. fols. 36-41 [Roger Bacon, *Speculum alchemiæ*] *Tit. (in another hand)*: Bacon his lookeninge glasse of Alchemye *Inc.*: Hermes the father of Philosophers saith in his science, Alkamy is a body, the substance of one, and by one symple compound [...]. *Expl.*: [...] for the death of mer[cury] is the depth of this science.

10. fols. 41-53 [Arnold de Villanova, *Quæstiones*] *Tit.*: Heare insueth certen questyons | demaunded by the Reu[er]end fath[er] | the Archbisshop of Reynes of | the mr Gwillyam de Cenes | as followeth *Inc.*: ffirst thou demaundest of me whither y^e worke of this mastery maye be done & made of the lights alone, that is to saye of Sol & Lune and water of Lyfe or not /. I answere thee [...]. *Expl.*: [...] declare this noble seacrett to no p[er]son saving only to children of Science and well expert in this Science. *Chap.*: Nowe here endeth the questyons | Essensiall of this worke and nowe as | towching the questyons accydentall yt thou inquiryrest to haue knowledge of I | shall make thee answer playnely hereafter in order/ *Inc.*: ffirst thou demaundest howe many furnesses shalbe necessarye to this worke, [...]. *Expl.*: [...] blessed also be he y^t maye come to the knowlege of this precyous stone etc. | finis Amen/

11. fols. 53-54^v *Tit.*: Hereafter ensueth certayne notable Instrucc[i]ons w[hi]ch be right speciall good /. *Inc.*: Note y^t the firste matter of mettalls is o[u]r white sulphur & o[u]r quicke silver for of theis two without doubte is made y^e mettalls & the cause of this for the sulphur & y^e quicke silver [...]. *Expl.*: [...] as a Spryte ready to fyxac[i]on and to the quicknes of fixac[i]on w[hi]ch when yt is fyxed.

12. fols. 55-62 [Arnoldus de Villanova, *Novum lumen*] *Tit.*: Novum lumen. / The new light. / *Præf. Inc.*: ffather and reuerent lorde, though I am ignorant of lyberall sciences and am assidny[?] <besy>[?] with study neither in clerical state abiding

[...]. *Expl.*: [...] the secrete vulgar ygnorant *Tit.*: Here begynneth the draft in the w[hi]ch he nameth | the stone of Phylosophers./ *Chap. 1 Inc.*: Vnderstand therefore the sayeng of the phylosopher that the Arte of Arts are in the disposition of the pacient [...]. *Chap. 8 expl.*: [...] the w[hi]ch yf yt be vnknowne a man holding Elixir p[re]vayleth not yf the same | Conclusio tocius epistole./ *Marginal notes with a clean Italic hand (but probably identical with the hand of the text).*

13. fols. 62^v-64 [*Alchemical verses in English and Latin*] *Tit.*: Laus Deo *Inc.*: To whome this boke shall come | As yt must to som[m]e | To be read or heard [...]. *Expl.*: [...] Seke yt forth as ye haue sought | Other tale of me get yee nought./ | *Finis.*

14. fols. 64^v-67^v [*Alchemical verses*] *Tit.*: Laus Deo./ *Inc.*: In the partis of Rome the wedding of m[er]cury | was celebrat in my p[re]sence as I came from stody | [...]. *Expl.*: [...] The frute yt doth folloe thereof I saye Amen/.

15. fols. 68-77 *In upper left corner heavily crossed out (except the date), partly legible*: I Recieved theis notes | of mr Daltoun S[...] | 22th octob. 1593 *Fols. 71^v-72^r blank.* *Tit.*: Here begynneth the | pa[ra]ble of y^e Philosophers *Inc.*: The begynnyng of wisdom is the loue of wisdom He w[hi]ch loveth wisdom loveth yt and so ys made like vnto yt, ffor every like thinge, engendereth his like & loveth yt Also the begynnyng of wisdom is the feare of the lord and his obedyence [...]. *Expl.*: [...] lyveth for ever and ever / Amen. *Post expl.*: Thus endeth the parable of the Philosophers drawne oute of an olde booke/.

16. fols. 77^v-83 [*Deleted note at head of fol. 77^v*: Theis notes I rec[eived] of Mr Turpin[?] 29 October 1593.] *Tit.*: Hic Incipit Artium Alkamie *Intro Inc.*: All the wisdom in the worlde cometh of o[u]r lord god Iesu christe god almightie maker of all thinges Therefore who that loveth wisdom aske yt of him in due forme and he will geve him thereof plenty for he is highest & founder of all Wisdom. [...]. *Expl.*: [...] of y^t kinge y^t all thinges disposeth Amen/. *Chap.*: In dei No[m]i[n]e Amen: Aqua Vitae. *Inc.*: Take a pounce of Salte Com[m]en and a pounce of Alome Roche & a pounce of salte peter and a pounce of vitriall of theis 4 distill a water on this mann[er] [...]. *Chap.*: A Lewte for this. *Inc.*: Take the gleyer of eggs well sponged [...]. *Chap.*: As the worlde is made/. *Inc.*: [*lacuna*] is o[u]r stone of 3 thinges of 7 planetts of 12 signes of 4 elements [...]. *Fol. 78^v*: *Drawing*: "A receptory" with "A Lymbeck", "A ffurnes" and "fyer hole" *Chap.*: The very trewe Mercury. *Inc.*: Nowe I will shewe thee the very mercury yt the Philosophers booke in the old time the w[hi]ch not mercury yt is called quycke silver ...; *Fol. 79*: *Drawing*: "Iupiter increasinge gladnes of harte" with labels: "albus", "Rubius", "Balneo" and "ignis"; *Fol. 79^v*: *Drawing of a bath* "Iubiter", "bolts hed | Saturnus", "mars", "venus", "luna", "mere", "Ege | Sol.", "Balneo" and "ignis" *Chap.*: The Vessell. *Inc.*: The vessell is a bolts hedd [...]; *Fol. 80^v*: *Two drawings of a phial and an egg-shaped vessel with explanatory text.* *Chap.*: Sol, lune, Sulpher, Mercury *Inc.*: Sol is the most treasure of the world for he is aboue y^e starres [...]. *Chap.*: Sulphure *Inc.*: Sulphure is as moche to saye Iubiter for he worketh [...]. *Chap.*: Sol *Inc.*: Sol is the most powrest matter of y^e earth and the best of the planetts [...]. *Chap.*: Luna *Inc.*: Luna is next vnto Sol in worthynes [...]. *Chap.*: Iubiter. *Inc.*: Iubiter it is to knowe that he is duke & leader & pryncipall of all the starres [...]. *Chap.*: Tyne glasse *Inc.*: Tyne glasse I am y^e markesite y^t many a man seaketh y^t is so mynerall [...]. *Chap.*: The doubts of Alkamy *Inc.*: Is to be ware of all salts all

corasyves all Aloms [...]. *Chap.*: The Elixer *Inc.*: Take an o[unce] of no sol and An o[unce] of no lune and 12 o[unces] of no water of Lyve [...]. *Chap.*: Proieccyon augmentac[i]on *Inc.*: Nowe I shall shewe thee p[ro]ieccion of the white & y^e redd [...]. *Expl.*: [...] and yt shalbe fyne Sol at all assayes / *Fol.* 83: *Unfinished (?) drawing, without explanatory text.*

17. fols. 83^v-86 *Tit.*: Aphebo aphebe Lune caput de | Aqua vite / *Inc.*: Speculum Alkamie scriptura vere n[omin]e domino scitur herem [?] p[ri]mu[m] verbu[m] hui[us] op[er]is est corporis in aqua[m] idem in mercurie reducc[i]o et hoc est q[uo]d Ph[ilosophorum] vocaveru[n]t [...]. *Expl.*: [...] salutaris q[uæ] nascit[ur] orbic[u]laris. *Chap.*: The Secrets of Alkamy is *Inc.*: Take an o[unce] of the best & another of y^e tother next & dissolve them [...]. [6ll.] *Chap.*: The Monic[i]ons *Inc.*: Nowe deare brother I haue shewed thee [...]. *Expl.*: [...] founder of the howses of Commons of England Amen *Chap.*: Auru[m] Potabile *Inc.*: Take little of y^e redd stone and cast yt in [...]. *Expl.*: [...] dayes in Balneo / *fols.* 84^r-86^r contain simple drawings of athanors and baths without any explanatory text.

18. fols. 86^v-91 *Tit.*: Liber Philosopho[rum] Cap[itulo] p[ri]mo *Inc.*: The subtill yt is first matter of all mettells mercury and Sulpher y^e Elixer a Levyyu[m] w[hi]ch is medycyne to all corrupt metallis [...]. *Expl.*: [...] and yt is the end of y^e Philosophers worke.

19. fols. 91-93 *Tit.*: Septem Clavis hui[us] Scientie *Inc.*: There bene 7 termes or keys y^e w[hi]ch be Roots of y^e origynall ca[us]ina[i]on of the blessed tree [...]. *Expl.*: [...] & that the blackness of him be done away etc; *fols.* 93^v-96^r blank.

20. fols. 96^v-98^v *Heading*: Liber Christopheri Taylour. / *Tit.*: Gemma Salutaris *Inc.*: The first worde is this worke y^t the body be turned into water y^t is to vnderstand yf it be turned into Mercury and y^t is y^t the Philosopher [...]. *Expl.*: [...] And another sayth passe not a peece of golde / contains "sayings of philosophers" including citations attributed to Pythagoras, Lucas, Plato, Democritus, Rasis, "Atsynberis", Alphidius, Balgus, Orsaltus, "Antazaquarras", "Castie", "Pandolpus", "Promenydes", Aristotle, "Metheleam", Morien, Theber and Plato, and quotations from the Rosary.

21. fols. 99-100^v [Isaac Hollandus, *Septem conditiones*] *Tit.*: Septem condic[i]ones hui[us] materiae. *Inc.*: The first condyc[i]on is this y^t yf there be any kynde of Argenti viui y^t should be converted in Auru[m] puru[m] or argentu[m] puru[m] [...]. *Expl.*: [...] and maie be multiplied withowt ende. | Deo gratias, Amen.

22. *Tit.*: Opera Aristotelis. fols. 101-110 *Inc.*: Christs name be blessed and cleped in hono[u]r he of hym, he that listeth to p[ro]fyt in the deeds of nature, but often tymes there are many men vnd[er]stand the sup[er]fluytie of the words of the Ph[ilosoph]ers [...]. *Expl.*: [...] yt hapneth many tymes of many to go oute of the waye. *N.B.* some of the terms in this work are encrypted.

23. fols. 110^v-113 *Heading*: Liber Christopheri Taylour *Tit.*: Erroris huius operis *Inc.*: The first erro[r] of this worke is in distillac[i]on of the fyer or in dyu[er]sytie of fyers in the same worke after the same greke for note onely but the kyndlynnes of heate [...]. *Expl.*: [...] knowe well yt all thinges turne vnto good to them yt love god w[i]th all their harte / | Deo gratias Amen /

24. fols. 113^v-126 *Heading*: hppe *Inc.*: Vnderstand yt when o[u]r matter feleth o[u]r sonne anon he is losed into water w[hi]ch afterward w[i]th in 40 howres shalbe turned into blacknes [...]. *Expl.*: [...] this is a worke of one daye or of one

hower or half an howre· finis auctorum de quo semper est mirabiles[?] etc./ *Fol. 113^v corresponds here to an older foliation “·1·”; 114^v = “·2·” etc. up to: 122^v = “·10·”, thereafter this older foliation ceases.*

25. fols. 126^v-128^r *Tit. [in another hand]:* Nowe my Childe take intentyve *Inc.:* Nowe my childe take intentyve heede & trust sadly and faithfully to my Councell and specially in vsinge of this wonderfull worke [...]. *Expl.:* [...] And the full content of all my mynd Ad vltimo *Post expl.:* To the wo[r]shipfull mr prio[r] of Lyfe *Marg. note in upper left corner on fol. 126^v crossed out.*

26. fols. 128^v-131^v [*Dastin, Visio*] *Tit.:* Visio Joh[ann]is Dastyne *Inc.:* Then nature is the surest effect of all kynde and increasing or augmenting of y^e Rote of them we haue knowen the necessary transmutac[i]on of the planett [...]. *Expl.:* [...] and be sett in the orchard of him qui sine fine viuit & Regnet amen /.

27. fols. 132-134, pp.135-150, 163- [*Notes of “mr Tisdale”*] *Fol. 132^r. Tit.:* out of the longe booke | of the p[re]parations of mettalls & the names/ & of saltes/ & mineralls/ *Heading:* of mr garland *Heading:* of mr turpin *Fol. 132^v Inc.:* doctor dee sayde that the white fir[men]t is not com[m]on [*silver*] <for that he is no p[er]fect boddy> but it is white gould. Also he sayth that as yo[u] examen gould with antimony [...]. *Heading:* of mr tisdale | he rectefieth very purely the spirite of wine [...]. *Fol. 133 heading:* of mr tisdale the 27th of novemb[er] 1575 | Take of [*sol*]· [*luna*]· & [*venus*] of each a like, [...] *heading:* for the graduation of gould *Inc.:* he tooke <blake> antimony crude, [...] *The whole page is crossed out [see note on this page: “I thinke this also to be but a sophysticacion”]. The numbering of the leaves is made before this heading. At the bottom of fol. 133^r:* || mr tould me that his child was borne the first monday after the full mone, And died ... *Fol. 133^v heading:* of mr tisdale *At the bottom of the page:* of mr tisdale his geber in quarto | his ·2· litell ould bookes in octavo | and all his bookes of paracelsus, raymond & bacon/ *Fol. 134^r. Heading:* of mr tisdale *in marg.:* novemb[er] ·8· 1575 | he tried <2 part of> gould ... *Fol. 134^v. Heading:* To fix sall armoniake ... *Expl.:* [...] feces <remayning> as before. *Fol. 136^r. Inc.:* do this woorke so oft, till the sayde earth dissolved [...]. *Expl.:* I should thincke it were better to distill out of him his soule and lyfe by often throwinge his water distilled <from the feces> vppon the [...]. *Fol. 137^r. Inc.:* I consider herew[i]thall that it stands w[i]th good reason that the earth be washed [...]. *Fol. 137^v. Inc.:* Take leade and melt it and cast white arsenicke [...]. *Inc.:* Also he sayde that he quenched [...]. *Both sections crossed out [N.B. deleted note on this page: “This I thinke to be but a sophistication.”]. Inc.:* Take of Romaine vitriall, and cop[er]as of like quantity And beate them to pould[er], And after put them in a close pepkin [...]. *Fol. 138^v. Heading:* of [*Jupiter*] & [*Mercury*] *Inc.:* he tooke [*Mercury*] ·5· and put it to his weight of [*Jupiter*] beinge [...]. *Heading:* To draw the 5th essence of Antimony *Inc.:* Take Antimony and grind it smale & put it into very good distilled [*vinegar*] [...]. *Fol. 139^r. Inc.:* Take 20 [*pounds*] of <Romaine> vitriall <blew of coler> or coperas of the mine greene of coler, And distill all the [...]. *Fol. 139^v:* mr tisdale calcines his [*sol*] thus [...]. *Fol. 140^r. Heading:* Certayne notes taken out of the booke of Sir Roger bacon | fryer of the ·5· essence *Inc.:* Take [*sol*] made pure [...]. *Heading:* The p[ro]p[er]tyes of mettalls quenched in | water ardent, or spirit of wine. *Inc.:* [*sol*] fined & drawen thinn or made in [...]. *Fol. 140^v. Heading:* To draw the water Ardent. *Inc.:* ·3· Take in the name of god / ·6· gallons of the strongest

secke, and draw out by balneo ... *Heading:* To make the 5th essence *Inc.:* 4 Take this burninge water, and in a pellican or other greate boddy of glasse [...]. *Heading:* To restore youth in ould men, | And to rayse agayne the dead *Inc.:* 5 Take eu[er]y day in the moreninge halfe a sponefulle or there about [...]. *Fol. 141^r. Heading:* An extracc[i]on of the ·7· bookes of the natures of things, | first written by p[ar]aselsus [*sic*] *Inc.:* 1. of the gen[er]ac[i]on 2. Of the increase [...]. *Heading:* The contents of the seconde booke concerninge | the growinge of naturall things *Fol. 141^v. Heading:* The third booke of naturall things, *Marg. notes by another hand. Fol. 142^r. Heading:* Of the death of many things. *Heading:* The fourth booke of y^c nature of | sertaine things & firste of the lief | of man &c. *Fol. 142^v. Heading:* The 5th booke what death is *Fol. 143^r. Heading:* of my none conceiptes And first I thincke that metalls are to be [*illegible deletion*] by the [...]. *Expl. fol. 143^v. [...]* [*sol*] with an heigh culler./ *Fol. 144^r. Heading:* out of bartholomevs *Heading:* of mr tisdale. *Inc.:* he sayes that <mercure> turned into water is to be 7 tymes distilled by filter, and not in balneo [...]. *Fol. 144^v. Heading:* of mr hill. *Inc.:* In eury action there are to be considered [...]. *Heading:* of mr tisdale. *Inc.:* he tooke [*sal armoniack*] sublimed from com[m]on salt [...]. *Fol. 145^r. Heading:* of mr ~~percivale~~ kogpiavno/ [*i.e. the cipher for "mr percivale"*] *Inc.:* he sayd that Antimony may be sublimed [...]. *Another crossed out heading, inc.:* he sayde yt mr smith made potts to hould his spiritts of crusibles beaten to smale dust [...]. *Fol. 145^v. Heading:* of mr ~~poole~~ keeno [*i.e. Cipher for "mr poole"*] *Heading:* of captayne ~~daultre~~ Tvandgo/ [*i.e. cipher for "captayne daultre"*] *Inc.:* he tould me that mr smith did first put his copp[er] into a water that did [...]. *Fol. 146^r. Heading:* by mr ~~poole~~ keeno/ *Fol. 146^v. Heading:* of mr tisdale | for the flies *Heading:* for distillinge of wine *Heading:* for his diaferatike *Fol. 147^r. Heading:* of mr tisdale *Fol. 147^v. A list of substances, with symbols and prices, inscribed In right upper margin:* the beste of these mettalls & mineralls | is worth the pound as foloweth [*A list of 26 chemical substances with some unusual symbols, e.g. a heart for gold, the contraction of "per" for sulphur, an ordinary "p" for arsenic, etc*] *Fol. 148^r blank; The following deleted sentence appears in the upper left corner of fol. 148^v:* Ari[es]· li[bra]· tau[rus]· Scor[pio]· gem[ini]· | Cap[ricorn]· can[cer]· acq[uiarius]· leo pis[ces]· vir[go]·/ *Inc.:* Take ·3·s· peeces, and [...]. *Fol. 149^r. Heading [deleted]:* of mr garland a blancher for [*venus*]; *Fol. 149^v. Heading:* of mr [*illegible deleted name*] | a pleasant drinke. *Inc.:* he tooke one parte of clere fountayne water ... *Heading:* of Mr Edgcome-/ *Heading:* of Mr Tisdale-/ *These two last sections are written by a totally different hand; Fol. 150^r. Heading:* of mr ~~dickenson~~ Tippolfel/ [*i.e. cipher for "mr dickenson"*] *Fol. 150^v. Heading:* of mr ~~miller~~ Minnog/ [*i.e. cipher for "mr miller"*] | he amalgamed 1 parte of [*luna*] with ·4· of [*mercury*] ... *Fol. 151^r. Heading:* of mr ~~miller~~ Minnog-/ | he with a stronge water brought [*mercury*] into a hard stone salt [...]. *Fol. 151^v. Heading:* out of ~~twipens~~ <dagkolf [*i.e. Turpin's*]> ould booke. folio 116.b. *Inc.:* Turn elem[en]ts & thou shalt haue y^t yow seekest [...]. *Expl.:* [...] moysture, into heate/ *Fol. 152^r begins abruptly with a series of recipes and a key to the chemical symbols used in the manuscript, written in two different hands. Fols. 152^v-153^r. Heading:* of the planetts and there natures. *In left marg.:* ptholomevs· fo[lio] 59· *Fols. 153^v-154^r. Tables with column headings:* the prime qualities | The 4 elementes. | y^c ·12· signes & there qualities. *Fol. 154^v. Heading:* out of Ripley. *Heading:* y^c longe booke. [*An index of topics with folio locations*]. *On the inside back cover there is what looks like a list of books*

borrowed from (or recommended by) various people: “of mr. Robinson”, “of mr garland”, “I had the notes of these bookes of ni[cholas] hill·1595.”

Old Royal Collection 1749 4°.

English, paper, late sixteenth-century, in-4° (not coll.) iii uncut folios + 23 leaves, written in one hand, unbound, and on the cover it says: “lefte to [?] | mr garland the 12th of Aprill 1595 | the 2^d | of John Englysheman & y^e later end, y^e questions | of Henry tyler | of John Englyshe | [T]he reasons that the [...]. The manuscript contains three different types of paper; **A**] Strasburg Lily. Probably Dutch, width: 61 mm, chainlines 28 mm. (cf. Briquet 7211 and 7212, but without the letters in the shield, cf. also W.A. Churchill, *Watermarks in Papers in Holland, England, France, etc., in the XVII and XVIII Centuries and their Interconnection* (Amsterdam: Herzberger, 1935), no. 401). **B**] Crown with a four-petalled flower on top, width: 25/26 mm, chainlines 19/20 mm. Type not found in Briquet or Gerhard Piccard, *Die Kronenwasserzeichen. Findbuch I.* (Stuttgart: W. Kohlhammer, 1961). **C**] seven-rayed sun under a device, reading something like: “ELEBE” or “ELEVE”, width: 36 mm, chainlines 19/20 mm. Not found, but cf. Briquet IV, 13.981-2.

1. fols. 1-20^v [*Notes from James Lacinius*]. *Endorsed at head of fol. 1^r in another hand*: Liber Christopheri Taylour./ *Tit.*: Notes out of James Lacinius | Collecc[i]ons taken fol: 27· pag: 1· *Inc.*: Of forme and matter is the compounde with matter is [*mercury*] & [...] × [...]. Here endeth the practise of mr John Englishman deacon, and coppied by me J: Metcalfe on the 11· & 12 daie of October· 1594. Etat: 24.

2. *Fols. 21^v-23^r*. [Henry Tyler, *Questions*]. *Tit.*: Questiones vpon the worke of H[enry]· T[ylor]· *Inc.*: Q. Imprimis w[hi]ch be o[u]r firste principles in this greate & royall worke, [...]. *Expl.*: [...] in the Eighte op[er]ac[i]on or gate p[ar]telie maie appeare. P· H· T· finis huius L | & R· G· op[er]is et artis. *Endorsed at head of fol. 21^v in the same hand as the inscription “Liber Christopheri Taylour”*: Out of mr Garlandes book of ye Earle of Trevisan./

NOTES

¹ Elias Ashmole, *Theatrum chemicum britannicum* (London, 1652), 481-484. Anthony à Wood, *Athenae Oxoniensis, An exact history of all the writers and bishops who have had their education in the University of Oxford. To which are added the Fasti, or Annals of the said University*, ed. Philip Bliss, 4 vols (London, 1813-1820), I, 639-643, III, 286. Thompson Cooper, “Kelley, Edward”, in *DNB*, X, 1230-1232.

² Numerous records of Kelley’s travels are given in Halliwell’s edition of Dee’s diary, starting with 18 October 1586: “E. K. recessit a Trebona versus Pragam curru delatus; mansit hic per tres hebdomadas” (*Private Diary*, 21.) 30 December 1586 “E. K. versus Pragam. [...] Jan. 18th, rediit E. K. a Praga” (*Private Diary*, 22), “Jan. 21st, E. K. again to Praga and so to Poland ward. [...] Feb. 19th, E. K. cam from Poland about none to Trebone.” (*Private Diary*, 22.) “Sept. 30th, T[homas] K[elley] and J[ohn] C[arp] went toward Praga. / Oct. 12th, Mr. E. K. toward Praga on horsbak [...] Oct. 26th, Mr. Edward Kelly cam to Trebona from Praga” (*Private Diary*, 24). And in 1588 “Oct. 25th, Mr. Ed. Kelley and John Carpio rode toward Praga; [...] Nov. 6th, Mr. Kelly cam home from Praga and Mr. Francys Garland, and Edward Rolls with him from Englis” (*Private Diary*, 29). And finally, in 1589: “Feb. 16th

Mr. Edward Kelley rode toward Prague after none, John Carpio, Edmond Hilton, Henry Garlande, Thomas Simkinson, Lodovik.” (*Private Diary*, 30)

³ *NP*, 223–226.

⁴ Ashmole, *Theatrum chemicum*, 482.

⁵ The Alexander Robert mentioned by Ashmole seems to be the same Roberts, who at least once delivered a letter from Kelley to Dee (Dee did not always give the names of those from whom he got Kelley’s letters), as a note from November 1594 suggests, “Receyued a letter from Sir Ed. Kelley by Roberts” (Oxford, Bodleian Library, Ashmole MS 487, containing diary notes and occasional short memoranda of John Dee from January 1577 to December 1600 in Iohannes Stadius, *Ephemerides novæ*, Cologne 1570. Hereafter referred to as “Ashmole MS 487” and the relevant date).

⁶ Ashmole, *Theatrum chemicum*, 481–2.

⁷ Ronald Sterne Wilkinson, “The Alchemical Library of John Winthrop Jr. (1606–1676) and his descendants in Colonial America”, *Ambix*, 11 (1963): 33–51.

⁸ John Winthrop Junior to Samuel Hartlib, 16 December 1659, in *Massachusetts Historical Society Proceedings*, 72 (October 1957–December 1960): 38–39, cit. Wilkinson, 43.

⁹ Wilkinson, 43.

¹⁰ Wilkinson, 44.

¹¹ Wood, I, 643; *DNB*, X, 1231.

¹² Ashmole MS 487, Nov. 25.

¹³ Ashmole, *Theatrum chemicum*, 483.

¹⁴ Arthur Edward Waite, “Biographical Preface” in *The Alchemical Writings of Edward Kelley* (London: Robinson & Watkins, 1973), xxxix.

¹⁵ Quoted from Waite, xxxix. My emphasis.

¹⁶ Prague, Nat. Mus. MS VI.D.17, cit. R. J. W. Evans, *Rudolph II and his Time* (Oxford: Clarendon Press, 1973), 227. Evans does not give any mention of the death of Kelley. Louise Schleiner kindly informed me of a Czech historian, Ivan Sviták, who gives Kelley’s date of death as 1598. As I have not been able to read Sviták’s two biographies of Kelley, I do not know which sources Sviták uses for that statement, but they are obviously better than the usual ones. The books are: *Hledání kamene mudrcu. Rehabilitace pana Edwarda Kelleye – neoplatonického hermetického filozofa a rytíře Českého království, který žil v letech 1584–1598 v Praze* (Prague: [n.pub.], 1991) and *Sir Edward Kelley: česká rytíř, 1555–1598* (Prague: Samisdat ISIS, 1994). Nevertheless, in the “Bibliographical notes” – which are written in English – of the first monograph, Sviták writes: “A. The Published Works of Edward Kelley (1555–1597, often given with the wrong date 1595)” (*Hledání kamene mudrcu* ..., 213).

¹⁷ Cf. Oxford, Bodleian Library, Ashmole MS 488, containing diary notes and occasional short memoranda of John Dee from December 1586 to April 1601 in Iohannes Antonius Manginus, *Ephemerides coelestium motuum* (Venice 1582). Hereafter referred to as “Ashmole MS 488” and the relevant date. During the period from January to September 1590 there are at least eight notes relating to correspondence and “talks” about Kelley: for the period January 1593 to the aforementioned “death news” of 25 November 1595, there are at least thirteen such entries.

¹⁸ *NP*, 228.

¹⁹ In British Library, Sloane MS 68 containing different loose items, mostly letters, we read in item 85, “A true copy of a letter written from Frankfort concerning Sir Edward Kelly’s troubles, May 15, 1591.” But this document does not suggest that Kelley’s troubles with the Bohemian authorities were of an alchemical, hermetical or mystical nature, but speaks of a political conflict between the substantial English community in Bohemia and the Bohemian authorities. It appears from this letter that Kelley was involved in the conflict as a prestigious member of the English community rather than as a persecuted alchemist. The political problem of being an Englishman in Prague at that time is reflected in some passages in this letter: “To Prag I durst not inquire much after it because it tutcht the Emperors brother neerly and was odious in it self. [...] At my first coming I was aduertised that there were many English in the Towne vpon which I ment not to discover my self, till I had sounded out what they were, the state they bare, and what course they tooke. Worde was given me that one Mr Dyer was in Sir Edward Kellyes house, and an other Paje with one of the Lees in the Towne and two or 3 other Captains which departed, as I was informd [...]” Cf. also item 93 in the same manuscript “A letter from Mr Tho. Webbes, at Stade, to Lord Burghley; concerning Mr. Dier’s and Sir Edw. Kelley’s trouble, June 26, 1591.”

²⁰ Ashmole MS 487, October 1593. In Ashmole MS 488, however, the note “The Newes of Sir Edward Kelly his libertie” is dated the 5 December 1593.

²¹ Ashmole MS 487, 12 August 1594.

²² Wayne Shumaker, *Renaissance Curiosa* (Binghamton: Mediaeval and Renaissance Texts and Studies, 1982), 25-26. Even though I have not checked the sources, it is my opinion that these rumours are obviously just fantastic stories. In the *Dictionary of National Biography* they are summarized in the following way: "Leaving Oxford 'abruptly', Kelley appears at London as a fraudulent scrivener or attorney (Du Fresnoy, *Hist. De la Philosophie Hermétique*, i. 307). About 1580 he had his ears cropped in the pillory at Lancaster for forging some ancient title-deeds (Nash, ii, 446); or, according to another account, for coining base money. Weever, in his "Funerall Monuments" (p.46), charges him in addition with having dug up a corpse in Walton-le-Dale Park for the purpose of questioning the dead." (*DNB*, X, 231).

²³ For a full description of the manuscripts see Appendix.

²⁴ Wilkinson; *R&W*, 67.

²⁵ Dee writes about a Mr. Powell – probably the father of Griffith, as he calls the Mr. Powell whom he met in 1582, "Mr. Powell the younger" – in Hearne's *Compendious Rehearsal*: "To my foresaid library and studies, may my three Laboratories, serving for *Pyrotechnia*, be justly accounted, as Appendix practical. The furniture of which and of all the storehouses, chambers, and garrets, belonging and replenished with Chymical stuff, was (for above 20 years) of my getting together, farr and near, with great pains, cost and damages; as partly Mr. Powel, her Majestie's servant at this present, can testifie for one journey, wherein he took pains with me, into the Dukedome of Lorrain (A. 1571.) and we brought from thence one great cart lading of purposely made vessels &c.", *R&W*, 197.

²⁶ From Adam McLean's website (<http://www.levity.com/alchemy/almss5.html>, accessed July 2005). I note the occurrence of the name Christopher Taylour in the following manuscripts: Oxford, Bodleian Library, Ashmole MS 1406. Part II, 131-173: "A treatise of the Numbers one and two, and the Unity and Chaos". "Liber Christophori Taylour. 1600", Oxford, Bodleian Library, Ashmole MS 1482, fols. 136-138: "Processus operis" (An account of an alchemical process, written partly in a secret alphabet, partly in Latin, and partly in English, superscribed by the writer "Liber Christophori Taylour"), and Oxford, Bodleian Library, Ashmole MS 1492. Sixteenth and seventeenth centuries, IX. 1, 130: "A vessell of circulation, with blind head of the owne. (In the handwriting of Christopher Taylour)."

²⁷ There are several manuscripts which were owned or written by Isaac Habrecht in the Royal Library in Copenhagen. I have not had the opportunity to undertake a close examination of them, but they are, apart from the one that will be discussed later, Old Royal Coll. 1727 4°, Old Royal Coll. 1661 4° (Fragmentum Codicis chart. anonymi Sec. XV. de morbis, eorumque cura), Old Royal Coll. 1667 4° (Hohenloesch Artzeneybuch, nominibus morborum manu, ut videtur Habrechtii, in margine annotatis.), Old Royal Coll. 1688 4° (Farrago medica 1606 collecta a Isaaci Habrechtii), Old Royal Coll. 1689 4° (Farrago chemica 1606 collecta a Isaaci Habrechtii), Old Royal Coll. 1690 4° (Isaac Habrechtii Collectanea Chymica), Old Royal Coll. 1691 4° (Isaac Habrechtii Dispositio in breves et succinctas theses medicinae theoretica.), Old Royal Coll. 1692 4° (Fasciculus variorum excerptiorum medicorum), Old Royal Coll. 258 fol. (Commercium Epistolicum Habrechtianum sive Epistolae variorum Autographiae ad Isacum Habrechtum maxime de rebus ad Alchymiam pertinentibus, ord. alphab.), and probably some more which I have not noted. This Isaac Habrecht is an interesting figure in connection with the "Filius Sendivogii", or "Hautnorthon" figure, known under the monogram "J.H.F.S.", who has been identified as an Johann Harprecht (Fortitudo) Starcke by Joachim Telle in an excellent study "Zum 'Filius Sendivogii' Johann Harprecht" (in Christoph Meinel, ed., *Die Alchimie in der europäischen Kultur- und Wissenschaftsgeschichte*, Wolfenbütteler Forschungen, 32 (Wiesbaden: Harrassowitz, 1986), 119-36. This is not the place to discuss the complicated and confused relation between the above mentioned "Filius Sendivogii", the Tübingen professors Johann Harprecht (1560-1639), his son, Johann Harprecht (1610-166?), this Isaac Habrecht (1589-1633), his father, also called Isaac (1544-1620), and the equally confusing identities of the author names "Isaac Hollandus", and "his son" "Johann Isaac Hollandus", but I hope to have the opportunity to return to this subject in some other connection.

²⁸ These crossings and cancellations seem not to have been "approved" by all hands in the manuscript, thus we read – crossed out! – on fol. 30v: "[...] I crossed these lettres [...] taking them to be but sophisticacious", on fol. 33, in the margin, with another, Italic, hand: "some Also outcrossede this."

²⁹ Cf. Old Royal Coll. 1727 4°, pp. 165-167, 175-177. My decipherings are based on the following substitution cipher: I=I, M=M, N&U=L/L=N K=P/P=C or K, A=V/V=A, D=T/T=A, E=O/O=E, F=S/S=F, G=R/R=G.

³⁰ C. J. Robinson “Hill, Nicholas”, in *DNB* X, 855–856. Cf. also Hugh Trevor-Roper, “Nicholas Hill, the English Atomist” in *Catholics, Anglicans and Puritans* (London: Martin Secker & Warburg, 1987), 1–39.

³¹ Trevor-Roper, 8.

³² As the *Dictionary of National Biography* states, but see Trevor-Roper, 19.

³³ This is the hypothesis put forward by Trevor-Roper, 19–39.

³⁴ None of which seems to have survived, but Trevor-Roper’s account of one of them is interesting in an alchemical connection: “According to Henshaw, the manuscript which he possessed was a copy taken by John Everard, a Neoplatonist who had translated the Hermetic writers, from “an imperfect copy in the hands of Edmund Earl of Mulgrave” [...]. The Earl’s manuscript was anonymous, but presumably it was he who ascribed it to Hill since he was the source of Henshaw’s information (or misinformation) about Hill’s life. [...] When Henshaw had acquired Everard’s transcript of the manuscript, about 1637, he showed it to the greatest expert on such arcane matters, his own kinsman William Backhouse of Swallowfield. This William Backhouse was a patron and himself a student of alchemy and other mysteries: he was the alchemical “father” – i.e. initiator – of the alchemical virtuoso Elias Ashmole [...]. On reading Henshaw’s manuscript, Backhouse, who knew Hill’s printed work, recognized it as being by the same writer and determined to discover more about him. [...] It is unfortunate that Backhouse – the one person, who, through Hill’s widow, could have discovered, and perhaps did discover, the true history of his life – left no record of it or indeed anything else. But Backhouse was a strange and secretive character who led a hidden life – *sache cacher* was his chosen motto – and committed nothing to paper.” (Trevor-Roper, 15).

³⁵ Thompson Cooper, “Digges, Thomas”, in: *DNB*, V, 976–978; *Biographia Britannica*, 2nd edn, 5 vols (London, 1778–93), V, 239, and Wood, I, 414–415, 636–639.

³⁶ See, for example, fols. 96^v and 110^v.

³⁷ Julian Roberts, personal communication.

³⁸ *R&W*, 11–13.

³⁹ Ashmole, *Theatrum chemicum*, 332–333.

⁴⁰ At least two other copies of this text exist in British libraries: British Library, Sloane MS 319, p.3 (around 1600) and Oxford, Bodleian Library, Ashmole MS 1394, item VI, 11.

⁴¹ Since it could be the name “Roger Kock” that is erased after two tracts in Old Royal Coll. 1723 4^o (see below), and since Roger Cook was in Prague at least from about 1609 up until 1612, this is of course a possibility. Speaking against this identification of the scribe with Roger Cook is the fact that the initials would then reasonably be R.C. and not R.K. since the larger part of the manuscript is written in English, and since Cook was definitively in England the 30 September 1600 (returning to the service of Dee, cf. *R&W*, 43), less than a year after the dating of this manuscript. I know nothing of Cook’s whereabouts following his departure from the service of Dee the 7 September 1581 to 1600, nor have I been able to find any other possible candidate for the R.K. signature.

⁴² *Private Diary*, 30.

⁴³ I am grateful to Dr Stephen Clucas for calling my attention to this and suggesting this reading, and I agree on the plausibility of this reading even though I find it very hard to confirm it after seeing the original. If this reading is correct, then the erased signature on fol. 20^v could read: “[per?] Rogerius Cooke”, that is, with an English spelling of the name. On Cook, cf. Edward Heron-Allen, “Cooke, Roger”, in *DNB*, IV, 1018–1019. According to *DNB* all traces of Cook are lost after 1584.

⁴⁴ *R&W*, 43 and *NP*, 178.

⁴⁵ I have not been able to find any information on this “Constantius Loogenhagius” (fol. 1^v) but the many references to the Netherlands is interesting in the light of two seventeenth-century tracts in Sloane MS 83 referring to a “Dr of Physicke” in the Netherlands, William Johnson, who is said to be Edward Kelley’s “alchemical son”, if we are to believe the titles “A Treatise of the Philosophers Stone. A Letter from S. Edward Kelly to his Son &c.” (fol. 1) and, on fols. 8–11 “A letter from Sir Edward Kelley to his sonne Mr. Will. Johnson, Dr. of Physicke in the Lowe Countryes.”

⁴⁶ The only trace I have found of this John Tichborn, after Mr. Adam McLean had brought it to my attention, is the signature “finis. Jo. Tichborn” after the explicit “of the nature of thinges | The Seaven bookes of Aureolus Theophrastus Paracelsus”, in British Library, Sloane MS 320, fol. 96. Extracts from this text are interestingly enough to be found in MS 1723, 145–148.

⁴⁷ *R&W*, 25. See, for example, 23, 29, and 102 in the facsimile reproduction of the Catalogue.

⁴⁸ *Mercurius Triumphans & Hebdomas Eclogarum Hermeticarum. Vnà cum commentariis Acroamaticis et Mysticis. In quibus de vnica, vera, summa, & antiquissima Philosophorum Medicina disseritur*

Libris XIII. Omnia Studio & Opera: Arioponi Cephalii Eutopiensis [etc] (Magdeburg, 1600) in-8:vo, [xx], 144 pp., with a vignette representing a dragon in a fire with the motto: "Durare Mori et non Perire". The dedication to Rudolph II is signed "M. C. M. D.", that is Martinus Copus, Medicinæ Doctor, the author (See John Ferguson: *Bibliotheca chemica. A catalogue of the alchemical, chemical and pharmaceutical books in the collection of the late James Young of Kelly and Durris*, 2 vols (Glasgow, 1906), I, 150).

⁴⁹ *Apotelesmata Philosophica, Mercurii Triumphantis, de vera, et summa Antiquissimorum Philosophorum Medicina. In quibus Elucidatio & Clavis totius Operis. Labore & studio Arioponi Cephalii Eutopiensis. Cum Grat: & Priuileg. Cæs. Maiest. ad Decennium.* (Magdeburg, 1601) in-4°, [72] pp., with the same vignette, and the motto: "Aut taceant aut discant" (Cf. Ferguson).

⁵⁰ From the early 1570s until 1581 Roger Cook was Dee's alchemical assistant, and from this period "there is evidence of continuous and considerable alchemical activity on Dee's part" (NP, 178). Edward Kelley did not enter the scene until 1582.

⁵¹ Appendix on paper. First I want to issue a warning: I am not an expert in the examination of watermarks, and I am very uncertain about the conclusions which can be drawn from the often insufficient information I present in my catalogue of the MSS, and, finally, this preliminary examination is too brief to be considered scientifically accurate. Nevertheless I will venture some general remarks which in my opinion strengthen the impression of the homogeneity of this group of manuscripts. First I note that manuscript 245 from the "R.K." group and manuscripts 240 and 247 from the "Christopher Tylour" group have a watermark of the same type of grapes (consisting of 34-42 grapes, "hanging" vertically between two chainlines and with a right-twisted branch), but in different dimensions. What speaks for their shared origin at the same manufacturer is the fact that both manuscript 240 and manuscript 247 are made up of another seemingly identical type of paper, i.e. the 64mm high one-handled pot with a four-petalled flower (other details could however be different). This very same type and dimensions also occurs in manuscript 1723, which again strengthens the hypothesis that hand II of this manuscript and the "R.K." signature in manuscript 246 are identical. The equation is this: The grapes of manuscript 245 (written by the same hand as manuscript 246) seem to stem from the same manufacturer as the grapes of manuscripts 240 and 247; the 64mm pot type of manuscripts 240 and 247 seem to stem from the same manufacturer as the 64mm pot type of manuscript 1723. Under all circumstances, the 64mm pot type occurs in the "Christopher Tylour" group as well as in the "R.K." group. The close connection of these manuscripts is also indicated by the similar watermarks of manuscript 246 and quires Kk-Ll of manuscript 240 (the 50mm one-handled pot without flower on top). I said that manuscript 247 was the most intriguing of the Copenhagen manuscripts, but at the same time the one that yielded the least amount of factual information. With regard to watermarks this manuscript nevertheless seems to be very close in origin to manuscript 240 (one watermark that is seemingly identical and one of an identical type), which in turn is very close in origin as well as provenance to manuscript 1727. Further, manuscript 247 seems very close in origin to manuscript 1723 (the John Carpe signature) because of the similar 64mm urn type. It is thus worth noting that if manuscript 1723 is written by the same hand as manuscripts 245 and 246, this also suggests a link between manuscripts 245/246 and manuscript 247 (the Arioponus Cephalus tract to the Emperour). Another curious detail is that quire V (a part of the "Lyttle Key of Raymond Lully") of the otherwise rather English-looking manuscript 240 is written on paper which, according to Briquet, was produced in Moscow 1594 (Briquet, IV, 12.721).

PART SIX: LIBRARY CATALOGUE AND BIBLIOGRAPHY

JULIAN ROBERTS

ADDITIONS AND CORRECTIONS TO
“JOHN DEE’S LIBRARY CATALOGUE” *

Our publication of *John Dee’s Library Catalogue* in 1990 has not, to our great relief, been followed by critical demolition. A number of reviewers and correspondents pointed out, quite correctly, that there were omissions and inaccuracies, while others found fault with aspects of our method. Our intention, some fifteen or twenty years in execution, had been to describe the purposeful growth, the extent and the final dispersal of John Dee’s library, and to provide by illustration, where possible, a means of identifying more survivors, whether manuscript or printed. The areas where our conjectures fell some way short of final proof, were the naming of those who raided Dee’s house after his departure in 1583 – and we still do not know why they did so – and the final passing of his books into the hands of John Pontois and Patrick Saunders. So far these conjectures have stood; no cache of Dee’s books, overlooked by us, had then been found, though the painstaking searches of Dr. William H. Sherman, particularly in Cambridge, notably increased the tally of survivors. His discovery of no. 1101, the *Historie* of Fernando Colombo, in the British Library, brought to light one of the most heavily and interestingly annotated of his books. Another new survivor which falls into this category is no. 282, Simler’s *Epitome*, now in the Bodleian. The intensity of Dee’s interest in British and Welsh antiquities was one of the major revelations after the publication of the *Catalogue*.¹

We suspected then that more evidence for this interest might emerge in Welsh libraries, and it still may do so, though the focus of attention is now upon Dublin. Lyndy Abraham has done something which we had toyed with and abandoned – examined Arthur Dee’s *Fasciculus chemicus* for evidence of the availability to him of any of his father’s books.² Given Arthur Dee’s sojourn in Moscow, a further question suggests itself: do any of Arthur Dee’s books remain in Moscow?

In December 1997 a survey by Mr. Ray Jordan of the Conservation Department of the Library of Trinity College Dublin brought to light a number of survivors among the books collected by Archbishop James Ussher of Armagh, and presented to the College in 1661. That Ussher had owned many of the manuscripts from Dee’s library was well known, and we recorded this fact, and that in 1626 John Bainbridge wrote to Ussher asking for the names of mathematical books that had been Dee’s.³

* An earlier version of the following list of additions and corrections to John Dee’s Library Catalogue was privately printed and issued for the Colloquium on John Dee held at Birkbeck College in the University of London in April 1995, and was introduced there by a brief paper from Julian Roberts entitled, “Life after the Library Catalogue.”

None of the survivors among Ussher's books – so far – is mathematical. At least two, however, of these survivors have proved to be of the greatest interest. The three folio volumes of Giovanni Battista Ramusio's *Navigazioni et viaggi* (no. 273) have probably gained the title of Dee's most heavily annotated work, and are now vital, along with Dr. Sherman's account of Colombo's *Historie*, to any future study of his navigational and geographical interests, and of his own involvement in the settlement of North America. The notes in his copy – if they are his, and original to him – of William Salesbury's *A dictionary in Englishe and Welshe, 1547*, (no. 1645) reveal a knowledge of, and interest in, the Welsh language much greater than that indicated in Julian Roberts's 1991 article.⁴ All the newly discovered books in Dublin had been rebound in eighteenth-century calf, with the exception of no. 387. Grateful thanks are due to Mr. Jordan for making the results of his survey available, and to Mr. Charles Benson, the Keeper of Early Printed Books in Trinity College for his help.

One biographical question remains unanswered; the nature of Dee's relationship with the London Grocer Thomas Constable, whose widow Katherine he married. The scrap of information provided by E.G.R. Taylor in her *Tudor Geographers*, (1930) is the only clue to the name of Dee's first wife. Taylor's reference takes us to a record of a 1566 lawsuit between John and Katherine Dee and Richard Payne of Lynton in Cambridgeshire over a debt of £18 incurred by Payne to Thomas Constable in 1558, and witnessed then by John Dee.⁵

Two discoveries have brought some shame upon us, since they were made in the two libraries we were supposed to know best: Deborah Harkness has found Latin versions of the mysterious "Soyga" (DM 166) in the Bodleian Library and the British Library.⁶

In offering this brief list of Additions and Corrections, we would point out that it is all too possible to be in doubt over the attribution of a book or manuscript to Dee's library. With printed books, the problem is perhaps smaller, because the 1583 catalogue of them is a more definitive record (though examination of his Simler suggests that he *did* buy books after 1583), whereas the catalogue of manuscripts of that year is a hasty work. There are, simply, manuscripts about which we cannot be sure.

ADDITIONS AND CORRECTIONS

ANNALS OF JOHN DEE'S LIFE

- 1550 (24 July) acquired no. 230.
- 1555 (28 September) acquired no. 548; (29 September) acquired no. 387.
- 1556 (26 March) acquired no. 338.
- 1558 (August 14) witnessed loan from Thomas Constable to Richard Payne of Lynton Cambs.
- 1563 (June 6) acquired no. 1620 at Venice; (July) in Rome (note in no. 273).
- 1566 described, with wife Katherine, as of Mortlake, in action against Richard Payne.
- 1575 correct date of burial of Katherine Dee.

NOTES ON BOOKS AND MANUSCRIPTS

- 22 T Platonis opera à Marsilio Ficino conversa & commentarijs illustrata f^o Basil.
Dee's copy of this, an edition by Froben of 1532, is in the library of St John's College, Cambridge, class-mark Cc.2.16. "IOHN DEE" is written on the bottom edge in front of the tail-band, and the title "Opera platonis" on the fore-edge. The "P Ssaunder<s>" is written at the head of the title-page. Dee has heavily annotated and underlined Ficino's *argumenta* to many dialogues, and the texts of some, notably, *Phaedo*, *Timaeus* and *Critias*. Bequeathed to the College by Bishop Peter Gunning in 1684.
- 23 T Etymologicum Magnum græcum f^o. ven. aldus 1549
Dee's copy is in Corpus Christi College, Oxford O.9.8., inscribed "Joannes Dee .1572." and, beside imprint, .o. (possibly .o.) and on right of title, .g. Also "Sum Christophori Gardyneri (?)" in seventeenth-century hand and a Greek motto. There are a few Greek side-notes, probably not Dee's. Bequeathed to the College by John Rosewell, 1684.
- 133 Fr. Pauli Germani de Middelburgo, de recta paschæ celebratione & de die passionis Christi, libri 19. f^o Forosempronij 1513
Dee's copy is TCD Lib., DD.d.36 (formerly DD.4.36 and M.3.5). At the head of the titlepage is "Nicolaus de nale"; then "Joannes Dee ex dono humanissimi viri Nicolai de Nale 1557 .16. Aprilis Londini In die passionis Domini"; then "Servire Deo regnare est W: Crashawe: 160<?>". At foot of page is "forosempronij 1513" (in Crashawe's hand?). Heavily annotated throughout in a variety of Dee's hands though there are few notes after lib.14. Very heavy annotation on the calendar, and Dee always draws attention to English writers, Roger Bacon, John of Salisbury, "Lincolniensis" (i.e. Robert Grosseteste) and Eschenden. Nicolas de Nale was a

Toulouse merchant, presumably resident in London, since his name appears in the Returns of Aliens in 1541, 1547 and 1564. Later Archbishop Ussher's.

- 230 J. Davis spoyle Georgij vallæ opera f^o. ven. 1501 Correctly, *De expetendis et fugiendis rebus*.
Dee's copy is TCD Lib., EE.aa.30. At head of titlepage is "Joannes Deëus 1550. 24: julij Parisijs. prætiū. 10 franch. 4s:" At foot of title is "ru." This was bought four days after Dee's arrival, and two days after the purchase of three other books. Lightly annotated throughout, with notes usually correcting or criticising Valla. On sig. a5^v is a cropped note "< >verbum ex primo libro <Proc>li in Euclidem, traduxit. <O>bscure valde, ut omnia vero hos libros correximus < >is ubique illustravimus & < >lijs, & in linguam latinam <du?>cere incepimus, anno 1549. Vltimo Augusti Lo=<vani?>". Later Archbishop Ussher's.
- 267 Fr. Bernardini Longi Expositio in prologum Averrhois in posteriora Aristotelis latine f^o. Neapoli 1551.
There is a copy (not Dee's) of this work in the Bodleian.
- 273 T Δ+ Navigationi & viaggi di diversi, raccolti da Ramusio, italicè f^o. ven. 2 volum.
Dee's copy in TCD Lib., DD.dd.40,41 (formerly DD.aa.18, DD.13.18 and Q.2.9) is of the Giunta edn of 1563-65, and was later Archbishop Ussher's. It is unsigned. After the imprint of vol. 1 is "re.2." The three volumes, bound in two, are massively annotated throughout, usually in English. There are frequent notes of travel times and distances. Dee refers several times to the voyage of Prince Madoc in 1170, to the early preaching of the Gospel in America and to the prior title of the British to the New World. In vol. 3 there are frequent, and approving, signs of interest in possible settlement and trade in Hochelaga, Canada, and "New France". On fol. 148 of vol. 3 a note refers to Dee's (previously unknown) presence in Rome in July 1563.
- 282 Joh Davis spoyle + Δ Josiæ Simleri Bibliothecæ Gesneri Epitom f^o Tig. 1574
Dee's copy was in the possession of Professor A.C. Hamilton, Queen's University, Kingston, Ontario. It was subsequently acquired by the Bodleian Library, shelf-mark Arch.H.c.7. For an account of the book and its heavy annotations, see R.J. Roberts, *Bodleian Library Record*, 14 (1994): 529-33.
- 338 Fr Jacobi Carpentarij animadversiones in Rami libros tres dialecticarum institutionum, 4^o. paris 1555

Dee's copy is TCD Lib., EE.hh.33 (formerly GG.17.33). At the head of the titlepage is "Joannes Dee 1556 .26 Martij". There are underlinings and notes throughout. Later Archbishop Ussher's.

- 387 Fr Clementis Romani Episcopi de rebus D. Petri, Epitome, græcè, 4° paris 1555
A suppositious work. H inserts "gestis" after "rebus".
Dee's copy is TCD Lib., BB.i.23 (formerly E.4.18 and C44). At head of titlepage is "Joannes Dee 1555. 29. Sep." There are no other annotations. In a contemporary calf binding, with blind-tooled shields in the centre of each cover. Later Archbishop Ussher's.
- 398 T Joh. vernerus de Elementis conicis &c 4° Norib 1522
Dr. B. Lawn informs us that this was in Thomas Rodd's catalogue, 1820, item 737, priced at £1.8.0d.
- 416 J Davis spoyle Tabulæ astronomicæ Elizabethæ Reginae 4° Ven. Petrus Liechtenstein. 1503
Dr. B. Lawn informs us that this was lot 220 in the B.H. Bright sale, 3 March 1845, sold to Rodd for 7s.
- 446 Fr Albumasaris introductorium in astronomiam 4° Ven. 1506
Dee's copy is CUL R*.4.23¹(D), bound (not by Dee?) with no. 421. (Information from Dr. W.H. Sherman.) With a few underlinings, and notes by Dee.
- 499 Jo. Davis spoyle Consentij & Cassiodori disciplinarum liberalium orbis. 4° Basileæ. 1528
The copy in TCD Lib., EE.e.26, later Archbishop Ussher's, has a few notes and underlinings, which may be Dee's.
- 548 Fr Joh. Balei de scriptoribus Brytanniæ, centuriæ quinque 4° Wesaliæ. 1549
Dee's copy is St. John's College, Cambridge, A.2.29. (Information from Dr. W.H. Sherman). It is signed "Joannes Dee 1555.28.Sept. ex dono Tristrami Suadel". There are some annotations, particularly in the early part of the book. "Suadel" is almost certainly Tristram Swadell, rector of Stepney and prebendary of St. Paul's, deprived 1560. After the imprint is p. o. Gift of Thomas Baker, ejected Fellow, with many notes, apparently his.
- 578 Fr Francesco Serdonati de' fatti d'arme de' Romani 4° Ven. 1572
The copy in TCD Lib., EE.f.32, later Archbishop Ussher's, may be Dee's, since the price written below the colophon, "pret: ijs.iiij.d." may be in his hand.

- 701 T Jordani Ruffi opusculum de Equis, lingua vulgari -/. italica 4°. Bresciæ 1493
Professor T.A. Birrell has pointed out that this is *L'Arte de cognoscere la natura de caualli*. The British Lib. copy at IA 31020 may well have been Dee's, though it only has a few underlinings.
- 715 Ovidii Metamorphosis 8°. Parisiis. Colinæus 1529
There is a copy (not Dee's) in the Bodleian.
- 812 T Ignatij Epistolæ græcè & latine 8° Parisijs 1562
The copy in TCD Lib., BB.g.36 (formerly BB.16.36 and H.2.11), later Archbishop Ussher's, may be Dee's; it is heavily annotated in Greek in a hand which may be his.
- 856 T Achillis P. Gassari Epitome historiarum & chronicorum mundi. 8°. Lugduni
Dee's copy is CUL L*.6.60, [1538]. On the titlepage is "P Saunders". (Information from Dr. W.H. Sherman.) There are extensive notes and underlinings, in particular to entries for the "British History", but also to later events.
- 1011 Fr Michaël. Neander de Methodo artium 8°. Oporin 1556
Dee's copy is TCD Lib., EE.kk.54 (formerly EE.19.54). Apart from "Joannes Dee 1556." at the head of the titlepage, there are no notes. Later Archbishop Ussher's.
- 1027 Claudius Campensis in Aristotelis De memoria & recordatione 8° parisijs 1557
Dee's copy is at BL 1030.e.1.(2). It is unsigned, but there are frequent underlinings and annotations. Dee evidently had the book in 1556, as he noted on fol. 17^v. "Author 30 annorum hoc anno 1556."
- 1101 T Historia del mondo nuovo di Fernando Colombo. 8° ven. 1571.
Dee's copy is British Lib. 615.d.7. (Information from Dr. W.H. Sherman). One of the most heavily annotated of all Dee's books, mainly in English. Another hand is also occasionally present. The Sloane press-mark g.300 appears on the title-page; a mark of ownership (?) beside the printer's device has been heavily crossed out; the letter .g. follows the imprint. The annotations reveal Dee's intense interest in Colombo's account of his father's voyages, and in particular in the customs and appearance of the inhabitants of the New World. Dee makes several notes about the voyage of Madoc ap Owen Gwynedd, "white men" (fol. 114^v) and to the

“Brytishe custom of names” (fol. 125) which suggest that he was looking for evidence of Madoc.

- 1158 Secreti dell'arte profumatoria italicè 8° ven 1555
This is *Notandissimi de l'arte profumatoria: a fare ogli, acque, paste, balle, moscardini, etc.* Venezia, F. Rampazzetto, 1555. 12°. It was lot 417 in Captain H. Trotter's sale, Christie's, Feb. 10/11 1947, bought by Myers of Bond St. for £12. It had a signature and date 1558. (Information from Dr. B. Lawn.)
- 1186 Fr Illyrici paralipomena dialectices 8° Bas 1558.
Dr. B. Lawn informed us that Goldschmidt offered this in at least three other catalogues.
- 1459 Alchimicus libellus anonymi cuiusdam, lingua belgica. 8° Campis 1551.
This has been identified for us by Professor T.A. Birrell, as by S. Andree, *Kunst boecke nyeulick wten alchemistischen gront vergadert*, 1551. (Copy, not Dee's, in British Lib.)
- 1552 Fr Tractatus in dialogi forma de pythonicis.
By Ulrich Molitor (?) whose work is in the form of a dialogue. Perhaps an earlier edition than no.1035.
- 1559 T. R. David Kimchi liber radicum, sive Thesaurus linguæ sanctæ, vel dictionarium hebraicum f° ven. Daniel Bombergus
Dee's copy is Bodleian Lib. EE17. Art. Seld. It is signed “Joannes Dee 1565:” Later John Selden's with his motto. There are no notes, but corrections to the column numbers and some titling on the rear cover may be Dee's.
- 1560 T Concordantiæ hebraicæ in f°. minori. ven.
Dee's copy of an edition of 1564 is in the library of Sidney Sussex College, Cambridge, Y-3-15. It is inscribed “Concordantiæ Maiores. Joannes Dee :1565” and below the imprint “Venetijs:” with an illegible date or code (probably M.C.δ). There are apparently no other notes. Given to the College by Paul Micklethwait in 1639.
- 1568 Fr Pentateuchus Mosis, [etc.] 4°. ven.1551
Dee's copy is TCD Lib., CC.g.3 (formerly AA.7.3 and A.2.2). At the head of the titlepage is “Joannes Dee 1561: Londini” and at the foot “.g.” There are a few notes and underlinings. Later Archbishop Ussher's.
- 1571 Fr. Eliæ Levitæ Grammatica hebraica 4o Isnæ
Later John Selden's.

- 1605 Jo. Daus spoyle Jonas propheta hebraicè cum versione latina et exercitatione Grammaticali Wigandi Happellij 8° Basileæ: 1561
Dee's copy is TCD Lib., CC.g.9 (formerly AA.7.9). At head of titlepage is "Joannes Dee 1562," and after date ".f." There is a single underlining. Later Archbishop Ussher's.
- 1606 Fr Joh. Isaaci defensio veritatis hebraicæ sacrarum scripturarum adversus Wilhelmi Lindani libros tres de optimo scripturas interpretandi ratione 8° colon. 1559
Dee's copy may be TCD Lib., CC.h.61 (formerly A.8.61), later Archbishop Ussher's; the letter ".q." is written after the imprint, but there are no other notes.
- 1620 T Thesei Ambrosij Grammatica Chaldaica Syriaca & Armenica. Item Appendix multarum diversarumque linguarum. 4° Papiæ. 1539
Dee's copy is in fact in the library of St. John's College, Cambridge, L.8.35. (Information from Elizabeth Quarmby-Lawrence.) It is signed "Joannes Dee 1563: Junij .6. Venetijs", and, bracketed off, "pretium 10[?] F F[?]" ; above the title is "pret.10s". There are underlinings and annotations by Dee throughout. At the end is "Perlegi festinus".
- 1645 T William Salesbury his Dictionarie in Englishe & Welshe, or Brytishe. 4° London 1547
Dee's copy is TCD Lib., EE.e.32 (formerly C.10.17). At the head of the titlepage is "John.Dee." The first half of the book (up to sig.K) has been extensively annotated and corrected. In some instances Salesbury has put words of English origin in the "Camraec" column and Dee has supplied a Welsh word. Where Salesbury has occasionally left a blank, Dee has supplied an English equivalent. He has also corrected equivalents in both languages. Later Archbishop Ussher's.⁷
- 1671 T Vocabulario de quatro linguas, gall. lat. ital & hispanic. 4° Lovanij 1558
This has been identified for us by Professor T.A. Birrell as *Vocabulario de quatro linguas*, 1558. The only copy recorded by J. Peeters-Fontainas, *Bibliographie des impressions espagnoles des Pays-Bas* (Bruges: Nieuwkoop, 1965), is in the Biblioteca Nacional, Madrid.
- M51 Roberti Gloucestrensis, Chronica, rhythmo Anglico. papyro. f°
Dr. W.H. Sherman has suggested that this is British Library, MS Harley 201, s. xv in. Against this is the fact that the latter is on vellum and is hardly a folio. However, several names from the "British History", e.g. Eldol, Gorlois, Merlinus, Malgwyn, have

been added in the margin in a hand almost certainly Dee's. (See also Watson, *D'Ewes*, A889.) In H M51 follows M52.

- D5a Cicero, Marcus Tullius. *Tusculanæ quaestiones*. Lugduni, apud Seb. Gryphum, 1541. 8°. Dee's copy is British Lib., 8461.b.13, inscribed "Iste liber pertinet ad me Johannem Dee teste Barleo, Smitheo, Odell cum multis alijs" [all deleted], in an upright hand, not wholly italic (Information from Dr W. H. Sherman). On verso of titlepage "Liber Rogeri Cook ex dono Domini Dee./ 1569." and "Liber Francisci Jones ex dono Georgij Wood 1635". On the fly-leaves are many pen-trials including "For Mr. Merritt Deane". There are notes throughout in a rather unsure italic, probably Dee's, and in other hands in secretary. There are translations into English, e.g. on p. 33 against "pusio" "a litle boy" and on p. 87 against "ballistae" "An ingin or crossbow wherwith a stone or arrow is shot". This has all the appearance of an undergraduate's book; Barley was probably Henry, scholar or fellow of Trinity (as Barkeley), BA 1546-47; Odell according to Venn was probably Fulke Woodhull, matriculated at St. John's MT 1544.
- D26 Wynman, Nicolaus. *Colymbetes, sive de arte natandi, dialogus & festivus & iucundus lectu*. Augustæ Vindelicorum, excudebat Henricus Steyner, 1538. 8°. Dee's copy is TCD Lib., DD.i.65. It is inscribed "Joannes Dee" at the head of the titlepage, and after the date ".u." There are a few underlinings. Later Archbishop Ussher's.
- DM166 Aldaraia sive Soyga. Professor Deborah Harkness, by the simple expedient of consulting the index to Thorndike and Kibre's *Catalogue of Incipits*, revealed that there were copies of a Latin text of this name in the Bodleian (MS Bodley 908) and the British Library (MS Sloane 8). Neither answers to the description of an Arabic book, since both are in Latin (partly, indeed, in Latin hexameter verse), written on paper, and both are of late sixteenth-century date and of probable English origin. It is possible that these are translations made in the 1590s, when Dee was seeking opinions on his Arabic book. He would not, we suppose, have needed to consult Uriel about the excellency of a Latin text. The Sloane manuscript is probably that sold in the Lauderdale sale of 1692, since its title (in gothic script) is "Aldaraia siue Soyga vocor" followed by (in a later hand) "Tractatus Astrologico-Magicus". ".g." follows the first title, and below it is the price, "11s".
- DM? Cambridge, Trinity College, MS. O.2.21, Geoffrey of Monmouth, *Historia regum Britanniae*, and other works.

Dr. W.H. Sherman says that the title on fol. 5 is in Dee's hand. There are three "Jupiter" marks on fol. 1, and two on fol. 2. Although it must be remembered that Dee was not alone in using the "Jupiter" mark, this is a "possible".

INDEX I

Cicero, Marcus Tullius *Tusculanae quaestiones*, *add* D5a

Gesner, Conrad *add* 170

Molitor, Ulrich *add* 1552

Orta, Garcia da *for* 1311* *read* 1310

Pico della Mirandola, Giovanni *for* 794 *read* 974

Robert of Gloucester *for* (M51) *read* M51

Wynman, Nicolaus *add* D26

INDEX II.

Cavendish, Richard *and* Thomas *for* DM165 *read* M50

Cook, Roger *add* o.no. D5a

Crashaw, William *add* o.no. 133

Gardynner, Christopher *add* o.no. 23

Harriot, Thomas *for* p. 77 *read* p. 99

Nale, Nicolas de *add* o.no. 133

Saunders, Patrick *add* o.no. 22, 856

Swadell, Tristram *add* o.no. 133

Ussher, James *add* these printed books: nos. 133, 230, 273, 338, 387, 499, 578, 812, 1011, 1568, 1605, 1606, 1645, D26

INDEX IV.

Cambridge, Corpus Christi College *add* 413 = *M117.

London, Royal College of Physicians 398 *for* M122(ii) *read* M121(ii)

London, British Library *add* Harley 201 M51

NOTES

¹ See R. J. Roberts, "John Dee and the Matter of Britain", *Transactions of the Honourable Society of Cymmrodorion* (1991): 129-43.

² Lyndy Abraham, "The sources of Arthur Dee's *Fasciculus chemicus* (1631)", *Ambix*, 41 (1994): 135-41, and "Arthur Dee, 1579-1651: a life", *Cauda Pavonis*, NS 13 (1994): 1-14. Her edition of the *Fasciculus chemicus* was published in 1997.

³ *R&W*, 65.

⁴ See R.G. Gruffydd and R.J. Roberts, "John Dee's additions to William Salesbury's *Dictionary*", *Transactions of the Honourable Society of Cymmrodorion*, n.s. 7 (2001): 19-43.

⁵ E.G.R. Taylor, *Tudor Geographers 1485-1583* (London: Methuen, 1930), 107

⁶ See Deborah Harkness, "The Nexus Of Angelology, Eschatology, And Natural Philosophy In John Dee's Angel Conversations And Library", *intra*, 278-9.

⁷ See Gruffydd and Roberts (2001).

STEPHEN CLUCAS

RECENT WORKS ON JOHN DEE (1988-2005)

A Select Bibliography

This bibliography does not pretend to be an exhaustive record of all scholarly works on John Dee in this period. It is a select bibliography of work which has been published since Nicholas Clulee's *John Dee's Natural Philosophy: Between Science and Religion* (1988), and readers are directed to the bibliography of that work and those of William H. Sherman (1995) and Deborah E. Harkness (1999) for more comprehensive information on essays, articles and books published prior to 1988. The bibliography also includes recent PhD theses on Dee, and one or two non-academic titles dealing with Dee and his career (such as the "novelised" biographies of Postel and Wilding). An unlisted, but important resource for Dee scholars is the microfilm series of John Dee's books and manuscripts produced by Adam Matthew: *Renaissance man: the reconstructed libraries of European scholars, 1450-1700. Series 1: The books and manuscripts of John Dee, 1527-1608. Part 1: Manuscripts from the Bodleian Library, Oxford, and Part 2: John Dee's manuscripts from Corpus Christi College, Oxford* (Marlborough: Adam Matthew, 1992-3). I have not included review-articles in the bibliography.

Abeles, Jennifer and MacMillan, Ken (eds.), *John Dee: The Limits of the British Empire (Studies in Military History and International Affairs)* (New York: Praeger Publishers, 2004)

Abraham, Lyndy, "Edward Kelly's Hieroglyph", in Alison Adams and Stanton J. Linden (eds.), *Emblems and Alchemy* (Glasgow: Glasgow Emblem Studies, 1998), 95-108.

Abraham, Lyndy (ed.), *Arthur Dee: Fasciculus Chemicus, translated by Elias Ashmole* (New York: Garland Publishing Inc., 1997).

Barone, Robert William, "The Reputation of John Dee: A Critical Appraisal" (Unpublished PhD thesis, Ohio State University, 1989).

Bassnett, Susan, "At the edges of the world: drawing new maps", *Comparative Criticism*, 15 (1993): 35-56.

Béhar, Pierre, "La *Monas Hieroglyphica* de John Dee et la 'Cabale Réelle'", in *Les langues occultes de la Renaissance: Essai sur la crise intellectuelle de l'Europe au XVIe siècle* (Paris: Editions Desjonquères, 1996), 91-120.

Bowd, Stephen, "John Dee and Christopher Saxton's Survey of Manchester (1596)", *Northern History*, 42:2 (2005): 277-94.

Clucas, Stephen, "Non est legendum sed inspicendum solum: Inspectival knowledge and the visual logic of John Dee's *Liber Mysteriorum*" in Alison Adams and Stanton J. Linden (eds.), *Emblems and Alchemy* (Glasgow: Glasgow Emblem Studies, 1998), 109-132.

———, "No small force: Natural philosophy and Mathematics in Thomas Gresham's London", in Francis Ames-Lewis (ed.), *Sir Thomas Gresham and Gresham College: Studies in the Intellectual History of London in the Sixteenth and Seventeenth Centuries* (Aldershot: Ashgate, 1999), 146-173.

———, "'Wondrous force and operation': Magic, Science and Religion in the Renaissance", in Philippa Berry and Margaret Tudeau (eds.), *Textures of Renaissance Knowledge* (Manchester: Manchester University Press, 2003), 35-57.

Clulee, Nicholas H., *John Dee's Natural Philosophy: Between Science and Religion* (London and New York: Routledge, 1988).

———, "John Dee and the Paracelsians" in Allen G. Debus and Michael T. Walton, (eds.), *Reading the Book of Nature: The Other Side of the Scientific Revolution, Sixteenth Century Essays and Studies*, 41 (Ann Arbor Michigan: Sixteenth Century Journal Publishers, 1998), 111-132.

———, "*Astronomia inferior*: Legacies of Johannes Trithemius and John Dee", in William R. Newman and Anthony Grafton (eds.), *Secrets of Nature: Astrology and Alchemy in Early Modern Europe* (Cambridge Mass. And London: The MIT Press, 2001), 173-233.

Fenton, Edward, *The Diaries of John Dee* (Charlbury: Day Books, 1998).

Håkansson, Håkan, *Seeing the Word: John Dee and Renaissance Occultism*, Published PhD Thesis, (Lund Universitet: Ugglan Minervaserien 2, 2001).

Harley, David, "Rychard Bostok of Tandridge Surrey (c. 1530-1605), M.P., Paracelsian propagandist and friend of John Dee", *Ambix*, 4:1 (2000): 29-36.

Harkness, Deborah E., *John Dee's Conversations with Angels: Cabala, Alchemy and the End of Nature* (Cambridge: Cambridge University Press, 1999).

———, "Alchemy and Eschatology: Exploring the Connections between John Dee and Isaac Newton", in James E. Force and Richard H. Popkin (eds.), *Newton and Religion* (Dordrecht: Kluwer Academic, 1999), 1-15.

———, "Managing and experimental household: the Dees of Mortlake and the practice of natural philosophy", *Isis*, 88:2 (1997): 247-262.

———, "Shows in the showstone: a theater of alchemy and apocalypse in the angel conversations of John Dee (1527-1608/9)", *Renaissance Quarterly*, 49:4 (1996): 707-737.

———, "The Scientific Reformation: John Dee and the Restitution of Nature" (Unpublished PhD Thesis, University of California Davis, 1994).

Jones, Elwyn Lewis, *Y dewin du bywgraffiad o John Dee (1527-1608)* (Dinbych: Gwasg Gee, 1993).

Levack, Brian P. (ed.), *Renaissance Magic* (New York: Garland, 1992).

Mandosio, Jean-Marc, "Entre mathématiques et physique: note sur les 'sciences intermédiaires' à la Renaissance" in *Comprendre et maîtriser la nature au Moyen Age: mélanges d'histoire des sciences offerts à Guy Beaujouan*, Hautes études médiévales et modernes, 73 (Geneva: Droz, 1994), 115-138.

———, "Alberti dans le miroir magique de John Dee", *Albertiana*, 2 (1999): 57-78.

———, "Des mathématiques vulgaires' à la 'monade hieroglyphique': les Elements d'Euclide vus par John Dee", *Revue d'histoire des sciences*, 56:2 (2002): 475-91.

Meier, Jorg M., *Das Büchlein der Venus (Libellus Veneris nigro sacer): Eine magische Handschrift des 16. Jahrhunderts* (Bonn: Holos, 1990).

Poole, Robert, "John Dee and the English Calendar: Science, Religion and Empire", *Electronic Seminars in History*, Institute of Historical Research website:
<http://www.history.ac.uk/projects/elec/sem2.html>
 (accessed June 2005).

Postel, Claude, *John Dee: Le Mage de la Ruelle d'Or* (Paris: Les Belles Lettres, 1995).

Rambaldi, Enrico, "John Dee and Federico Commandino: An English and an Italian Interpretation of Euclid during the Renaissance", *Rivista di Storia della Filosofia*, 44 (1989): 211-247.¹

Roberts, Julian, "John Dee and the Matter of Britain", *Transactions of the Honourable Society of Cymmrodorion*, (1991): 129-143.

———, and Watson, Andrew G., *John Dee's Library Catalogue* (London: Bibliographical Society, 1990).

Seymour, Ian, "The political magic of John Dee", *History Today*, 39 (1989): 29-35.

Sherman, William H., *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst: University of Massachusetts Press, 1995).

———, "John Dee's *Brytannicae Reipublicae Synopsis*: a Reader's Guide to the Elizabethan Commonwealth", *The Journal of Medieval and Renaissance Studies*, 20:2 (1990): 293-315.

———, "The Place of Reading in the English Renaissance: John Dee Revisited", in James Raven, Helen Small and Naomi Tadmor (eds.), *The Practice and Representation of Reading in England* (Cambridge: Cambridge University Press, 1996), 62-76.

———, "A Living Library: The Readings and Writings of John Dee" (Unpublished PhD dissertation, University of Cambridge, 1992).

Slighter, William E., "The cosmopolitics of reading: Navigating the margins of John Dee's *General and Rare Memorials*" in D.C. Greetham (ed.), *The Margins of the Text* (Ann Arbor: University of Michigan Press, 1997), 199-227.

Szönyi, György, *John Dee's Occultism. Magical Exaltation Through Powerful Signs* (Albany, NY: State University of New York Press, 2005).

———, "John Dee and Early Modern Occult Philosophy", *Aries*, 2:1 (2002): 76-87.

———, "Ficino's Talismanic Magic and John Dee's Hieroglyphic Monad", *Cauda Pavonis*, 20:1 (2001): 1-11.

———, "The Language of the Other: John Dee's Experiments with Angelic Conversations" in Ina Schabert (ed.), *Imaginationen des Anderen im 16. und 17. Jahrhundert*, Wolfenbütteler Forschungen, 97 (Wiesbaden: O. Harrasowitz, 2001).

———, *Exaltatio és hatalom. Keresztény mágia és okkult szimbolizmus egy angol mágus műveiben* [*Exaltatio and Power. Christian Magic and Occult Symbolism in the Works of an English Magus*], Ikonológia és műértelmezés 7 (Szeged: JATE Press, 1998).

———, "Traditions of Magic: From Faustus to Dee at European Universities and Courts", *Cauda Pavonis*, 10:2 (1991): 1-8.

Szulakowska, Urszula, *The Alchemy of Light: Geometry and Optics in Late-Renaissance Alchemical Illustration*, Symbola et Emblemata, 10 (Leiden: Brill, 2000).

———, "Paracelsian Medicine in John Dee's Alchemical Diaries", *Cauda Pavonis*, 18:1-2 (1999): 26-31.

———, *John Dee and European Alchemy*, Thomas Harriot Seminar Occasional Papers, 21 (Durham: University of Durham School of Education, 1996).

———, "Geometry and Optics in Renaissance alchemical illustration: John Dee, Robert Fludd and Michael Maier", *Cauda Pavonis*, 14:1 (1995): 1-12.

Sviták, Ivan, *Kouzelník z Londýna: John Dee v Cechách, 1584-1589* (Prague: ISIS, 1994).

Van den Broecke, Steven, *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology*, Medieval and Early Modern Science, 4 (Leiden: Brill, 2003).

———, “Dee, Mercator, and Louvain Instrument Making: an Undescribed Astrological Disc by Gerard Mercator (1551)”, *Annals of Science*, 58:3 (2001), 219 – 240.

Walton, Michael T., and Phyllis J., “Being Up Front: The Frontispiece and the Prisca Tradition”, *Cauda Pavonis*, 17: 1-2 (1998): 8-13.

———, “The geometrical Kabbalahs of John Dee and Johannes Kepler: The Hebrew Tradition and the mathematical study of nature”, in Paul H. Theerman and Karen Hunger Parshall (eds.), *Experiencing Nature: Proceedings of a conference in honour of Allen G. Debus* (Dordrecht: Kluwer Academic, 1997), 43-59.

Whitby, Christopher, *John Dee's actions with spirits: 22 December 1581 to 23 May 1583* (New York and London: Garland Publishing Inc., 1988).

Wilding, Michael, *Raising Spirits, Making Gold, Swapping Wives: The True Adventures of Dr John Dee and Sir Edward Kelly* (Nottingham: Shoestring Press, 1999).

Woolley, Benjamin, *The Queen's Conjuror: the Science and Magic of Doctor John Dee, Adviser to Queen Elizabeth I* (London and New York: Harper Collins, 2001).

¹ This article was subsequently reprinted in Sergio Rossi and Dianella Savoia (eds.), *Italy and the English Renaissance* (Milan: Unicopli, 1989), pp. 123-153, and in Lino Conti (ed.), *La matematizzazione dell'universo: Momenti della cultura matematica tra '500 and '600* (Assisi: Edizioni Porziuncola, 1992) pp. 49-86.

INDEX

- Aaron, 213
 Abeles, Jennifer, 345
 Abraham ben Simeon, 197
 Abraham, Lyndy, 333, 343, 345
 Abubacher, 148
 Abulaifa, Abraham, 199
 Ackermann, Silke, 124
 Actions, spiritual, 16, 231, 239, 241, 258
 Adam Kadmon, 155-6
 Adam, 150-151, 155-6, 165, 177, 218, 222, 237, 243, 264, 266, 278
 Adam's stone, 162
 Adept, 79, 156, 240
 Agnello, Battista, 113
 Agricola, Georgius, 109, 126
 Agrippa of Nettesheim, Henricus
 Cornelius, 15, 27, 144-5, 158, 179-180, 196, 199, 210, 212-213, 219-220, 231, 233-5, 237, 245, 258-9, 275, 279-280, 285, 319
 Albertus Magnus, 311
 Albumasar, 337
 Alchemy, 1-4, 7, 9, 14-15, 17, 27-8, 31, 69-70, 74, 90, 103-4, 108, 149, 154-5, 159-76, 179, 210, 212-215, 220, 236, 245, 258, 275, 280, 286-7, 295-6, 298, 302, 309, 329, 339
 Alemanno, Johannes, 145
 Alembic, 312
 Algorithm, 180
 Alkahest, 161-2
 Alkindi, 3, 6, 237
 Allegory, 159, 161, 239
 Alleyn, Edward, 220
 Alleyn, Thomas, 107
 Alms-giving, 241
 Alnirangiat, see Nīrangiyāt.
 Alphabet, 179, 216; Enochian, 244; Hebrew, 159, 180, 199, 237; of Honorius of Thebes, 264
 Alsace, 127
 Alum, 322-3
 Alvares, Emmanuel, 124
 Ambosius, Theseus, 340
 Ambrose, Elizabeth Ann, 225
 America, 99, 106, 132
 Amram, David W., 158
 Amulet, 158, 210, 224, 238
 Anaxagoras, 167, 176
 Andrae, Johann Valentin, 34,
 Andree, S., 339
 Angelic conversations, 3, 6-7, 13, 16-17, 23-5, 27-8, 73, 136-7, 149-150, 156, 159, 174, 177-8, 207-229, 231-282
 Angelology, 9, 17, 265, 277, 279
 Angels: Anachor, 177, 211; Anchorus, 177, 211; Anilos, 177, 211; Ave, 231, 250, 252, 254, 256, Befafes, 244; Camara, 240; Gabriel, 154, 218, 248, 250, 253-4, 259; Il, 202; Ilemer, 254; Madimi, 253, 268, 287; Mapsma, 254; Michael, 154, 177-8, 208, 245, 248, 251, 259, 269, 280; Nalvage, 217, 253-4; Nariel, 280; Raphael, 208, 220-221, 248, 254, 259-260, 264; Raziel, 154, 264; Uriel, 177-8, 202, 256, 259, 269, 278, 280, 341, 251
 Anglicanus, Ricardus, 314
 Antimony, 164-6, 305-6, 324
 Antiquarianism, 4, 11, 100, 116, 124, 333
 Antisemitism, 143-4
 Antwerp, 104, 108, 123
 Apian, Peter, 116
 Apocalypse, 16, 156, 174, 256, 257, 277-9
 Apollo, 161, 170
 Apollonius, 70
 Apono, Petrus de, 264
 Archemasterie, 13,
 Archimedes, 67, 70
 Architecture, 4

- Aries, 164-6, 169
 Aristotelianism, 25, 28, 31-2, 49, 52, 73, 78, 148
 Aristotle, 41
 Arithmetic, 46, 121
 Arndt, Johann, 222
Ars artium, 241, 243-4
Ars beryllistica, 213, 226
Ars memorativa, 243
Ars notoria, 231, 240-245, 248, 256-7, 264, 272
Ars sintrillia, 209, 213
 Art, heptarchical, 240, 245, 254-7
 Artephius, 209, 213, 223-4
 Arthur, 81
 Ascendant, 90, 92, 94
Asclepius, 233
 Ashmole, Elias, 177-8, 278, 280, 295, 297, 300
 Asia, 98
 Aspects, astrological, 87, 89
 Assaying, 103-4, 107, 109, 117, 128
 Asterisms, 69
 Astrolabe, 125-6, 129; mariner's, 115; planispheric, 114
 Astrology, 2-3, 6, 11-13, 15, 29, 41, 45, 54, 56-769, 74, 78, 80, 85-94, 154, 166, 179, 212, 214, 245, 276, 280, 337; electional, 87; Judicial, 86, 92-3; mediaeval, 242; mundane, 87; natural, 85
 Astronomy, 2, 6, 9, 11-13, 24, 28, 41, 57, 73, 80, 233, 248
 Atlantic, 121
 Augsburg, 109
 Augustine, 238
 Auvergne, William of, 210
 Averroes, 336
 Avicenna, 209
 Azalus, Pompilius, 279
 Azimuth, 44, 46-7,
 Azores, 105
 Babbage, Charles, 190, 203
 Backhouse, William, 329
 Bäcklund, Jan, 18,
 Bacon, Francis, 221
 Bacon, Roger, 3, 28-30, 34, 55, 63, 71, 81, 202, 210, 213, 236, 263, 299, 321, 335
 Baffin Island, 14, 101, 113
Bahir, 150-151
 Bailey, John E., 20, 261
 Bainbridge, John, 333
 Baldwin, Robert, 14,
 Bale, John, 337
 Ballistics, 67, 70
 Barker, Peter, 32,
 Barone, Robert W., 345
 Basel, 67
 Basset, Robert, 299
 Bassnett, Susan, 17-18, 345
 Beale, Robert, 118
 Beare, James, 120
 Beetle, solar. See *Heliocantharis*.
 Béhar, Pierre, 346
 Benson, Charles, 334
 Berry, Philippa, 267
 Berthelot, Pierre, 175
 Best, George, 116, 119
 Beza, Theodore, 270
 Bianchi, Massimo Luigi, 225
 Billingsley, Henry, 10, 33, 56, 98-100, 113, 123
 Birckmann, Arnold, 300, 309
 Birkbeck, University of London, 1, 18
 Birrell, T. A., 338-9
 Birunguccio, Vannoccio, 112, 126
 Black Mountains, 109
 Blast furnace, 111, 113, 127
 Bodleian Library, 18, 334
 Bohemia, 286-7, 290, 295, 302, 327
 Böhme, Jakob, 223
 Bonatus, Guido, 93
 Bongus, Petrus, 34,
 Bonner, Edward, Bishop of London, 97
 Borax, 316
 Borough, Stephen, 14, 98, 100, 115, 123
 Borough, William, 80, 98, 101, 103, 114-115, 120-121, 123
 Boulenger, Jules Cesar, 234
 Bowd, Stephen, 346

- Boxer, Charles, 124
 Boyle, Robert, 7, 34,
 Brahe, Tycho, 12, 32, 44, 46-7, 49,
 51-2, 144
 Bratislava, 104
 Bremen, 106-7, 295
 British Library, 18, 334
 Brod, Max, 229
 Broecke, Steven vanden, 8, 18, 20-21,
 350
 Brotton, Jerry, 138
 Bruno, Giordano, 5, 25-7, 31, 147-8,
 157, 221, 233-4, 299.
 Bugaj, Roman, 226
 Bulmer, Bevis, 111
 Burckhardt, Jacob, 25, 236
 Burghley House, 101
 Burning mirror, 161
 Burt, Edwin, 3-4, 6, 24-5, 261
 Butterfield, Herbert, 24-5, 31,
 Cabala, 3-7, 9, 26-8, 74, 76, 126, 143-
 158, 166, 169, 174, 180, 199, 202,
 210, 217-218, 222, 232-3, 236-7,
 255, 257, 276, 279-280; Christian,
 15, 144, 157, 180, 231, 233;
 practical, 199, 236-7; "real", 144-5,
 148-9, 151-2, 158-9, 161, 346
 Cabot, Sebastian, 98, 112, 114, 128
 Cadoxton, 128
 Caephalus of Eutopia, Arioponus,
 308, 317, 329-330
 Calcination, 312, 323
 Calder, I. R. F., 1, 3-4, 6, 25-8, 33-4,
 53, 202-3, 231-4, 258, 263
 Calendar reform, 2, 5-6, 74-5, 81, 348
 Calvin, Jean, 251-2
 Cambaia, 98
 Camden, William, 52, 79, 99
 Cannan, Edward, 125
 Cano, Sebastiano del, 104
 Carbuncle, 162
 Cardano, Girolamo, 93, 214
 Carey, Henry, Lord Hunsdon, 119
 Carolides of Karlsberg, 290
 Carpe, John (Carpio), 296, 302, 306,
 308, 318
 Carpentarius, Jacobus, 336
 Cartography, 2, 11, 14, 33, 72, 97,
 101, 125; Chinese, 101, 125
 Cartwright, Thomas, 272
 Casa de Contratacion, 104
 Casaubon, Meric, 20, 34, 202, 216,
 280, 285
 Cassiopeia, 48, 51-3, 79
 Cathay Company, 14, 104-5, 107,
 111, 113, 115, 119-120
 Cathay, 2, 69, 101, 103, 109, 117,
 124, 130, 134
 Catoptrics, 56, 89, 93-4, 210
 Catoptromancy, 213, 234, 257
 Cavallaro, Federico, 15,
 Cecil, Thomas, 1st Earl of Exeter,
 125
 Cecil, William, Lord Burghley, 10,
 14, 21, 69, 82, 99, 101, 103, 105,
 109, 118-119, 125, 127-8, 240,
 286, 288, 297-8, 306, 327; his
 astronomical ceiling, 69.
 Cepheus, 48,
 Ceremony, 235, 238-9
 Chaldee, 242, 266, 340
 Chancellor, Richard, 98, 103, 116,
 Charlatanism, 2, 17, 178, 285
 Charles V, 112, 128
 Charnock, Thomas, 299, 319
 Charts, Atlantic, 105; birth, 92-3;
 circumpolar, 98, 100-101, 103,
 105, 116; navigational, 98
 Chastity, 241
 Chemistry, 24,
 Chiasm, 219
 Christology, 147, 154, 157
 Cicero, 239, 341
 Ciphers, 106
 Circle, deferent, 61.
 Clagett, Marshall, 68
Clavis Salomonis, 236-7, 241, 262,
 264
 Clement of Alexandria, 239, 265
 Clock, 98
 Clonmines, 109
 Clucas, Stephen, 21, 137, 140, 159,
 201, 207, 295, 329, 346
 Clulee, Nicholas H., 7-8, 11, 16, 62-3,
 74, 81, 89, 91, 148, 152, 154, 156,

- 176, 208-9, 221, 235-9, 241, 276-7, 281, 345-6
 Cock (Kock), Roger, 306, 318, 329
Coctio, 164-5
 Cohen, Floris, 24, 30
 Cole, Humfrey, 114, 120, 124
 Collinson, Patrick, 82, 264
 Cologne, 300, 309
 Colonization, 14, 132
 Columbus, Christopher, 131-40, his Library, 132-3
 Columbus, Ferdinand, 14, 131-40, 333-4, 338
 Colvin, Howard M., 82
Combinatoria, 201
 Comets, 17, 41, 43-4, 48-9, 56-7, 277
 Commandino, Federico, 21, 348
 Company of Mineral and Battery Works, 108, 113
 Company of Mines Royall, 108, 111, 113-114, 127
 Compass, 120, 123; magnetic variation of, 98, 100, 114-116, 121, 125, 134; paradoxal, 98, 100, 103-4, 116, 125; sea, 98-9, 115, 125
 Confession, 241
 Conic section, 161
 Conics, 68
 Conjuring, 263; Dee accused of, 71, 215; statutes against, 214
 Constable, Thomas, 334-5
 Cook, Roger, 306, 318, 329-330, 341
 Coombe Martin, 107-8, 111, 128
 Cooper, Edmund, 286
 Coote, C. H., 104
 Copenhaver, Brian, 30, 36, 263
 Copernicanism, 2, 5, 12-13, 24, 32, 45, 49-51, 59, 62, 65-7, 74-9, 157
 Copernicus, Nicolaus, 23-4, 30-31, 74, 76
 Copper, 105-6, 111, 127
 Copperas, 324
 Copus, Martinus, 317, 330
 Cormack, Lesley B.,
Corpus Hermeticum, 4
 Cortes, Martin, 98, 115
 Cosmography, 3, 57, 90, 99, 112, 114
 Cosmology, 13, 67, 74-5, 155-6, 280
 Coudert, Allison P., 158
 Couliano, Ioan P., 27,
 Covell, William, 93.
 Cracow, 106, 216, 219, 231, 250, 252, 275
 Crashawe, William, 335
 Creation, 150, 154, 156, 158, 213, 218, 256, 278
 Croll, Oswald, 291
 Cromwell, Thomas, 118
 Cross, 147, 152-4, 162, 166-7, 169-170
 Cross-staff, 47-8, 84, 125-6
 Crusius, Paulus, 5
 Cryptanalysis, 180
 Cryptogram, 180
 Cryptology, 17,
 Crystallomancy, 1-3, 16, 34, 207, 210, 213-215, 219-220, 226, 234, 236, 243
 Cumberland, 109, 127
 Cunningham, William, 99
 Curry, Patrick, 94.
 Cyberculture, 34,
 Dartford, 103, 113
 Dastin, John, 324
 David, 251
 Davis, Erik, 34,
 Davis, John, 99, 105-6, 108, 118, 120
 Daye, John, 63, 100, 103, 116-118, 123.
 De Léon-Jones, Karen, 15, 201
 Deacon, Richard, 34, 106
 Debus, Allen G., 6-7
 Deconstructionism, 143
 Dee, Arthur, 10, 20, 333, 343
 Dee, David, 81
 Dee, Jane, 287-8
 Dee, John, accused of "conjuring", 71, 215; accused of unpatriotic self-interest, 71-2; and imperialism, 14, 33, 117-119, 131-2, 137; and maritime affairs, 9, 97-130, 131-140; and mathematics, 12, 24, 29, 256; and patronage, 9, 29, 65-6, 69, 97, 109, 138, 220; as "Christian Aristotle", 80, 84; as a political figure, 8-9, 14, 33, 72-3, 105, 131-

- 2, 136, 245; as magus, 4, 27, 221, 234, 263; colloquia on, 1, 18; criticises Spanish colonizers, 135-6; his "experimental household", 33, 281; his *Brytannici Imperii Limites*, 118, 129; his *Claves angelicae*, 216, 244; his *Compendious Rehearsall*, 52-3, 92, 328; his *De heptarchia mystica*, 216, 244, 249-50, 265, 269-70; his *Diary*, 92, 107, 214, 263, 286, 297, 326-7; his *Famous and Rich Discoveries*, 3, 98, 117-118, 123; his *General and Rare Memorials*, 71-2, 79, 98, 103, 109, 116-118, 120-121; his *Hipparchus redivivus*, 53, 59; his *Laboratory*, 328; his *Liber auxilij et victoriae terrestres*, 265; his *Liber Logaeth (Book of Enoch)*, 17, 195-7, 216, 279, 282; his *Liber Mysteriorum*, 239, 241, 244, 256; his *Library Catalogue*, 8, 18, 35, 99, 125, 211, 224, 236, 277, 279, 333-343; his *Library*, 8-9, 14, 16-17, 28, 32-3, 98-9, 103, 107, 114-116, 118-119, 128, 132-3, 145, 236, 276-7, 280; his *marginalia*, 8, 14, 33, 126, 131-140, 145, 209, 224, 333-4; his *Mathematical Praeface*, 3, 6-7, 10, 13, 16, 24-8, 32-3, 56-7, 66, 71, 73, 77, 79-80, 90, 98, 147, 209, 215; his *Monas Hieroglyphica*, 3, 7, 10, 15-16, 26-9, 33-5, 71-2, 74-5, 90-91, 103, 144-7, 149-57, 159-76, 211-212, 216, 233, 240; his oration "Pro Sapientia", 259; his *Oratory*, 235, 252; his *Parallaticae commentationis*, 12, 51, 58, 65; his *Planetarum distantis*, 59; his *Propaedeumata Aphoristica*, 6-7, 13, 15-16, 26, 28-9, 33, 55-8, 71-3, 78, 87-90, 92, 147, 210-211; his *Stella admiranda in Cassiopeiae Asterismo*, 79; his teaching of navigation, 99, 103, 113-114, 119, 121; his *Thalattokratia Britanniki*, 106, 118, 128; his wardenship of Manchester College, 118; the "Warburg" interpretation of, 7, 23, 25, 27-30, 32.
- Dee, Katherine (née Constable), 107, 334-5
- Dee, Rowland, 272
- Dee, Theodorus, 92
- Dee's Pinnacles, see Iceland.
- Del Rio, Martin, 234
- Delos, 161, 170
- Demonology, 179
- Dénes, J., 203
- Denham, Robert, 113
- Denmark, 98
- Deptford, 129
- Dering, Edward, 271
- Descartes, René, 23-6, 34
- Dew, 165-6
- Diana, 161, 170
- Dibbley, 98
- Digges, Leonard, 13, 65-6, 93; his *Pantometria*, 70; his *Prognostication Everlasting*, 75
- Digges, Thomas, 12-13, 42, 44, 46, 47, 58, 65, 69, 75, 93, 309; and alchemy, 69-70, 82, 300, 320; and patronage, 69; his *Alae seu Scalae Mathematicae*, 41-63, 65-84; his *Mathematicall Discourse*, 67-8, 70, 77; his *Stratiticos*, 70
- Distances, celestial, 56, 58-9, 69, 73
- Divination, 13-14, 214, 218, 234
- Dobbs, Betty-Jo Teeter, 175
- Donald, Maxwell B., 127
- Dorn, Gerard, 34-5,
- Drake, Sir Francis, 106, 125, 136
- Dreams, 240
- Drebbel, Cornelius, 296, 306
- Dreyer, John L. E., 60.
- Duckett, Sir Lionel, 111, 114, 121
- Dudley, John, 1st Duke of Northumberland, 69, 98, 112
- Dudley, John, 2nd Earl of Warwick, 69
- Dudley, Robert, Earl of Leicester, 70, 92, 127, 214, 286
- Duffy, Eamon, 270
- Duhem, Pierre, 25,

- Dunn, Richard, 15, 83
 Dunn, William, 282
 Dürer, Albrecht, 197
 Dyer, Edward, 79, 107, 111, 126-7, 286-8, 297-8, 327
 Eade, John C., 94
 Eagle, 167
 Earthquake, London (1580), 277
 Easton, Joy B., 81
 Ebreo, Leon, 145
 Eccentric, 50,
 Eco, Umberto, 27, 34, 216
 Eden, Richard, 98, 111-112, 115
 Edward VI, 69, 109, 113
 Edwardes, Roger, 239-240, 257, 264, 273
 Egg, alchemical, 164, 167; cosmic, 154-5
 Election, special, 239
 Elixir vitae, 321
 Elizabeth I, 6, 29, 81, 105, 113, 117-121, 125, 132, 214, 286-7, 297
 Elton, Geoffrey, 20,
 Elyot, Thomas, 118
 Emerald Tablet, 165
 Engineering, 67, 70, 276
 Englysheman, John, 326
 Enoch, 217, 219, 222, 237, 250
 Epicurus, 70,
 Epicycle, 50, 61,
 Equinox, 49, 52, 61, 164
 Erasmus, Desiderius, 222, 269
 Erkerne, Lazarus, 126
 Eschatalogy, 17, 256-8, 275, 277
 Esotericism, 16, 79, 138, 208, 222
 Eucharist, 239
 Euclid, 10, 21, 32, 33, 56, 68, 70, 98, 124, 145, 147-150, 209, 336
 Eusebius, 239
 Evans, R. J. W., 286, 297
 Everard, John, 329
Exaltatio, 16, 212-213
 Exercises, spiritual, 16, 236, 239-240, 245, 252, 258
 Exeter College, Oxford, 282
 Exorcism, 238
 Faivre, Antoine, 225
 Fasting, 244
 Faustus, 137, 207, 220
 Feild, John, 5, 75
 Feingold, Mordechai, 21,
 Fell-Smith, Charlotte, 2, 285-6, 288
 Fenton, Edward, 18, 22, 125, 346
 Ferguson, John, 224, 308
 Fernandes, Simão, 104-6
 Ficino, Marsilio, 4, 18, 27, 94, 143, 145, 157, 233, 237, 258-9, 263, 279, 335
 Field, J. V., 159, 201
 Figulus, Benedictus (Benedict Töpfler), 299, 319
 Figure, horary, 87, 92
 Fine, Oronce, 108
 Fire, "artificial", 164; "celestial", 164-5; "central", 164
 Firpo, Luigi, 232-5
 Fisher, John, 248-250, 253-4, 260-261, 269
 Flint, Valerie, 137, 139
Flos aureos, 241
 Fludd, Robert, 30, 157, 223
 Folkerts, Menso, 203
 Form, accidental and substantial, 56-7.
 Forman, Simon, 87, 92, 94, 214, 257, 272
 Formari, Baliano de, 139
 Forshaw, Peter J., 272
 Foxe, John, 71
 Frangipani, Cornelio, 277
 Frank, Sebastian, 222
 Frankfurt, 286, 295
 Frederick, Duke of Wurtemberg, 82
 French, Peter J., 1, 4-7, 16, 27-8, 34, 80-81, 211, 221, 233-4, 258, 263, 285
 Friseland, 134
 Frisius, Gemma, 2, 14, 32, 52, 98, 108
 Frobisher Bay, 101
 Frobisher, Martin, 14, 97, 99, 101, 103-4, 105, 107-9, 113-114, 116, 117-121, 124, 129, 132, 134-5
 Fromond, Nicholas, 107
 Fuller, Thomas, 290
 Galileo, 7, 23-6, 34,

- Gamaaea*, 15, 211-212
 Gansiniec, Ryszard, 226
 Gansz, Joachim, 106, 111, 126
 Garcie, Pierre, 101
 Garland, Francis, 286, 296-7, 299-300, 306, 309, 319, 326
 Gauntlett, Arthur, 241, 265
 Geber, 212, 312, 315
Gematria, 146-7, 149-150, 152-4, 203
 Gemma, Cornelius, 52, 62
 Genealogy, 81
 General scholar, 10, 20
 Genesis, 150-151, 213
 Geneva, Ann, 94
 Geoffrey of Monmouth, 341
 Geography, 1, 14, 72, 97, 99-100, 104, 108, 111, 113, 116-117, 121, 131, 219, 233, 275-6, 280, 334
 Geomancy, 13,
 Geometry, 2, 11, 15, 50, 76, 78, 90, 116, 120-121, 148-9, 151-2, 154, 156, 159, 164, 213, 216; plane, 68; solid, 13, 67-8; spherical, 14
 Germanus, Paulus, 335
 Gesner, Conrad, 11, 211
 Gilbert, Adrian, 105-8, 111
 Gilbert, Sir Humphrey, 98, 105, 126
 Gilbie, Anthony, 251, 270
 Giorgi, Francesco, 27, 279
 Givry, Grillot de, 170
 Globe, 98, 100, 120-121, 124; celestial, 69; terrestrial, 104, 124
 Gloucester Hall, Oxford, 285
 Gloucester, Deanery of, 108
 Gloucestershire, 97
 Gnosticism, 237
 Godzich, Wlad, 273
 Gogava, Antonio, 57.
 Gold, 103-5, 108, 135, 297, 315; potable (*aurum potabile*), 323
 Goldstein, Bernard, 32,
 Golem, 150, 152, 155-6
 Golinski, Jan, 30,
 Gomara, Lopez de, 112
 Gore, circumpolar, 104
 Goulding, Robert, 12, 272
 Grafton, Anthony, 21,
 Grammar, 152
 Grant, Alison, 127
 Grassl, Gary C., 126
 Graves, Michael, 82,
 Great Linford (Bucks.), 87
 Greenblatt, Stephen, 134, 138
 Greenland, 124, 134
 Gregory I, 241, 265
 Greifswald, 215
 Grenville, Richard, 109, 127
 Gresham College, 120, 130
 Gresham Professor; of Astronomy, 121; of Geometry, 121
 Gresham Sir Thomas, 21, 111, 119-120, 130
 Griffin, Owen, 114, 121
 Grosseteste, Robert, 55, 63, 236, 335
Groundplat, 98
 Gruffydd, R. G., 343
 Guilford, Jane, Duchess of Northumberland, 69
 Guinea, 104, 108
 Gundelfinger, Joachim, 108-9
 Gundersheimer, Werner, 229
 Gunther, R. W. T., 124
 Gwinne, Peter, 297
 Gwyn, David, 83
 Haddon, Walter, 69
 Hainzel, Paul, 47,
 Hájek, Tadeáš, 44-5, 47, 272
 Håkansson, Håkan, 18, 22, 347
 Hakluyt, Richard, 99, 105, 121, 127-8
 Hall, A. Rupert, 24,
 Hall, Christopher ("Pallinurus"), 104, 114-115, 119, 121, 125, 129
 Halley, Edmund, 121
 Haly, 93
 Hamburg, 215
 Hammond, John, 292, 294
 Hansen, Bert, 32,
 Hansman, L, 224
 Harbrecht, Isaac, 328
 Harbrecht, Johannes, 318-319
 Harkness, Deborah E., 9, 16-18, 23, 33, 178, 201, 202, 236, 263, 334, 341, 345, 347
 Harley, David, 347
 Harmony, 161

- Harprecht, Johann, 328
 Harriot, Thomas, 12, 24-5; his *Brief and True Report*, 106, 135; his friendship with Dee, 120, 130; his word-squares, 201, 204
 Harrison, Thomas. See Charnock, Thomas.
 Hartlib, Samuel, 296
 Harvey, Gabriel, 131, 257, 272, 277
 Harvey, Richard, 93
 Harvey, William, 24,
 Hasler, P. W., 82
 Hatfield House, 121
 Hawkins, William, 125
 Hebrew, 15, 145, 148-151, 159, 170, 180, 200, 236, 242, 266
 Hechstetter, Daniel, 109
 Heidelberg, 220
 Heilbron, John, 6, 12
 Helgerson, Richard, 33,
Heliocantharis ("solar beetle"), 167
 Hellmann, Clarisse D., 60.
 Helms, Mary, 138
 Henderson, Janice A., 60.
 Heninger, S. K., 93
 Henry VII, 137
 Henry, John, 29, 36,
 Heptarchy, 239. See Art, Heptarchical.
 Herbert, Henry, 2nd Earl of Pembroke, 119
 Herbert, John, 128
 Herbert, William, 1st Earl of Pembroke, 69, 97, 109, 111
 Hermeneutics, 145, 147, 149
 Hermes Trismegistus, 4, 30, 165, 175, 264.
 Hermeticism, 4-5, 9, 15-16, 19, 26-8, 30, 32, 66, 74, 144, 146, 149, 202, 213, 221-2, 233, 236-8, 258, 263, 299
 Herzog August Bibliothek, Wolfenbüttel, 207
 Hesperides, 170
 Hessen-Kassel, Landgrave of, 47, 51,
 Hickman, Bartholomew, 220
 Hieroglyph, 146, 150, 152, 165-6, 244
 Hill, Nicholas, 299-300, 309, 320, 325-6, 329
 Hipparchus, 42, 53,
 Historiography, 3, 7-8, 10, 19, 23, 28, 30-33, 221, 231, 276
 History, Welsh, 97, 100, 124, 134, 140, 333
 Hogan, Edward, 107
 Holden, Clay, 201
 Holland, Isaac, 298-9, 300, 310-311, 314
 Holland, Richard, 62.
 Holy Table, 254, 262
 Honorius of Thebes, 264, 268
Horizon aeternitatis (Horizon of eternity), 172
 Hornblende, 113
 Horoscope, 15
 Houses, astrological, 86, 90
 Howard, Henry, 85
 Hrdina, Karel, 286, 290, 292
 Hullier, Pierre, 99
 Humility, 252, 254-5
 Hunckler, Jiri, 286
 Husey, John, 250
 Hutchinson, Keith, 36,
 Hydrography, 100, 108
 Iamblichus, 219, 237
 Iceland, 101; "Dee's Pinnacles" in, 101, 125
 Idel, Moshe, 143, 202
Impetratio, 16, 254-5, 257
 Incantation, 94, 179, 209, 232, 235, 237, 255, 259
 Infinite universe, 62, 81.
 Inspectival knowledge, 265, 267
 Instruments, mathematical, 2, 69, 75, 97, 114, 116, 123, 125
 Intelligences, supercelestial, 77
 Interdisciplinarity, 9-11, 99, 108, 111
 Invocation, 179, 234, 238, 249, 251, 263
 Irving, Washington, 132
 Jackman, Charles, 101, 103-4, 119
 James I, 292
 Japan, 101, 103, 109
 Jardine, Lisa, 138
 Jardine, Nicholas, 73

- Jenkinson, Andrew, 128
 Jerome, 238
 Jervis, Jane L., 60.
 Jesus College, Oxford, 285
 Joachim of Fiore, 219
 Joel, Franz, 215
 John of Salisbury, 214, 335
 Johnson, Francis R., 1-2, 62, 81.
 Johnson, William, 329
 Johnston, Stephen, 12, 14
 Jonson, Ben, 268
 Jordan, Ray, 333
 Joseph, 213
Judith, 101
 Kabbalah, see Cabala.
 Kadir, Djelal, 136-7
 Kahn, David, 201
 Kassel, 220
 Kassell, Lauren, 272
 Keedwell, A. D., 203
 Keefer, Michael, 225
 Keen, Benjamin, 139
 Kelley, Donald R., 20-21,
 Kelley, Edward, 9, 16-17, 24, 73,
 106, 108, 177-178, 197, 215-217,
 219-220, 231-4, 244, 250, 256,
 263, 275, 277, 285-96, 300, 302,
 306, 308, 314, 316, 327, 329; his
 death, 297; his Knighthood, 286,
 297.
 Kelley, Joanna (née Cooper), 287-8,
 290-291, 294
 Kelley, Patrick, 286
 Kelley, Thomas, 285-6, 288, 291, 297
 Kenyon, Walter A., 125
 Kepler, Johannes, 25, 144, 221
 Keswick, 113, 127
 Ketel, Cornelius, 124
 Khunrath, Heinrich, 34, 223, 257, 272
 Kieckhefer, Richard, 202, 261
 Kiesewetter, Carl, 261
 Kircher, Athanasius, 6, 34, 223
 Knollys, Francis, 119
 Kodlunarn Island, 14, 105, 113, 117-
 118
 Koyré, Alexandre, 24-6, 30, 82
 Kranich, Burchard, 113
 Kriss-Rettenbach, L., 224
 Kristeller, Paul Oskar, 25,
 Krivoklat, 286
 Küffler, Johannes Sibertus, 296
 Labrador, 115, 117, 124
 Lacinius, James, 326
 Lagarias, J. C., 201
 Lana, Francesco, 6
 Language, Adamic (*Lingua adamica*),
 16, 202, 215, 217-218; 231, 233,
 242-4; universal, 16, 215-216, 227
 Languet, Hubert, 127
 Lardner, Dionysius, 203
 Larkey, Sanford V., 62, 81
 Laski, Prince Albertus (Alasco), 73,
 106, 250, 271, 297
 Latitude, 46, 100, 115-116, 120, 134
 Latona, 161
 Lauderdale, Duke of, 177, 278
 Law, international, 97
 Lawn, Brian, 337, 339
 Laycock, Donald, 34, 197
 Leconsfield family, 126
 Leibniz, Gottfried Wilhelm, 144, 157
 Lenkiewicz, Robert O., v., 201
 Leo, Johannes, 288, 290
 Leowitz, Cyprian, 277
 Lestringant, Frank, 140
 Levack, Brian P., 347
 Libavius, Andreas, 34,
Libellus Veneris nigro sacer, 348
Liber juratus, 245
Liber razielis. See *Sefer Raziel*.
Liber sacer, 241, 245, 264
Liber virtutis, 241
 Liberal arts, 242-3
 Lisbon, 108
 Liturgy, 239, 242, 254
 Lochner, Zacharias, 109
 Lodestone, 98
 Lok, Michael, 103-5, 107, 109, 113-
 114, 118-121, 125-9
 Longitude, 100, 115-116, 120
 Longus, Bernardus, 336
 Louvain, 8, 14, 18, 52, 55, 64, 69, 97-
 8, 108, 117, 119
 Lubeck, 106
 Lucar, Cyprian, 128
 Lucar, Emmanuel, 128

- Lull, Ramon, 27, 306, 311, 317-320
 Lullian wheel, 189
 Lullism, 26, 243, 299
Lunationes (lunar phases), 266
 Lydney, 111
 MacMillan, Ken, 345
 Macrocosm, 151, 155
 Madoc ap Owen Gwynedd, Prince,
 134, 140, 338-9
 Madox, Richard, 115, 129
 Maestlin, Michael, 45,
 Magdeburg, 109
 Magellan, Ferdinand de, 112
 Magic, 256, 258
 Magic, 3-6, 11, 16, 26-9, 31, 66, 77,
 144, 146, 152, 178-180, 202, 210,
 213, 221; angel, 237; cabalistic,
 237; Christian, 255, 257;
 daemonic, 234; Enochian, 219;
 hyperphysical, 257; mechanical,
 159, 164, 240; mediaeval, 234-8,
 259, 263; natural, 4, 29, 159, 212,
 234, 263; neoplatonic, 231, 237,
 241; pseudo-Solomonic, 16, 231,
 240-245, 248-251, 254, 256-7,
 263-4; religious, 29, 233; spiritual,
 235
Magisterium, 167
 Magnetism, 87-8, 121, 320
 Magus, 4-5, 9, 26-7, 29, 91, 208, 213-
 214, 220-221, 234, 237, 263
 Maier, Michael, 159, 161-2, 164
 Maius, Nicholas, 290, 293
 Manchester College, 118
 Mandosio, Jean-Marc, 347
 Manilius, 79, 94
 Manly, J. M., 202
 Marcasite, 104
 Marsh, Thomas, 63.
 Mary I, 92, 112, 124, 128
 Mass, Catholic 239
 Mathematics, applied, 2, 4, 7, 13-14,
 28, 70-71, 81, 97, 100, 116
Mathematicus, 69-70, 84, 255
 Matthew, Adam, 345
 Maximilian I, 220
 McDermott, James, 124, 129
 McLean, Adam, 328-9
 Mechanics, 7, 24,
 Medina, Pedro de, 99
 Meier, Jorg M., 348
 Meinel, Christoph, 328
 Mela, Pomponius, 276, 280
 Melanchthon, Philipp, 93
Menadrie, 10,
 Menendez d'Aviles, Pedro, 117
 Mercator, Gerard, 14, 18-19, 21, 55,
 57, 98-9, 104, 108, 276, 280
 Mercers Company, 121
 Merchant Adventurers, 103
 Mercury, "philosophical", 155, 159,
 161-2, 165
 Mercury, 161, 164-7, 169, 321-3
 Meridian, 44-7; convergence of, 101
 Meta Incognita, 97, 101, 105, 107-8,
 111, 117, 125
 Metallurgy, 11, 14, 97, 103-4, 106-8,
 111, 113, 126, 156, 166
 Metathesis, 156
 Metcalfe, J., 300
 Mica, 162
 Mickelthwait, Paul, 339
 Microcosm, 151, 155, 165
 Millenarianism, 16-17, 256
 Mineralogy, 97
 Mining, 14, 104, 109, 112-113, 126-7
 Mithradates, Flavius, 145
 Mitra, Prabir, 36,
 Monad, 146-7, 151, 211-212
 Monas symbol, 298, 309-310
 Moritz of Hesse-Kassel, 220
 Morocco, 105
 Mortification, 241
 Mortlake, 14, 16, 97-9, 104-5, 107,
 123, 133, 177, 214, 252, 286, 335
 Moscow, 333
 Moses, 213, 236-7
 Motion, diurnal, 52, 53, 56;
 rectilinear, 52,
 Munster, Sebastian, 112
 Muscovy Company, 109, 114-115,
 120
 Music, 90, 161
 Mystagogy, 240, 265
 Mysteries (*Mysteria*), 11, 239-241,
 255, 257

- Nale, Nicolaus de, 335-6
 Napier, Richard, 87
 Nativity, astrological, 87
 Natural Philosophy, 5, 7-10, 15, 20-21, 23, 26, 28-33, 36-7, 57, 62, 73-4, 77-8, 87, 93, 116, 209-211, 220, 224, 232, 235-8, 262, 276-7, 280-281, 343.
Navicula, 124
 Navigation, 2, 4, 7, 14, 24, 67, 71-2, 97-100, 108, 113, 120-121, 131-2, 334; celestial, 104, 114, 116; polar, 118
 Navy, Petty Royal, 97, 117-118
 Neath Abbey, 111
 Neath, 128
 Necromancy, 179, 214
 Neoplatonism, 3-6, 9, 13, 25-8, 30, 32, 66, 94, 143, 145, 148-9, 210, 213, 220-222, 231-3, 236-7, 256, 258-9, 279.
 Netherlands, 70, 72-3, 107, 123
 Neugebauer, Otto, 60.
 New Star ("Tycho's Supernova", 1572), 12, 60, 17, 32, 41-3, 45, 47-53, 57-9, 65, 75, 78-9, 277
 Newfoundland, 105-6
 Newman, William R., 36,
 Newton, Isaac, 7, 23-4, 30, 157, 166, 221
 Newton, Thomas, 298-9, 312
 Nīraṅgiyāt (Alnirangiat), 209
Nomina dei (names of God), 148-9, 154-5, 231, 234, 236, 243-4, 250-251, 255, 267-8, 279
 Norman, Robert, 121
 North Sea, 106, 118
 North, John D., 94.
 North, magnetic, 116
 Northumberland circle, 300
 North-West Passage, 14, 101, 103, 109, 118, 124
 Northwick Hill, 250
 Norton, Thomas, 69,
 Norway, 98, 123
Notarikon, 146-7, 149-150, 153-4, 166
 Nova Zembla (Novaya Zemlya), 98, 101
 Novick, Peter, 23,
 Nowotny, Karl A., 203, 224
 Numerology, 15, 26, 147, 210, 232, 256
 Nuñez, Hector, 105
 Nuñez, Pedro, 108
 Oastler, Christopher L., 123
 Observations, astronomical, 44, 46-8, 51-2, 54, 58, 75, 78, 89, 91
 Occult Philosophy, 3, 8, 16, 27-8, 66, 233, 236, 263
 Occult sciences, 3, 28, 208, 234, 258
 Occultism, 232
 Offusius, Jofrancus, 77-8, 84
 Optics, 29, 32, 55, 74, 90, 161, 209-210, 276
Opus, alchemical, 161-2, 164-5, 170, 172, 174
 Oratory, 235, 252
 Orphic hymns, 5, 263
 Ortelius, Abraham, 14, 98-9, 114, 123-5
 Ostanes, 15, 162, 166, 175
Ouruburos, 164
 Ovid, 288, 292, 338
 Palingenius, Marcellus, 84
 Palmer, Andrew, 107
 Pandulfus, 13,
 Pantheus, Johannes, 155, 159, 320
Papstbilder, 219
 Paracelsianism, 4, 6, 8, 15-16, 31, 35, 37, 118
 Paracelsus, 164, 208, 210-215, 218, 220-221, 325
 Parallax, 12, 32, 42-5, 47-53, 56-8, 78; annual, 60-61; combined, 54; diurnal, 60-61; lunar, 43; ratio of, 54
 Paris, 97
 Parr, Anne, 97
Pars fortuna, 92, 94
 Patai, Rafael, 197
 Payne, Richard, 334-5
 Pearls, 105
 Pedersen, Olaf, 61.
 Pelagius Solitarius, 266

- Pele*, 279-280
 Pelham, Sir William, 107
 Pena, Johannes, 32,
 Penotus, Bernardus Georgius, 298,
 311
 Percy, Henry, 8th Earl of
 Northumberland, 112
 Percy, Henry, 9th Earl of
 Northumberland, 126-7, 299, 306
 Perkins, William, 238, 273
 Pernety, Antoine J., 164
Perspectiva, 15, 56-7, 90
 Peru, 112
 Pet, Arthur, 101, 125
 Peterson, Joseph H., 201
 Petition, 242, 252, 255
 Petró, Eduard, 290
 Philadelphia, 105
 Philip II, 105, 111-112, 123, 125
 Philosemitism, 143-4
 Philosophers' stone, 2, 79, 162, 164,
 166, 170, 172, 300, 302
Picatrix, 237, 263-4
 Pickering, Sir William, 69
 Pico della Mirandola, Giovanni, 4,
 27, 143-5, 147-8, 151, 157, 180,
 233, 236-7, 258-9
 Pigafetta, Antonio, 112
 Pisnice, Jinrich z, 287
 Pisnice, Ludmilla z, 287,
 Plato, 5, 18, 77, 169, 335; *Timaeus*, 5,
 77
 Platt, Gabriel, 296
 Plotinus, 237
 Poe, Edgar Allen, 178
 Pole, celestial, 44, 61; magnetic, 115
 Polyhedra, 70
 Pontois, John, 333
 Poole, Robert, 348
 Popkin, Richard H., 21, 157
 Poppler, John, 111
 Porphyry, 237
 Porta, Giovanni-Battista della, 6, 203-
 4
 Postel, Claude, 345, 348
 Postel, Guillaume, 151, 216, 219,
 222, 224
 Pozsony, 220
 Practitioner, mathematical, 70, 79-81,
 84, 209
 Prague, 106, 108, 220, 286-8, 296-7,
 302, 306, 308, 327
 Prayer, 16, 232-4, 238-9, 241-244,
 248, 253-5, 263; action-specific,
 242, 245, 248, 250, 254;
 extemporaneous, 248-9, 254; Lords,
 253; magical, 254; operative, 231,
 248, 272; private, 235, 252, 254,
 271; Pseudo-Solomonic, 242-3,
 248-250.
Prisca Theologia, 29, 143
 Privy Council, 103, 106-7, 113, 119,
 214
Proberbüchlein, 109, 127
 Procession, equinoctial, 52.
 Proclus, 29-30, 77, 336
 Profession, 240, 258, 287
 Progression, planetary, 56.
 Prophecy, 13, 16, 74, 136-7, 140,
 147-8, 217, 219, 222, 232, 234,
 239-40, 248, 251, 255-7, 340
 "Propheying", 239
 Proportion, 91, 154, 161, 164, 166,
 172, 174
 Psalms, 238-9, 242, 250-251, 253,
 270; penitential, 254
 Psellus, 219
 Pseudo-Aristotle, 29, 314
 Pseudo-Democritus (Bolos of
 Mendes), 15, 170
 Pseudo-Dionysius the Areopagite,
 279, 282
 Pseudo-Ptolemy, 265
 Ptolemy, 42-3, 50, 53-4, 60, 73, 75,
 97, 100, 155, 167, 169, 219, 241,
 275
 Pucci, Francisco, 288
 Pynchon, Thomas, 34,
Pyronomia, 167, 317
 Pythagoreanism, 4, 15, 26, 28, 145-
 153, 155-6, 162, 164, 172
 Quadrant, 125-6; astronomical, 98
 Quaternary, 146, 150, 152-3, 156,
 162, 164, 172, 174
 Quinn, David B., 126, 131
 Quinsay, 98

- Quintessence, 166, 316, 325
 Quintilian, 239
 Raisacher, Bartolomaeus, 41,
 Raleigh, Sir Walter, 106
 Rambaldi, Enrico, 348
 Ramus, Petrus, 108, 336
 Ramusio, Giovanni-Battista, 334, 336
 Randolph, Thomas, 107
 Rangoni, Tommaso, 279
 Rathgeb, Jacob, 82
 Rays, stellar, 55, 88-90
 Recession, stellar, 51,
 Recorde, Robert, 1, 93, 99, 109, 124
 Reeds, Jim, 17, 282
 Reeds, Karen M., 201
 Reflection, 87
 Reform, astronomical, 49-50,
 Refraction, 87
 Regiomontanus, Johannes, 12, 44-7,
 54,
 Regression, Planetary, 56.
 Reinhold, Erasmus, 5
 Reisch, Gregorius, 214
 Reuchlin, Johannes, 15, 144-6, 148,
 151, 153, 155, 157, 180, 222, 231,
 234, 237, 244-5, 258-9, 267, 279-
 280.
 Revelation, 157, 159, 222, 233, 235,
 239, 243, 248, 250, 252, 255, 257,
 265, 275, 277-8, 280
 Rheticus, 116
 Richeson, Allie W., 82
 Ring Dial, 98
 Rings, Solomonic, 244, 257, 268, 280
 Ripley, George, 299, 318, 321, 325
 Riviera, Cesare della, 174
 Roanoake, 106, 126
 Roberts, Alexander, 296
 Roberts, Julian, 8, 15, 17-18, 32, 66,
 115, 139, 211, 276, 281, 306, 348
 Roche, John, 84, 123
 Roche, Susan, 124
 Rosemberk, Vilem, 286
 Rosen, Edward, 24-5,
 Rosicrucianism, 4, 27, 34, 208, 223,
 255
 Ross, G. Macdonald, 36,
 Rossi, Paolo, 143
 Rostock, 106
 Rotation, diurnal, 46
 Rothmann, Christoph, 32, 51,
 Royal Library, Copenhagen, 17, 295,
 298
 Royal Mint, 113
 Royal Society, 222-3
 Ruddock Alwynne A., 129
 Rudolph II, 207, 217, 220, 254, 286,
 295-7, 300 306, 308, 317, 330
 Russell, Anne, Countess of Warwick,
 119
 Russia, 98, 115, 123
 Rutters, 101, 115, 123-4, 134
 Ryba, Bohumil, 290
 Rye, William R., 82
 St Andrews, 124
 St Athanasius, 251
 St Brendan's Isle, 134
 St Cyprian, 241
 St George's Channel, 106, 118
 St Helena, 104, 214
 St John's College, Cambridge, 18,
 299, 335, 340
 Sal armoniac, 312, 324
 Salesbury, William, 334, 340
 Salt, 161, 164
 Saltpetre, 316, 321-2
 Saul, Barnabas, 214-215, 250
 Saunder, Nicholas, 99, 118
 Saunders, Patrick, 333, 335
 Saxton, Christopher, 118, 346
 Scale, diagonal, 98.
 Scarab, 167
 Schaffer, Simon, 36,
 Schleiner, Louise, 290, 294, 327
 Scholem, Gershom, 143, 176, 202-3,
 222
 Schott, Gaspar, 6
 Schuster, John, 7, 31-2,
 Schutz, Jonas, 103, 113
 Schwenckfeld, Kaspar, 222
 Sciences, mathematical, 10, 66, 70,
 77, 80, 209
Scientia experimentalis, 7
 Scientific Renaissance, 8, 31-2,
 Scientific Revolution, 6-8, 23-6, 30-
 33

- Scot, Michael, 244
 Scrying, 16, 83, 207, 213-215, 219-220, 231, 234, 251, 254, 257, 275
 Sebutzin, 286
Sefer Raziel (Liber Razielis), 241-3, 264, 266, 268
Sefer Yetzirah, 150-151, 154
Sefirot, 15, 147-9, 155-6
 Selden, John, 339
 Seltman, Muriel, 201
Semaphoras, 243-4, 267-8
 Sendivogius, Michael, 287
 Senior, 314-315
 Serjeantson, Richard, 20,
 Seville, 115, 123
 Seymour, Ian, 348
 Sheerness, 106
 Sherman, William H., 8-9, 11, 14, 16, 23, 33, 81, 118, 129, 207-8, 220-221, 224, 229, 276, 281, 333-4, 337-8, 340, 342, 345, 348.
 Shirley, John W., 204
 Shirley, Rodney W., 123
 Shumaker, Wayne, 6, 179, 203, 223, 234-5
 Sidney circle, 27, 36,
 Sidney, Mary, Countess of Pembroke, 119
 Sidney, Sir Philip, 36, 127, 147, 286
 Sigil, 210-211
Sigillum dei, 243, 245, 246 (Plate 14), 247 (Plate 15), 280
 Significator, 90
 Signs, planetary, 91, 154, 159, 210
 Silver, 105
 Simler, J., 336
 Siraisi, Nancy, 21,
 Sirius, 92
 Skelton, R. A., 124
 Slighter, William E., 349
 Smet, Antoine de, 125
 Smith, Hugh, 98
 Smith, Sir Thomas, 86, 93, 113
 Sofala, 108
 Solids, Archimedean, 68; geometry of, 13, 67-8; Platonic, 67-8, 77-8.
 Solomon, 236-7, 241-2, 244, 248
Soyga, Book of, 17-18, 177-214, 278-9, 334, 341
Spagyria, 165
 Species, multiplication of, 88
 Spenser, Edmund, 277
 Sperber, Julius, 255
 Sphere, armillary, 114; nautical, 124; plane, 125; projection of, 100; sublunar, 49, 76-7
 Spheres, celestial, 43, 46, 49, 52, 75-7
 Spirits, planetary, 94, 242
 Spiritualism, 2, 28, 34, 210, 231
Squirrel, 105
 Stamford, 101
 Stars, fixed, 51-2, 73
 Statics, 80, 82
 Stefannson, Vilhjalmur, 127
 Stephanos of Alexandria, 165
 Strategy, military, 67.
 Sublimation, 170
 Suffumigation, 241
 Sulphur, 161-2, 164, 167, 169, 315, 322-3
 Summerson, John, 82
 Sundial, 69
 Surveying, 67, 80, 114, 118
 Sviták, Ivan, 327, 349
 Swadell, Tristram, 337
 Swansea, 111
 Sylvius, Willem, 72
 Szeged, Hungary, 18, 214
 Szönyi, György, 16, 18, 349
 Szulakowska, Urszula, 176
 Tables, arithmetical, 125; astronomical, 5, 74, 337; commutative, 199; Enochian, 197; logarithmic, 190; magical, 17, 179, 196-210, 216, 231; Vigenère, 203-4; "ziruph", 199-201, 204.
 Talbot, Edward, 285, 297
 Talisman, 16, 209-210, 212, 224, 234, 237, 241, 243-5, 259, 267,
 Taton, René, 82
 Taurus, 166
 Taylor, E. G. R., 1-3, 7, 65, 124-5, 131, 334
 Taylour, Christopher, 298, 300, 308-310, 312-314, 323, 328, 330

- Telle, Joachim, 328
Temurah, 146-7, 149-150, 154, 156, 199
 Ternary, 153, 162, 164, 166
Terra lemnia, 155, 166
 Tetractys, 146
Tetragrammaton, 153-5, 267
 Thacher, John Boyd, 139
Thaumaturgike, 6
 Thebit ben Corath, 237
 Theobalds, 69, 82
 Theology, cabalistic, 222; Protestant, 147; symbolic, 146
 Theosophy, 30, 257
 Theurgy, 5, 16, 231, 234-5, 238-245, 250, 254, 257-9
 Thevet, André, 99, 124, 134, 140
 Thomas, William, 114
 Thoren, Victor E., 37.
 Thorndike, Lynn, 19, 241, 261
 Thorne, Robert, 113
 Thurneysser, Leonhard, 215
 Tides, 69
 Tobias, 264
 Torah, 154, 158
 Torperley, Nathaniel, 12,
 Trebon, 106, 286-7, 295, 302
 Trevisanus Bernardus, 320, 326
 Trevor-Roper, Hugh, 329
Tria prima, 161
 Triangles, nautical, 2, 18; spherical, 44-6, 116
 Trigonometry, 54; spherical, 46
 Trinity College, Cambridge, 78, 97, 292
 Trinity College, Dublin, 98, 123, 333
 Trithemius, Johannes, 17, 20, 22, 28, 179, 199, 203, 213, 215, 218, 231, 237, 258-9, 264, 270-280, 311
 Tudeau, Margaret, 267
 Turner, Robert, 241, 265
 Tychborn, John, 302, 306, 315-316, 329
 Tyler, Henry, 326
 Ussher, James, Archbishop of Armagh, 333
 Valla, Georgius, 336
 Vere, Edward, Earl of Oxford, 299
 Verrazano, Girolamo, 113
 Vesalius, Andreas, 23-5,
 Vespucci, Amerigo, 112
 Viagatz passage, 101
 Vickers, Brian, 3, 19, 36, 223
 Villanova, Arnold da, 299, 313, 320-322
 Virginia, 106, 120, 135
 Vitriol, 306, 315, 321, 324
Voarchadumia, 155, 159
 Vocation, 258
 Voynich manuscript, 202
 Waite, A. E., 297
 Wales, 97, 100, 109, 111, 134, 140, 334, 340
 Walker, D. P., 4, 143, 238
 Wallis, Helen, 124
 Walsingham, Francis, 14, 105-107, 118-119, 127
 Walton, Michael T., 158, 350
 Warburg Institute, 3, 23, 208
 Warner, Walter, 12,
 Waters, David W., 82, 131
 Watson, Andrew G., 8, 15, 32, 66, 211, 276, 281, 306, 348
 Watts, Pauline M., 140
 Webb, Henry J., 82
 Webbes, Thomas, 327
 Webster, Charles, 224
 Weever, John, 285, 292, 297, 328
 Weigel, Valentin, 222
 Weikersheim, 220
 Weiner, Gordon, 157
 Wellisch, Hans, 21,
 Werner, Johannes, 337
 Westman, Robert S., 5
 Weston, Elizabeth Jane (Westonia), 17-18, 288-292, 289 (Plate 16).
 Weston, John Francis, 291
 Weston, John, 291-2
 Whitby, Christopher, 177, 197, 208, 220, 234, 237, 257, 276-7, 280-281, 350
 White, John, 106
 Whitehall, 113
 Whitgift, John, Archbishop of Canterbury, 239, 264, 272
 Wier, Johann, 238

- Wife-swapping, 287
 Wilding, Michael, 345, 350
 Wilkinson, Ronald S., 296, 327
 Wilks, Allan, 201
 William of Hesse-Kassel, 220
 Williams, Gwyn, 140
 Williams, Roger, 113
 Williams, William, 109
 Willoughby, Hugh, 98
 Wilson, Curtis, 82
 Winthrop, John, 296
 Wirszubski, Chaim, 158
 Wolfe, Reynier, 99
 Wolfenbüttel, 220
 Wolsey, Cardinal, 113
 Wonder, 134
 Wood, Anthony à, 11-12, 295, 297
 Woolley, Benjamin, 18, 22, 350
 Worcestershire, 286
 Word-squares, 197, 201
 Worsop, Edward, 80
 Wotton, Edward, 286
 Wynman, Nicolaus, 341
 Wynter, Sir William, 107, 111, 119
 Yates, Frances A., 1, 3-7, 9, 15, 17,
 23, 25-31, 34, 74, 143-4, 146, 157-
 8, 196, 208, 211, 221, 233-4, 236,
 238, 258, 285.
 Yewbrey, Graham, 36, 208, 223, 227
 Young, Richard, 106-7, 111
 Zambelli, Paola, 157-8, 225, 229
 Zamora, Margarita, 139
 Zelinsky, Krystof, 286
 Zenith, 43, 54,
 Zetterberg, Peter J., 175
 Zetzner, Lazarus, 34,
 Zika, Charles, 229
 Zimmermann, Samuel, 109
 Zimmermann, Rolf C., 225
 Zodiac, 86-7, 154, 164, 180, 210
 Zurich, 211

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

1. E. Labrousse: *Pierre Bayle*. Tome I: *Du pays de foix à la cité d'Erasmus*. 1963; 2nd printing 1984 ISBN 90-247-3136-4
For Tome II see below under Volume 6.
2. P. Merlan: *Monopsychism, Mysticism, Metaconsciousness*. Problems of the Soul in the Neoaristotelian and Neoplatonic Tradition. 1963; 2nd printing 1969 ISBN 90-247-0178-3
3. H.G. van Leeuwen: *The Problem of Certainty in English Thought, 1630–1690*. With a Preface by R.H. Popkin. 1963; 2nd printing 1970 ISBN 90-247-0179-1
4. P.W. Janssen: *Les origines de la réforme des Carmes en France au 17^e Siècle*. 1963; 2nd printing 1969 ISBN 90-247-0180-5
5. G. Sebba: *Bibliographia Cartesiana*. A Critical Guide to the Descartes Literature (1800–1960). 1964 ISBN 90-247-0181-3
6. E. Labrousse: *Pierre Bayle*. Tome II: *Heterodoxie et rigorisme*. 1964 ISBN 90-247-0182-1
7. K.W. Swart: *The Sense of Decadence in 19th-Century France*. 1964 ISBN 90-247-0183-X
8. W. Rex: *Essays on Pierre Bayle and Religious Controversy*. 1965 ISBN 90-247-0184-8
9. E. Heier: *L.H. Nicolay (1737–1820) and His Contemporaries*. Diderot, Rousseau, Voltaire, Gluck, Metastasio, Galiani, D'Eschery, Gessner, Bodmer, Lavater, Wieland, Frederick II, Falconet, W. Robertson, Paul I, Cagliostro, Gellert, Winckelmann, Poinsinet, Lloyd, Sanchez, Masson, and Others. 1965 ISBN 90-247-0185-6
10. H.M. Bracken: *The Early Reception of Berkeley's Immaterialism, 1710–1733*. [1958] Rev. ed. 1965 ISBN 90-247-0186-4
11. R.A. Watson: *The Downfall of Cartesianism, 1673–1712*. A Study of Epistemological Issues in Late 17th-Century Cartesianism. 1966 ISBN 90-247-0187-2
12. R. Descartes: *Regulæ ad Directionem Ingenii*. Texte critique établi par Giovanni Crapulli avec la version hollandaise du 17^e siècle. 1966 ISBN 90-247-0188-0
13. J. Chapelain: *Soixante-dix-sept Lettres inédites à Nicolas Heinsius (1649–1658)*. Publiées d'après le manuscrit de Leyde avec une introduction et des notes par B. Bray. 1966 ISBN 90-247-0189-9
14. C. B. Brush: *Montaigne and Bayle*. Variations on the Theme of Skepticism. 1966 ISBN 90-247-0190-2
15. B. Neveu: *Un historien à l'Ecole de Port-Royal*. Sébastien le Nain de Tillemont (1637–1698). 1966 ISBN 90-247-0191-0
16. A. Faivre: *Kirchberger et l'Illuminisme du 18^e siècle*. 1966 ISBN 90-247-0192-9
17. J.A. Clarke: *Huguenot Warrior*. The Life and Times of Henri de Rohan (1579–1638). 1966 ISBN 90-247-0193-7
18. S. Kinser: *The Works of Jacques-Auguste de Thou*. 1966 ISBN 90-247-0194-5
19. E.F. Hirsch: *Damião de Góis*. The Life and Thought of a Portuguese Humanist (1502–1574). 1967 ISBN 90-247-0195-3
20. P.J.S. Whitmore: *The Order of Minims in 17th-Century France*. 1967 ISBN 90-247-0196-1
21. H. Hillenaar: *Fénelon et les Jésuites*. 1967 ISBN 90-247-0197-X
22. W.N. Hargreaves-Mawdsley: *The English Della Cruscan and Their Time, 1783–1828*. 1967 ISBN 90-247-0198-8
23. C.B. Schmitt: *Gianfrancesco Pico della Mirandola (1469–1533) and his Critique of Aristotle*. 1967 ISBN 90-247-0199-6
24. H.B. White: *Peace among the Willows*. The Political Philosophy of Francis Bacon. 1968 ISBN 90-247-0200-3

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

25. L. Apt: *Louis-Philippe de Ségur. An Intellectual in a Revolutionary Age.* 1969
ISBN 90-247-0201-1
26. E.H. Kadler: *Literary Figures in French Drama (1784–1834).* 1969 ISBN 90-247-0202-X
27. G. Postel: *Le Thrésor des prophéties de l'univers.* Manuscrit publié avec une introduction et des notes par F. Secret. 1969
ISBN 90-247-0203-8
28. E.G. Boscherini: *Lexicon Spinozanum.* 2 vols., 1970 Set ISBN 90-247-0205-4
29. C.A. Bolton: *Church Reform in 18th-Century Italy. The Synod of Pistoia (1786).* 1969
ISBN 90-247-0208-9
30. D. Janicaud: *Une généalogie du spiritualisme français. Aux sources du bergsonisme: [Félix] Ravaisson [1813–1900] et la métaphysique.* 1969
ISBN 90-247-0209-7
31. J.-E. d'Angers: *L'Humanisme chrétien au 17^e siècle.* St. François de Sales et Yves de Paris. 1970
ISBN 90-247-0210-0
32. H.B. White: *Copp'd Hills towards Heaven. Shakespeare and the Classical Polity.* 1970
ISBN 90-247-0250-X
33. P.J. Olscamp: *The Moral Philosophy of George Berkeley.* 1970 ISBN 90-247-0303-4
34. C.G. Noreña: *Juan Luis Vives (1492–1540).* 1970 ISBN 90-247-5008-3
35. J. O'Higgins: *Anthony Collins (1676–1729), the Man and His World.* 1970
ISBN 90-247-5007-5
36. F.T. Brechka: *Gerard van Swieten and His World (1700–1772).* 1970 ISBN 90-247-5009-1
37. M.H. Waddicor: *Montesquieu and the Pilosophy of Natural Law.* 1970 ISBN 90-247-5039-3
38. O.R. Bloch: *La Philosophie de Gassendi (1592–1655).* Nominalisme, matérialisme et métaphysique. 1971
ISBN 90-247-5035-0
39. J. Hoyles: *The Waning of the Renaissance (1640–1740).* Studies in the Thought and Poetry of Henry More, John Norris and Isaac Watts. 1971
ISBN 90-247-5077-6
For Henry More, see also below under Volume 122 and 127.
40. H. Bots: *Correspondance de Jacques Dupuy et de Nicolas Heinsius (1646–1656).* 1971
ISBN 90-247-5092-X
41. W.C. Lehmann: *Henry Home, Lord Kames, and the Scottish Enlightenment. A Study in National Character and in the History of Ideas.* 1971
ISBN 90-247-5018-0
42. C. Kramer: *Emmery de Lyere et Marnix de Sainte Aldegonde. Un admirateur de Sébastien Franck et de Montaigne aux prises avec le champion des calvinistes néerlandais. [Avec le texte d'Emmery de Lyere:] Antidote ou contrepoison contre les conseils sanguinaires et envinemez de Philippe de Marnix Sr. de Ste. Aldegonde.* 1971
ISBN 90-247-5136-5
43. P. Dibon: *Inventaire de la correspondance (1595–1650) d'André Rivet (1572–1651).* 1971
ISBN 90-247-5112-8
44. K.A. Kottman: *Law and Apocalypse. The Moral Thought of Luis de Leon (1527?–1591).* 1972
ISBN 90-247-1183-5
45. F.G. Nauen: *Revolution, Idealism and Human Freedom. Schelling, Hölderlin and Hegel, and the Crisis of Early German Idealism.* 1971
ISBN 90-247-5117-9
46. H. Jensen: *Motivation and the Moral Sense in Francis Hutcheson's [1694–1746] Ethical Theory.* 1971
ISBN 90-247-1187-8
47. A. Rosenberg: *[Simon] Tyssot de Patot and His Work (1655–1738).* 1972
ISBN 90-247-1199-1
48. C. Walton: *De la recherche du bien. A study of [Nicolas de] Malebranche's [1638–1715] Science of Ethics.* 1972
ISBN 90-247-1205-X

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

49. P.J.S. Whitmore (ed.): *A 17th-Century Exposure of Superstition*. Select Text of Claude Pithoys (1587–1676). 1972 ISBN 90-247-1298-X
50. A. Sauvy: *Livres saisis à Paris entre 1678 et 1701*. D'après une étude préliminaire de Motoko Ninomiya. 1972 ISBN 90-247-1347-1
51. W.R. Redmond: *Bibliography of the Philosophy in the Iberian Colonies of America*. 1972 ISBN 90-247-1190-8
52. C.B. Schmitt: *Cicero Scepticus*. A Study of the Influence of the *Academica* in the Renaissance. 1972 ISBN 90-247-1299-8
53. J. Hoyles: *The Edges of Augustanism*. The Aesthetics of Spirituality in Thomas Ken, John Byrom and William Law. 1972 ISBN 90-247-1317-X
54. J. Bruggeman and A.J. van de Ven (éds.): *Inventaire des pièces d'Archives françaises se rapportant à l'Abbaye de Port-Royal des Champs et son cercle et à la Résistance contre la Bulle Unigenitus et à l'Appel*. 1972 ISBN 90-247-5122-5
55. J.W. Montgomery: *Cross and Crucible*. Johann Valentin Andreae (1586–1654), Phoenix of the Theologians. Volume I: Andreae's Life, World-View, and Relations with Rosicrucianism and Alchemy; Volume II: The *Chymische Hochzeit* with Notes and Commentary. 1973 Set ISBN 90-247-5054-7
56. O. Lutaud: *Des révolutions d'Angleterre à la Révolution française*. Le tyrannicide & *Killing No Murder* (Cromwell, *Athalie*, Bonaparte). 1973 ISBN 90-247-1509-1
57. F. Duchesneau: *L'Empirisme de Locke*. 1973 ISBN 90-247-1349-8
58. R. Simon (éd.): *Henry de Boulainviller – Œuvres Philosophiques, Tome I*. 1973 ISBN 90-247-1332-3
For Œuvres Philosophiques, Tome II see below under Volume 70.
59. E.E. Harris: *Salvation from Despair*. A Reappraisal of Spinoza's Philosophy. 1973 ISBN 90-247-5158-6
60. J.-F. Battail: *L'Avocat philosophe Géraud de Cordemoy (1626–1684)*. 1973 ISBN 90-247-1542-3
61. T. Liu: *Discord in Zion*. The Puritan Divines and the Puritan Revolution (1640–1660). 1973 ISBN 90-247-5156-X
62. A. Strugnell: *Diderot's Politics*. A Study of the Evolution of Diderot's Political Thought after the *Encyclopédie*. 1973 ISBN 90-247-1540-7
63. G. Defaux: *Pantagruel et les Sophistes*. Contribution à l'histoire de l'humanisme chrétien au 16^e siècle. 1973 ISBN 90-247-1566-0
64. G. Planty-Bonjour: *Hegel et la pensée philosophique en Russie (1830–1917)*. 1974 ISBN 90-247-1576-8
65. R.J. Brook: *[George] Berkeley's Philosophy of Science*. 1973 ISBN 90-247-1555-5
66. T.E. Jessop: *A Bibliography of George Berkeley*. With: *Inventory of Berkeley's Manuscript Remains* by A.A. Luce. 2nd revised and enlarged ed. 1973 ISBN 90-247-1577-6
67. E.I. Perry: *From Theology to History*. French Religious Controversy and the Revocation of the Edict of Nantes. 1973 ISBN 90-247-1578-4
68. P. Dibbon, H. Bots et E. Bots-Estourgie: *Inventaire de la correspondance (1631–1671) de Johannes Fredericus Gronovius [1611–1671]*. 1974 ISBN 90-247-1600-4
69. A.B. Collins: *The Secular is Sacred*. Platonism and Thomism in Marsilio Ficino's *Platonic Theology*. 1974 ISBN 90-247-1588-1

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

70. R. Simon (éd.): *Henry de Boulainviller. Œuvres Philosophiques*, Tome II. 1975
ISBN 90-247-1633-0
For Œuvres Philosophiques, Tome I see under Volume 58.
71. J.A.G. Tans et H. Schmitz du Moulin: *Pasquier Quesnel devant la Congrégation de l'Index*. Correspondance avec Francesco Barberini et mémoires sur la mise à l'Index de son édition des Œuvres de Saint Léon, publiés avec introduction et annotations. 1974 ISBN 90-247-1661-6
72. J.W. Carven: *Napoleon and the Lazarists (1804–1809)*. 1974 ISBN 90-247-1667-5
73. G. Symcox: *The Crisis of French Sea Power (1688–1697)*. From the *Guerre d'Escadre* to the *Guerre de Course*. 1974 ISBN 90-247-1645-4
74. R. MacGillivray: *Restoration Historians and the English Civil War*. 1974
ISBN 90-247-1678-0
75. A. Soman (ed.): *The Massacre of St. Bartholomew*. Reappraisals and Documents. 1974
ISBN 90-247-1652-7
76. R.E. Wanner: *Claude Fleury (1640–1723) as an Educational Historiographer and Thinker*. With an Introduction by W.W. Brickman. 1975 ISBN 90-247-1684-5
77. R.T. Carroll: *The Common-Sense Philosophy of Religion of Bishop Edward Stillingfleet (1635–1699)*. 1975 ISBN 90-247-1647-0
78. J. Macary: *Masque et lumières au 18^e [siècle]*. André-François Deslandes, Citoyen et philosophe (1689–1757). 1975 ISBN 90-247-1698-5
79. S.M. Mason: *Montesquieu's Idea of Justice*. 1975 ISBN 90-247-1670-5
80. D.J.H. van Elden: *Esprits fins et esprits géométriques dans les portraits de Saint-Simon*. Contributions à l'étude du vocabulaire et du style. 1975 ISBN 90-247-1726-4
81. I. Primer (ed.): *Mandeville Studies*. New Explorations in the Art and Thought of Dr Bernard Mandeville (1670–1733). 1975 ISBN 90-247-1686-1
82. C.G. Noreña: *Studies in Spanish Renaissance Thought*. 1975 ISBN 90-247-1727-2
83. G. Wilson: *A Medievalist in the 18th Century*. Le Grand d'Aussy and the Fabliaux ou Contes. 1975 ISBN 90-247-1782-5
84. J.-R. Armogathe: *Theologia Cartesiana*. L'explication physique de l'Eucharistie chez Descartes et Dom Robert Desgabets. 1977 ISBN 90-247-1869-4
85. Bérault Stuart, Seigneur d'Aubigny: *Traité sur l'art de la guerre*. Introduction et édition par Élie de Comminges. 1976 ISBN 90-247-1871-6
86. S.L. Kaplan: *Bread, Politics and Political Economy in the Reign of Louis XV*. 2 vols., 1976
Set ISBN 90-247-1873-2
87. M. Lienhard (ed.): *The Origins and Characteristics of Anabaptism / Les débuts et les caractéristiques de l'Anabaptisme*. With an Extensive Bibliography / Avec une bibliographie détaillée. 1977 ISBN 90-247-1896-1
88. R. Descartes: *Règles utiles et claires pour la direction de l'esprit en la recherche de la vérité*. Traduction selon le lexique cartésien, et annotation conceptuelle par J.-L. Marion. Avec des notes mathématiques de P. Costabel. 1977 ISBN 90-247-1907-0
89. K. Hardesty: *The 'Supplément' to the 'Encyclopédie'*. [Diderot et d'Alembert]. 1977
ISBN 90-247-1965-8
90. H.B. White: *Antiquity Forgot*. Essays on Shakespeare, [Francis] Bacon, and Rembrandt. 1978
ISBN 90-247-1971-2
91. P.B.M. Blaas: *Continuity and Anachronism*. Parliamentary and Constitutional Development in Whig Historiography and in the Anti-Whig Reaction between 1890 and 1930. 1978
ISBN 90-247-2063-X

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

92. S.L. Kaplan (ed.): *La Bagarre*. Ferdinando Galiani's (1728–1787) 'Lost' Parody. With an Introduction by the Editor. 1979 ISBN 90-247-2125-3
93. E. McNiven Hine: *A Critical Study of [Étienne Bonnot de] Condillac's [1714–1780] 'Traité des Systèmes'*. 1979 ISBN 90-247-2120-2
94. M.R.G. Spiller: *Concerning Natural Experimental Philosophy*. Meric Casaubon [1599–1671] and the Royal Society. 1980 ISBN 90-247-2414-7
95. F. Duchesneau: *La physiologie des Lumières*. Empirisme, modèles et théories. 1982 ISBN 90-247-2500-3
96. M. Heyd: *Between Orthodoxy and the Enlightenment*. Jean-Robert Chouet [1642–1731] and the Introduction of Cartesian Science in the Academy of Geneva. 1982 ISBN 90-247-2508-9
97. James O'Higgins: *Yves de Vallone [1666/7–1705]: The Making of an Esprit Fort*. 1982 ISBN 90-247-2520-8
98. M.L. Kuntz: *Guillaume Postel [1510–1581]. Prophet of the Restitution of All Things. His Life and Thought*. 1981 ISBN 90-247-2523-2
99. A. Rosenberg: *Nicolas Gueudeville and His Work (1652–172?)*. 1982 ISBN 90-247-2533-X
100. S.L. Jaki: *Uneasy Genius: The Life and Work of Pierre Duhem [1861–1916]*. 1984 ISBN 90-247-2897-5; Pb (1987) 90-247-3532-7
101. Anne Conway [1631–1679]: *The Principles of the Most Ancient Modern Philosophy*. Edited and with an Introduction by P. Loftson. 1982 ISBN 90-247-2671-9
102. E.C. Patterson: *[Mrs.] Mary [Fairfax Greig] Sommerville [1780–1872] and the Cultivation of Science (1815–1840)*. 1983 ISBN 90-247-2823-1
103. C.J. Berry: *Hume, Hegel and Human Nature*. 1982 ISBN 90-247-2682-4
104. C.J. Betts: *Early Deism in France*. From the so-called 'déistes' of Lyon (1564) to Voltaire's 'Lettres philosophiques' (1734). 1984 ISBN 90-247-2923-8
105. R. Gascoigne: *Religion, Rationality and Community*. Sacred and Secular in the Thought of Hegel and His Critics. 1985 ISBN 90-247-2992-0
106. S. Tweyman: *Scepticism and Belief in Hume's 'Dialogues Concerning Natural Religion'*. 1986 ISBN 90-247-3090-2
107. G. Cerny: *Theology, Politics and Letters at the Crossroads of European Civilization*. Jacques Basnage [1653–1723] and the Baylean Huguenot Refugees in the Dutch Republic. 1987 ISBN 90-247-3150-X
108. Spinoza's *Algebraic Calculation of the Rainbow & Calculation of Changes*. Edited and Translated from Dutch, with an Introduction, Explanatory Notes and an Appendix by M.J. Petry. 1985 ISBN 90-247-3149-6
109. R.G. McRae: *Philosophy and the Absolute*. The Modes of Hegel's Speculation. 1985 ISBN 90-247-3151-8
110. J.D. North and J.J. Roche (eds.): *The Light of Nature*. Essays in the History and Philosophy of Science presented to A.C. Crombie. 1985 ISBN 90-247-3165-8
111. C. Walton and P.J. Johnson (eds.): *[Thomas] Hobbes's 'Science of Natural Justice'*. 1987 ISBN 90-247-3226-3
112. B.W. Head: *Ideology and Social Science*. Destutt de Tracy and French Liberalism. 1985 ISBN 90-247-3228-X
113. A.Th. Peperzak: *Philosophy and Politics*. A Commentary on the Preface to Hegel's *Philosophy of Right*. 1987 ISBN Hb 90-247-3337-5; Pb ISBN 90-247-3338-3

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

114. S. Pines and Y. Yovel (eds.): *Maimonides [1135-1204] and Philosophy*. Papers Presented at the 6th Jerusalem Philosophical Encounter (May 1985). 1986 ISBN 90-247-3439-8
115. T.J. Saxby: *The Quest for the New Jerusalem, Jean de Labadie [1610-1674] and the Labadists (1610-1744)*. 1987 ISBN 90-247-3485-1
116. C.E. Harline: *Pamphlets, Printing, and Political Culture in the Early Dutch Republic*. 1987 ISBN 90-247-3511-4
117. R.A. Watson and J.E. Force (eds.): *The Sceptical Mode in Modern Philosophy*. Essays in Honor of Richard H. Popkin. 1988 ISBN 90-247-3584-X
118. R.T. Bienvenu and M. Feingold (eds.): *In the Presence of the Past*. Essays in Honor of Frank Manuel. 1991 ISBN 0-7923-1008-X
119. J. van den Berg and E.G.E. van der Wall (eds.): *Jewish-Christian Relations in the 17th Century*. Studies and Documents. 1988 ISBN 90-247-3617-X
120. N. Waszek: *The Scottish Enlightenment and Hegel's Account of 'Civil Society'*. 1988 ISBN 90-247-3596-3
121. J. Walker (ed.): *Thought and Faith in the Philosophy of Hegel*. 1991 ISBN 0-7923-1234-1
122. Henry More [1614-1687]: *The Immortality of the Soul*. Edited with Introduction and Notes by A. Jacob. 1987 ISBN 90-247-3512-2
123. P.B. Scheurer and G. Debrock (eds.): *Newton's Scientific and Philosophical Legacy*. 1988 ISBN 90-247-3723-0
124. D.R. Kelley and R.H. Popkin (eds.): *The Shapes of Knowledge from the Renaissance to the Enlightenment*. 1991 ISBN 0-7923-1259-7
125. R.M. Golden (ed.): *The Huguenot Connection*. The Edict of Nantes, Its Revocation, and Early French Migration to South Carolina. 1988 ISBN 90-247-3645-5
126. S. Lindroth: *Les chemins du savoir en Suède*. De la fondation de l'Université d'Upsal à Jacob Berzelius. Études et Portraits. Traduit du suédois, présenté et annoté par J.-F. Battail. Avec une introduction sur Sten Lindroth par G. Eriksson. 1988 ISBN 90-247-3579-3
127. S. Hutton (ed.): *Henry More (1614-1687). Tercentenary Studies*. With a Biography and Bibliography by R. Crocker. 1989 ISBN 0-7923-0095-5
128. Y. Yovel (ed.): *Kant's Practical Philosophy Reconsidered*. Papers Presented at the 7th Jerusalem Philosophical Encounter (December 1986). 1989 ISBN 0-7923-0405-5
129. J.E. Force and R.H. Popkin: *Essays on the Context, Nature, and Influence of Isaac Newton's Theology*. 1990 ISBN 0-7923-0583-3
130. N. Capaldi and D.W. Livingston (eds.): *Liberty in Hume's 'History of England'*. 1990 ISBN 0-7923-0650-3
131. W. Brand: *Hume's Theory of Moral Judgment*. A Study in the Unity of *A Treatise of Human Nature*. 1992 ISBN 0-7923-1415-8
132. C.E. Harline (ed.): *The Rhyme and Reason of Politics in Early Modern Europe*. Collected Essays of Herbert H. Rowen. 1992 ISBN 0-7923-1527-8
133. N. Malebranche: *Treatise on Ethics* (1684). Translated and edited by C. Walton. 1993 ISBN 0-7923-1763-7
134. B.C. Southgate: *'Covetous of Truth'*. The Life and Work of Thomas White (1593-1676). 1993 ISBN 0-7923-1926-5
135. G. Santinello, C.W.T. Blackwell and Ph. Weller (eds.): *Models of the History of Philosophy*. Vol. 1: From its Origins in the Renaissance to the 'Historia Philosophica'. 1993 ISBN 0-7923-2200-2
ISBN 0-7923-2202-9
136. M.J. Petry (ed.): *Hegel and Newtonianism*. 1993 ISBN 0-7923-2202-9

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

137. Otto von Guericke: *The New (so-called Magdeburg) Experiments* [Experimenta Nova, Amsterdam 1672]. Translated and edited by M.G. Foley Ames. 1994 ISBN 0-7923-2399-8
138. R.H. Popkin and G.M. Weiner (eds.): *Jewish Christians and Cristian Jews*. From the Renaissance to the Enlightenment. 1994 ISBN 0-7923-2452-8
139. J.E. Force and R.H. Popkin (eds.): *The Books of Nature and Scripture*. Recent Essays on Natural Philosophy, Theology, and Biblical Criticism in the Netherlands of Spinoza's Time and the British Isles of Newton's Time. 1994 ISBN 0-7923-2467-6
140. P. Rattansi and A. Clericuzio (eds.): *Alchemy and Chemistry in the 16th and 17th Centuries*. 1994 ISBN 0-7923-2573-7
141. S. Jayne: *Plato in Renaissance England*. 1995 ISBN 0-7923-3060-9
142. A.P. Coudert: *Leibniz and the Kabbalah*. 1995 ISBN 0-7923-3114-1
143. M.H. Hoffheimer: *Eduard Gans and the Hegelian Philosophy of Law*. 1995 ISBN 0-7923-3114-1
144. J.R.M. Neto: *The Christianization of Pyrrhonism*. Scepticism and Faith in Pascal, Kierkegaard, and Shestov. 1995 ISBN 0-7923-3381-0
145. R.H. Popkin (ed.): *Scepticism in the History of Philosophy*. A Pan-American Dialogue. 1996 ISBN 0-7923-3769-7
146. M. de Baar, M. Löwensteyn, M. Monteiro and A.A. Sneller (eds.): *Choosing the Better Part*. Anna Maria van Schurman (1607–1678). 1995 ISBN 0-7923-3799-9
147. M. Degenaar: *Molyneux's Problem*. Three Centuries of Discussion on the Perception of Forms. 1996 ISBN 0-7923-3934-7
148. S. Berti, F. Charles-Daubert and R.H. Popkin (eds.): *Heterodoxy, Spinozism, and Free Thought in Early-Eighteenth-Century Europe*. Studies on the *Traité des trois imposteurs*. 1996 ISBN 0-7923-4192-9
149. G.K. Browning (ed.): *Hegel's Phenomenology of Spirit: A Reappraisal*. 1997 ISBN 0-7923-4480-4
150. G.A.J. Rogers, J.M. Vienne and Y.C. Zarka (eds.): *The Cambridge Platonists in Philosophical Context*. Politics, Metaphysics and Religion. 1997 ISBN 0-7923-4530-4
151. R.L. Williams: *The Letters of Dominique Chaix, Botanist-Curé*. 1997 ISBN 0-7923-4615-7
152. R.H. Popkin, E. de Olaso and G. Tonelli (eds.): *Scepticism in the Enlightenment*. 1997 ISBN 0-7923-4643-2
153. L. de la Forge. Translated and edited by D.M. Clarke: *Treatise on the Human Mind (1664)*. 1997 ISBN 0-7923-4778-1
154. S.P. Foster: *Melancholy Duty*. The Hume-Gibbon Attack on Christianity. 1997 ISBN 0-7923-4785-4
155. J. van der Zande and R.H. Popkin (eds.): *The Skeptical Tradition Around 1800*. Skepticism in Philosophy, Science, and Society. 1997 ISBN 0-7923-4846-X
156. P. Ferretti: *A Russian Advocate of Peace: Vasilii Malinovskii (1765–1814)*. 1997 ISBN 0-7923-4846-6
157. M. Goldish: *Judaism in the Theology of Sir Isaac Newton*. 1998 ISBN 0-7923-4996-2
158. A.P. Coudert, R.H. Popkin and G.M. Weiner (eds.): *Leibniz, Mysticism and Religion*. 1998 ISBN 0-7923-5223-8
159. B. Fridén: *Rousseau's Economic Philosophy*. Beyond the Market of Innocents. 1998 ISBN 0-7923-5270-X
160. C.F. Fowler O.P.: *Descartes on the Human Soul*. Philosophy and the Demands of Christian Doctrine. 1999 ISBN 0-7923-5473-7

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

161. J.E. Force and R.H. Popkin (eds.): *Newton and Religion*. Context, Nature and Influence. 1999
ISBN 0-7923-5744-2
162. J.V. Andreae: *Christianapolis*. Introduced and translated by E.H. Thompson. 1999
ISBN 0-7923-5745-0
163. A.P. Coudert, S. Hutton, R.H. Popkin and G.M. Weiner (eds.): *Judaeo-Christian Intellectual Culture in the Seventeenth Century*. A Celebration of the Library of Narcissus Marsh (1638–1713). 1999
ISBN 0-7923-5789-2
164. T. Verbeek (ed.): *Johannes Clauberg and Cartesian Philosophy in the Seventeenth Century*. 1999
ISBN 0-7923-5831-7
165. A. Fix: *Fallen Angels*. Balthasar Bekker, Spirit Belief, and Confessionalism in the Seventeenth Century Dutch Republic. 1999
ISBN 0-7923-5876-7
166. S. Brown (ed.): *The Young Leibniz and his Philosophy (1646–76)*. 2000
ISBN 0-7923-5997-6
167. R. Ward: *The Life of Henry More*. Parts 1 and 2. 2000
ISBN 0-7923-6097-4
168. Z. Janowski: *Cartesian Theodicy*. Descartes' Quest for Certitude. 2000
ISBN 0-7923-6127-X
169. J.D. Popkin and R.H. Popkin (eds.): *The Abbé Grégoire and his World*. 2000
ISBN 0-7923-6247-0
170. C.G. Caffentzis: *Exciting the Industry of Mankind*. George Berkeley's *Philosophy of Money*. 2000
ISBN 0-7923-6297-7
171. A. Clericuzio: *Elements, Principles and Corpuscles*. A Study of Atomisms and Chemistry in the Seventeenth Century. 2001
ISBN 0-7923-6782-0
172. H. Hotson: *Paradise Postponed*. Johann Heinrich Alsted and the Birth of Calvinist Millenarianism. 2001
ISBN 0-7923-6787-1
173. M. Goldish and R.H. Popkin (eds.): *Millenarianism and Messianism in Early Modern European Culture*. Volume I. Jewish Messianism in the Early Modern World. 2001
ISBN 0-7923-6850-9
174. K.A. Kottman (ed.): *Millenarianism and Messianism in Early Modern European Culture*. Volume II. Catholic Millenarianism: From Savonarola to the Abbé Grégoire. 2001
ISBN 0-7923-6849-5
175. J.E. Force and R.H. Popkin (eds.): *Millenarianism and Messianism in Early Modern European Culture*. Volume III. The Millenarian Turn: Millenarian Contexts of Science, Politics and Everyday Anglo-American Life in the Seventeenth and Eighteenth Centuries. 2001
ISBN 0-7923-6848-7
176. J.C. Laursen and R.H. Popkin (eds.): *Millenarianism and Messianism in Early Modern European Culture*. Volume IV. Continental Millenarians: Protestants, Catholics, Heretics. 2001
ISBN 0-7923-6847-9
177. C. von Linné: *Nemesis Divina*. (edited and translated with explanatory notes by M.J. Petry). 2001
ISBN 0-7923-6820-7
178. M.A. Badía Cabrera: *Hume's Reflection on Religion*. 2001
ISBN 0-7923-7024-4
179. R.L. Williams: *Botanophilia in Eighteenth-Century France*. The Spirit of the Enlightenment. 2001
ISBN 0-7923-6886-X
180. R. Crocker (ed.): *Religion, Reason and Nature in Early Modern Europe*. 2001
ISBN 1-4020-0047-2

ARCHIVES INTERNATIONALES D'HISTOIRE DES IDÉES

*

INTERNATIONAL ARCHIVES OF THE HISTORY OF IDEAS

181. E. Slowik: *Cartesian Spacetime*. Descartes' Physics and the Relational Theory of Space and Motion. 2001 ISBN 1-4020-0265-3
182. R.L. Williams: *French Botany in the Enlightenment*. The Ill-fated Voyages of *La Pérouse* and His Rescuers. 2003 ISBN 1-4020-1109-1
183. A. Leshem: *Newton on Mathematics and Spiritual Purity*. 2003 ISBN 1-4020-1151-2
184. G. Paganini (ed.): *The Return of Scepticism*. From Hobbes and Descartes to Bayle. 2003 ISBN 1-4020-1377-9
185. R. Crocker: *Henry More, 1614–1687*. A Biography of the Cambridge Platonist. 2003 ISBN 1-4020-1502-X
186. T.J. Hochstrasser and P. Schröder (eds.): *Early Modern Natural Law Theories*. Contexts and Strategies in the Early Enlightenment. 2003 ISBN 1-4020-1569-0
187. F. Tomasoni: *Modernity and the Final Aim of History*. The Debate over Judaism from Kant to the Young Hegelians. 2003 ISBN 1-4020-1594-1
188. J.E. Force and S. Hutton (eds.): *Newton and Newtonianism*. New Studies. 2004 ISBN 1-4020-1969-6
189. W. Schmidt-Biggemann: *Philosophia perennis*. Historical Outlines of Western Spirituality in Ancient, Medieval and Early Modern Thought. 2004 ISBN 1-4020-3066-5
190. R. Faggionato: *A Rosicrucian Utopia in Eighteenth-Century Russia*. The Masonic Circle of N.I. Novikov. 2005 ISBN 1-4020-3486-5
191. L. Hill: *The Passionate Society*. The Social, Political and Moral Thought of Adam Ferguson. 2005 ISBN 1-4020-3889-5
192. D. Offord: *Journeys to a Graveyard*. Perceptions of Europe in Classical Russian Travel Writing. 2005 ISBN 1-4020-3908-5
193. S. Clucas (ed.): *John Dee: Interdisciplinary Studies in English Renaissance Thought*. 2006 ISBN 1-4020-4245-0
194. J.K. Jue: *Heaven Upon Earth*. Joseph Mede (1586-1638) and the Legacy of Millenarianism. 2006 ISBN 1-4020-4292-2
195. G. Wright: *Religion, Politics and Thomas Hobbes*. 2006 ISBN 1-4020-4467-4