ROGER BACON AS MAGICIAN

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pedagogical needs, and philosophical tastes of thirteenth-century English Franciscans, the earlier catalogue was apparently associated in its origin and intended use with some other equally impressive editorial and bibliographical projects, which manifest a similar Biblical and patristic interest, and which together constituted a collection of useful aids for theological instruction and study.

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ROGER BACON AS MAGICIAN*

The practice of magic was much in vogue in the Renaissance and even the word had gained a limited respectability. Thus in 1558 when Giambattista della Porta published his collection of curiosities of art and nature he did so under the title *Magia naturalis*, and even in the next century the far more sober Bishop John Wilkins was to publish a book entitled *Mathematicall Magick*.[1] Such works indicate essential similarities between magic and science in that each has as part of its aim the application of not readily apparent knowledge to practice. But we should not think that the widespread acceptance of natural magic in the Renaissance meant that the term had become a synonym for what we should now call science,[2] for we still have to bear in mind such pictures as those of Marsilio Ficino chanting his Orphic hymns,[3] of John Dee conversing with spirits through his medium Edward Kelly,[4] and of Tommaso Campanella and Pope Urban VIII closeted together and performing secret rites to ward off the plague.[5]

Writers on various types of magic were wont to look back to earlier workers in the tradition. Foremost among these were the supposed ancient practitioners of *prisca magia* such as Zoroaster, Orpheus, Pythagoras, Plato, and Hermes Trismegistus, but there is at times mention of more modern figures. Thus in his *Apologia* of 1487 Pico della Mirandola listed Alkindi, Roger Bacon, and William of Auvergne as *iuniores* who had detected the nature of good non-demonic magic.[6] These names are often repeated, together with those of such

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[1] First ed. 1648; republished in J. Wilkins, *The Mathematical and Philosophical Works* (Reprint of 2nd ed.; London 1970) II 89-246.

[2] D. P. Walker, *Spiritual and Demonic Magic from Ficino to Campenella* (London 1958) 75-76, writes, 'The activities designated by the term natural magic all had a strong tendency to become indistinguishable from some other activity more properly called by another name; magic was always on the point of turning into art, science, practical psychology, or, above all, religion.'

[3] Walker, *op. cit.* 12-24.

[4] See e.g., the article on Dee in *Biographia Britannica* III (London 1750) 1633-45.

[5] Walker, *op. cit.* 205-210.

[6] G. & G. F. Pico della Mirandola, *Opera quae extant omnia* (Basel 1601) I 80-81. Cf. G.

other medieval figures as Albertus Magnus, Arnald of Villanova, Cecco d'Ascoli, Michael Scot, Peter of Abano, and Ramon Lull, but usually the references are brief, and sometimes an author contents himself with a mere list of medieval magicians.[7]

We must suspect that the somewhat arid discussions of this kind were given more body by a rich legendary tradition, which in particular would dwell on the supposed deeds of these men and not solely on their writings; and indeed in nineteenth-century Italy orally transmitted folklore about Michael Scot was still current.[8] In turning to consider such legends we restrict our attention to Roger Bacon. Here we find that our major legendary sources are reduced to essentially two. The first is a prose romance written probably in the late-sixteenth century and entitled *The Famous Historie of Fryer Bacon. Containing the Wonderfull Things that he did in his Life: also the Manner of his Death; with the Lives and Deaths of the two Coniurers, Bungye and Vandermast. Very Pleasant and Delightfull to be Read.*[9] This work, which I shall hereafter call the *Famous Historie*, formed the basis for Robert Greene's play *The Honorable Historie of frier Bacon, and frier Bongay*, and the play contains no new legendary material of interest. The second source is much earlier, but much shorter. It occurs in a recital of deeds of Franciscans written in Dubrovnik in 1384-85 by one Peter of Trau.[10] In this Bacon is not explicitly spoken of as a magician,

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Pico della Mirandola, *De hominis dignitate* (ed. E. Garin; Florence 1942) 152, and see pp. 23-24 of Garin's introduction.

[7] See e.g. H. C. Agrippa, *De occulta philosophia* ([Cologne] 1533) sig.aa.iii; J. Wierus, *De praestigiis daemonum* (5th ed. Basel 1577) 154, 880-881; M. del Rio, *Disquisitionum magicarum libri sex* 1.3, 1.5.q.4 (3rd ed. Mainz 1606) I 21-22, 185 *et passim*; G. Naudé, *Apologie pour tous les Grands Personnages qui ont esté faussement soupçonnez de Magie* (Reprint of 1st ed. Paris 1625; London 1972); L. Thorndike, *A History of Magic and Experimental Science* (New York 1923-58) II 549-551, 888-890; IV 498, 520, *et passim*. On Bacon more particularly see also e.g. del Rio, *Disq. mag.*1.4.q.1, 1.5.q.1 (I 83, 152-4 in 3rd ed.); Thorndike, *Hist. Mag.* VI 244-6, 431, 467; W. F. McNeir, 'Traditional Elements in the Character of Greene's Friar Bacon,' *Studies in Philology* 45 (1948) 172-179.

[8] J. Wood Brown, *An Enquiry into the Life and Legend of Michael Scot* (Edinburgh 1897) 222-228.

[9] I use the edition in *Early English Prose Romances* (ed. W. J. Thoms, 2nd ed.; London 1858) I 179-250. The first edition known of was in 1623, but the work must have been available to Robert Greene whose *Friar Bacon and Friar Bungay* was written by 1592. See McNeir, *op. cit.* (*supra* n. 7) 172 n. 1.

[10] MS Oxford, Bodl., Canon. Misc. 525 fol. 202^{v}-203^{v}: Qualiter fratres minores fuerunt phylosophi naturales capitulum quartum . . . (203^{r}) . . . Item frater Rogerius dictus Bachon Anglicus magis reali phylosophie studens quam scribende mirasa [sic] operatus est in ea experimenta. Nam tante subtilitatis in naturali phylosophia extitit ut magis eius mirabilibus experimentis (quibus nulla verior scientia) quam scripture stilo aut doctrine verbo insistens, pontem ultra triginta miliaria longum naturaliter condempsans, super mare a terra firma in Anglie insulam per ipsum inde illuc cum tota sua comitiva transiens, aliquando fecit, ipsum post eius salubrem transitum similiter destruens, rarefaciendo naturaliter. Huiusmodi etiam cum semel in Anglia cuidam ioculatori, de ipso nugas facienti, cyrothecam quam secum portabat dedisset excuciendam ad quamdam, integramque in domo coram omnibus stabiliret [sic] columpnam, ipseque eam excuciente primo percuteret ad eam eiusdem aeris simili condempsatione, sic fecit eius manum dextram qua sic excuciebat

but as one who was more interested in performing experiments in real philosophy than in writing or teaching. Nevertheless the deeds recounted are of a type that would later be termed magical. Both these accounts probably had a strong basis in oral tradition,[11] and we may suspect that the uncertainties of orally transmitted stories formed the background to the volte-face made by the bibliographer John Bale. In his *Summarium* of 1548 he described Bacon as a 'juggler and necromantic mage' who was said to have performed great marvels at Oxford 'not by the power of God but by the operation of evil spirits.'[12] But about ten years later, in his *Catalogus*, Bale wrote of Bacon, 'He was possessed of incredible skill in mathematics, but devoid of necromancy, although many have slandered him with it.'[13]

Bale's experience may provide us with a salutary warning of the dangers of dealing with legendary material; on the other hand the excavations of Troy and Knossos may warn us of the complementary dangers of its complete neglect. I intend, therefore, in this article to select three themes from the legendary tradition and to use them as starting points in attempting an investigation of the historical Bacon's activity. The legends themselves can of course offer us only the slenderest evidence, but they may well serve to give a valuable orientation to our

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cum dicta cyrotheca absorberi quod omnibus eidem viderentur immers[um?] collumpne. Et per fortitudinem condempsationis ipsius aeris taliter eandem materiam fecit stringi, quod idem ioculator vehementer aclamaret(?) misericordiam, promittens se nunquam de fratre truphari, per ipsius aeris similem rarefactionem liberatus sit. De similibus et maioribus idem Rogerius mencionem facit in sua epistola ad papam Clementem quartum ad laudem Dei amen. Qualiter fratres minores fuerunt perspectivi capitulum quintum. . . . Item prephatus frater Rogerius Bachon, qui tante huiusmodi scientie plenitudine (203^{v}) redundabat, ut delectatione experimentorum eius, obmissis doctrinis et scriptis componendis, aliquando in universitate Oxonie duo specula composuit patentia, in quorum altero quilibet omni hora diei et noctis poterat accendere candelam, in altero vero videre quid agebant homines in quantumcumque remotis constituti partibus. Et quia ad experimentum primi studentes plus stabant candelas accendendo quam in libris studendis, et in secundo multi, visis suis consanguineis et amicis mori, infirmari, aut aliter impediri, de universitate recedentes studium destruebant, eiusdem universitatis communi consilio utrumque est fractum. Igitur quot qualia et quanta mirabiliora hic in hijs, scilicet phylosophia et perspectiva, composuisset et conscripsisset scientiis, ex quo tam stupendis in eis instabat experimentis ad laudem Dei amen.' In certain places the manuscript readings seem highly corrupt, but the nature of the marvelous tricks is quite clear. Cf. A. G. Little, 'Description du manuscrit Canonic. Miscell. 525 de la Bibliothèque Bodléienne à Oxford,' *Opuscules de critique historique* 1 (1903) 251-297 esp. 287-8.

[11] The extant reports of oral tradition about Bacon are mainly of topographical interest. See e.g. Anthony Wood, *Survey of the Antiquities of the City of Oxford* (ed. A. Clark; Oxford 1889-99) I 425-427; Thomas Hearne, *Remarks and Collections* 24 Dec. 1723, 23 Sep. 1724 (Oxford 1885-1921) VIII 148, 271.

[12] John Bale, *Illustrium maioris Britanniae scriptorum . . . summarium* ([Ipswich] 1548) fol. 114^{v}: '. . . prestigiator ac Magus necromanticus, non in virtute Dei, sed in operatione malorum spirituum Oxonii ad nasum eneum, scholasticorum domicilium, mirabilia magna fecisse traditur.'

[13] John Bale, *Scriptorum illustrium maioris Brytannie . . . catalogus* (Basel 1557-59) I 342: 'Accessit ei in Mathesi peritia incredibilis, sed absque Necromantia: quamuis ea a multis infametur.'

investigation. We shall have always to remember that legends about a particular person often use that person merely as a vehicle for tales derived from another source, as is witnessed by many modern anecdotes about eccentrics. But when this is so, the person about whom the anecdote is told usually presents certain features that make him a fit subject for it.[14] Thus the very existence of the Bacon legends may be held to give us *prima facie* evidence that he indulged in activities which could give plausibility to the stories about him. It is also possible that the mass of alchemical writings (many, but not all, spurious) attributed to Bacon[15] helped to make him a fit subject for magical legends, and probably there was a two-way effect with legends encouraging false attributions which themselves reinforced legends. The question of what, if any, alchemy Bacon practised will be outside the scope of this article.

In recent years there has been little attempt to reconstruct what Bacon actually did, but interest in his activities survived longer than did the magical tradition. Already in the sixteenth century there were attempts to dissociate him from magic, and John Dee wrote a work (now lost) to demonstrate that Bacon's deeds did not depend upon the action of demons.[16] In 1625 Gabriel Naudé included him among the great men to be defended against charges of magic[17] and by 1679, the Royal Society of London was showing interest in his works and wishing to see more of them printed.[18] Roger Bacon was being transformed from a magician into a hero of experimental science.[19] Out of this grew the popular picture of him as a lone figure struggling desperately to illuminate a darkened age, a picture which does not yet seem to be wholly dead. But from the middle of the nineteenth century Bacon became the object of more intensive and wide-ranging critical study and much re-evaluation has taken place. He has been dethroned from his position as a man three hundred years ahead of his time and shown to

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[14] The Virgil legends, on which see J. W. Spargo, *Virgil the Necromancer* (Cambridge Mass. 1934), seem to be an exception, but this is probably explained by the legends growing up long after Virgil's death.

[15] See A. G. Little, 'Roger Bacon's Works with References to the MSS. and Printed Editions,' *Roger Bacon: Essays* (ed. A. G. Little; Oxford 1914) 375-425 and D. W. Singer, 'Alchemical Writings attributed to Roger Bacon,' *Speculum* 7 (1932) 80-86. J. Pits, *Relationum historicarum de rebus anglicis tomus primus* (Paris 1619) 369, also ascribes some apparently magical works to Bacon.

[16] C. H. Josten, 'A Translation of John Dee's "Monas Hieroglyphica" (Antwerp 1564) with an Introduction and Annotations,' *Ambix* 12 (1964) 84-221 at 122-124; J. Crossley, 'Autobiographical Tracts of Dr. John Dee' in *Chetham Miscellanies* 1 (1851) (= *Remains Historical and Literary Connected with the Palatine Counties of Lancaster and Chester* vol. 24) 75; cf. 26. On aspects of Dee's relation to Bacon see N. H. Clulee, 'John Dee's Mathematics and the Grading of Compound Qualities,' *Ambix* 18 (1971) 178-211.

[17] Naudé, *op. cit.* (*supra* n. 7) 488-495.

[18] T. Birch, *The History of the Royal Society of London* (London 1756-7) III 470-474, 477, 479; cf. IV 156.

[19] For a scholarly and still very useful account, written largely from this standpoint, see the article on Bacon in *Biographia Britannica* I (London 1747) 341-364. For other early treatments of Bacon see J. Ferguson, *Bibliotheca Chemica* (Glasgow 1906) I 63-66. Bacon cannot of course be taken to be an experimental scientist in the modern sense; see N. W. Fisher and S. Unguru, 'Experimental Science and Mathematics in Roger Bacon's Thought,' *Traditio* 27 (1971) 353-378.

have been in many ways a typical Scholastic thinker. His fulminations against reliance upon authority have been compared with the very uncritical way in which he himself used authority. His errors and superstitions have been emphasized, and the stories of his persecution by the Church brought down to size. As essential tools for these tasks a mass of unedited material has been published, and difficult problems of chronology and bibliography tackled.[20] Such exercises are by no means complete, but I think that we are now justified in approaching for a while older traditions of Bacon scholarship and using the modern work to consider what may be inferred about the actions of this man, who still shines through his writings as an individual[21] and attractive figure who poses many problems about the life and thought of his times.

I. The Brazen Head

In the fifth chapter of the *Famous Historie* it is related how Bacon found that he could surround England with a wall of brass for her greater protection if he made a brazen head and heard it speak.[22] The construction of the head seems to have been relatively easy, but making it speak was far more difficult, and no books proved of any use to Bacon and his collaborator Bungay.[23] They therefore sought the advice of a devil who, under constraint, informed them of the operations necessary and emphasized how essential it was that they should hear

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[20] Among important studies of Bacon we may note: E. Charles, *Roger Bacon* (Paris 1861); *Roger Bacon: Essays* (ed. A. G. Little; Oxford 1914); L. Thorndike, *A History of Magic and Experimental Science* II (New York 1923) 616-691; R. Carton, *L'Expérience physique chez Roger Bacon* (Paris 1924); T. Crowley, *Roger Bacon: The Problem of the Soul in his Philosophical Commentaries* (Louvain and Dublin 1950); S. C. Easton, *Roger Bacon and his Search for a Universal Science* (Oxford 1952). Among major editions may be noted: *Opera quaedam hactenus inedita* (ed. J. S. Brewer, London 1859); *The 'Opus Maius' of Roger Bacon* (ed. J. H. Bridges; Oxford 1897-1900); *Opera hactenus inedita* (ed. R. Steele *et al.*, Oxford 1905-40); *Moralis Philosophia* (ed. E. Massa; Zurich 1953). For an extended bibliography on Bacon see F. Alessio, 'Un secolo di studi su Ruggero Bacone (1848-1957),' *Rivista critica di storia della filosofia* 14 (1959) 81-102.

[21] Even Thorndike (*Hist. Mag.* II 678) who was much concerned to stress Bacon's similarities to his contemporaries writes, 'There is no other book quite like the *Opus Maius* in the Middle Ages, nor has there been one like it since.'

[22] *Famous Historie* (205-211 Thoms).

[23] There was a thirteenth-century Oxford Franciscan called Thomas Bungay, on whom see A. B. Emden, *A Biographical Register of the University of Oxford to A. D. 1500* I (Oxford 1957) 305. A. G. Little and F. Pelster, *Oxford Theology and Theologians* (Oxford 1934) 75 note that 'No contemporary evidence to justify the tradition of Bungay's close association with Roger Bacon has yet come to light.' However, there seems to have been another Friar Bungay in the fifteenth century with a definite reputation as a magician, for when describing the Battle of Barnet of 1471 the chronicler Robert Fabyan wrote, 'Of the mystes and other impedimentes whiche fyll vpon the lordes partye, by reason of the incantacyons wrought by fryer Bungey, as the fame went, me lyst not to wryte.' See his *The New Chronicles of England* (ed. H. Ellis, London 1811) 661. It therefore seems that the legendary tradition has conflated the two to produce a composite figure who can both be contemporary with Bacon and vie with him in magical practices. Little weight can be attached to the ascription of a *De magia naturali* to Thomas Bungay in Bale, *Catalogus* I 347.

the head when it did speak. The process recommended was long and arduous and the moment of speaking uncertain, so that it eventually fell out that the head uttered its few words while the friars were asleep and the stupidity of Bacon's servant Miles prevented them from being awakened before the head disintegrated in a vast explosion. The project thus failed.

Various rationalizations of this story have been attempted. In the seventeenth century Sir Thomas Browne thought he had the answer and wrote:

> Every ear is filled with the story of Frier *Bacon*, that made a brazen head to speak these words, *Time is*, Which though they want not the like relations, is surely too literally received, and was but a mystical fable concerning the Philosophers great work, wherein he eminently laboured: implying no more by the copper head than the vessel wherein it was wrought, and by the words it spake, then the opportunity to be watched, about the *Tempus ortus*, or birth of the mystical child, or Philosophical King of *Lullius*: the rising of the *Terra foliata* of Arnoldus, when the earth, sufficiently impregnated with the water, ascendeth white and splendent. Which not observed, the work is irrecoverably lost. . . . Now letting slip this critical opportunity, he missed the intended treasure. Which had he obtained, he might have made out the tradition of a brazen wall about *England*. That is, the most powerfull defence, and strongest fortification which Gold could have effected.[24]

This explanation — that the story is an allegorical account of an alchemical process — certainly has the merit of taking into account all the facets of the legend, including the wall of brass and the missed opportunity, and Bacon himself admitted that he was wont to write on alchemy in *aenigmata*.[25] But there are still reasons for being suspicious of it.

These stem mainly from the fact that stories of artificial speaking heads were very common and attached themselves to, among others, Virgil, Gerbert, Robert Grosseteste, and Albertus Magnus.[26] Thus it seems that a romance writer would be liable to add a speaking head to a story of any magician, and so there is little reason for supposing anything specific in Bacon's career to suggest the legend. We, therefore, have to consider the explanation of the widespread medieval notion of these devices, and it is rather implausible to suggest that, in the first half of the twelfth century when William of Malmesbury was writing of Gerbert's speaking head,[27] he was in fact retailing an alchemical allegory. We thus seek another explanation.

One such has been suggested by Lynn White, backed up by archaeological evidence,[28] for there survive certain medieval sufflators or fire blowers shaped in the form of human heads.[29] Water was put into these vessels and they were

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[24] Thomas Browne, *Pseudodoxia epidemica* 7.17 (ed. C. Sayle, *Works* [Edinburgh 1904-07] III 72).

[25] *Opus tertium* (ed. A. G. Little, *Part of the Opus Tertium* [Aberdeen 1912] 77-86).

[26] See the fine survey of legends of speaking heads in A. Dickson, *Valentine and Orson* (New York 1929) 200-216. Legends of artificial heads, of course, had one ancestor in those of oracular severed heads; our task is to find other progenitors.

[27] William of Malmesbury, *De gestis regum Anglorum* 2.172 (ed. W. Stubbs [London 1887-89] I 202-203).

[28] L. White, *Medieval Technology and Social Change* (London 1964) 90-92.

[29] F. M. Feldhaus, 'Ein Dampfapparat von vor tausend Jahren,' *Prometheus* 25 (1913-14) 69-73; W. L. Hildburgh, 'Aeolophiles as fire-blowers,' *Archaeologia* 94 (1951) 27-55. The

then placed near a fire. After a sufficient interval the water boiled and a mixture of air and steam was blown out of the mouth of the vessel onto the fire causing it to burn more fiercely. Presumably these ingenious devices made some kind of noise when in operation, and they may even have been designed with this end in view, for a similar machine described by Hero of Alexandria was designed to blow a trumpet or imitate birdsong.[30]

This rationalization of the brazen-head stories seems to possess sufficient verisimilitude to make us think that we are on the right track, but the mention of Hero suggests an extension of the argument, for a legend would seem less likely to arise from a device primarily intended to be useful than from one concocted purely for purposes of ostentation. Several of these were designed in antiquity and Hero's *Pneumatica* in particular presents us with numerous mechanical toys and temple devices, including machines for pouring libations on an altar when a fire is lit under it, singing birds, drinking animals, and suchlike.[31] The elaborate embellishments made both to medieval water clocks and early mechanical clocks[32] suggest that men of the Middle Ages had tastes very similar to Alexandrian Greeks in these matters, and recent writers have argued for a far greater degree of mechanical ingenuity in the Latin Middle Ages than is commonly assumed.[33] In particular, by the end of the thirteenth century

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oldest specimen which Feldhaus describes in some detail is made of bronze. This would have been included under the term 'brass' up to the eighteenth century. Roger Bacon's discussion of *aes* and *orichalcum* shows that for him the distinction between these terms was not that between modern 'bronze' and 'brass'; see J. M. Stillman, *The Story of Alchemy and Early Chemistry* (Dover ed.; New York 1960) 266-269. The action of human shaped sufflators was described by Albertus Magnus, *De meteoris* 3.2.17 (*Opera omnia* II [ed. P. Jammy; Lyons 1651] 100).

[30] Hero of Alexandria, *Pneumatica* 2.35 (ed. W. Schmidt, *Opera quae supersunt omnia* I [Leipzig 1899] 316-322).

[31] On the later tradition of Hero's *Pneumatica* see M. Boas, 'Hero's *Pneumatica*. A Study of its Transmission and Influence,' *Isis* 40 (1949) 38-48. Until very recently it has been assumed that two at least partial Latin translations were made during the Middle Ages; see A. Birkenmajer, 'Vermischte Untersuchungen zur Geschichte der mittelalterlichen Philosophie,' *Beiträge zur Geschichte der Philosophie des Mittelalters* 20 Heft 5 (1922) 19-31, and C. H. Haskins, *Studies in the History of Mediaeval Science* (Ungar ed.; New York 1960) 181-183. However, E. Grant, 'Henricus Aristippus, William of Moerbeke and Two Alleged Mediaeval Translations of Hero's *Pneumatica*,' *Speculum* 46 (1971) 656-669, has put forward strong arguments for doubting whether any such translation was made at that time. Nevertheless it will be clear from what follows that the tradition of such devices as are described in the *Pneumatica* did pass to the Middle Ages. Roger Bacon, *Communia mathematica* 3.2.2 (ed. Steele, *Op. hact. ined.* XVI 44), mentions a *De conductibus aquarum*. This is probably the fragmentary Latin translation of the *Pneumatica* of Philo of Byzantium (ed. W. Schmidt, *Heronis Alexandrini Opera omnia* I 458-489). The devices in this fragment are not as ostentatious as Hero's, but are related; cf. A. G. Drachmann, *Ktesibios, Philon and Heron* (Copenhagen 1948) 45-47.

[32] See e.g. A. P. Usher, *A History of Mechanical Inventions* (Revised ed.; Cambridge, Mass. 1954) 187-210.

[33] See e.g. M. Sherwood, 'Magic and Mechanics in Medieval Fiction,' *Studies in Philology* 44 (1947) 567-592, and D. J. de S. Price, 'Automata and the Origins of Mechanism and Mechanistic Philosophy,' *Technology and Culture* 5 (1964) 9-23.

the Castle of Hesdin in Artois had a very large collection of trick machinery to entertain the unwary guests.[34] It seems probable that devices of this kind would have become famous, and they may even have formed part of the equipment of some medieval jugglers, although the reports of jugglers' activities concentrate more on their producing optical illusions.[35]

However that may be, there were at least sufficient devices for reinforcing, if not initiating, brazen-head legends, and it may be that speaking tubes or other means of localizing sound were used. We have no definite evidence for associating any of these devices with Bacon himself, but it is certain that he, like other practically minded philosophers, would have been fascinated by such machines[36] and could even have designed some for himself and displayed them to his colleagues.

II. Optical Devices

Our next selection of legendary material has a far more definite connection with Bacon himself, and we shall be able to compare it with several passages from his own writings. It concerns various marvelous optical devices. In the *Famous Historie* we read that 'It did chance that the King of England (for some cause best knowne to himselfe) went into France with a great armie, where after many victories, he did beseige a strong towne and lay before it full three moneths, without doing to the towne any great damage, but rather received the hurt himselfe.'[37] Eventually the king announced that he would give a substantial reward to anyone who could capture the town for him. Friar Bacon heard of this and journeyed to France. When he reached the king he made a long speech about the marvels that may be performed by art without the use of magic, part of which reads as follows:

> Physicall figurations are farre more strange: for by that may be framed perspects and looking-glasses, that one thing shall appeare to be many, as one man shall appeare to be a whole army, and one sunne or moone shall seem divers. Also perspects may be so framed, that things farre off shall seem most nigh unto us: with one of these did Iulius Caesar from the sea coasts in France marke and observe the situation of the castles in England. Bodies may also be so framed that the greatest things shall appeare to be the least, the highest lowest, the most secret to bee the most manifest, and in such like sort the contrary. Thus did Socrates perceive, that the dragon which did destroy the citie and countrey adioyning, with his noisome breath, and contagious influence, did lurke in the dennes between the mountaines: and thus may all things that are done in cities or armies be discovered by the enemies. Againe, in such wise may bodies be framed, that venemous and infectious influences may be brought whither

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[34] Sherwood, *op. cit.* 587-591.

[35] In Geoffrey Chaucer, *Squieres Tale* 209-211 (ed. W. W. Skeat, *Complete Works* [Oxford 1894] IV 467) an onlooker says that the horse of brass on which the knight has appeared 'is rather lyk/ An apparence y-maad by som magyk, / As Iogelours pleyen at thise festes grete.'

[36] Compare the famous lists of possible mechanical devices given by Bacon in *Communia mathematica* 3.2.2 (43-44 Steele) and *Epistola de secretis operibus artis et naturae* 4 (ed. J. S. Brewer, *Op. quaedam hact. ined.* 532-3).

[37] *Fam. Hist.* (211-2 Thoms).

> a man will: in this did Aristotle instruct Alexander; through which instruction the poyson of a basiliske, being lift up upon the wall of a citie, the poison was convayd into the citie, to the destruction thereof: also perspects may be made to deceive the sight, as to make a man beleeve that hee seeth great store of riches, when that there is not any. But it appertaineth to a higher power of figuration, that beams should be brought and assembled by divers flexions and reflexions in any distance that we will, to burne any thing that is opposite unto it, as it is witnessed by those perspects or glasses that burne before and behinde.[38]

This quotation would not have been made at such length were it not for the fact that the author of the romance has lifted the speech almost verbatim from one of Bacon's own works, the *Epistola de secretis operibus artis et naturae*,[39] and so this is what Bacon himself believed could be done. According to the author of the *Famous Historie*, after Bacon had finished his speech, he used his perspect glasses to show the king the town that he was besieging as if at close range, and on the following morning he brought the glasses again into play, this time to burn down various buildings in the town so that the king was able to take it with the minimum of resistance.[40]

This pair of uses for optical instruments is also found in the 1385 Peter of Trau account of Bacon, where we read:

> He was so complete a master of optics that from love of experiments he neglected teaching and writing, and made two mirrors in the University of Oxford: by one of them you could light a candle at any hour, day or night: in the other you could see what people were doing in any part of the world. By experimenting with the first, students spent more time in lighting candles than in studying books; and seeing in the second their relations dying or ill or otherwise in trouble, they got into the habit of 'going down' to the ruin of the university: so by common counsel of the University both mirrors were broken.[41]

To these accounts we may add another optical story reported by Roger's namesake Francis, who wrote, 'They have an old tale in Oxford, that Friar Bacon walked between two steeples: which was thought to be done by glasses, when he walked upon the ground.'[42]

When we move from these legends to considering what Bacon in fact did, we must first of all try to find out what equipment he had. That he was not niggardly in his expenditure on learning may be gathered from his references to the two thousand pounds that he had spent in the twenty years prior to 1267 or 1268 on books, instruments, experiments, and other expenses necessary for the pursuit of wisdom.[43] We may thus feel certain that he would have acquired

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[38] *Fam. Hist.* (213-4 Thoms).

[39] *Ep. de sec. op.* 5 (534-5 Brewer).

[40] *Fam. Hist.* (215-6 Thoms).

[41] See *supra* n. 10. Translation from A. G. Little, 'Roger Bacon,' *Proceedings of the British Academy* 14 (1928) 265-296 at 267.

[42] Francis Bacon, *Sylvia sylvarum* 8.762 (ed. J. Spedding, R. L. Ellis and D. D. Heath, *Works* II [London 1857] 586). Cf. Robert Burton, *Anatomy of Melancholy* 1.3.3 (ed. F. Dell and P. Jordan-Smith [New York 1927] 364) and I. d'Israeli, *Amenities of Literature* (London 1842) III 192.

[43] *Opus tertium* 17 (ed. J. S. Brewer, *Op. quaedam hact. ined.* 59).

what optical instruments were available, but these may not have been many. In particular, at the time of writing the works for the pope around 1267, it does not seem that Bacon had a large range of lenses, for, when he gets down to practical details instead of merely saying what can be done, he speaks of a crystal sphere or hemisphere or else of a round glass filled with water.[44] We may feel certain that he possessed instruments of this kind, and in fact he sent a crystal ball to the pope,[45] but probably they exhausted his range of lenses. However, towards the end of the thirteenth century eyeglasses came into use in Italy,[46] and so it may be that before the end of his life a wider supply of lenses became available to Bacon.

On the question of burning mirrors we may produce more definite evidence, for, at the time of writing the works for the pope Bacon was particularly interested in the construction of one such by Petrus Peregrinus, whose experiments on magnetism have given him lasting fame. Bacon mentions Peter's endeavors in this connection four times in the *Opus maius* and *Opus tertium*.[47] On the third occasion he briefly announces the completion of the task, and on the fourth he goes triumphantly into more detail:

> I have mentioned already that this type of congregation [of rays] can be made by reflection and that a mirror has been made, a model and sign, as it were, of this wonder of nature, so that the possibility of such a work may be seen. But it was with great expenses and labour that it was made, for its contriver was set back by the sum of 100 Parisian pounds and he worked at it for many years laying aside study and other necessary occupations. But he would not have given up the labour for the sake of a thousand marks, both on account of the most beautiful power of wisdom which he recognised, and for the reason that in future he can make better mirrors at less cost, because he has learned by experience what he previously did not know. Nor is it any wonder if he spent so much and laboured so hard in this first work, because never has any Latin known how to achieve this before him; and it is indeed a wonder that he dared to approach such an unknown and such an arduous business. But he is the most wise of men and nothing is difficult to him unless it be because of lack of money. Certainly if the citizens of Acre [*Aconenses*] and those Christians who are beyond the sea had twelve such mirrors they could drive the Saracens from their lands without any shedding of blood, and there would be no need for the lord king of France to set out with an army to take that land. . . .[48]

Both the theory and the practice of the construction of parabolic burning mirrors had been treated by the Arabic writer Ibn al-Haitham, known to the Latins as Alhazen, and his work on the subject had been translated into Latin

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[44] E.g. in *Opus maius* 4.2.2 (I 113 Bridges).

[45] *Op. tert.* 32 (111 Brewer).

[46] See E. Rosen, 'The Invention of Eyeglasses,' *Journal of the History of Medicine* 11 (1956) 13-46, 183-218.

[47] *Op. mai.* 4.2.2 (I 116 Bridges); *Op. tert.* 13, 33, 36 (47, 113, 116 Brewer). On Petrus Peregrinus and his relation to Bacon see E. Schlund, 'Petrus Peregrinus von Maricourt,' *Archivum Franciscanum historicum* 4 (1911) 436-455, 633-643; 5 (1912) 22-40 and A. C. Crombie, *Robert Grosseteste and the Origins of Experimental Science* (2nd imp.; Oxford 1961) 204-210.

[48] *Op. tert.* 36 (116 Brewer).

under the title *De speculis comburentibus* and circulated anonymously.[49] It seems from a remark of Bacon's in the *Opus maius* that Peter was using this work in constructing his burning mirror, although he perhaps only had available a defective version.[50] In what is probably a very late work Bacon refers to Alhazen's tract in some detail and then gives a résumé of his own experiences in having burning mirrors constructed:

> I have had many burning mirrors made in which as if through models the goodness of nature may be manifested, and they are not of great cost when compared with the quantity of useful and splendid works [obtainable]; for the first mirror made cost sixty Parisian pounds, which is equivalent to about twenty pounds sterling, but afterwards I had a better one made for ten Parisian pounds, that is five marks sterling, and later still, when carefully experienced in these matters, I perceived that better ones could be made for two marks or twenty *solidi*, . . . but great and subtle consideration is needed.[51]

Thus it seems that up to 1267 Bacon did not have any curved mirrors of much use, but that after this period he acquired several. In this later period of his life he would still have had the crystal balls and glasses of water of his younger days and may even have acquired some more sophisticated lenses. Laden with all this apparatus he would almost certainly have done something with it, but we are not provided with many natural philosophical works from the later period of Bacon's life, so that we have once again to indulge in a certain amount of conjecture.

But first we must emphasize the general spirit that Bacon and his contemporaries had in regard to optical devices. This spirit is well exemplified by the passage already quoted which the author of the *Famous Historie* lifted from the *De secretis operibus artis et naturae*, and many similar utterances are to be found in the *Opus maius*. Bacon has very much an eye to the deceits that may be performed with optical instruments.[52] To this end he regards 'broken mirrors' as particularly efficacious, for, by means of such, multiple images may be produced.[53] It is interesting to note that Bacon regards even this as a case of art perfecting nature, for, as Pliny related, under certain atmospheric conditions

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[49] J. L. Heiberg and E. Wiedemann, 'Ibn al-Haiṭams Schrift über parabolische Hohlspiegel,' *Bibliotheca Mathematica* 10_3 (1910) 201-237.

[50] *Op. mai.* 4.2.2 (I 116 Bridges). Cf. S. Vogl, *Die Physik Roger Bacos* (Erlangen 1906) 71.

[51] MS London, Brit. Mus., Royal 7.F.viii fol. 4^v: 'Multa enim specula feci fieri comburentia in quibus tanquam per exemplaria potest bonitas nature manifestari nec sunt magni sumptus secundum quantitatem utilium operum et magnificorum. Primum enim speculum factum constitit 60 libras parisiencium que valent circiter 20 libras sterlingorum sed postea feci fieri melius pro 10 libris parisiencium scilicet pro v marcis sterlingorum et postea diligenter expertus in hiis percepi quod melioria possent fieri pro duabus marcis vel 20 solidis . . . sed magna consideratio et subtilis requiritur in hac parte.' Cf. Charles, *op. cit.* (*supra* n. 20) 305. A. G. Little *op. cit.* (*supra* n. 15) lists the work from which this quotation is taken as a recension of the *De multiplicatione specierum*. This it probably is, but Bacon seems to have intended it to form part of the fifth part of his *Compendium studii theologiae*, which may have been his last projected attempt at a grand synthesis: see Charles, *op. cit.* 90-91. From *Comp. stud. theol.* 1.2 (ed. H. Rashdall [Aberdeen 1911] 34) we learn that the first part of this work was being written in 1292.

[52] *Op. mai.* 5.3.3.3-4 (II 164-6 Bridges).

[53] *Op. mai.* 5.3.1.6, 5.3.3.3 (II 145-6, 164 Bridges).

several suns and several moons may be seen. This is spectacular, but Bacon is also interested in using the principle to multiply men and armies so that the infidels may be scared out of their wits. Probably Bacon had experimented with fragmented plane mirrors to produce minor illusions of this sort and we have good evidence that similar tricks were being performed by the jugglers of the time.

Not much study seems to have been made of the non-literary and non-musical activities of these medieval entertainers, but it is quite clear that they had a large repertoire of what we should now call conjuring tricks, including at times optical illusions.[54] From the fourteenth century we have references to such illusions by Chaucer,[55] and probably at the end of the thirteenth century, Thomas Cabham had spoken of a class of jugglers who 'make as it were certain images to be seen, by incantations or otherwise.'[56] For more detail we have to move to the sixteenth century where we are given a very full first-hand account of a magical séance by Benvenuto Cellini,[57] for which an explanation was later proposed by Sir David Brewster,[58] who suggested that the spirits were in fact images projected by concave mirrors onto the clouds of smoke that the magician had produced. Such images could be made to move around in the smoke, and it only needed the powers of imagination of those present in the mysterious midnight atmosphere to produce a convincing and terrifying effect. But back in the thirteenth century Witelo, in his *De natura demonum*, had written of how the appearance of demons could be produced by optical means, and Nicole Oresme later associated this with the practices of jugglers.[59]

Thus it seems certain that in Bacon's time jugglers were making use of optical illusions, and Bacon himself would have been very interested, for he certainly thought it relevant to include in the paean of praises that he accorded Petrus Peregrinus the fact that he examined 'the illusions and devices of all the jugglers.'[60] Peter of Trau too related a rather obscure story of how Bacon got the better of a juggler who had been making fun of him, though this was not by optical means.[61]

As we have seen, the legendary tradition concentrated on Bacon's being able to see distant things as if near and on his burning of objects. It seems certain that Bacon was able to use both mirrors and crystal balls to do such things as

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[54] The best study from this point of view seems still to be J. Strutt, *Glig-Gamena Angel-Deod or The Sports and Pastimes of the People of England* (London 1801) 152-160. Many jugglers' conjuring tricks are discussed in Reginald Scot, *The Discoverie of Witchcraft* 13 (ed. M. Summers [London] 1930); optical illusions are mentioned in ch. 19 on p. 179. On the possible importance of jugglers to the history of technology see J. Needham, *Clerks and Craftsmen in China and the West* (Cambridge 1970) 58-59.

[55] See particularly *Squieres Tale* 208-227, *Frankeleyns Tale* 410-423, 533-541 (IV 467 494, 497-8 Skeat). See also Skeat's discussion of the etymology of 'etregetour' in III 273.

[56] E. K. Chambers, *The Mediaeval Stage* (Oxford 1903) II 262: 'alii qui . . . et faciunt videri quasi quaedam fantasmata per incantationes vel alio modo.'

[57] Benvenuto Cellini, *Life* 1.13 (ed. R. H. H. Cust [London 1927] I 242-247).

[58] D. Brewster, *Letters on Natural Magic addressed to Sir Walter Scott* (London 1832) 68-76.

[59] M. Clagett, *Nicole Oresme and the Medieval Geometry of Qualities and Motions* (Madison, Wis. 1968) 358, 484-5.

[60] *Op. tert.* 13 (47 Brewer): 'omnium joculatorum illusiones et ingenia.'

[61] See *supra* n. 10.

lighting candles by the sun's rays, but there was nothing new in this.[62] The ability to see distant objects as if near is far more problematic. In the *Opus maius* he speaks of the possibility of combining both mirrors and perspect glasses to this end, but very similar passages are to be found in the writings of Robert Grosseteste, and Bacon's source could have been purely literary.[63] Nevertheless it seems very probable that even by the time of the *Opus maius* Bacon had experimented with combinations of crystal balls and flasks of water and observed a large, though distorted, magnification. Whether later in life he tried to produce any refinements of such an experience (possibly using mirrors) is difficult to say, but we may consider one piece of evidence.

In 1579 Thomas Digges published *An Arithmeticall Militare Treatise named Stratioticos*. . . . This work had been begun by Thomas's father, Leonard, and at the end of it in a short memoir of his father's doings Thomas wrote:

> He was able by *Perspectiue Glasses* duely scituate vpon conuenient *Angles*, in such sorte to discouer euery particularitie in the Countrey rounde aboute, wheresoeuer the *Sunne* beames might pearse: As sithence *Archimedes*, (*Bakon* of *Oxforde* only excepted) I haue not read of any in *Action* euer able by meanes natural to performe the like. Which partly grew by the aide he had by one old written booke of the same *Bakons Experiments*, that by straunge aduenture, or rather *Destinie*, came to his hands, though chiefelye by conioyning continual laborious Practise with his *Mathematical* Studies.[64]

In his *Pantometria* Leonard Digges had said that he had written at length on the 'miraculous effectes of perspectiue glasses,'[65] but this work seems never to have been published. The crucial point for us in the *Stratioticos* passage is the book of Bacon's that Leonard used. R. Steele says simply that it 'is no longer known to exist,'[66] while F. R. Johnson seems to assume that it is the *Opus maius*.[67] Certainly it is in Part V of the *Opus maius* that Bacon writes of the possibility of combining mirrors or perspect glasses in order to see at a distance, and this may have been enough to influence Leonard Digges. Nevertheless, although this part of the *Opus maius* often circulated separately,[68] 'Bacon's Experiments' seems rather an odd title for it. It is, therefore, quite possible that Digges was referring to some other more detailed work that is now either lost[69] or still surviving in manuscript under a perhaps confusing title, for the

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[62] C. Singer, 'Steps Leading to the Invention of the First Optical Apparatus,' *Studies in the History and Method of Science* II (ed. C. Singer, Oxford 1921) 385-413 at 386-7.

[63] *Op. mai.* 5.3.3.3-4 (II 165-6 Bridges); Robert Grosseteste, *De iride* (ed. L. Baur, *Die philosophischen Werke* [Münster 1912] 74). Cf. Little, *op. cit.* (*supra* n. 41) 274, and E. Rosen, 'Did Roger Bacon Invent Eyeglasses?' *Archives internationales d'histoire des sciences* 7 (1954) 3-15.

[64] *An Arithmeticall Militare Treatise named Stratioticos* . . . . *Long since attempted by Leonard Digges Gentleman. Augmented, digested and lately finished by Thomas Digges, his Sonne* (London 1579) 189-190.

[65] *A Geometrical Practice, named Pantometria* . . . *framed by Leonard Digges Gentleman, lately finished by Thomas Digges his sonne* (London 1571) sig. G.i^{v}-G.ii^{r}.

[66] R. Steele, 'Roger Bacon and the State of Science in the Thirteenth Century,' *Studies in the History and Method of Science* II (ed. C. Singer, Oxford 1921) 121-150 at 147.

[67] F. R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore 1937) 178-9.

[68] Little, *op. cit.* (*supra* n. 15) 382-4.

[69] In 1682 Robert Plot thought that it might have been in the custody of Thomas Allen; see Birch, *op. cit.* (*supra* n. 18) IV 156.

chaotic state of Bacon's manuscript legacy has been the despair of bibliographers since the time of Leland.[70]

These features of the work of Bacon and of Leonard Digges have often been discussed by writers on the history of the telescope, though sometimes in terms dependent upon the later existence of the telescope. I have tried as far as possible to avoid anachronism by considering this aspect of Bacon's activity within the context of what Renaissance writers would have called natural magic. In general Bacon's optical pursuits may be seen as exemplifying very favorably his repeated insistence on the value both of probing the secret causes of nature and applying the theoretical knowledge gained to practical ends, for besides the 'prophecies of future discoveries,' which we have noted, and the practical work, which we have attempted to reconstruct, Bacon wrote at length on the theory of the transmission, reflection, and refraction of rays, and indeed — like Grosseteste — he had grounds for regarding optics as almost the basic science of nature, for other 'species' were 'multiplied' in the same way as light, and this was the fundamental mode for the transmission of the forces of nature.

III. Forbidden Magic

The activities that we have so far discussed would not have been termed magical by Bacon himself, although they would fall within the domain of the natural magic of a later age.[71] Our final theme brings us to the gates of what in all ages would have passed for magic and concerns the raising of spirits, a subject which has a large place in the *Famous Historie*. We do not need to go into details, but may cite as one example a contest between Bacon and the German conjuror Vandermast.[72] At the close of a banquet Vandermast raises the spirit of Pompey for the delectation of the English king. Bacon promptly replies by producing the ghost of Julius Caesar. The two spirits fight; Caesar kills Pompey; Bacon wins the contest.

When describing such incidents the imagination of a romance writer will obviously roam far and wide, but the general theme of necromantic activities gives us occasion for re-examining Bacon's attitude to magical practices. This subject has been considered with some thoroughness by Thorndike,[73] who draws upon a wealth of relevant texts, but his account is somewhat vitiated by his apparent assumption that the domain of magic is given *a priori*, and he seems to hold that it includes anything 'occult.' Now, although this may be a useful general characterization (which could be held to include much of modern science) it must here be supplemented by a consideration of Bacon's own definition of magic, for otherwise it is illegitimately easy to hold with Thorndike that Bacon 'fails in his attempt to draw the line between science and magic.'[74]

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[70] On some of the difficulties which arise from Bacon's method of writing see F. Picavet, *Essais sur l'histoire générale et comparée des théologies et philosophies médiévales* (Paris 1913) 218-224.

[71] Bacon seems never to have used the term *magia naturalis*, but it had been used earlier by William of Auvergne e.g. in *De legibus* 24 (*Opera omnia* [Paris 1674] I 69).

[72] *Fam. Hist.* (217-8 Thoms). I am unable to identify a historical source for Vandermast. In Greene's play he has the Christian name Jacques. The name may represent a corruption of that of some figure such as the Cracovian Jakob Randersacker, on whom see Thorndike, *Hist. Mag.* IV 457, 482.

[73] Thorndike, *Hist. Mag.* II 659-677.

[74] *Ibid.* 666.

In his attempt to divide philosophy from magic, or, as he more frequently says, true mathematics from false mathematics, Bacon's main criterion seems to be whether one is morally or theologically justified in holding certain beliefs or indulging in certain practices. If a practice is licit, it is not magic; if it is illicit and has to do with the misuse of knowledge, it is magic.

Bacon discusses the characteristics of false mathematics in several of his writings. One of the fullest descriptions is in his introduction to the pseudo-Aristotelian *Secretum secretorum*.[75] There we learn that false mathematicians have two main faults. The first is that they believe that everything happens of necessity. This is the doctrine of astrological determinism and need not concern us here. The second is that they make use of demons. In some cases these are made to appear sensibly, especially on polished surfaces, such as the finger nail of a virgin boy or a sword; they then give information either verbally or by visual impression. In other cases the demons act invisibly, as in the divinatory practices of geomancy, hydromancy, aeromancy and pyromancy. The information that they give may be either true or false, and they are of course chiefly motivated by spite. The calling upon such malicious spirits will increase mightily as the day of Antichrist approaches.

All this is very clear, and if one wants to play safe one will keep well away from any practices that may involve the action of demons. But Bacon is precluded from this course by other of his principles, for one of his most central doctrines is that there are many marvels of art and nature that can and should be investigated and applied to the utmost good of Christendom. This is surely going to mean that he will have to approach very near to forbidden ground, and there is evidence that in fact he does.

When calling upon their demons necromancers were wont to make much use of songs and incantations, but Bacon believes that there are also marvelous natural powers produced by the human voice when backed up by the action of the rational soul.[76] To make use of these one will have to perform actions very close to those of the magician,who himself may be using natural powers when he thinks that he is employing the service of demons. Bacon recognises the danger very clearly and writes: 'It is therefore necessary to be very cautious in one's decisions in these matters, for a man may easily fall into error, and many do err in both directions, for some decline every operation, while others go to excess and fall into magic.'[77] Bacon himself gives some evidence of favoring the rasher policy, for he praises Petrus Peregrinus for his investigations 'of the experiments, prophecies, and songs of old women and of all magicians.'[78] It is probable that Bacon himself proceeded in this manner, and one of the few contemporary references that we have to him shows him listening to one Peter of Ardene giving an account of how he attended five séances at which a certain Spanish master called up his demon, who answered the questions that those present put to it.[79] We could not feel confident that Bacon's curiosity never led

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[75] *Tractatus brevis et utilis ad declarandum quedam obscure dicta in libro Secreto secretorum Aristotelis* 3 (ed. Steele, *Op. hact. ined.* V 6-8).

[76] *Op. mai.* 3.14; 4 (III 122-5, I 395-9 Bridges); *Ep. de sec. op.* 3 (529-532 Brewer).

[77] *Ep. de sec. op.* 3 (531 Brewer).

[78] *Op. tert.* 13 (47 Brewer): 'experimenta vetularum et sortilegia, et carmina earum et omnium magicorum.'

[79] *Liber exemplorum* (ed. A. G. Little; Aberdeen 1907) 22.

him to attend such a séance himself. Indeed he may have gone to see whether the effects were the result of optical illusions.

A similar situation applies in the case of forbidden books. Bacon both fulsomely condemns such books and also asserts that many of them contain portions of genuine wisdom.[80] The implication is clearly that, although they are in general to be eschewed, the pioneer investigator is under an obligation to examine them and extract those things that are licit.

Thus underneath Bacon's vigorous condemnations of magic we may see evidence of an acute personal dilemma, and his natural curiosity, combined with the policy to which he was committed, may at times have led him to overstep the mark. In trying to form a probable picture of his activities in this direction we must remember the context in which his works were appearing, for when writing to the pope or issuing a work for general release it would not have been prudent to accuse himself of forbidden practices. And it is noteworthy that it is in the *Epistola de secretis operibus artis et naturae*, which has the form of a private letter, that Bacon lays himself most open to the charge of dabbling in magic, even though he still explicitly condemns it there. In general there seems a fair degree of probability that Bacon performed certain actions that could easily have led his less educated contemporaries to believe that he was a full-blooded magician. We should also expect any suspicion of trafficking with spirits to escape the pen of the Franciscan chronicler Peter of Trau, who was anxious to present a favorable if slightly quixotic picture of Bacon. Despite all this we must still admit that there is no evidence that Bacon was imprisoned on the grounds of suspected necromancy.[81]

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The course of this paper has been marked by the frequent occurrence of tentative arguments, and we have had again and again to content ourselves with the exploration of possibilities and the assertion of probabilities: certainty has usually eluded us. This state of affairs cannot give complete satisfaction, but in this field it is one that we may be doomed to live with. Nevertheless I think that we have established that the historical Bacon was a not altogether unsuitable vehicle for the legends about him, although we must admit that our knowledge of the origin and development of the legendary tradition remains scanty.[82] But even if the genetic connection between the historical Bacon and the legendary Bacon is tenuous, this does not preclude us from inclining to the view that the former was not merely an armchair philosopher but went some way towards meriting his later classification as a magician.

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[80] *Ep. de sec. op.* 3 (532 Brewer).

[81] Easton, *op. cit.* (*supra* n. 20) 126-143, 192-202, has very plausibly suggested that Bacon's troubles arose from his holding Joachite views. Cf. F. Heer, *The Intellectual History of Europe* (London 1966) 135-8. Anthony Wood, *op. cit.* (*supra* n. 11) II 401 suggested that he may have been condemned for the work *De victoria Christi contra Antichristum.* T. Tanner, *Bibliotheca Britannico-Hibernica* (London 1748) 63 n.s, following Leland gives the *incipit* of this as 'Nec sum propheta, nec filius prophetae.'

[82] It is curious that in his *Summa logicae et philosophiae naturalis*, which was written probably in the 1340s in Oxford, John Dumbleton referred to Bacon as 'unus qui Bakun cognominatur' (MS Vatican, Vat. Lat. 6750, fol. 194^{vb}).