Notes to Chapter 3

(1) Primary, printed sources readily accessible, for the events of Dee's life, are his *Compendious Rehearsall*, hereafter abreviated to C.R. in the notes (on which see Ch. X, p. 4, et seq.) included in *Autobiographical Tracts of Dr. John Dee*, ed. James Crossley for the Chetham Society, 1851, and the *Diaries* (on which see Ch. VIII, p. 682 et seq.) (ed. Halliwell, 1842, Camden Society, pub. XIX, from 1577-1601; ed. J.E. Bailey, 1880; from 1595).

Minor facts taken from these have not in general been given specific reference, except where a direct quotation has been made. The sources are indicated of all other biographical details introduced.

(2) Horoscope Sloane MS. 1782, f. 31. Also, Ashmole MS. 1788, f. 136 (a more detailed scheme). These dispose of the various other suggestions made as to Dee's birthplace (e.g., Dugdale, *England and Wales*, p. 1479, declared it to be Upton-under-Severn; J. Williams, *History of Radnorshire*, p. 164, the parish of Bugaild in that county. See N.Q. 7th Ser. I, p. 127, 1886).

(3) Dee in financial straits wrote to Burleigh in 1574, that he had long expected to receive a revenue by the grace of the Queen or Privy Council "which both right well knew, by how hard dealing my father Roland Dee (servant to her Majestie's father, the most renowned and triumphant king of our age) was disabled for leaving unto me due mayntenance." (Ellis, *Original Letters*, p. 34.) Strype's statement to the same effect (*Annals*, Vol. II, pt. 1, p.520-521) is based on this same letter.

The tradition sometimes followed, that Dee's father was "a respectable vintner in London" (Cooke Taylor, *Romantic Biography*, 1842, i. 379; Meyrick, *Heraldic Visitations*, 1846, i. 167, "a vintner in London in good circumstances"; Cunningham, *Lives*, 1838, ii. 281, "generally stated to have been a vintner"; Delaulnaye, *Biog. Universelle*, 1852, X, p. 267; N.Q. 5th Ser. ii, p. 376, 1874) would appear to be baseless, though it can be traced back to statements of Wood, Aubrey, and Ashmole (e.g., *Brief Lives*, ed. Clark, Vol. I, p. 211). (Confusion has probably arisen by mistakenly interpreting references to Dee's grandson Rowland who had a shop in Butter Court, Lombard Street; letter of Arthur Dee, 1649, Ashmole MS., 1790, f. 66^{r}.) Dee's father besides holding this position at court was, however, also a mercer. There is a grant to him from Henry VIII of 3rd May, 1544 (*Letters and Papers Foreign and Domestic VIII*, ed. Gairdner, 1903, Vol. XIX, Pt. I, p. 371, Doc. 610, No. 7) which after a preamble setting out the losses suffered by the King's customs by negligence of the common packers in the city appoints Rowland to be one of the two packers of all merchandise in London and its suburbs to be conveyed beyond sea; to receive a moiety of the fees and meet a moiety of the charges (the other moiety was the concern of the packer appointed by the Lord Mayor). He is invested with authority to untruss and ransack any consignment not packed in his presence. A further grant was made in October the same year jointly to thirty-six persons, one of which was Rowland Dee of lands formerly belonging to the Monastery of St. James, Northampton (Ibid, XIX, pt. 2, p. 317, Doc. 527, No. 30), and a further grant "for services to the King and to Henry VIII, was made 1st Feb. 1550 by Ed. VI concerning these same properties to Rowland Dee and twenty eight others all byt two described as `mercers'" (*Calendar Patent Rolls* of P.R.O. Ed. VI, Vol. III, p. 201, London, 1925). Lysens (*Environs of London*, 1792, Vol. I, p. 377) declared that Dee's father was imprisoned in the tower in 1553; this is probably accurate and not a mistake for Dee himself, who had been seized at this date on charges of conjuring and heresy (vide infra Ch. 4), as has been suggested, as a pardon for "Rowland Dee of London" was granted 18th December, 1554 (*Calendar of Patent Rolls*, Philip and Mary, Vol. I, London, 1937, Pardons Roll I, Suppl. Patent Rolls, 635, p. 424). This is the latest piece of information that survives concerning him.

(4) She was heiress to William Wild (Dee's Pedigree Harleiam MS. 5835 f. 4-6). Marginalia by Dee in books from his library now in the possession of the Royal College of Physicians supply on a few points in a little additional information on his life and views, though unfortunately sometimes in part now illegible. On the errata page of Cardan's *Libelli Quinqz* he

has written "Anno 1509 vel 1508 on....21 October my mother was born to whom I am very like in...having my...And she was married 1524" (the titles of a dozen such autographed volumes are reproduced in N.Q. 9th Ser. VIII, p. 177, where a few of Dee's notes, including the present one, are reproduced).

(5) Cotton Charter, XIV f.l. (see also Chapter XIII, f.38, and Burleigh's epitome, Landsdown MS. 94, Art 51) Dee's autograph pedigree (cited previous note) traces his descent through his grandfather Bedo Dee, the royal standard bearer, back to "Tewder, King of South Wales," and "Orwen Prince of all Wales" etc. J.D. Rhys, who interrupts a discussion of the correct orthography and etymology of some Welsh surnames to insert an encomium on Dee, writes "Juxta Crucis Amnem (NANTY GROES) in agro Maessyuetiano apud Oabrobrytannos, erat olim illustris quaedam Nigrorum Familia; undè IOAN DV, id est IOANNES ille Cognomento NIGER Loniniensis sui generis ortum traxit" (*Cambrobytannicae cymraecaeve linguae institutiones*, 1592, p. 60) (Dee's own descendants appear in a pedigress supplied by his grandson Rowland, on which appear eight children of Dee's, twelve of his eldest son Arthur's, and seven of Rowland's--most of them merchants, several in Russia or Holland. Rawlinson's MS. D. 923, f.51). On Dee's descendants see also Fell Smith, *John Dee*, appendix I, p. 308 et seq, and on the family generally, *A genealogical account of some of the families derived from Bedo Dee*, 1815, which is an extract from Wilson's *History of the Merchant Taylor's School*, 1812 and 1814, where a little more information is given and where the subject is explored because Francis Dee Bishop of Peterborough, the son of either a brother or cousin of John Dee (p. 1168) endowed a scholarship to Johns, Cambridge, for such of his kin as should thereafter attend this school.

(6) C.R. Ch. I, pp. 4-5 (Philemon Holland was also at school there. The present Grammar Free School at Chelmsford was not founded however until 1552 by Edward VI (see Carlisle, *Description of Endowed Grammar Schools*, pp. 411-414).

(7) Vide Cooper, *Annals of Cambridge*, Vol. I, p. 375.

(8) The material in the preceding paragraph is largely summarised from Rouse Ball's *A short Account of the History of Mathematics*, and the same author's *History of the Study of Mathematics at Cambridge*. On the Wolsey lectureships and Kratzer see Wood, *Annals II*, 2, p.834 et seq.

(9) Vide infra Ch. 4, p.303 et seq.

(10) A letter of Ascham's to Edward Raven from London, dated only 17th Sept., but written, as may be deduced from its contents and other dated letters it connects with, in 1550, just before Ascham's departure for Germany, continues after the salutation "Quanquam Ioan. Daeus noster instar multaram literarum esse potest, tame cum sciam quam charae tibi nostrae literae sunt, nolui committere, ut tam idoneus nuncius sine meis ad te litenis Cantabrigiam profisceretur." (*Familiarum Epistolarum libri tres*, 1590, p. 206.) A letter of Joannes Metellus to Ascham, undated, but placed among some other letters of 1568, though it is possibly much earlier, regrets that he has not been in direct touch with Ascham for so long, "amo enim praeclaras virtutes tuas supra modum, easque dum vixero colam. Quo fit, ut saepe de te quesierim: cum multi tamen testarentur, te, Regia excessise, atque studiorum tuorum causa, privatam vitam ager. Nam & hoc Joan. Dius vester affirmavit. Gaudeo igitur, te non degere, ut narrabant, in obscuris locis, sed eadem in statu, quo apad Mariam Reginam permansisse." The surprise evidenced that Dee brought such a report perhaps indicates an ascription to Dee of some intimacy with Ascham. The report perhaps referred tothe situation that arose, when Ascham, who had an invariable, overwhelming preference for university life, left Elizabeth to whom he had been appointed tutor in 1548, and returned to Cambridge, he incurred her disfavour by so doing but was recalled to her service on her accession.

(11) Mulcaster, *Positions*, 1581, Ch. III, p. 240-241.

(12) T. Smith *Vita,* p. 3.

(13) C.R. Ch. I, p. 5. The normal routine for students may be gathered from the Trinity statutes 1546, they rose at 4.30, chapel was at 5, lectures were given in college until 9, and afterwards lectures and disputations in the public schools until dinner at 11, from 1-3 further attendance at the schools; recreation was then allowed until supper at 6, after which students immediately retired to their chambers. Dee must have worked on until midnight to fulfil his programme. Dee's account brings forcibly to mind, by contrast, Gabriel Harvey's judgment on the amount of time necessary to master the available modern knowledge of the subjects in which Dee was chiefly interested: "Any art or science, liberal or mechanical, may be lernid for ordinary talke in three dayes; for use practise and profession in six: any languages to understand in six: to speake and write in twelve: my Brother Jon did lerne to Domify, per se, in two or three howers, ye urinal in a few more. Many such pragmaticall feats presently gotten." (*Marginalia,* p. 91.)

(14) Rabelais, *Pantagruel,* 1532, Ch. 8, Urquhart trans.

(15) Dee never figures as one of the notable "Graecians" of the day such as Cheke or Ascham. What little evidence exists does not imply any deep scholarship in this respect, though he seems to have contributed a great deal to the very fine translation of Euclid made from the Greek text and not as was usual from Campanas' "Latin version which appeared under Billingsley's name in 1570. The contents of his vast library, as regards many subjects so exhaustively complete, only very inadequately reflected in its limited collection of literary texts and commentaries, the "humanist" aspects of contemporary classicism. He was fond, it is true, of introducing Greek words or phrases into his works, or supplying them with Greek titles. Such surviving works in parallel Greek and Latin versions, as he once owned, seem generally, from underlinings etc., to have been read by him in the Latin and annotated in that language (though his copy of the Edito Princeps of Arrieus' *Periplus* of 1553, he had worked carefully through, probably on more than one occasion as his many underlinings and comments reveal. The work is preserved in Chetham Library, Manchester. See Bailey in *The Bibliographer,* I, 1882, pp. 72-74. Casaubon pointed out that Dee passes without remark the very ungrammatical Greek in which the angelic communications were sometimes delivered by Kelly. However, St. John's under Cheke's particular patronage, had become at this time a centre of Greek studies, and championed Cheke's system of reformed pronunciation for which Ascham became one of the most prominent advocates. The controversy this aroused--and partisanship here seems to have become accepted as merely the external badge, or shibboleth, serving to indicate position as regards a more radical cleavage that separated the "modern" innovators from the more conservative academics--was still raging at the time of Dee's readership in Greek. (The new pronunciation had been publicly prohibited by the Chancellor, Bishop Gardiner, in 1542, but apparently ineffectively as he continued to thunder against it in directives to the authorities in subsequent years. Accounts of the dispute are given by Strype in his *Lives* of Cheke, and Smith, and a summary in Cooper's *Annals,* Vol. I, p. 401 et seq.) The performance of *Plutus* in St. John's in 1536 was arranged by the advocates of the reformed pronunciation, and the tradition of Greek plays, one of which Dee "set forth" seems to be not unconnected with the dispute.

(16) Preface. Aj^{r}. Dee defines it as "that Art Mathematicall, which giveth certaine order to make straunge workes, of the sense to be perceived, and of men greatly to be wondred at." His account of what it performs leads straight on into the "Digression Apologeticall," which opens (Aj^{v}) "And for these, and such like marveilous Actes and Feates, Naturally, Mathematically, and Mechanically, wrought and contrived: ought any honest Student, and Modest Christian Philosopher, be counted and called a *Coniurer*?"

(17) *De Occ. Phil.*, lib. II, Cap. 11. Similarly a century later, Wilkins entitles his work: *Mathematical Magicke*.

(18) *Scenes and Machines of the English Stage,* p. 87. That Dee's college, St. Johns,

was in the habit of exhibiting sumptuous and elaborate performances, seems indicated by one of Ascham's "Epistles" of about 1550 (quoted Campbell in this same passage) which asserts "that the city of Antwerp exceeds all other cities as the refectory of St. Johns Hall, Cambridge exceeds itself when furnished at Christmass, with its theatrical apparatus for acting plays."

(19) C.R. p. 6. The Christmas Lord was an ancient custom. The original draft of Trinity Statutes have however one chapter entitled "De Praefecto Iudorum qui *Imperator* dicitur." His functions were to govern the whole society in hall or chapel, as a republic in his charge, according to a set of laws he ws to draw up in Latin or Greek verse, during the twelve days of Christmas. He was to be responsible for presenting Latin tragedies and comedies, and six "Spectacula" or as many dialogues. (See Cooper, *Annals*, Vol. II, p. 112, n.1.) (The list of the original fellows of Trinity including Dee, is given in a document on the foundation listed in *Letters and Papers....of Henry VIII*, Vol. XXL, pt. 2, London, 1910, p. 340, Doc. 448, No. 43.)

(20) C.R. p. 5. Visits abroad for such purposes would seem to have been encouraged by the English Universities. Cheke received an exhibition from Henry VIII to pay for any foreign travel he might think it necessary to make.

(21) *Grace Book* ed. Venn (Records of the University, 1542-89), p. 51. All other M.A.'s of 1547-1548, and as a general rule, were granted 9 terms after B.A. Dee is granted one, having studied for only six terms, "Sic ut eius admissio stet pro completis gradu et forma sine vlteriori visitacione et non sit in preiuditium magistri Nevynson" (Dee's B.A. had followed after the usual twelve terms of lectures and disputations 1545-1546, Ibid. p. 31). A dispute over seniority seems to have arisen with this Nevynson--who received his B.A. a year prior to Dee, and his M.A. at the same time (he later became a Doctor of Laws, 1552-1553)--as a Memoranda of April 24, 1548 decrees "quod Magister Dee de collegio Trinitatis actu in artibus professor cederet magistro Nevynson de eadem collegio inceptori in artibus et nullam omnino vindicaret senioritatem de ills infra universitatem" (Ibid p. 48). A list of regents for the year, in column, probably taken fromthe M.A. lists which were usually regarded--though not invariably so--as indicating order of merit, leads off with the names Nevynson, Dee, Coren, Lodge...(Ibid, p. 51). (Dee should not be confused with the *Doctor Deius*, some of whose functions and privileges, a grace passed to Ascham in this year--Ibid, p. 53--this is probably George Day D.D., Master of Johns, who preceded Ascham as public orator.)

(22) C.R. p. 6. Dee kept himself apart from the English universities for the rest of his life, refusing all offers of positions there; feeling perhaps, that they were uncongenial to his own particular interests both scientific and philosophical. His dislike of them may have been of the same order as Bruno's, who, in a statement admitting that they were not tied to Aristotelianism, manages nevertheless to convey his low opinion of them generally: "There are three fountains in the University, to one of which they have attached the name Fons Aristotelis, and the other two they call Fons Pytagore and Fons Platonis. From these three wells (at which horses and cattle come to drink) they draw water to make beer" (*De la Causa, Principia et Uno*, Dialogue 1). But adepts in those studies that largely occupied Dee, and on which he set high value, were traditionally supposed to be hostile to prevailing academic life and instruction; thus Butler says of the Hermetic Philosopher, "he believes a scholar can no more live in the university than a serpent in Ireland" (*Characters*, p. 99).

(23) In 1563 Eliz. State Papers, Vol. XXVII, no. 63 (vide infra Ch. 6, n. 24).

(24) Gabriel Harvey writing humorously to Spenser on his lack of qualifications for delivering a philosophical ovation, writes: "but would to God in heaven I had a while for their [his auditors] sake the profound learning of Mr. Duffington *the mysticall and supermetaphysicall philosophy of Doctor Dee*, the rowling tongue...of Mr. Williamson our fine Cambridge barber...the trim lattin phrases and witty proverbes of him that built Caius College." (*Letter Book*, p. 71.) This is of course in 1579, but it is perhaps relevant to cite it here as all Harvey's other instances are well known Cambridge figures, and the qualities they are there known for. All

Harvey's other mentions of Dee (e.g., *Marginalia*, pp. 162-163) speak only, and with respect, of his mathematical knowledge, and the practical achievements to which this may assist.

(25) *Vita*, p. 5.

(26) Dee gives two lists of his own works, neither compiled in any particular order; viz. C.R. Ch. 6, pp. 24-27, and in the *Discourse Apologeticall* (printed with C.R. in *Chetham Miscellany* I) pp. 74-78. These lists are similar but not identical, the present mentioned works figure only inthe latter of them for example. Titles and dates of lost or partially surviving works cited hereafter, when extracted from either of these lists have not been accompanied with any detailed source reference. The present works are lost. The only surviving fragment of Dee's work that might appear in any way connected with them are the fourteen points he considers from Aristotle's *de Anima*, which he may have looked upon as "fallacies" (vide infra ch. 4); but it is unlikely that Dee would have treated such a subject "in English meter" (a form adopted probably for mnemonic rather than aesthetic reasons). And in any case the fallacies that he dealt with in this work were almost certainly those discussed below (n. 27).

(27) The thirteen fallacies divided into two groups of six and seven types, according to whether they concern words or things; are set out in *DC Sophisticis Elenchis* IV, 165b and 166b. Blundeville's *Art of Logik* discusses them in Bk. 6, ch. 5, p. 190 et seq (the first group or Equivocation, Amphibology, Conjunction, Division, Accent and Figure or form of speech) and Bk. 6, ch. 7, p. 193 et seq (the second group, or "the Fallox of the Accident, the Fallax of Speech respective instead of speech absolute, ignorance of the Elench, Petitions of the principle, a cause that is not a cause indeed, and many questions comprehended into one"). As to the importance of such a study Dee probably was already acquainted with Proclus' praise of a lost work of Euclid's on Parologisms which might serve as a preparatory to the constructive reasoning in the *Elements*: "il y a énuméré les divers genres de faux raisonnements séparément et dans l'ordre en exercant notre intelligence sur chaeun d'eux par les théorèmes variés, il y a opposé le vrai au faux et mis la réfutation de ce qui est fallacieux en harmonic avec la preuve. Ce dernier ouvrage est donc propre à purifier et à exercer" (*Comment on Euclid*, ed. cit. p. 63-64). Writers continued to accept Aristotle as a model on this topic, however much they might differ from him about the methods of reasoning it was most profitable to employ in scientific or philosophical investigation. (The reformers' rejection of Aristotle's claims for the syllogism was based on the opinion that it was an unnecessarily inconvenient and cumbrous instrument for effective thought, and offered no assistance to the "invention," they retained just such a limited respect for it as Francis Bacon later avowed: "Non est meum abdicare in totum syllogismum. Res est syllogismus magis inhabilis ad praecipua, quam inutilis ad plurima." Letter to Father Redept Baransan 1622. *Works* II, p. 128). Thus Blundeville's work, which its title page declares is "Very necessary for all Students in any profession how to defend any argument against all subtill sophisters and cavilling schismatickes, and how to confute their false syllogisms and captious arguments," speaks respectfully of Aristotle throughout; but it begins by distinguishing two objects of this art "the one to discerne truth from falshood in any manner of speech; the other is to teach a compendius way to attaine to any Art or Science, and therefore it is defined of some to be the Art of Arts and Science of Sciences...because it sheweth the method, that is to say, the true order and right way that is to be observed in seeking to come to the perfect knowledge of any art or science," and his work only sovers the first function, while of the second he says "of which methodicall part mine old friend *M. Iacomo Acontio Tridentino* hath written in the latine tongue a very proper and profitable treatise. And therefore I minde here to deal onely with the first office" (pp. 1-2). (Nevertheless with some reference to its relations with Ramism he does summarise the *de Methodo* and describe its advocacy of a procedure based on the Euclidean resolutive-compositive method, p. 64 et seq.) Yet though fairly orthodox on this topic, echoes of Ramus are frequent, in terms or statements (as his initial division of logic into the two parts, "invention" and "judgment," or the passage in p. 121 where he brands arguments based on human authority as "martificial"). Finally, it may be noted as another increasingly typical feature of this work, that its author's desire to assist the cause of popular education, is accompanied with a slight "non-conformist" religious bias, emerging for

instance in his expression of approval for, and desire to be of service to, "clergy who had taken no degree in divinity." (He describes his wprl as "a most necessary Booke for such Ministers as had not beene brought vp in any Vuniversitie: to[o] many of which Ministers, though God had given the gift of vtterance, and great good zeale to set forth in good speech the true Christian doctrine" yet lack the means to refute the sophistical arguments that the academically trained are able to bring against them and which they sometimes even "gather out of the very words of holy Scripture," and propound with subtle fallacies (To the Reader f3^{v}).

(28) E.g., *English Euclid*, note by Dee. f. 385^{r}, "Besides all other uses and commodities, that are of the croked superficies of the Cone, Cylinder and Sphere, so easely and certainely, of us to be dealt with all: this is not the least, that a notable Error, which among Sophisticall brablers, and vngeometricall Masters and Doctors, hath a long time been upholden: may most evidently, hereby be confuted, and vtterly rooted out of all men's fantasies for euer. The Error is this, *Curvi, ad rectam, nulla est proportio*. This Error, in lines, superficeies and solides, may with more true demonstration be overthrowne, then the fauourers of that fond fantasie are able, with argument, either probable or sophistically, to make shew or pretence to the contrary." etc. (This "error" recurs" in various forms in Averroes' commentaries on Aristotle, which Dee probably has in mind e.g., On *Anal. Post. I*, comm. 67. "Non est proportionalibitas secondem veritatem inter lineam rectam et circularem." Met. X. Comm. 10. "Linea enim arcualis non potest aequari lineae rectae neque recta non rectae," also Phys. VII. Comm. 29, Bagolinus ed. Venice, 1550; see J.F. Hoffmann, *Ramon Lull's Kreisquidratur*, Heidelberg, 1942, p. 6, n. 16.)

(29) *English Euclid*, "An Advise by John Dee" f. 397 et seq, discusses this method "so ancient and so profitable" that was revealed, he claims, by Plato to Leodamas. Dee advises his readers to work back from the end of the thirteenth book to the definition of a point, and always "by Resolution (discreetly and advisedly) to resolve, unlose unioynt and diseaver every part of any work Mathematicall, that thereby as well the due placing of every verity, and his proofe; as also what is either superfluous, or wanting, may evidently appeare. For so to invent, and therewith to order their writings, was the custome of them, who in the old time, were most excellent." He himself writing any work "which requireth great discourse, at length have found, (by experience) the commodity of it, such that to do other wayes, were to me a confusion, and an vnmethodicall heaping of matter together: besides the difficulty of inuenting the matter to be disposed and ordred." Ramus has similar appreciations of a method drawn from the Elements, e.g., *Praefationes*, p. 171 et seq, cp. also Freigius *Vita*, p. 26 et seq (in *Monumentum Illustrissimis*) describing Ramus' admiration for mathematics and their influence on his thought quoting his speech to Paris University, "Quindecim Euclidis libri sunt, quos (ut omnes omnino artes) sicut uno Logicae organo contextos esse primum, sic cadem posteo retexi posse cogitabat" etc. (p. 26).

(30) C.R. ch. 3, p. 8.

(31) E.g., Banosius' life of Ramus dedicated to Philip Sydney prefixed to Ramus posthumous *Comment. de Relig. Christ*, 1577, f B^{r}, mentions among Ramus' acquaintances such collaborators of Dee's as Hieronymus Wolf and Commandine, and these "quo vero animi ardore mathemata sit persoquutus, testantur (follows lists of names by countries)...in Britainnia vero Acontius & Dius." Freigius *Vita Rami*, p. 30, "Nemo est in Britannia, Germania, Italia, mathematica studio excellens, quem non animo & literaru sermone adieri. Scripsit in Britanniam ad Acontium & Diam, in Germania ad Gesnerum, ad Camerarium...."

(32) A letter of Ramus' to Dee of 14th Jan., 1565, is given in *Praefationes, epistolae, orationes*, pp. 204-205. He recalls meeting Dee in the Lutetian library. Lasicius had set out from Britain, from Ramus and "binas ei scholas physicus commiseram, quas nostro nomine duobus in tota insula doctissimis hominibus offeret." One had gone to Acontius who had declared Dee should be the proper recipient of the other. "Itaque cum Iasicius Lutetiam reversus de multiplici eruditione Dii, deq; ipsius singulari bibliotheca antiquis neque dum editis graecae mathematicae scriptoribus referta narrasset." He learns Dee has an unknown treatise of Archimedes, he

possesses himself Apollonius Pergacus on Conics, eight books of Pappus, Serenus on sections of the cylinder, various oposcula of Theodosius, and some fragments of Hero. "Eac, amabo te, ut elenchus tuorum mathematicerum nobis communicetar, ut si quid divitus tuis nobis opus erit, a te operi expetamus, & quidem tam liberaliter quam ingenue nostra tibi communia fidri velim." He ends by confessing that beyond the names Oxford and Cambridge, he does not know any details of English scholars interested in the subject and asks Dee to supply him with information on the leading English mathematicians, and what ancient texts can be found in the libraries there.

Ascham had perhaps given Dee's name to Ramus as owner of the Archimedes treatise, as Ramus had written to him previously 6th March, 1564 (Ascham, *Famil. Epist.*, p. 458-459), and enquired among other things, "de libro Archimedes quem audivi penes aquedam eruditum vestrae aulae medicamesse: si facultas ulla sit describendi, habeo rariora quaedam in hoc genere & Pappi & Apolloni & Sereni, quae per liberiter vicissim, tumeo communicabo...."

(33) Accounts of Ramus' influence may be found in: Perry Miller's *The New England Mind*, NY, 1939; Hardin Craig, *The Enchanted Glass*, NY (O.U.P.), 1936; F.F. Graves, *Ramus and the Educational Reform in the XVIth Century*, NY, 1912.

(34) *Astronomiae Encomium*, 1601, p. 6 (written 27 years previously).

(35) See F.R. Johnson and S.V. Iarkey, *Robert Recorde's Mathematical Teachings and the anti-Aristotelian Movement* (H.L.B. No. 7, April 1935), p. 78: Recorde's place is with Vives, Erasmus, Sturmius, Malenithon, Ramus, Colet, Cheke, and Ascham, but "except for him only Peter Ramus (among these)...went beyond the subjects of the trivium and attempted a thoroughgoing revision of the quadrivium subjects...."

(36) *Praefationes*, pp. 203-204. He goes on to praise Acontius' *de Methodo* (1557)--a plea for the sustematisation of all knowledge--as not identical but compatible with his own teachings.

(37) *Euclidis Elementorum libri XV...à Federigo Commandino Urbinatè, nuper in Latinum conversi*....Pisauri, 1572, Preface.

(38) *Euclidis elementorum libri quindecim*, Paris, 1558. Dedicatory epistle to the Archbishop of Rheims.

(39) *Peter Ramus and the Confusion of Logic, Rhetoric and Poetry*, 1947, quotations from pp. 4, 7, 16.

(40) Quintiliem is an undeniably important source of Ramus' thought; his praise of Mathematics for its own sake, not merely as providing a discipline or for use, and his claim that its order should provide a model even for rhetoric, is thus not without interest: see *Inst. Orat.* lib. I, cap. 10, 46 (e.g., Quid quod se eadem geometria tollit at rationem usque Mundi ? inqua, cum siderum certos constritulosque cursus numeris docet, discimus nihil esse inordinatum atque fortuitum quad ipsum nonnunquum pertinere ad oratorem potest." Loeb ed., ed. Butler, 1921, Vol. I, p. 180).

(41) Graves, *Ramus*, p. 24, on Ramus' adoption of what he claimed to be the Socratic as opposed to Aristotelian method, because it was the only one which set out to lead men "to their own natural sense of right and liberty of judgment"; also p. 145 et seq on the basis of dialectic approached through an investigation of how men use their reason; it is said to begin as Nature's pupil, to end as its school master.

(42) *Metaphysics*, 1007 a-b.

(43) C.R. p.5. Sheets of his observations taken at Louvain in Aug. and Nov. 1548 are

bound in the back of his copy of Albohali's *de Judiciis Nativitatum*, Noribergae, 1546 (now in R.C.P.).

(44) *Preface*, Ciiij^{r}.

(45) F. 96^{v}, 1519, Venice ed. (in the R.C.P.). A note of Dee's on the flyleaf, that the exact time of birth must be used in forecasting the disposition of the body and the faculties of the mind, is dated 14th Sept., 1551.

(46) C.R. ch. 5, p. 21. (This phrase might also imply a practical matter of procedure. Since the time of Hipparchus, the vernal equinox had shifted about 24˚ backwards into Pisces; but as the zodiac was still measured from it, it continued to be regarded as the first point of Aries. Hence the erection of an "ancient" horoscope and a sixteenth century one, as regards the placing of the signs, would if no corrections were made, differ considerably. The fact of this change was, of course, known to all who had even a smattering of astronomy. It forms the subject of Spenser's Introduction to Bk. 5 of the *Faerie Queene*, esp. stanzas 5-7; of the signs Spenser writes: "So now all range and do at random rove/Out of their proper places far away.") Agrippa, who similarly doubts not the general truth of astrology, but the particular applications men make of it in its "judicial" form, is outspoken to a friend who in 1526 applied to him for a horoscope; such forecasts, he replies, are "nothing more than the fallacious guess of superstitious men who have founded a science on uncertain things and are deceived by it"; but nevertheless, "I will do all that you ask me to the best of my ability, having warned you first, not to put more faith in these judgments than befits a Christian" (*Epistle* 19. See Morley, *Agrippa*, Vol. II, pp. 138-139).

(47) E.g., Worsop's *A Discoverie of Sundrie Errors*, 1582. Gi^{v} brings a long and bitter indictment made on Scriptural (Isaiah XLVII, Jeremiah V, Kings XXI, Deut. XVIII, where its practise is forbidden to the Israelites) and philosophical (Pico, Cornelius, Sceppelius, Agrippa, i.e., de *Vanitate*) authority to an end by allowing it a certain general truth and limited scope in predictions, for "Master John Dee in his mathematicall preface learnedly sheweth what astrologie is. In that preface you shall finde how some over reade: that is unlawfully attribute more unto that science than duely appertaineth thereto."

(48) John Chamber, *Treatise against judiciall Astrology*, 1601, p. 102. "When man was placed in *Paradise*" he continues, "he was set there to dresse the garden, not to be gasing still up to the starres like a wizard. Heaven is Gods booke which we must leave to him and content ourselves with our earthly abc." Later he passes some strictures on passages from Dee's *Preface*, concerning the metaphysical applications of number, though without naming the author directly.

(49) Wedel, *The Mediaeval Attitude towards Astrology*, preface, pp. iii-iv. He observes (p. 49-50) that Adelard of Bath's *de Eodem et Diverso* (1100) is one of the first mediaeval texts to reunite (or confuse) astrology and astronomy (carefully distinguished by Isidore), where astronomy closes a procession of the liberal Arts, and a man knowing it, is the comment, will know the whole past and future conditions of the world.

(50) Whatever the origins of the Universe its orderliness is a fact, argues Manilius:

"Sed facies quacumque tamen sub origine rerum
Convenit, et certo digestum est ordine corpus"

(*Astronomicon*, lib. I, 11, 117-118)

and in Bk. II (11. 60-66) he proclaims:

"Infusumque deum caclo terrisque fretoque
Ingentem aequali moderantem foedere molem:
Totumque alterno consensu vivere mundum,
Et rationis agi motu: cum spiritus unus
Per cunctas habitet partes, atque irriget orbem
Omnia pervolitans, corpisque animale figuret."

(51) Pliny, *de Mundi cum commentarius Jacobi Milichii*, 1543, f.97^{v}. Inscribed: "Joannes Deeus 1550 Januario Lovanij" (B.M. Copy).

(52) *de Stella Nova*, 1606, 173-174. Descriptio Viscerum Terrae facultatis: that the earth's tides and expulsions of vapours are stimulated "ab aspectibus planetarum harmonicis certissimum est.

Et me hercule non absurde quis huic excretioni etiam voluptatem suam adiunxerit: ita multa terrae cum animantibus conveniunt...."

(53) See Lenoble, *Mersenne*, p. 153 et seq ("L'Ame du Monde").

(54) Richard Harvey, (*An Astrological discourse* A iij^{r}) gives a list of prominent English defenders of it; they include, besides Dee, Sir Thomas Elyot, Sir Thomas Smith, Recorde, and Digges. The work itself is dedicated to the Bishop of London. On the other hand, Maunsell in his *Catalogue of English printed Bookes*, 1595, in a section limited to attacks on "Astrologie Judiciall," gives merely the works of Calvin, Fulke, Coxe and the anonymous *Foure Great Lyars*.

(55) *De Aug. Scient.*, lib. III, cap. IV (*Works*, Vol. II, p. 334).

(56) *Against the Professors*, lib. V; "Against the Astrologers," ch. 1 (*Works*, Loeb, Vol. IV, 1949). He attacks Chaldean nativities but praises astrology as used to predict floods etc., since as thus practised by Hipparchus and Eudoxus it rests only on observable phenomena. Indeed, most of his criticism is directed against the inaccuracy and uncertainty which results from the complexity of the study and the methods of reasoning it is compelled to employ, and does not amount to a denial of the validity of the general assertion of astrology that the stars influence events in the world.

(57) *Daemonologie*, p. 13. The art taught by Cardan and Agrippa which pretends "to foretell what commonweales shall florish or decay" is condemned, but "the science of heavenlie creatures" and "knowing thereby the powers of simples and sicknesses, the course of the seasons and the weather...is not unlawfull, being moderately used."

(58) The "Discorso del flusso e reflusso del mare," 1616, incorporated in *Dialogues of the Two Principal Systems*, Salisbury trans. vol. I, p. 422. The attack on Kepler's views occurs on the 4th day's discussion, Galileo propounds instead a theory that tides are caused by the difference in rotational speed of different parts of the earth. Kepler's theory is rejected because it is "occulta"; the same charge that it involves an "occult cause" not to be admitted by reason is brought out by Huygens, and frequently by followers of Descartes, against the Newtonian theory of attraction, i.e., of action at a distance. Brunschvicg (*L'Expérience Humaine*, p. 531) comments on Huygen's criticism: "Huygens pouvait avoir raison...Mais la formule de la gravitation c'est tout de même bien quelque chose, et que Newton aurait négligée si par malheur, il s'était avisé de prendre conseil de Huygens." In the Renaissance science would have suffered markedly even had it been possible at all, if all theories were to have been rejected which could not be immediately explained or which did not involve recourse at some point to the convenient doctrineof "occult causes."

(59) E.g., Porta, *Naturall Magick*, which throughout makes continual references to "experiment" and "experience." Lib. I, cap. VIII, gives besides quoting authorities (such as Theophrastus, Hippocrates and Galen on the influence of the dogstar, p. 13) give lengthy catalogues of effects observable in the animal, vegetable and mineral world produced by the heavenly bodies (e.g., "The inwards of mice answer the Moon's proportions; for they increase with her, and with her also they shrink away. If we cut our hair or pare our nails before the new moon, they will grow again but slowly; if at or about the new moon, they will grow again quickly" p. 11). Similar examples are given by Covell, *Polimanteia*, 1595, "the Nightingale and Cuckoo can always be noticed to grow hoarse at the rising of Syrius, and it would be irrational to deny *The Sympathy* betwixt the starres of the North and the Adament Stones, whereas we see continually

that those starres draw that stone" (f. K4^{v}). Thus Dee (Preface biiig^{v}) declares that opponents of astrology "understand not (or will not understand) of the other workinges and vertues of the Heavenly *Sunne, Mone* and *Sterres*: not so much, as the Mariner, or Husbandman: no, not so much, as the *Elephant* doth, as the *Cynocephalus*, as the Porpentine doth" (as to the tides, Dee adds shortly after "And perchaunce they thinke, the Sea & Rivers (as the Thames) to be some quicke thing, and so to ebbe, and flow, run in and out, of themselves, at their owne fantasies. God helpe, God helpe.")

(60) *Opera*, Vol. I, p. 152. Similarly, Porta has an early, fundamental chapter in his *Natural Magick*, entitled "What things receive their force and power from Heaven, and from the stars" which he begins by declaring that he supposes noe to doubt that the Superior rule the Inferior in Nature "and that the generation and corruption of mutable things, every one in his due course and order is overruled by the power of those Heavenly Natures." (Bk. 1, Ch. 8, p. 10.)

(61) *Opus Majus*, IV, CH. 11 (Vol. I, p. 170).

(62) *Preface*, b iij^{v}.

(63) *Meteorologica*, I, 2.

(64) *De Generatione et Corruptione*, cap. X.

(65) It was also argued as scriptural justification that, as Noah built the first boat, but mankind were scattered over the face of the earth, separated by seas, therefore to save God's justice which required that man could have had warning and opportunity to repent, the flood must have been announced by the stars (by a conjunction of several planets in a watery sign) which the astrologers could have correctly interpreted. See Recorde, *Castle of Knowledge*, 1550, f.aV: "though Noe could not in person go into all partes of the world, yet was that office supplied by the heavens." (Ralegh bases a similar argument on Philo's statement that Abraham reached a knowledge of the true God while dwelling in Chaldea, through a study of the stars. *History of the World*, I, 11, 2 p. 177.)

(66) *A Discovery of Sundrie Errors*, G.1^{v}.

(67) *de Disc. Math., Opera*, Vol. I, p. 153.

(68) M. Pliny, *de Mundi*, ed. cit. f20^{v}.

(69) *History of the World*, Bk. I, ch. 1, sect. 11, p. 12. Similarly, Evans Lloyd denounces those who disbelieve astrology as "Epicures," in that they think the motions of the heavens to be "without purpose." (*An Almanac for 1582*, Epistle Dedicatory, Aij^{r}.)

(70) *de Disc. Math., Opera*, vol. I, p. 154.

(71) *Preface*, b, iiij^{r}.

(72) Hieronymus Salius on the excellence of astrology, an answer to its detractors and despisers, p. 1.

(73) Cp. Frege, *Grundlagen*. "Jene Unterscheidungen von a priori und a posteriori synthetisch und analytisch betreffen...nicht den Inhalt des Urtheils, sondern die Berechtigung zur Urtheilsfallung," (3 p. 3) "Wenn man einen Satz empirisch nennt, weil wir Beobachtungen gemacht haben mussen, um uns seines Inhalts bewusst zu werden, so gebraucht man des Wortes empirisch nicht in dem Sinne dass es dem, a priori entgegensetzt ist" (1, 8, p. 12). Subjective

conditions have to be satisfied before a proposition is arrived at, and sense experience suggest its being made "Dies kann immerhim zutreffen, ohne dass di abgeleiteten Sätze aufhören, a priori zu sein" (4, 77, p. 91).

(74) *De Caelo*, II, cap. 4, 6.

(75) Bk. I, 611-612.
(76) *Opus Majus*, Pt. IV (vol. I, p. 260 et seq).

(77) *Elements*, Vinegia, 1543, p. 1 (note headed "Quale & quanti fiamo le scientie, overe Discipline Mathematice," preceding the dedication).

(78) Joannes Garcœus, *Astrologiae Methodus*, Basle, 1576. Ded. to Augustus of Saxony A.3^{r} (the B.M. copy 716/K/32 contains notes in a hand very similar to Dee's).

(79) *de Disc. Math., Opera*, Vol. I, p. 160.

(80) *De Coniunctionibus magnis insignioribus superiorum planetarum...* (London, 1573, previously published abroad in 1563. This is properly the title of the first part only, which is followed by "Prognosticon ab anno domini 1564 usque in viginti annos sequenter") Leovitius was mathematician to Otho Henry, Prince Palatine of the Rhine and his services to astronomy won him a tribute from Tycho Brahe. See Sherburne, *Catalogue of Astronomers*, pp. 58-59 (appended to *The Sphere of Marcus Manilius*, 1675).

(81) *Preface*, biiij^{r}.

(82) Philo, *De Opficis Mundi*, XIX (58-62) (*Works*, Vol. I, pp. 45-47).

(83) *Ennead* IV, 3, 12. See also III, 1, 5; II, 3. (Porphyry however recounting the attempt on the life of Plotinus--*Life*, ch. X--by Alexandrinus Olimpius, speaks of the baleful defluxions of the stars, as though they were physical forces capable of direction and deflection. On Plotinus' astrological views, see Thorndyke, *History of Magic and Science*, Vol. I, p. 312 et seq.)

(84) E.g., *In Somn. Scip.*, I, 1 (*Opera*, p. 68) "Et Plotinus...(of the stars) pronuncia nihil vi vel potestate eorum hominibus evenire; sed ea quae decreti necessitas in singules, sonciti ita per horum septem transitum statione recessive montari, ut ares praeterrolando seu stando futura frennis vel noce significant nescientes." Cf. also *Saturnali* I, 17, *Opera*, p. 190.

(85) *Urinall of Physick*, 1651 ed., p. 105.

(86) *Castle of Knowledge*, 1550 avi^{r}.

(87) Ibid a V^{r-v}.

(88) *de Rerum Varietate*, 1557, lib. XIV, cap. LXVIII, p. 922. The explanation here recalls Plotinus (*Ennead*, IV, 4, 35): the Universe expresses itself in figures of celestial motions through the contemplation of the intelligible world. The Ideas of these figures, not they themselves, exert an influence on things.

(89) *Admonitio de vero et licito Astrologiae usu* B3^{r}-B4^{r}.

(90) Marginal note in Ptolemy, *Quadripartitum*, f.2.

(91) *de Disc. Math.* (*Opera*, Vol. I, p. 156).

(92) *History of the World*, I, 1, 11, p. 14. He is expounding a causal doctrine but with reservations. The chapter is headed "Of Fate, and that the stars have great Influence: and that their operations may diversely be prevented or furthered." His reservations lead him to cite Plotinus' position with approval, contradicting some earlier statements of his own, though he says Plotinus wrote "giving them [the stars] something lesse than their due."

(93) *Opus Majus*, Vol. I, p. 270 et seq.

(94) *Summa Theologica*, I (1), Qu. 115, Art. IV. (Migne ed. Cols. 1388-1389). The stars act directly on the body "in vires autem animae quae sunt actus organorum corporeum, (non) directe, quidem, sed per accidens...unde si intellectus et voluntas essent vires corporeis organis alligatae (sicut posuerunt aliqui dicentes, quod intellectus non differt a sensu) ex necessitate sequeretur quod corporo coelestia essent causa electionum et actuum humanorum." This is not so, but "Intellectus ex necessitate accipit ab inferioribus viribus apprehensiva sed voluntas non ex necessitate sequitur inclinationem appetitus inferioris," though as a fact, it can be seen to do so in the majority of cases. "Et ideo astrologi ut in pluribus vera possunt praedicere, et maximè in communi non autem in speciali quia nihil prohibet aliquem hominem per liberum arbitrium passionibus resistere."

(95) MS. (bound in Caxton's *Mirror of the World*) in Pierpont Morgan Library. Reproduced Curt F. Bühler, *16th Century Prognostications* (Isis XXXIII, 1941, 609 ff), pp. 619-620.

(96) 22nd May, 1592. Cotton MS. Jul. Caes V, f41 (printed Camden, *Epistolae*, pp. 47-48). Dee continues: "These spiritual grammatical Concords of good manners I have spent care, that all my imps may be instructed in, to the more apt and skilful serving of our Creator." Dee's scheme for Arthur's nativity survives in a notebook--Sloane MS, 1962 f.28^{r}. Against it Arthur has written "Sententia patris mei de mea nativatate erat. Magna bona cum multis malis." Arthur has cast his own children's nativities in this same notebook (f9 et seq).

(97) *Dialogue between a Tutor and a Pupil*, London, 1768, p. 138.

(98) See Allen, *The Star Crossed Renaissance*: "To be a ranking member of the astrologer's profession in the sixteenth century required a mastery of astronomy and mathematics...to be an opponent of astrology one needed only enough Latin to read Pico and abridge his arguments." p. 100.

(99) In Pliny, *de Mundo*, 1584, p. 171.

(100) *Discoverie of Witchcraft*, 1584, p. 171.

(101) *Albumazar*, ed. H.G. Dick, 11 562-563. (The play is founded on Porta's *Lo Astrologo*, but softens the more general criticisms of its prototypes and concentrates upon charlatanism, but even Porta, despite his better satire in that work, was far from rejecting astrology as a science.)

(102) He affirmed: "Praeter communiem motus et luminis influentiam nuffam vim coelestibus peculiarem inesse." *Disputationes*, p. 311, cp. *Heptaplus*, II, 3-4, pp. 232-238 (e.g., p. 236, "Coelestium corporum duae in universas manifestae operationes: motus et illuminatio"). On Pico's physical and philosophical views on the heavens see esp. Garin, *Pico*, III, 4. Il mondo celeste e l'Astrologia, p. 169 et seq. ("L'influenza degli astri in quel che ha di vero, si riduce per Pico alla luce e al calore che i corpi celesti diffondono" p. 177.)

(103) *de Disc. Math.* (*Opera*, Vol. 1, p. 168).

(104) The case for this position--that Pico only disapproved of certain forms of judicial astrology, but accepted the science in the main--has been argued by Massetani: *La filosofia cabbalistica di Giovanni Pico della Mirandola*. See esp. Appendix pp. 173-183.

(105) *De la Demonomanie*, I, 3, p. 60. (He does not call Pico here as Kocher asserts--*Christopher Marlowe*, p. 151--"le Maistre en l'Art Diabolique," this phrase applies to the, here unnamed, Agrippa, who is thus described by Bodin throughout. Bodin allows that the Florentines practised magic in ignorant good faith; it is Agrippa only who "en a usé par impieté detestable," p. 61.)

(106) *Admonitio adversus Astrologiam*, Geneva, 1549. An English translation by Godfrey Gylby appeared in 1561. Though "a certain convenience betwyxte the starres and planets and the disposition of a mans body" is admitted (B1) yet the science as a whole is "nothing but a divelish superstition" (Aiiij 2^{v}). Catastrophes and benefits to men arise solely from the will of God, and do not necessarily operate by natural means; the fulfillment of predictions is only wrought by the agency of evil spirits. Chamber in his *Treatise* follows Calvin: "A Christian and an astrologer cannot wel mantle in one coat," and if predictions come to pass it is only through a "certain pact and league between the astrologer and the divell." (p. 13)

(107) *Responsiones in disputationes...Pico...adversus Astrologis* (appended to his *de Astrologica Veritate*), lib. II, p. 176, on the concordance of religion and astrology, of which the foolish errors of Bonatus and Albumazar lead to the denial.

(108) Kraus, *Jabir Ibn Hayyan*, Vol. II, p. 98 et seq.

(109) Mandonnet, *Siger de Brabant*, p. 111.

(110) Delrio (*Disquisitionum Magicarum*, 1599) rejoices that the thoroughly pernicious *de Incantationibus* should have been at least suppressed; "opusculum certe miratus fui tam diu tolerari ab Ecclesia, nunc recens & merito in Romano Indici damnatur." (Vol. I, lib. I, cap. 3, p. 32.)

(111) Bacon, *Opus Majus*, Vol. I, p. 278 et seq. Vide infra ch. IV, p. 297. On Dee and the astrological doctrine of world cycles in the sixteenth century vide infra ch. IX, p. 782 et seq.

(112) See Wedel, *The Mediaeval Attitude towards Astrology*, p. 6 et seq.

(113) R. Harvey, *An Astrological Discourse*, pp. 4-5: "The slight arguments of Picus Mirandules, Cornelius Agrippa and divers others...have been thoroughly answered by Balantius, Schonerus, Melancto, Cardan and sundry others, but specially of late by Junctinus."

(114) *Treatise against Judiciall Astrology*, 1601, p. 58.

(115) Ibid, p. 56.

(116) *Second Part of the Anatomie of Abuse*, 1583, H.4 (4)--I4 (8).

(117) *Treatise against Judiciall Astrology*, p. 4. This is also the keypoint of Roger Hutchinson's criticisms in *The Image of God* (1550), ch. 15. Astrology, he declares, leads men to exclude God from the World when He should be thought of bearing a similar relation to it as the soul of the body, because it suggests that God withdrew himself from the creation after the sixth day there being no further need for Him to exercise his powers. Such a view, says Hutchinson, leads directly to the doctrines of the "libertines," to fatalism, nature worship, and the denial of difference between good and evil; and, anxious to leave no loophole for the astrologers, he goes so far as to maintain that the star at Bethlehem, since it must have been motionless, can have been no star, but

an angel. (*Works*, ed. J. Bruce Parker Soc., Cambridge, 1842, p. 77 et seq.) Similarly, Weemes, analysing the causes of atheism, finds one of the chief of these to be belief in the very type of universal law astrologers such as Dee were trying to discover, that is, according to Weemes, the belief "in the constant course of Nature, and the wheeles mooving one within another, and turning about in the selfsame manner"; which he says is the principle tenet and argument of "The Physical Atheist [such as Epicurus] who measures all things by the law of nature." (*Treatise of the foure degenerate Sonnes*, London, 1636, pp. 4, 6.)

(118) *An Apologie or Declaration of the Power and Providence of God*, II, 1, 1, p. 78.

(119) See Dreyer, *Tycho Brahe*, pp. 13-14.

(120) *The New Planet no Planet*, 1646, pp. 67-68. The same spirit as is evident here and in Calvin, Stubbes, and Chamber, is strikingly apparent also in the most sweeping attack on astrology made in England in Dee's day. This was Fulke's *Anti Prognosticon that is to saye An Invective agaynst the vayne and unprofitable predictions of the Astrologians*, written "for the utter subversion of that fained art." (English trans., 1566.) It sets out to confute a formidable list of English advocates for this science--Cunningham, Hyll, Ascham, etc. (Bi^{r})--by attacking all forms of divination as merely the fruit of "overweening curiosity and imposture." (Aiii^{r-v}), from the standpoint that "That only is necessary [if we believe Cicero] without the which we cannot live" (Aiiij^{v})--while prognostications are inessentialsof life, and: "For as it is said and not without a cause: These thynges that are above us, pertayne nothyng unto us: and these thynges which are above our reache ar not to be sought for, with muche curiostie" (Av^{r}).

(121) *De Natura Deorum*, II, 21. A teaching also found in the Hermetic writings; e.g., Hermes declares to Tat: " " (*Hermetica*, ed. Scott, I, pp. 432-433, from Stoboeus, Exc. XI, Aph. 43).

(122) *Preface*, Aj^{v}.

(123) Ibid, bj^{v}. cp. biiij^{v} "those most noble Corporall Creatures."

(124) 415 b and d.

(125) *Statesman*, 269 E.

(126) Solmsen, *Plato's Theology*, p. 88.

(127) *Statesman*, 269 D.

(128) R.G. Bury, *Theory of Education in Plato's Laws* (Revue de l'Étude Grecque Vol. 50, 1937, pp. 314-315).

(129) E. des Places, *Platon et l'Astronomie chaldééne* (Annuaire de l'Inst. de Philo. et d'Hist. Orient, 4, 1936, p. 134).

(130) *Cratylus*, 396.

(131) *Laws*, XII, 967 a-d.

(132) *Timaeus*, 91d. Elyot writes of the metempsychosis taught by Pythagoras--and it is a typical comment of a Christian neo-Platonist of the Renaissance--that it is a doctrine to be interpreted like "his mistical cousailes called *Simbola*," for "therein is a more secrete meanynge &

approchige nere unto rayson" (*Of the knowledge that maketh a Wise Man*, 1533, p. 24^{r-v}, ed. Howard, pp. 63-64).

(133) *De Anima*, 407a.

(134) *De Gons. Phil.*, I, 4.

(135) *De Monarchia*, I, 9 (the theme of this whole chapter). Similarly, Chapman says, perhaps a little more perspicuously, since his explanation probably over-simplifies the teaching, referring to the stars, "We are commanded t'imitate their nature/By making all our ends eternity" (*Byrons Conspiracy*, III, 5, II, 11-12).

(136) Plotinus finds the Christian's great fault to be that they persuade men "to despise the world and the things that are in it'; "they do not honour this sensible fabrication of things, nor this visible earth, but they say that there is a new earth produced for them." But, argues Plotinus, it is not fit "to assert that the soul of the vilest men is immortal and divine, but that all heaven and the stars that are there do not participate of immortality, though they consist of things far more beautiful and pure" than earthly things; to despise the beauty of the world is not to become a good man; and, developing the theme of goodness acquired through love of the beautiful, and the nature and significance of this "love," he demands, "how could this world be separated from the intelligible world; or the Gods in it from the intelligible Gods?" (*Ennead*, II, IX, 15, 5 and 16.)

(137) *de Disc. Math* (*Opera*, Vol. I, p. 150).

(138) Reprinted F.R. Johnson, in J.H.I, I, 3, 1942, p. 102.

(139) *Alae seu Scalae*, 1573, preface Ai^{v}.

(140) Letter to Paeonius on the gift of an astrolabe ch. 5 (*Oeuvres*, trans. Drum, p. 193).

(141) Vide infra Ch. VI.
Almost the first dateable evidence is a note of Dee's of 1556, of over 50 alchemical works he had read that July--Corpus Christi MS. 191 f.88-91; there is also extant an alchemical MS. Dee owned (Addit. MS. 2129) bearing his signature and the date 1558, he has inserted many annotations, chiefly cross references to other alchemical works--by "Albertus Magnus," "Lull" etc.--indicating his already considerable learning in this field.

(142) *Juridico-Philosophica Dissertatio*, p. 122. Similarly, Kelly in a letter to Dyer calls alchemy "our astronomie inferiour" (MS. Ashmole 1420 f.328).

(143) Metzger, *Les Concepts Scientifiques*, I, 2 pp. 28, 30.

(144) Ashmole, introduction to *Theatrum Chemicum Brittanicum*, 1652, A3 (2)^{v}.

(145) de Givry (*Museé des Sorciers*, p. 220) discussing cabalism and hermetic philosophy in the Renaissance includes Dee's name (principally, it is to be supposed, on the strength of the *Monas*) in a list of thinkers such as Pico, Postel, Agrippa, Paracelsus, Khumroth and Fludd, whom he declares "Peuvent être considéré comme les principaux novateurs qui mêlèrent à la théologie chrétienne des principes qui lui étaient étrangers, et qu'elle se refuser d'admettre officiellement."

(146) Sloane MS. 3183 f33, Kelly's Angels failing to understand Dee's attempts to quote in this language, he apologises hopefully, "I am not so good in the Hebrue Tongue; but you know my meaning."

(147) E.g., *Poimandres*, Libellus, 4-9 (*Hermetical* pp. 115-119).

(148) More than thirty copies of printed works by "Lull" occur in Dee's list of his library. The majority Dee seems to have kept grouped together on his shelves (see Harl MS. 1739 f40^{v} (59^{v})), he also possessed a number of treatises in MS. Dee's copy of the *Libellus de Kabbalistico Auditu*, Venice, 1518, is preserved in the R.C.P., autographed and dated 1564 on the last leaf, preceded by the note "Aspica domine de sede sa'cta tua." Dee did not distinguish this from Lull's other writings as a comment he has placed on his MS of the *Ars Demonstrativa* shows (Digby MS 197 f 10^{v}) "Notand_a autem nanc Lulli autem quae hic ars demonstrativa inscribitur pluriby modis sub diversis nomniby ab eodem authore conscriptam esse. Scripsit enim artem magnam, artem brevem, artem principiorum, auditie cabalistic_ et in quibus omniby unã eandeq artem sic varie intitulatem reliquit quod reote annotauit--Jordanus Brunus in sua Architectura."

(149) Pappus, *La Cabbale*, 1903, p. 33.

(150) *Mersenne*, p. 99. Lenoble continues, "La vénération mystique pour la réalité suprême, l'un des Platoniciens, le Dieu ineffable de la tradition juive, conduit à la meter dans l'inconnaissable et à chercher des formes intermédiaires par lesquelles elle peut agir sur le monde, ou nous remonter vers elle." The claims of the cabalah as a philosophy were to become widely enough recognised to induce Liebnitz at one period to take up the study of it. See Foucher de Careil, *Liebnitz, la philosophie juive et la Cabale*, Paris, 1861.

(151) Blau, *The Christian Cabala*, p. 9, suggests Reconati (1290-1350) as the source of the Three World's doctrine, but it may probably, in essence, be much older.

(152) Paris, 1532, p. 9 et seq. The B.M. Copy (621.d.29) has many annotations in a hand similar to Dee's, but there is no signature, for the original flyleaf is lacking.

(153) *Characters*, p. 102.

(154) This is almost the general theme, but see esp. Sect. 35, p. 252, Forbes trans. "In these books [of the cabalists] principally resides, as Esdras with a clear voice justly declared, the spring of understanding, that is the ineffable theology of the supersubstantial deity; the fountain of wisdom, that is the exact metaphysic of the intellecual and angelic forms; and the stream of knowledge, that is, the most steadfast philosophy of natural things."

(155) Blau, *The Christian Interpretation of the Cabala*, observes (p. 61) that it was chiefly Franciscans who took up the Cabalah and Dominicans who opposed it. It was a doctrine that was always in danger of becoming suspect when carried to extremes. One of the condemned theses of Pico was cabalistic. Reuchlin's works were the centre of bitter controversies in France and Germany. By the early seventeenth century it is usual to find the Cabalah when treated of in orthodox works on divination and magic, dismissed as a harmless amusement while it confines itself to confirming established Christian dogmas, such as the Virgin birth, by applying its peculiar methods of exegesis to the Talmud and Old Testament, but held to be a pernicious device liable to devilish direction if extended further. (Peucer's remarks in *Les Divines*, IX, 10, p. 346, are an early example of this attitude: discussing cabalistic "confirmations" of Christian doctrine, he comments "Voila de plaisantes speculations recueilles apres l'évenement, sans autorité de l'Escriture Saincte, sans aucune raison ferme ou necessire, mais fondées en raison probable, et propre à cause de sa convenance.") By the middle of the century a typical moderate judgment is that of Herbert of Cherburg (*Dialogue*, pp. 158-159); he admits that "great and hidden mysteries and powers are contained in numbers," but "as for the way of transporting letters, and making anagrams, and reducing them afterwards to numbers, I must take it to be a little better than ridiculous though I must confess I have noted some things to have fallen out very fatally in this kind."

(156) Morley, *Agrippa*, p. 85.

(157) Even Mersenne was prepared to apply himself to the Cabalah for such purposes as occasion, demonstrating that Silo (Gen. LIX, 10) had the same numerical value in Hebrew as Messiah, i.e., 358, and that Jesu and Silo had the same value (58) in Latin characters (see Lenoble, *Mersenne,* p. 102).

(158) E.g., in John Colet's *Two Treatises on the Hierarchies of Dyonisius* on Giles du Guez, tutor to Mary, librarian to Henry VII; Erasmus sent Reuchlin's book to John Fisher etc. *The Christian Interpretation of the Cabala,* esp. pp.34-36, 62-64.

(159) Ibid, p. 16. On Georgius and Bongus, see pp. 32, 38.

(160) Mersenne recognises in Plato and Pythagoras the Greek source of cabalistic teachings on number, but does not approve of the doctrines any more for this; he proceeds to praise Plato for setting numbers above sensible things generally, but he censures him for treating of the magical powers of certain individual numbers (Lenoble, *Mersenne,* p. 97).

(161) Papus, *La Cabbale,* p. 73.

(162) *De Cons. Phil.*, III, 11.

(163) *Prologue*, 11, 741-742.

(164) *De Verbo Mirifico* (1552 ed.), lib. 2, cap. IX, p. 196.

(165) *De Occ. Phil.*, lib. I, cap. 70.

(166) *Alphabetae linguae sanctae*, p. 5. Cheradamus there writes "Namsi non mediocris est ponderis negotium de litens Graecis vt Plato summa industria, & acri studio, & ingenio sagaci, earum probat divitias, imo delicias in libro eui Cratyl inscriptio est. n_ ent, vt, ipse inquit, alphabeto habemus quicquem melius, quo de veritate primarum nomin_ indicemus...quanto magis litere sanctissimae linguae quae supra omnium existimationem est docta, lepida & gravis" etc. Later, p. 14 et seq he reproduces passages from the *Cratylus* on letters of the Greek alphabet and applies them to the Hebrew. (Pico similarly accepts the positive statements of the *Cratylus*, denying its strictures to be absolute as regards all names. Thus "Opinio Cratili de nominibus ita est intelligenda non quod talia sint noia, sed quod talia esse debenisi sint recta" (*Conclusimes,* p. 133, no. 53), a condition he feels is satisfied by some Hebrew names).

(167) *De Aug. Scient.* Prefatio (ed cit vol. II, p. 285) Bacon is contrasting this with his later arrogant desire for knowledge of good and evil. When Mersenne finally rejected a cabalistic view of language he was compelled to declare that the names Adam imposed were as indifferent and as totally conventional as any others. Lenoble, *Mersenne,* p. 516.

(168) *Sculptura,* ed. C.F. Bell, 1906, ch. 11, pp. 11-13.

(169) In the Astronomical Appendix to his translation of Manilius' *Sphere,* London, 1675.

(170) J. Pantheus, *Voarehadiemia,* Venice, 1536, p. 13.

(171) "Sepher jetzira authore abrahamo" (in *Artis Cabalisticae*, ed. Pistorius, 1582) p. 890.

(172) Pico, *de orat. dign.*, Sect. 34, pp. 249-250, declares on the authority not only of the Hebrews but of Esdras, Hilary and Origen, that Moses on Sinai received from God not only the Law, that was written in five books, "but also a true and more occult explanation of the law."

(173) Epistle Trans. Morrow, *Studies,* p. 181, see Ibid p. 109 ff for comment and comparison with similar passage Epistle VII; *Phaedrus,* 775 c-d.

(174) *Ordinall of Alchemie,* Chap. I (in Ashmole *Theatrum Chem.*, pp. 13-14).

(175) Cheradamus, *Alph. ling. sanct.* p. 28, for instance engages in the not unusual attempt to derive even the names of Greek gods from Hebrew words.

(176) *The Wonderful Workmanship of the World,* trans. T.T., 1578 (by Lambert Danœus) p. 10. (Similarly the cabalistic interpretations of the Scriptures which brought them into line with philosophy and natural science, might be said to be the solution for many Renaissance thinkers to the perennial problem suggested by the conflict or gulf between facts established by experience and the letter of the text, as expressed recently by F. Hoyle after pointing out the gaps and inaccuracies in Biblical cosmology: "Is it in any way reasonable to suppose that it was given to the Hebrews to understand mysteries far deeper than anything I can comprehend when it is quite clear that they were completely ignorant of many matters that seem commonplace to me?"--*The Nature of the Universe,* Oxford, 1950, p. 115. The cabalah provided a means by which the religious scientist of Dee's day could effectively deny the validity of the minor in this argument, since the apparent teachings of the text were no longer the complete, perfect or most important aspect of the revelation to Moses.)

(177) E.g., Clement, *Strom*, VI, 11. Among other things it is there argued that Abraham's servant can be shown to have been in a state of salvation, from the similarity between the number of them--expressed in Greek--and the sign of Jesus.

(178) Zohar III f.152a (quoted Duhem, *Système du Monde,* vol. 5, p. 82).

(179) "Creavit Mundum tribus libres videlicet...scriptis, numeratis, pronunciatio." (*Sepher Jetzirah,* cap. 1 in Pistorius' *Artis Cabalisticae,* p. 889.)

(180) *La Kabbale,* p. 91.

(181) Ibid, p. 93.

(183) Kraus, *Al Jabir* I, p. 256; see esp. p. 223 et seq: "La Balance des Lettres."

(184) *Pico*, p. 52, "dall aria si formano le 22 lettere dell'alfobeto ebraico.--Queste lettere fanno l'uffiuio delle idee di Platone" etc.

(185) See Enrico Cardile's edition of Lull's *Trathato della Quita Essenza*, Todi, 1924, which gives some bibliographical information illustrating the Lull tradition.

(186) The genuineness of this work is discussed by Blau, *Christian Cabala.* Appendix B, pp. 117-118 (cp. also for comments on the work, pp. 17-18). Vide Supra n 148 for Dee's statement on a Lull treatise transcribed for him that this work contains the same teaching as the rest of Lull's writings.

(187) *de Aud. Kabb.*, 1516 f aij^{v}.

(188) *Preface* bij^{r}.

(189) *De Arte Cabalistica*, 1517, f. II^{v}. Reuchlin continues "Hinc recte acceptus esse apparet Cabalistae in arboe decem Phiphereth in medio sephwoth ponendum censuerut magnum illum gedom quasi lignum vitae in medio Ideales paradisi aut quasi lineam rectam, ut diunt

mediam...."

(190) *Egluryn Phraethineb.*, vida infra. Ch. 10, n. 13.

(191) *De Occ. Phil.*, lib. I, cap. 70.

(192) *Preface*, Aiij^{r}.

(193) Marimus, *Life of Proclus.* Rosan trans. ch. XXVIII, p. 29, on the "golden chair" ch. XXVI, p. 28.

(194) See Hopper, *Mediaeval Number Symbolism*, pp. 97-98.

(195) Rouse Ball notes that most merchants continued to keep accounts in Roman numerals until about 1550, most monasteries until about 1650 (*History of the Study of Mathematics*, p. 7). The abacus did not disappear from use until the mid-seventeenth century, although Hindu numerals represent it symbolically.

(196) The almost complete dominance such commercial manuals secured over instruction in the subject, and maintained throughout most of the seventeenth century has been accounted the cause of the destruction, or rather of the prevention of the growth of demonstrative arithmetic in England, throughout this period (Cajori, *History of Elementary Mathematics*, p. 188 et seq).

(197) *Athenae Oxon.*, I, p. 255 (though Wood is speaking here only of Records when at Oxford, before and after his years in Cambridge).

(198) *English Euclid* f. 339^{v}.

(199) Appended to *A geometrical Practical treatise named Pantometria*, 1591, is "A Mathematical discourse of the five regular Platonicall Solides and their *Metamorphoses* into other *Geometricall Badges* conteyning an hundred newe *Theoremes* at least of his owne *Invention*, never mentioned before by any other *Geometrician*." (Digges however announces his treatment will be purely mathematical "meaninge not to discourse of their secrete or mysticall appliances to the Elementall regions and frame of the Celestiall Spheres as thinges remote and farre distant from the Methode, nature and certaintie of Geometricall demonstrations" f.97.)

(200) Even Mersenne on occasion. Thus in *la Vérité des Sciences* he proves from the property of parallelograms--along with other similar demonstrations--that angels may be in heaven and earth at the same time, since these figures are all equal when having the same base and lying between the same parallels, but by displacement to right or left the greater sides may be prolonged to infinity while the base and area remain finite and constant. This "proof" is terminated by a prayer that the guardian angel of the sceptic will keep him in mind of such geometrical theorems (Lenoble, *Mersenne*, p. 236).

(201) *Two Principal Systems*, Dial. I, Salusbury trans., Vol. I, p. 3. Salviati explains to Simplicius that though he is not far from the opinion of Plato and Pythagoras that the human understanding partakes of divinity because it comprehends number, yet the Pythagoreans only pretended to practise "numerology," giving this out to the populace to distract them from prying into their genuine secrets (irrationals, etc.) and serious investigations; for the people would either see the fatuity of this numerology, and not wish to meddle further, or accepting it would be misled, and have the Pythagoreans undisturbed in secure and private possession of true mathematics.

(202) Thus the first mathematical work Mersenne gave to the world was the *Synopsis Mathematica*, 1626, a reissue of ancient writings exhumed and published by Maurolyc seventy-five years previously.

(203) See Boutroux, *L'Idéal Scientifique des Mathématiciens*, p. 46 (Boutroux instances Cavalieri's geometry which, although seeming to replace the finite calculus by a new approach employing radically different elements, is directly traceable to techniques of Archimedes, and is throughout full of respect for "classical form").

(204) Euclid has employed geometrical representations in establishing arithmetical propositions, lines being used much as the literal symbolism of modern algebra (see Robbins & Karpinski study, in Nichomachus, *Introduction,* p. 46).

(205) Cp. Dee, *Preface* *ij^{r} "Practise hath led *Numbers* farder, and hath framed them, to take upon them, the shew of *Magnitudes* propertie: which is *Incommensurabilitie* and *Irrationalitie*. (For in pure *Arithmetike*, an *Unit*, is the common Measure of all numbers.) And, here, Numbers are become, as Lynes, Playnes and Solides: sometymes *Rationall*, sometymes Irrationall. And have propre and peculiar characters (as vz. vJl...)."

(206) See Boutroux, *L'Idéal Scientifique*, p. 77 et seq. Tartaglia makes it a reproach he observes, to a translator of Euclid, that he permitted himself to employ indifferently "multiplicare" and "ducrer." Vieta at the end of the century allowed Arithmetic and Geometry, parallel but quite distinct rules; Descartes' Geometry of 1637 first asserts their logical identity.

(207) f.371^{r}.

(208) f.125^{v}. See De Morgan, *The Connexion of Number and Magnitude* (in the Fifth Book of Euclid). This book which "is all reasoning, unhelped by the senses" contains "exact knowledge of the connexion between the ideas between the ideas which are the foundation of one and the other science" (i.e., geometry and arithmetic) (p. 2).

(209) f.228^{v}. On this book and contemporary algebraic practise, see Heath, *Euclid's Elements*, Vol. 3, p. 8 et seq.

(210) *Preface*, *ij^{v}.

(211) Boutroux points how geometrical considerations misled even Vieta's algebraic practise, and precluded him from a clear view of the problems he attempted (*L'Imagination et les Math selon Descartes*, p. 40, "l'interpretation géometrique conduit Viète à un ordre d'exposition tout à fait vicieux" etc.). But the seventeenth century, though it initiated and even went far by its innovations, to complete and establish a change of attitude, did not absorb its own achievements at once. De Morgan comments on Newton's *Principia*, that "it is the work of an inordinate Euclidean, constantly attempting to clothe in the forms of ancient geometry, methods of proceeding which would more easily have been presented by help of algebra." (*Essays on the Life and Works of Newton*, ed. Jourdain, London, 1914, p. 128). In 1690 Leybourne only discusses Algebra after a full treatment of Euclidean Geometry for "*Algebra* cannot be with profit attained without a competent knowledge of *Geometry*, as of such *Definitions*, *Theorems* and *Problems*" as he has previously set out (*Cursus Mathematicus*, p. 333).

(212) *L'Idéal Scientifique* (p. 182 et seq).

(213) Ibid, p. 95. The *Geometry* of 1637 was not an introduction to this science, but a thoroughgoing application of algebra to it "En d'autres termes l'algèbre selon Descartes, précède logique ment les autres branches des Mathématiques et elle n'est aucunemunt conditionnée par la nature des problèmes auxquels on l'applique." (At the same time though, this revaluation alters radically the rôle algebra henceforth performs, there was nonetheless a certain procedural continuity, since the view of its operations as essentially "combinatory" "est parfaitément conformes, remarrmarquons le, aux vues qui inspiraient les algébristes du Moyen-Ages, et de la Renaissance, que nous avons...rapproché de Raymond Lulle" p. 105).

(214) Ibid, p. 85, in the Middle Ages and Renaissance "L'algèbre, en effet, est essentiellement une *Règle* (Regula disaient les algébristes de la Renaissance, *Ars certis legibus et praeceptis contenta* dit un commentateur de Descartes)." Cp. Dee, *Preface* *ij^{v} on "The Rule or Arte of Æquation" "*The Rule of Coss* or *Algebra*" "The Latins termed it, *Regulam Rei & Census*, that is, the *Rule of thyng and his value*. With an apt name: comprehendyng the first and last pointes of the works."

(215) Rather at times, did the tide seem to be running the other way; witness for example, the prohibition of Gigmilla (which picked out knots in the webs of cloth) secured by organised craftmen in 1552.
(216) *Works*, I. 20.

(217) M. Boas, *Hero's Pneumatica a Study of its Transmission and Influence* (Isis vol. 40, 1949, pp. 38 et seq) has traced the wide effects of Hero's work in the sixteenth century, which in turn lead on to important discoveries in the seventeenth. References multiply of course after Commandine's Latin edition of 1575 (Dee's principle mentions are in the *Preface* of 1570--he had visited Commandine in Italy shortly before); but many earlier writers--Leonardo, Valla, Cardan, etc.--betray their acquaintance with it, and some, like Ramus, are known to have possessed manuscripts of it.

(218) *de Architectura*, lib. X, cap. 8, Vol. II, p. 312.

(219) Delrio, *Disquisit. Magic*, Vol. I, 1, 14 (De Magia artificiali) says this name was imposed by Hero and Pappus. It is a variety of magic that "per se bona est," but "per accidens utraque sit illicita" if engaged on with evil intentions.

(220) *The New Attractive*, 1581, f Aij^{v}.

(221) An illustration of such a usage occurs in Gabriel Harvey's praise of Artisans (*Pierce's Supererogation*, ed. Brydges, p. 188) when he speaks of "the brave engineer, fine Daedalist, skilful Neptunist, marvellous Vulcanist, *and every Mercurial occupationer, that is every Master of Craft.*"

(222) Diogenes Laertius, lib. VII (Loeb, ed. II, p. 83).

(223) *Euclidis Elementorum libri XV*, ed. S. Gracipis 1557, Preface CV^{v} (signed Johannes Dee, 1558, some notes by Dee; the blank leaves covered with his notes on proportional series. BM.530/b/1).

(224) Two relevant passages occur in the Life of Marcelus; during the siege of Syracuse Archimedes "confided in the superiority of his engines, though he did not think the inventing of them an object worthy of his serious studies, but only reckoned them among the amusements of geometry. Nor had he gone so far, but at the pressing instances of King Hiero, who intreated him to turn his art from abstract notions to matters of sense and to make his reasonings more intelligible to the generality of mankind applying them to the uses of common life."

"Yet Archimedes had such a depth of understanding, such a dignity of sentiment, and so copious a fount of mathematical knowledge, that though in the invention of these machines he gained a reputation of a man endowed with divine rather than human knowledge yet he did not vouchsafe to leave any account of them in writing, for he considered all attention to mechanics and every art that ministers to common uses as mean and sordid, and placed his whole delight in those intellectual speculations which, without any relation to the necessities of life have an intrinsic excellence arising from truth and demonstration only" (*Lives*, J.L. and W. Langhorne, 3rd ed., 1778, Vol. 2, pp. 374-375, 379).

(225) See J.L. Heiberg, *Le Rôle d'Archimede dans la développement des Sciences exactes* (Scientia, Vol. XX, 1916, p. 84 et seq).

(226) *De Subtilitate*, lib. XVI, p. 445.

(227) G. Séailles, *Léonard de Vinci*, Paris, 1906, pt. I, ch. 7, pp. 381-382. (Cp. Koyrés remarks, *Galileo and Plato*, J.H.1, 1943, p. 406--"The sixteenth century, at least its latter half, is the period of the reception and study of the gradual understanding of Archimedes.")

(228) See T.L. Heath, introduction to *The Works of Archimedes*, p. vi et seq.

(229) An important example was *La Nova Scientia*, 1550 of Tartaglia (who had published a Latin translation of some of Archimedes works in 1543); it set out to establish a number of propositions on ballistics of which the proofs depend upon a number of precedent "Diffinitioni," "Suppositioni" and "Comune Sententie."

(230) E.G.R. Taylor comments truly enough: "the temper of Dee's mind was such that he looked upon knowledge as the prerogative of the initiate only." (*Tudor Geography*, p. 24.)

(231) See Morley, *Agrippa*, I, p. 221.

(232) As so frequently, Norton gives a convenient statement (*Ordinall*, preface):

> "Hermes, Rases, Geber and Aviceri,
> Merlin, Hortorlan, Democrit and Morien,
> Bacon and Raimond with others many moe
> Wrote under covert and Aristotle also...
> From *Laymen* fro *Clearkes* and so from every man
> They hid this art that no man find it can"

(in Ashmole, *Theatrum Chemican*, p. 8). Dee's son Arthur, an ardent alchemist, and perhaps having inherited some of the temperamental secretiveness of his father, held similar views: a letter of his to Ashmole in 1649 survives (Ashmole MS. 1790 f.66^{r}), written when Ashmole had informed him that he had translated and was about to publish Arthur's Latin *Fasciculus Chemicus.* Arthur's letter bitterly regrets that a translation of any hermetic work should appear in print.

(233) R.A. Strathman, *John Dee as Ralegh's Conjurer* (H.L.Q. X. 4, 1947), p. 370.
(234) *Dialogue*, p. 2.