An Unidentified Work by Giovanni da'Fontana: Liber de omnibus rebus naturalibus
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An unidentified work by Giovanni da' Fontana : Liber de omnibus rebus naturalibus

In 1544 there was printed at Venice by OCTAVIAN SCOT under the name of POMPILIUS AZALUS of Piacenza a work on all natural things contained in the universe, whether celestial or terrestrial or mathematical, and concerning the angels and movers of the heavens. The work is listed by GRAESSE, (1) but not by BRUNET. There is a copy in the British Museum (2) and another at the Bibliothèque Nationale. (3) There appears to be no other edition of the work, and I know of no manuscript of it.

The work is dedicated to the Emperor, CHARLES V, in the preface to whom the captivity of FRANCIS I at Pavia is mentioned, and who appears to have asked AZALUS to write on natural phenomena. In modern works on CHARLES V, however, there seems to be no reference to AZALUS and his book. He represents himself in the preface as both a university lecturer upon medicine and a practicing physician, and as further burdened with the load of a family and sons. He apologizes for his lack of eloquent and elegant diction, an amenity which his adverse fortune and occupation with other arts have prevented him from acquiring. Perhaps this is the reason why his name does not appear in histories

(1) JEAN GEORGE THEODORE GRAESSE, *Trésor de livres rares et précieux*, Dresden, 1859-1869, 7 vols. A recent sales catalogue therefore does not seem wholly justified in describing our book as « resté inconnu à tous les bibliographes. »

(2) AZALUS (POMPILIUS), *Liber de omnibus rebus naturalibus quae continentur in mundo; videlicet coelestibus et terrestribus necnon mathematicis et de angelis motoribus quae coelorum*, Venetiis, 1544. fol.

(3) *Liber* POMPILII AZALI, *Placentini, de omnibus rebus naturalibus quae continentur in mundo, videlicet coelestibus et terrestribus necnon mathematicis ,et de angelis motoribusquae (sic) coelorum*, Venetiis, apud OCTAVIANUM SCOTUM D. AMADEI, 1544. In-fol. 142 leaves. I have used this copy.

of Italian literature or in such a specialized work on the literary history of Piacenza as that of POGGIALI. (4) Nor is it found in such other historical works on Piacenza as I at present have access to. Only in histories of medicine is he mentioned and there very briefly. DE RENZI credits him with an interest in botany and cites HALLER'S *Biblioteca Anatomica* for his interest in anatomy. (5) But this is very likely nothing more than inference from the title of the work ascribed to him. Since he treated « of all natural things », surely he must have included herbs and human anatomy.

We need not worry ourselves overmuch as to who POMPILIUS AZALUS was, since he was certainly not the author of the work before us or perhaps even of its preface or at least not of all of it, nor, so far as we know, was he the author of any other work. He therefore is of no interest to us as an author but only either as a gross liar himself or the invention of an unscrupulous publisher or possibly as the victim of circumstances. But to continue with the preface, in which AZALUS is still supposedly speaking. He says that if his work is not just what the emperor had expected, at least it will be so plainly set forth that it can be understood without further explanation at first reading. His understanding is that the emperor does not want new doctrine but a collection of previous authorities in one volume. He dwells, however, upon the labor to which he has been put in its composition and further expresses his hatred of those who plagiarize the works of others and suppress the authors' names.

The preface then turns to the plan of the ensuing work and states that it wanders as it were over the whole world and is divided into five parts. The first treats of the parts of the world, their order, and the sites of those which are not manifest to the eye, with many theological and philosophical questions annexed. The second part is especially concerned with the orbs of the sky, the planets and their various movements and properties. The third part deals with the four elements and such related phenomena as winds. The fourth part discusses the habitable world, its

(4) C. POGGIALI, *Memorie per la storia letteraria da Piacenza*, Piacenza, 1789, 2 vols.

(5) SALVATORE DE RENZI, *Storia della medicina italiana*, Napoli, 1849, 2nd ed., 5 vols., III, 98 and 287.

divisions, and the effects of the heavens upon different longitudes and latitudes. The fifth part is about the quantities (qualities ?) of the elements of the heavens and stars, and of the marvelous things in any sphere of things active and passive, forsooth, air, fire, water, and earth, and various minerals, plants, and animals. This program, with its strong flavor of astrology, is fairly well carried out in the subsequent text, so that one suspects that this concluding portion of the preface is from the pen of the author of the text and not of POMPILIUS AZALUS, whose warning to CHARLES V that he would find the ensuing work different from his expectation we are now to find amply justified.

For the text bears unmistakable and frequent signs of being the work of an Italian author of the previous century and not of POMPILIUS AZALUS at all. Moreover, this author lived in the earlier part of the fifteenth century. He speaks of PAUL OF VENICE who died in 1429 as having once been his preceptor in the liberal arts, and marvels that PAUL, Augustinian Eremite as he was, should have adhered to the opinion of AVERROES rather than to that of AUGUSTINE (6). BLASIUS OF PARMA (BIAGIO PELACANI) (7) who died in 1416 likewise was at one time our author's teacher (8) and used to tell of a reflection of the Milanese army in the sky

(6) Edition of 1544, fol. 2v. After arguing against the doctrine of the unity of the intellect as diabolical and erroneous, our author says : « hic admiror permaxime de PAULO VENETO ordinis Haeremitarum Sacrae Theologiae doctore olim in artibus praeceptore meo qui huic AVERROIS opinioni plurimum adhaeserit et non verissimo sanctissimoque Patri suo AUGUSTINO. Nemo certe ita sapiens est qui quandoque non descipiat. »

(7) F. AMODEO, « Appunti su BIAGIO PELICANI da Parma. » *Atti del IV Congresso Internazionale dei Matematici*, III, Rome, 1909, 549-553, held on the basis of early printed editions that the name should be spelled PELICANI rather than PELACANI, but is in disagreement with TIRABOSCHI, with AFFÒ, *Memorie degli scrittori e letterati Parmigiani*, 1789, II, 166-168, and with the university records of Pavia as published by MAIOCCHI, *Codice diplomatico dell'università di Pavia*, Pavia, 1905. In a manuscript at the Bodleian, Canon, Misc. 422 ,15th century, fols. 1-52, we read : « Explicit Summa super libro de celo et mundo compilata per famosissimum artium doctorem magistrum BLAZIUM DE PARMA DE PELACANIIS. » At the Vatican, in Ms. Barberini Latin 357, 15th century, fols. 61-107, is found the spelling, « BLAXIUM DE PELLECANIS, » but I know of no Ms. with AMODEO's spelling.

(8) Edition of 1544, fol. 41v (II, 10) : « Recitat tamen BLAXIUS PARMENSIS doctor meus quod aliqui sapientum non attribuunt coelo lunae istum quintum motum... Sed ego simul cum prefato doctore meo salva pace illorum credo quod celum lunae non sit excerptum ab ipso motu. »

which he had seen in 1403 (9). Our author further refers to « our friend, » PROSDOCIMO OF PADUA, who had drawn up some of the most recent astronomical tables. (10) Undoubtedly this was PROSDOCIMO DE' BELDOMANDI, noted writer on astronomy, mathematics, and music, who died in 1428.

In the text, moreover, someone is addressed a number of times in the second person who is certainly not the emperor, CHARLES V, but whom the author calls « my son », and in one place, « My OCTAVIAN. » (11) In another passage he states that, as he was about to terminate the section of his work dealing with images in the heavens, there came to him as he was writing a studious youth who wished to know further why the ancients so often conceived the constellations in human or animal form. (12).

Furthermore, our author indulges in certain definitely dated personal reminiscences. He recalls the damage wrought on August tenth, 1410, by the worst wind in all the history of Venice. (13) He tells how « a certain man of subtle genius and invention who constructed an instrument in 1416 called The Mirror of the Planets thought that the sun had an epicycle but

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(9) *Ibid.*, fol. 75r : « Recitat enim BLAXIUS PARMENSIS olim doctor meus semel apparuisse tempore suo anno gratiae MCCCCIII in Lombardia iuxta castrum quod dicitur Buxetum per tres dies omni die ante horam tertiarum in nubibus equites et pedites armatos. »

(10) *Ibid.*, fol. 35v (II, 3) : « PROSDOCIMUS PATAVIUS amicus noster qui novissimas tabulas instituit. »

(11) *Ibid.*, fol. 31v, « Nollem tamen, fili mi, ad has artes quas ecclesia prohibet te avertas »; fol. 35v, « Sed adverte, fili mi... »; fol. 41r, « Tu quoque, OCTAVIANE mi, priusquam finem libro imponam, operis coelestis fabricam intelliges esse mirandam »; fol. 66v, « Nec credas hoc, fili mi, esse impossibile vel fabulam poetarum. »

(12) *Ibid.*, fol. 28v : « Volebam finem hactenus imposuisse sermonibus de imaginibus supercoelestibus, putans quantum ad propositum opus explicare decreveram satis dixisse. Sed mihi scribenti supervenit quidam studiosus adolescens cupidus ulterius scire cur veteres has formas hominum et animalium magis quam aliorum in coelo conceperint... Nec tibi displicebit, ut opinor, heac prolixitas qui poetarum libros legis. »

(13) *Ibid.*, fol. 71r, « Et ipse memor sum anno ab incarnatione domini nostri M.CCCC. decima die mensis Augusti qua celebratur festum beatissimi Laurenti... » Thus the edition gives the date as 1400, but probably a « X » or « decimo » has been omitted by confusion with the « decima » for the day of the month which immediately follows. Concerning the storm of August 10, 1410, see HAZLITT, *The Venetian Republic*, I (1915), 813; SABELLICO, *Degl'Istorici delle cose Veneziane*, Venice, 1718, II, IX, 463.

no deferent », a view of which our author disapproves. (14) Our author was once sent by the Doge of Venice to Brescia to visit the great condottiere, Count CARMIGNUOLA, then captain general of the Milanese army, who was born in 1390 and died at Venice on May 5, 1432. (15) He comes down to a much later date when he states that in the Jubilee year of 1450 the *aux* of the sun was in the first degree of Cancer. (16)

Such passages as we have been listing are both too numerous, too disseminated throughout the work, and in some cases too closely associated with the opening of chapters, to make it possible to account for them on the theory that AZALUS might have crudely stitched together excerpts from another author or authors without expunging anachronistic personal allusions. Moreover, they are all evidently by one and the same person, whose connection is with Venice rather than Piacenza and whose period is the first half of the fifteenth rather than of the sixteenth century. Finally, it is clear from a reading of the text that it is not a medley or adaptation of one author's work by another, but all in one style and from one pen. To all appearances a work which faithfully reflects the thought and conditions of the middle of the fifteenth century has been printed unchanged in the middle of the next century.

Either, then, the dedication of POMPILIUS AZALUS, by some slip of the printer, was attached to the wrong text and table of contents, or AZALUS, despite his professed abhorrence of plagiarism, made a most bare-faced and inept attempt to pass off as his own labor and the sweat of his brow a work which is manifestly not his own. Perhaps he figured that CHARLES THE FIFTH would never look at the book anyway. Perhaps he even failed to examine it at all closely himself. But we do not greatly care what AZALUS

(14) Edition of 1544, fol. 45v : « Hoc loco nolo praetermittere quod quidam subtilis ingenii vir et inventionis compositorque cuiusdam instrumenti quod speculum planetarum appellavit anno domini MCCCCXVI arbitratus est solem epiciclum habere sed non deferentem cum ille sibi supplere videatur locum deferentis. Sed hanc oppinionem non intendo in praesenti ventilare alias fortasse dabitur tempus quo efficacissimis rationibus falsam esse monstrabimus. »

(15) *Ibid.*, fol. 130v.

(16) *Ibid.*, fol. 39v : « Ad principale redeundo propositum dicimus quod anno gratiae millesimo quadragentesimo quinquagesimo quo Iubileum celebravimus inventa est aux solis esse in gradu primo Cancri. »

thought or did. We are more concerned about restoring to the fifteenth century author the work which should have long since been placed to his credit. Who was this citizen of Venice, this pupil and friend of such a celebrated trio in the learning of the early fifteenth century as BLASIUS OF PARMA, PROSDOCIMO DE' BELDOMANDI, and PAUL OF VENICE? He himself gives us the clue by refering to other writings of his. He had addressed a treatise on perspective in painting to the Venetian painter, IACOPO BELLINI, (17) father of GENTILE (died 1507) and GIOVANNI (died 1516) who were also artists. He had composed a work on the solid sphere and another on a most novel instrument, *De trigono balistario*. (18) This last title is decisive. Our author is no other than GIOVANNI DA' FONTANA, hitherto chiefly known as a Venetian writing in the fifteenth century upon military and hydraulic engineering.

Thereby hangs a tale, and with it goes a moral. In 1925, in the department of Queries and Answers in the pages of *Isis*, (7, 105) Dr. GEORGE SARTON, calling attention to the analysis in S. J. VON ROMOCKI's *Geschichte von Explosivstoffe*, I (1895), 231-240, of GIOVANNI DA' FONTANA's album on military engineering with Latin explanations written in cipher (*Bellicorum instrumentorum liber cum figuris et fictivis literis conscriptus*, written about 1420), asked whether any manuscripts were extant of other works by GIOVANNI therein cited: *Libellus de laberintis*, *Libellus de aquae ductibus*, *Tractatus de pisce ave et lepore*. Working at the Vatican library in 1927 I found a *De speculo* ascribed to IOHANNES FONTANA Venetus in a manuscript of the Barberini collection. (19) And in examining QUETIF and ECHARD's *Scriptores ordinis praedicatorum*, Paris, 1719-1721, 2 vols., I found the statement that a JOHN FONTANA of Piacenza about 1420 wrote a moralizing work (Opus in quo multa moralia) somewhat resembling the *Speculum historiale* of VINCENT OF BEAUVAIS. An answer

(17) *Ibid.*, fol. 74v (III, 14): « Ab hac naturali experientia ars pictoria optimos canones accepit ut in libello ad IACOBUM BELLINUM Venetum pictorem insignem certe descripsi. »

(18) *Ibid.*, fol. 36 r: « Ego similiter cum quendam tractatum de spaera solida componerem et aliud de Trigono Balistario instrumento novissimo in similes errores incidi sequens ALFONSI canones et aliorum vestigia. »

(19) Barb. lat. 350, fols. 61-65v, « Cum inferiorum cognitio ad celestium conducat inquisitionem.../... alio modo et commodius videtis. »

to Dr. SARTON's query to this effect was published in *Isis* (13, 103) in 1929. Meanwhile, with the name of GIOVANNI DA' FONTANA fresh in mind, while working at Oxford in 1929 among the Canonicus manuscripts of the Bodleian, I came across a long treatise on the measurement of altitudes, latitudes, and the instruments for this, with accompanying figures, written in 1440 by IOHANNES FONTANUS, a salaried physician of Venice, and entitled, *De trigono balistario*. Concerning this I despatched another answer to *Isis* (14, 221, 1930), and it was this title, when I turned in 1930 to write up the notes taken the previous summer at Paris on the work ascribed to POMPILIUS AZALUS, which suggested its true author. All of which in a sense went back to Dr. SARTON's original query, so that the moral of this long tale is the value of such a department as that of Queries and Answers. Before the query I had noted nothing by GIOVANNI DA' FONTANA; since it I have found two works by him in manuscripts, one in print, citations by himself of yet other writings of his, and a somewhat dubious secondary reference to yet another work. The fact that QUETIF and ECHARD located him at Piacenza suggests that their notice may be to some extent a confused recollection of our present volume, although it is scarcely a moralizing work and resembles the *Speculum naturale* of VINCENT OF BEAUVAIS more than his *Speculum historiale*.

One of the most interesting features of the *Liber de omnibus rebus naturalibus* is the geographical knowledge or conjecture which it displays at a time nearly half a century prior to the voyages of COLUMBUS and VASCO DA GAMA. This is so considerable that a recent sales catalogue, deceived by the supposition that the work was really composed under CHARLES V, interprets two passages as allusions to America. (20) But the *terra incognita* to which GIOVANNI DA' FONTANA refers was neither South nor North America, continents which at that date lay entirely without his ken. He held rather that the Indian Ocean, as we call it, was landlocked, being bounded on the north by India, on the west

(20) « Deux passages se rapportant à l'Amérique se trouvent au feuillet 94 : « Et ab eius occasu finitur pro parte etiam terra incognita etc. » et au feuillet 95 : « Unde ex tribus maximis totius orbius *(sic)* partibus asia coniungitur africae per dorsum arabiae, quem nostrum mare Mediterraneum ab arabico excludit praeterea per terram incognitam quae indicum pelagum cingit terminatur etc. »

by Africa or Ethiopia, on the east and south by unknown land which, however, was in part accessible and through which there was perhaps a passage. (21) He accepted the common theory that there were two chief seas : one the ocean which encircles all the land, the other a sea surrounded by land or the Mediterranean. Only he did not attempt to restrict the second conception to the Mediterranean Sea between Europe and Africa, and between the Straits of Gibraltar and Syria. For him the midland sea was manifold, and the aforesaid Mare Indicum or Arabicum was its greatest member or manifestation. (22) Just as the western Mediterranean had an irregular coastline and was studded with islands, so the Indian Sea had its gulfs and islands, many of which were inhabited. (23)

Nor did FONTANA believe that the southern temperate zone was uninhabited. In his first book, it is true, he set forth the common view in the fourteenth and fifteenth centuries that part of the earth was not covered by water because the earth had two centers, one of magnitude, the other of gravity, and so in part projects beyond the sphere of water. (24) The converse of this view would have to be that the opposite hemisphere of the earth must be so much the deeper submerged. But in a later book FONTANA tells us that recent cosmographers and especially those who owe their information to true experience and distant travel and diligent navigation have found beyond the equinoctial circle to the south a notable habitable region not covered by water and many famous islands. (25) From such

(21) Edition of 1544, fol. 79r (III, 18) : « mare Indicum quod est in latere orientali australi interclusum ex parte sua septentrionali terra Indica et occidentali terra Ethiopica, ex oriente vero et austro terra incognita est pro parte accessibili. De quo nostri ferunt manifestum hostium non habere, sed nos credimus illud habere et aditum esse ad oceanum vel brachium Amphitritis meridionale sed fortasse hominibus ignotum. »

(22) *Idem*, « multiplex est et maximum eorum proprie dicitur mare Indicum. »

(23) *Ibid.*, fol. 94v, « Non aliter dicimus de mari Indico, omne enim cum suis sinibus arabico persico gargetico eoque qui dicitur proprio nomine magnus sinus a terra similiter ex omni parte clauditur. »

(24) *Ibid.*, fol. 11r, I, 10 : « de quatuor elementorum sphaeris et caeli, et quomodo pars terrae remanet ab aqua discooperta »; fol. 11v, cap. 14 *(sic)* : « de vero situ terrae secundum centrum et cur secundum potestatem sit discooperta ab aqua. » Under this heading we read, « Duplex esse centrum in aliquo elemento, unum magnitudinis, alterum gravitatis. »

(25) *Ibid.*, fol. 90r : « Sed qui successerunt cosmographi et proprie qui vera

regions and islands came pearls, silk, and other precious articles of merchandise. (26) Although FONTANA retained the traditional division of the habitable world into seven climes as a matter of customary convenience, he was careful to explain that many inhabited regions and cities lay outside and beyond these zones. (27)

How shall we reconcile these statements of FONTANA? If, despite his acceptance of the doctrine that more than half of the earth's surface must be under water, because of the greater weight of the element earth, he recognized the existence of land in the southern as well as the northern hemisphere, then it would seem that he must have held that the western hemisphere was entirely covered by the ocean. Thus he affirms that it should be believed that there is not any of the zones containing land which is not covered by water and uninhabitable for about half its longitude. (28)

This is a very significant passage and shows that the bearing of this Aristotelian doctrine of heavy and light as applied to the spheres of earth and water has not been realized with reference to the problem of sailing west and the voyage of COLUMBUS. From what FONTANA says it is evident that the Venetians of the middle of the fifteenth century had considerable knowledge of the Indian Ocean and adjoining regions south of the equator. But this very establishing of the existence of habitable land in the southern hemisphere would make a scientist of the time, who held the general belief that earth was heavier than water and that the sphere of earth was surrounded by a sphere of water, the more inclined to believe that there was no land in the western hemisphere. Such a scientist would discourage his fellow Italians

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experientia et peragratione itinerum et diligenti navigatione certiores facti sunt invenerunt ultra circulum equinoctiali suppositum versus Austrum esse partem notabilem habitabilem ab aqua discooperta et insulas multas atque famosas. »

(26) *Idem*, « Nec est omnino illa zona inter torridam et extremam Australem inhabitabilis ex quibus insulis et partibus ad nos deferuntur optimata omnis fere generis et margaritae gemmae pulcherrimae et sericum et multa pretiosa. »

(27) *Ibid.*, fol. 96r : « Post vero multa secula multae gentes incoluerunt partes plurimas extra climata praedicta et fabricate sunt civitates innumere et notae factae sunt et famosae ita ut non tantum ex clima septem versus septemtrionalem sed ultra primum sub equinoctiali et ultra, ut ante intellexisti, de quibus multa narrantur in cronicis et historiis gesta memoriae digna. »

(28) *Ibid.*, fol. 90r : « Et credendum est quod non sit aliqua ex zonis predictis terrae quae secundum fere medietatem longitudinis eius non sit ab aqua cooperta et inhabitabilis. »

from westward enterprises, and possibly the Portuguese, when they found that the west coast of Africa extended south of the equator, would take the same view, although their discovery of islands out in the Atlantic would have a corrective effect. Empirical observations of fishermen and traders might lead to new truth, but the accepted scientific hypothesis tended to discourage discovery. And this raises the serious question whether scientific hypotheses, although highly esteemed by many, do not, like historical generalizations, tend to accomplish more harm than good. What we need are more facts, to find a few more islands in the ocean of mystery.

Whence did FONTANA obtain his knowledge of distant lands? Probably it was in large measure due to his connection with Venice, the great trading power of the time. He has much to say about the Great Khan, and uses the works of thirteenth century travelers like MARCO POLO and ODORIC, or more recent writers like JOHN ANGLICUS (MANDEVILLE?) and NICHOLAS OF VENICE (NICCOLÒ CONTI?). A less familiar contemporary named by him is CONSTANTINE OF VENICE, a faithful friend of his who had traveled for many years through the empire of the Great Khan. (29) Sometimes such friends regaled him with tales of doubtful veracity. He heard from many merchants who were dear friends of his « and trustworthy » that they had seen in the river Tanais (Don?) and in other streams of Asia aquatic animals which seemed human in form but were really fish. (30) To investigate whether deep sea water was sweet he had constructed a vase for the Venetian patrician, MARCO LIPPOMANO, to drop overboard, but it was never tried out. (31) Despite his knowledge of the earth's surface, he held to the belief that hell was situated within the earth. (32) Those who expressed doubt as to tales of other lands and gave themselves neither to study nor travel he chided as idle stay-at-homes like an ass in its stable or a cow nourished in a courtyard. The best way for such a person to

(29) *Ibid.*, fol. 119r, « CONSTANTINUS VENETUS mihi fidelis amicus qui plurimis annis per regna magni kan peragravit multa similia se vidisse retulit. »

(30) *Ibid.*, fol. 125v, « Audivi a multis mercatoribus amicis meis carioribus et fide dignis se vidisse in Tanay flumine... »

(31) *Ibid.*, fol. 81v (III, 19).

(32) *Ibid.*, fol. 83v.

discover his ignorance would be to pay a brief visit to some adjoining region. « And most assuredly he will find there some differences and novelties, either in the idioms of the language, or in human *mores*, or in the manner of living or costume, or in the arts and crafts, or in variety of plants or fruits or birds and beasts differing from his own province. » (33) And how much more is this the case with a really distant land.

GIOVANNI DA' FONTANA was proud of the improved knowledge of the weather and of the map-making of his age. Prevailing winds, islands, promontories, gulfs, rocks, shoals had all been charted. (34) This is a noteworthy literary reference to the excellence of the portolan charts which sailors of the Mediterranean had been using and making since at least 1300. FONTANA also was proud of the mechanical progress and invention of the later medieval period, and spoke of almost the entire habitable world being full of magnificent fabrics, ingenious machines, and organic instruments for carrying on the arts or operative sciences. (35) From this it is something of a descent to the old story of remedies learned from observing animals heal themselves therewith. Despite the fact that FONTANA was himself the author of an illustrated work on instruments of war, he represents as the invention « of impiety no less than genius... the horrid machine

(33) *Ibid.*, fol. 142v (the last page of the work) : « Si quis talium voluerit suam cognoscere ignorantiam, parum per se a domo discedat et ad aliquam proximam transferat regionem. Et certissime inveniet ibi aliquas differentias et novitates vel in linguarum idiomate vel in moribus hominum vel in modo vivendi vel in habitu corporis vel in artificiis et operibus vel in herbarum diversitatibus vel fructuum vel in volatilium aut quadrupedum differentia aliter quam in propria provincia. »

(34) *Ibid.*, III, 7 (the numbering of the folios here becomes a little confused) : « Navigantes autem cautiores facti et experti multa naufragia atque maris pericula evaserunt (cum facile sit inventis agere et superfactis consulere) ventorumque ortus et differentias adiunxerunt et nostris etiam temporibus communiter observatur... Igitur multiplicantes situs et aspectus ventorum ad loca quaecumque maritima precisius atque tutius navigant per illos signantes insulas promontoria sinus scopulos siccas subaqueas et ripareas ut quae voluerint accedere vel evitare facile possint. Gaudent enim naucleri et portulani ventorum plurimum in suis mappis vel cartis et stellis nauticis descripta. Paucitate vero eorum antiquitus formidabant et saepius periclitabantur in mari. »

(35) *Ibid.*, fol. 110v, « Totus enim fere habitabilis orbis fabricis illustratur magnificis, ingeniosis machinis plenus est et organicis instrumentis de quibus scientiae operativae quas artes vocamus. »

which we call a *bombarda.* » But he marvels that so much force is generated by a weak powder. (36)

Interesting, if true, are some of FONTANA's statements and anecdotes concerning his own times. A « trustworthy » person had told him that when he attended the University of Paris, it had fifty thousand students and more than sixteen thousand colleges and boarding-houses. (37) When on the mission to CARMIGNUOLA, he heard rustics tell of men who ate the little children of their enemies. (38) A Venetian left orders that he be buried in the wall, and a man at Padua, while FONTANA was a student there, insisted upon burial with joy and gladness rather than mourning. (39) When Venice during a war ran short of gold and silver, the government stamped leather and ordered it to be accepted as legal tender for a few days, when gold and silver would again be given in exchange. (40)

Besides those late medieval writers who had been his own friends or teachers, like BLASIUS OF PARMA, PAUL OF VENICE, and PROSDOCIMO DE' BELDOMANDI, FONTANA cites such names from the preceding century as GIOVANNI DE' DONDI, IOHANNES DE LINERIIS, (41) and PIETRO D'ABANO. The theory of AZARCHEL (AL-ZARKALI) and THEBIT of access and recess to explain the movement of the eight sphere was in FONTANA's opinion a subtle invention which avoided the necessity of a vacuum or the penetration of one body by another. King ALFONSO followed it in his Tables, and JOHN DE DONDIS and many others observe it at present. But FONTANA prefers to it the explanation given by PETER OF ABANO in his *Lucidator* and treatise on the movement of the eight sphere. (42) He mentions 1310 as the date of these

(36) *Ibid.*, fol. 111v, « Ex quibus est orrida machina quam bombardam appellamus ad diruendam omnem fortem duritiem etiam marmoream turrem non minus impietatis quam ingenii fuisse existimo qui primo adinvenerit... tantam vim habeat a pusillo pulvere. »

(37) *Ibid.*, fol. 112r, « Audivi a fide digno quod cum ibidem esset etiam illo tunc temporis in illius studio scolares erant quinquaginta millia et plusquam sexdecim millia hospitium collegia. »

(38) *Ibid.*, fol. 130v.

(39) *Idid.*, fol. 133v-134r.

(40) *Ibid.*, fol. 136r.

(41) *Ibid.*, fol. 35v, « IOANNES DE LINERIIS quamvis acutus arismetra... »

(42) *Ibid.*, fol. 34v : « ... hanc sequutus est rex ALFONSUS in suis tabulis et multi antiquorum tabulistarum et IOANNES DE DONDIS Patavius et plurimi hodiernis

two treatises which is, indeed, the date given in their texts. FONTANA also accepts PETER OF ABANO's astrological doctrine of alternating periods of advance and decline in civilization as the movable and immovable zodiacs of the eighth and ninth spheres coincide and separate. (43) Reference is made to a student of perspective who had stated that the utmost radius of a rainbow was forty-four degrees, and that therefore a rainbow could not be seen when the sun was more than forty-four degrees above the horizon. (44) But his name is not given. FONTANA repeats the comparison of the universe to a mechanical clock which God had set running which we find in writers like NICOLAS ORESME of the fourteenth century who accepted JEAN BURIDAN's theory of impetus. FONTANA himself does not go quite that far but retains the blessed angels as moving intelligences. (45).

JOHN OF SACROBOSCO is criticized for having held that a lunar eclipse could never be visible throughout the inhabited region of the globe. (46) But FONTANA agrees with him that the eclipse of the sun at the time of the crucifixion could not have been natural for the reason that the moon was then in its fourteenth day and beneath the horizon in the southern hemisphere in opposition to the sun, and so could not interpose between sun and earth. (47) MICHAEL SCOT and ALBERTUS MAGNUS are other thirteenth century authors cited, and that for such incredible stories as those of men with three eyes or of the men of India or Ireland who grow so old that they ask to be taken to some less salubrious climate in order to be able to die at last. (48)

Not only did FONTANA affirm that God had entrusted to angels

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temporibus observant sed non legerunt opinionem quam veram iudicamus quae fuit PETRI physici medici et in arte astrorum clarissimi sive ex proprio ingenio sive ab alio accepit in suo lucidario astrologico eam ponit atque particularem tractatum de motu octavae descripsit quem ad propositum ordinavit per efficacissimas rationes naturales et verissimas experientias reprobans omnes opiniones eorum qui tales motus accessus et recessus cum reiteratione eorum crediderunt. »

(43) *Ibid.*, fol. 36r-v.

(44) *Ibid.*, fol. 75v (III, 14).

(45) *Ibid.*, fol. 41r (II, 9) : « O mirabilis sapientia divina quod tam nobile horologium aedificavit et mirabiliter moveri iussit per benedictos angelos ministros suos ! »

(46) *Ibid.*, fol. 59v (II, 33).

(47) *Ibid.*, fol. 59v (II, 37).

(48) *Ibid.*, fols. 117v, 140v; see also the story from ALBERTUS at fol. 124v.

the task of running the clock of the world; he also displayed an inclination towards that type of astrological necromancy which there is some reason to suspect had brought CECCO D'ASCOLI to the stake, and towards *Ars notoria* which was often condemned by the orthodox as a forbidden occult art. In a chapter on the blessed angels who dwell in the twelve signs of the zodiac he states that the first makes a man perfect in his life with no fear of damnation; the second, which has a form like a child of three years, enriches men; the third confers power over brothers and kindred and floods; and so on. (49) Exorcists are able to summon these spirits, one of whom has the form of a dove bearing a crown of twelve precious gems on his head and in his mouth a green laurel leaf folded in the sign of the cross. This angel instructs one in geomancy, theology, and mathematical science. The spirit or spirits of the ninth sign or Altitude are able to transport men very swiftly from province to province. Blessed is the man who rises to such merit that he can call and converse with such spirits. « Nor think, my son, that this is impossible or of the fables of the poets. » (50)

The Notory Art admonishes man what sort of life he must lead in prayer and fasting, in chastity and purity of heart, in devotion and faith, and what modes and times and places he must observe, if he wishes to summon to himself some angel from those blessed Intelligences. If they appear to wicked men, it is only to deceive them, but they are coerced by holy exorcists through the virtue of God. Although sometimes they are coerced by philosophers and students of the arts, they do not appear because of the sanctity of such persons' lives but because of their faith and the virtue of the characters and divine names which they employ, which we believe God revealed to Adam while he was still in a state of innocence, and which Adam afterward communicated to his sons. (51)

Although stars are lacking in the ninth sphere, the sages say that characters and outlines of images not apparent to us are present there, including the twelve signs of the zodiac and many

(49) *Ibid.*, fol. 66r.
(50) *Ibid.*, fol. 66v.
(51) *Idem.*

other occult emblems of numerous properties and virtues. The astronomers of Persia and India even say that some of these can be seen by very keen vision at certain seasons on very clear and quiet nights from mountain tops and by those to whom it is conceded or revealed. They attribute these characters to the angels of the spheres of the planets and the stars. Experimenters engrave such characters or names of angels and constellations on metals, or make seals in wax or gum, or paint images of various forms and materials. HERMES, ENOCH, TOC, AARON, EVAX, SALIMANANCHUS, ZENO, ZAEL, PTOLEMY and many Greeks were authorities concerning such images and wrote on the *Ars notoria*. « And we read that in the region of the damned are found characters and infernal figures and names of the chief devils for forming images to promote lust, discord, secret homicide, to spread disease », and **for** other bad ends. Not good angels but astute devils revealed them to men in the abominable art of magic. Many are found in writings on fascination, among the authors of which FONTANA names VIRGIL and PETER OF ABANO. God forbids the manufacture of such images but witches employ them. (52) Some persons think that those images which work against poisons, diseases, fire, thunderbolts, and other ills, or which confer wisdom, eloquence, and concord, are not to be condemned but have an astrological and natural basis and were revealed to men by angels as remedies. But FONTANA concludes that it is safer to omit both kinds since they are hard to distinguish. (53) Some pages later he states that some believe that the names of the mansions of the moon are those of angels deputed to those places, for each mansion has its own characters and peculiar influence, and experimenters are wont to form images or to begin new undertakings when any planet but more especially the moon enters them. (54) Thus experimenting is connected a second time with magic and occult arts. But FONTANA warns

(52) *Ibid.*, fol. 26r, « has fieri semper prohibuit Deus sed iubent malefici. » The preceding discussion occurs on the same page in the chapter (I, 26), « De caracteribus sphaerae nonae et (con) stellationibus. »

(53) *Idem*, « Cum vero similium characterum descriptiones variae sint et pictorum errore atque scriptorum corruptae habeantur et ad corrigendum nullam regulam invenio. »

(54) *Ibid.*, fol. 33v.

his son to have nothing to do with these arts which the church prohibits. (55) Anent pyromancy he remarks in another passage that certain *Piromantici*, who wish to make prognostications from haloes and other appearances of colors of that sort, incorrectly assume that they are in the sky. (56) He alludes to certain activities of the alchemists without expressing disapproval, as when he speaks of their artificial waters or their producing flames of different colors. (57)

Such is the combination of science and superstition, of credulity and correct information in this work by GIOVANNI DA' FONTANA. It will perhaps repay a more detailed study than I have as yet had the time and opportunity to give to it. The primary purpose of the present treatment has been to restore a hitherto unidentified work to its proper author and period and to give some notion of its importance rather than to attempt an exhaustive exposition of its content. It certainly gives us a new insight into the back-ground of the later voyages of discovery including those of COLUMBUS to America.

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(55) *Ibid.*, fol. 31v.

(56) *Ibid.*, fol. 77r (III, 17): « Qui vero alonem et huiusmodi apparentias colorum esse in coelo putant male iudicant (ut quidam Piromantici ex hiis coloribus volentes ferre pronostica) licet ibidem esse appareant. »

(57) *Ibid.*, fols. 75v and 79v (III, 15 and 19).