

PHYSICS IN THE TWELFTH CENTURY : THE PORTA ELEMENTORUM OF PSEUDO-AVICENNA'S ALCHEMICAL DE ANIMA AND MARIUS' DE ELEMENTIS

Sébastien Moureau

Vrin | *Archives d'histoire doctrinale et littéraire du Moyen Âge*

2013/1 - Tome 80
pages 147 à 222

ISSN 0373-5478

Article disponible en ligne à l'adresse:

<http://www.cairn.info/revue-archives-d-histoire-doctrinale-et-litteraire-du-moyen-age-2013-1-page-147.htm>

Pour citer cet article :

Moureau Sébastien, « Physics in the twelfth century : the Porta elementorum of Pseudo-Avicenna's alchemical De anima and Marius' De elementis », *Archives d'histoire doctrinale et littéraire du Moyen Âge*, 2013/1 Tome 80, p. 147-222. DOI : 10.3917/ahdIm.080.0147

Distribution électronique Cairn.info pour Vrin.

© Vrin. Tous droits réservés pour tous pays.

La reproduction ou représentation de cet article, notamment par photocopie, n'est autorisée que dans les limites des conditions générales d'utilisation du site ou, le cas échéant, des conditions générales de la licence souscrite par votre établissement. Toute autre reproduction ou représentation, en tout ou partie, sous quelque forme et de quelque manière que ce soit, est interdite sauf accord préalable et écrit de l'éditeur, en dehors des cas prévus par la législation en vigueur en France. Il est précisé que son stockage dans une base de données est également interdit.

**PHYSICS IN THE TWELFTH CENTURY :
THE *PORTA ELEMENTORUM* OF PSEUDO-AVICENNA'S
ALCHEMICAL *DE ANIMA* AND MARIUS' *DE ELEMENTIS***

par Sébastien MOUREAU

F.R.S. – FNRS

Université catholique de Louvain

INCA – Institut orientaliste

Place Blaise Pascal 1, bte L3.03.33

1348 Louvain-la-Neuve, Belgique

Abstract

*In this article, the author demonstrates the Arabic origin of the *Porta elementorum*, a treatise about elementary natural philosophy which introduces the alchemical *De anima* of Pseudo-Avicenna, and stresses the links between the *Porta elementorum* and the *De elementis* of Marius, another treatise about physics which is partly preserved in the only manuscript Cotton Galba E IV. These observations allow one to put forward the hypothesis of a common Arabic origin for both treatises. The annex is a critical edition of the *Porta elementorum* with an annotated translation, as well as the corresponding extracts of the *De elementis*.*

Résumé

*L'auteur démontre dans cet article l'origine arabe de la *Porta elementorum*, traité de philosophie naturelle élémentaire préliminaire au *De anima* alchimique du pseudo-Avicenne, et souligne les liens étroits qu'elle entretient avec le *De elementis* de Marius, un autre traité de physique partiellement conservé dans le seul manuscrit Cotton Galba E IV. Ces constatations permettent d'émettre l'hypothèse d'une origine arabe commune des deux textes. En annexe, on trouvera une édition critique de la *Porta elementorum* accompagnée d'une traduction annotée et des extraits du *De elementis* correspondant.*

Riassunto

*In questo articolo l'autore dimostra l'origine araba della *Porta elementorum*, trattato di filosofia naturale elementare che introduce il *De anima* alchemico dello pseudo-Avicenna, e sottolinea i legami che lo uniscono al *De elementis* di Marius, un altro trattato di fisica parzialmente conservato nel manoscritto Cotton Galba E IV. Queste constatazioni permettono di ipotizzare una comune origine araba dei due testi. In appendice l'autore presenta un'edizione critica della *Porta elementorum* accompagnata da una traduzione annotata e degli estratti corrispondenti dal *De elementis*.*

[Mots-clés : Avicenne (Ps.), *Porta elementorum*, alchimie, philosophie naturelle]

In 1572, Mino Celsi published in Basel, in the publishing house of Pietro Perna, a compendium of alchemical works entitled *Artis Chemicæ Principes, Avicenna atque Geber**. In this book is found the *Liber de anima*, a medieval alchemical treatise falsely attributed to Avicenna, which is better known under the title *De anima in arte alchemiæ*¹. The introduction of this text is a short treatise about natural philosophy, the *Porta elementorum*. While studying the alchemical *De anima*², I was helped by Charles Burnett at the Warburg Institute, who provided me assistance and led me to find a very close link between the *Porta elementorum* and a treatise about natural philosophy, the *De elementis* of Marius. This article shows that both texts probably come from the same Arabic treatise. It begins with a chronological *status quaestionis* about Marius' *De elementis*, then presents new evidence: first I provide information about the *Porta elementorum* and demonstrate that it is a translation; then I consider the link between the *De elementis* and the *Porta elementorum* and draw new conclusions and hypotheses from it; then I study the differences between the *De elementis* and the *Porta elementorum*. The last part of the article introduces the appendix, which is a critical edition and an English translation of the *Porta elementorum* with corresponding extracts of the *De elementis*: this part contains a list of the witnesses of the *Porta elementorum* and an explanation of the *stemma codicum* and of my method of editing.

I. THE *DE ELEMENTIS* OF MARIUS : *STATUS QUAESTIONIS*

Since Charles Haskins, in 1924, drew scholars' attention to four medieval treatises about natural philosophy contained in the second part of the manuscript London, British Library, Cotton Galba E IV, many studies have been devoted to these works³. In Haskins' opinion, these treatises had perhaps been composed in

*This article is dedicated to Professor Charles S. F. Burnett, to whom I owe the discovery of the link between the *De elementis* and the *Porta elementorum*. I thank him not only for all the help that he gives me in my research and for his contribution to my philological, historical and philosophical training, but also and above all for his friendliness. I also owe him a great debt of gratitude for revising this article. I thank Irene Caiazza and William Newman, who revised my article and helped me to improve it with their corrections and suggestions. I also thank Peter Adamson, Jonathan Black, Charlotte Bodart, Godefroid de Callatay, Eduard Frunzeanu and Didier Kahn for their suggestions and help when writing and revising the article. I also thank Catherine Arbuthnott for providing me her provisional edition of the *De aluminibus et salibus*.

(1) Nine p. not numbered and p. 1-471 of the compendium. Cf. n. 33. The title *De anima in arte alchemiæ* is found only in the edition of 1572, no manuscript mentions it: the title in the manuscripts is *De anima* or *Liber de anima*.

(2) S. MOUREAU, *Le De anima in arte alchemiæ du pseudo-Avicenne. Édition critique, traduction et étude*, PhD thesis, Université catholique de Louvain-Institut orientaliste, Louvain-la-Neuve 2010, and cf. hereafter in this article (especially n. 33).

(3) C. H. HASKINS, *Studies in the History of Mediaeval Science*, Harvard University Press, Cambridge (Mass.) 1924, p. 93-95.

Italy, in a milieu in which Arabic features were being assimilated, but still not completely integrated. The second of these treatises (f. 190r-200r) is the *De elementis* of a certain Marius, unfortunately acephalous in the manuscript (loss of the first folio of the treatise). The three other treatises are : an anonymous treatise about the elements, also entitled *De elementis*⁴; a treatise on the climate, i.e. a translation of Hippocrates' *Liber de aere, aqua et regionibus* from the Arabic version from Galen's commentary⁵; and a *De elementis* identified by Richard C. Dales as the chapter on the elements of Nemesius' *De natura hominis*⁶, which has been shown to be a translation from the Arabic version⁷. The manuscript Cotton Galba E IV is made up of two parts. The second part (f. 187-244), which interests us here, comes from the abbey of Bury St. Edmunds and contains, in addition to the four cited treatises, other important works⁸. According to recent palaeographical studies⁹, the manuscript dates from the mid-12th century¹⁰.

(4) Studied and edited by R. C. Dales, « Anonymi *De Elementis*: From a Twelfth-Century Collection of Scientific Works in British Museum MS Cotton Galba E. IV », *Isis*, 56 (1965), p. 174-189.

(5) This Latin translation of Hippocrates' Περὶ ἀέρων, ὑδάτων, τόπων was edited by H. DILLER, « Die Überlieferung Der Hippokratischen Schrift Περὶ Ἀέρων, Ὑδάτων, Τόπων », *Philologus*, Supplementband, 23/3 (1932), p. 57-135. The fact that this translation was made from Arabic is discussed and proved in C. BURNETT, « Physics Before the Physics : Early Translations from Arabic of Texts Concerning Nature in Mss British Library, Additional 22719 and Cotton Galba E IV », *Medioevo*, 27 (2002), p. 67-68. On the various Latin translations of this work, cf. G. GUNDERMANN, « *Hippocratis de aere aquis locis* », mit der alten lateinischen Übersetzung, De Gruyter, Berlin 1911; K. FREUDENMANN, *Beiträge zur Überlieferungsgeschichte der hippokratischen Schrift Περὶ ἀέρων, ὑδάτων, τόπων*, PhD thesis, Tübingen 1922; HIPPOCRATES, *Airs, Eaux, Lieux*, trans. and ed. J. JOUANNA, Les Belles Lettres, Paris 1966, p. 109-119; H. GRENEMANN, *Hippokrates : « De aeribus aquis locis »*. Interlineare Ausgabe der spätmittelalterlichen Übersetzung und des Fragments einer hochmittelalterlichen Übersetzung, Habelt, Bonn 1996.

(6) R. C. DALES, « An Unnoticed Translation of the Chapter *De Elementis* from Nemesius' *De Natura Hominis* », *Medievalia et Humanistica*, 17 (1966), p. 13-19.

(7) This treatise was studied and edited twice: H. GRENEMANN – U. WEISSER, *Iparchus Minutientis alias Hipparchus Metapontinus: Untersuchungen zu einer hochmittelalterlichen lateinischen Übersetzung von Nemesios von Emesa, De natura hominis, Kapitel 5: De elementis*, Habelt, Bonn 1997; BURNETT, « Physics Before the Physics ». Further manuscript variants are found in another article: ID., « *Verba Ypocratis Preponderanda Omnium Generum Metallis*. Hippocrates *On the Nature of Man* in Salerno and Montecassino », in D. JACQUART – A. PARAVICINI BAGLIANI (ed.), *La Scuola Medica Salernitana. Gli Autori e i Testi*, Sismel – Edizioni del Galluzzo, Florence 2007, p. 69-74.

(8) On these other treatises and the coherence of this second part of the manuscript, cf. BURNETT, « Physics Before the Physics ».

(9) E. PARKER MCLACHLAN, *The Scriptorium of Bury St Edmunds in the Twelfth Century*, Garland Publishing, New York-London 1986, p. 323. Cited from Burnett, « Physics Before the Physics », p. 55, n. 4.

(10) Various descriptions of the manuscript have been made (sometimes contradictory, especially for the dating): last quarter of the twelfth century (probably from 1190-1200) in DALES, « Anonymi *De Elementis* », p. 174-175; from c. 1175 in R. THOMSON, « *Liber Marii De Elementis*: The Work of a Hitherto Unknown Salernitan Master », *Viator*, 3 (1972), p. 180-183; between 1190-

In 1972, Rodney Thomson published an article in which he proposes a first thorough historical study of Marius' *De elementis*¹¹. Thomson noticed that the manuscript was kept in Bury St. Edmunds' abbey, and that it contains the ex-libris of the monk Henry of Kirkestede, who was *armarius* in the abbey between 1360 and 1380. The manuscript also belonged to John Dee: this information allows Thomson to precisely specify the content¹². Thomson also calls attention to Haskins' claim¹³ that in two passages of the *De elementis*, the author asserts that he has written a treatise entitled *De humano proficuo*¹⁴ and promises to compose another about the five senses¹⁵. In the *Catalogus Scriptorum Ecclesiae* written by Henry of Kirkestede, we find the reference of a book entitled *De humano proficuo* attributed to a certain Marius Salernitanus, without incipit or any mention of a library containing the book (as is sometimes the case for other works in the catalogue); the *De elementis* is not in this catalogue, but Henry of Kirkestede died before finishing his work (moreover, he often omits books). Thus, Thomson argues that we may suppose that the mention of the *De humano proficuo* was taken from the *De elementis*, and that the name Marius Salernitanus was on the now lost first page. Thomson also points out a *Marius medicus* listed as dead in 1206 or in 1217 in the register of the dead persons of Salerno's San Matteo church, who could be the same person as the Marius of the *De elementis*¹⁶. In light of this

1200 in *Marius : On the Elements*, ed. R. C. DALES, University of California Press, Berkeley 1976, p. 7-10; mid-twelfth century in BURNETT, « Physics Before the Physics », p. 55-56.

(11) THOMSON, « *Liber Marii De Elementis* ».

(12) Thanks to John Dee's catalogue : *Ibid.*, p. 182-183.

(13) HASKINS, *Studies in the History of Mediaeval Science*, p. 94.

(14) DALES, *Marius : On the Elements*, p. 179 : « D. Quid est illa anima rationalis quam ei esse inditam perhibes ?

M. Substantia que non perit.

D. Quod argumentum ad hoc ostendendum habes ?

M. De hoc agere ad hunc librum minime pertinet. Satis enim aperte inde tractaverunt philosophi, in quorum scriptis argumenta evidentia et necessaria de hoc invenire poteris. In libro quoque alio quem *de humano proficuo* feci satis evidenter de hoc ego ».

(15) *Ibid.*, p. 177 : « D. Si deo libitum fuerit, scripta illorum scrutabor scrutansque quod nunc quero inveniam. Sed precor nunc ut super quinque sensibus corporeis pauca compendiose dicere non fastidias.

M. Precibus tuis libentissime, etsi de eis ad hunc librum agere minime pertinent. Sed simulac et huius voluminis metam perventum fuerit, librum integrum de eis deo opitulante componere aggrediar, ideoque hic de ipsis agere pretermittam ».

(16) No date is mentioned, but Garufi conjectures the date with other information about the year, cf. C. A. GARUFI, *Necrologio del « Liber Confratrum » di S. Matteo di Salerno*, Tipografia del Senato, Rome 1922, p. 124. Quoted in THOMSON, « *Liber Marii De Elementis* », p. 185. However, the recent palaeographical studies of the manuscript (supposed composition around the mid-12th century) excludes this dates. I could not find the note in Galante's new edition of the register, M. GALANTE, « Un necrologio e le sue scritture : Salerno, secoli XI-XVI », *Scrittura e civiltà*, 13 (1989), p. 49-328. Thomson does not seem to confuse this *Marius medicus* with the well known physician Maurus, as he quotes him in the note (Maurus is also in the register). I found two other Marius listed in the register, cf. p. 162 and n. 81.

information and some quotations of the *De elementis* in Urso of Calabria's works, Thomson assumes a dating of the *De elementis* from c. 1175.

Also in 1972, Richard C. Dales analysed the content of the treatise, without studying the historical information¹⁷. In this article, Dales highlights for the first time the link between Marius' *De elementis* and an anonymous work on natural philosophy entitled *Compendiosus tractatus de philosophia et eius secretis*, better known under the title *Apex physicae*¹⁸. Other investigators would examine this text and prove that the *De elementis* is the direct source of the second book of the *Apex physicae* (see below)¹⁹. Dales also underlines a contact between the *De elementis* and a cosmological treatise entitled *De philosophia mundi* attributed to a certain "Alcantarus Chaldaeorum philosophus" (see below)²⁰.

In her PhD thesis (1975), Jacqueline H. L. Reuter-Beaumont²¹ stresses the fact that, again in Henry of Kirkestede's *Catalogus Scriptorum Ecclesiae*, we find the mention of three books of Petrus Alfonsi's dialogues, of which the third is entitled *De humano proficuo*. Moreover, this Petrus Alfonsi's dialogue is quoted in Peter of Cornwall's late twelfth-century *Liber disputationum contra Symonem Iudeum*, as a work about summoning angels to transmute elementary and metallic compounds. According to this information, Reuter proposes to identify Marius with Petrus Alfonsi.

In 1976, Richard C. Dales presented an extensive study of the work, with a critical edition and an English translation²². Dales repeats Thomson's arguments, but opposes some of his opinions. He argues that nothing in the *De elementis* shows that Marius was a *medicus*, so the necrology of 1206 or 1217 is therefore

(17) R. C. DALES, «Marius "On the Elements" and the Twelfth-century Science of Matter», *Viator*, 3 (1972), p. 191-218.

(18) *Ibid.*, p. 192, n. 8.

(19) M.-O. GARRIGUES, «L'*Apex Physicae*. Une encyclopédie du XII^e siècle», *Mélanges de l'École française de Rome. Moyen Âge, Temps modernes*, 87 (1975), p. 313; DALES, *Marius : On the Elements*, p. 35-36; M.-T. d'ALVERNÉ, «Pseudo-Aristotle, *De Elementis*», in J. KRAYE – W. F. RYAN – C. B. SCHMITT (ed.), *Pseudo-Aristotle in the Middle Ages, the Theology and Other Texts*, The Warburg Institute-University of London, London 1986, p. 83; P. MORPURGO, *Filosofia della natura nella schola Salernitana del secolo XII*, Cooperativa Libreria Universitaria Editrice Bologna, Bologna 1990, p. 198-199; introduction to books I-II in «*Apex phisice Anonymi*», ed. H. LEMKE – G. MAURACH, *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft*, Books I-II, 45 (1994), p. 171-263, Books III-IV, 49 (1999), p. 7-80, here, 45 (1994), p. 174-175, this article contains a critical edition of the text; C. BURNETT, «The Works of Petrus Alfonsi : Questions of Authenticity», *Medium Aevum*, 66 (1997), p. 60.

(20) DALES, «Marius "On the Elements" and the Twelfth-century Science of Matter», p. 192, n. 8.

(21) J. H. L. REUTER-BEAUMONT, *Petrus Alfonsi : An Examination of His Works, Their Scientific Content and Their Background*, PhD thesis, University of Oxford, Oxford 1975, p. 208, p. 232 sq. I have had no access to this PhD thesis, I cite the arguments quoted in Burnett, «The Works of Petrus Alfonsi», p. 55-57, and J. TOLAN, *Petrus Alfonsi and His Medieval Readers*, University Press of Florida, Gainesville 1993, p. 207-208.

(22) DALES, *Marius : On the Elements*.

very hypothetical. He asserts that the signs that the *De elementis* has a Salernitan origin are inconclusive: the sources of the *De elementis* are, he says, different from the sources of the Salernitan authors, and the absence of the *elementatum* theory shows it too²³. He puts forward the hypothesis that Marius could have been an author who was born and died in Salerno but worked in France, maybe in Montpellier, in a milieu close to translators from Arabic and very interested in neoplatonism (but he also emphasizes some incompatibilities with the content of the *De elementis*, as the mention of orange trees, etc.)²⁴. As for the dating, he assumed a composition between 1150 and 1170.

In her review of Dales' book, Jacqueline Reuter-Beaumont opposes many of his affirmations²⁵. She investigates the link between the *De elementis* and the *Apex physicae*: a copy of the latter is preserved in the manuscript Vatican Library, Barberini Lat. 283, and in Silverstein's catalogue²⁶, the dating of the composition of this treatise is between 1137 and 1151, since it is dedicated to Robert of Selby, chancellor of Roger II of Sicily from 1137 to 1151²⁷. Therefore, the dating of Dales does not fit, according to Reuter-Beaumont, who proposes a composition of the *De elementis* before 1140. Moreover, the sources noticed by Dales are more often parallels than real sources, and Reuter-Beaumont suggests that Arabic sources are to be sought rather than Latin and does not support the composition in a French milieu.

(23) On this theory, cf. I. CAIAZZO, « The Four Elements in the Work of William of Conches », in I. CAIAZZO – B. OBRIST (ed.), *Guillaume De Conches. Philosophie et science au XII^e siècle*, Sismel-Edizioni del Galluzzo, Florence 2011, p. 10-14; T. SILVERSTEIN, « *Elementatum*: Its Appearance Among the Twelfth-Century Cosmognists », *Mediaeval Studies*, 16 (1954), p. 156-162.

(24) This is also the hypothesis proposed by Brian Lawn in a correspondence quoted by Dales: B. LAWN, « Some Observations on the Milieu of Marius' *De Elementis*: An Extract from a Personal Correspondence to the Editor », in DALES, *Marius: On the Elements*, p. 41-45.

(25) J. H. L. REUTER-BEAUMONT, « Book Review of Marius: "On the Elements". A Critical Edition and Translation by Richard C. Dales », *Medium Aevum*, 48 (1979), p. 115-118. There is another review of Dales work, in which his ideas are well summarized: J. CADDEN, « Book Review of Marius: "On the Elements". A Critical Edition and Translation by Richard C. Dales », *Isis*, 70 (1979), p. 302-303. A short article of Bengt Löfstedt in 1995 offers some corrections and additions to the edition and translation, in a more philological view (B. LÖFSTEDT, « Notes on Marius' *De Elementis* », *Arctos, Acta Philologica Fennica*, 29 (1995), p. 111-113).

(26) T. SILVERSTEIN, *Medieval Latin Scientific Writings in the Barberini Collection*, University of Chicago Press, Chicago 1957, p. 79.

(27) The dating of the *Apex physicae* is established by the dedication, cf. B. OBRIST, « William of Conches, Māshā'allāh, and Twelfth-century Cosmology », *Archives d'histoire doctrinale et littéraire du Moyen Âge*, 76 (2009), p. 51, n. 92. However, the name of the dedicatee appears only in one of the three manuscripts of the *Apex physicae* (Vatican, Biblioteca Apostolica Vaticana, Ms. Barberini Lat. 283), cf. GARRIGUES, « L'*Apex Physicae* », p. 321. The assumed quotations (*Ibid.*, p. 311-312) in the *Apex physicae* of Gundissalinus' *De divisione philosophiae*, which would change the dating (written after 1162), are not convincing when we examine the texts.

In an article in 1991, Dagmar Gottschall points out a citation in the version E of the *Pantheon* of Godfrey of Viterbo (1125-1192/1200)²⁸. In this extract, Godfrey of Viterbo mentions his master (*preceptor*) Marius Salernitanus, who could be the same as the Marius of the *De elementis*. This citation reinforces the hypothesis of a Salernitan origin of the *De elementis*.

In an article in 1997 about the Latin works attributed to Petrus Alfonsi, Charles Burnett refutes Reuter-Beaumont's theory of the identification of Marius with Petrus Alfonsi²⁹. He argues, in addition to linguistic and especially doctrinal variations, an important difference of subject: the *De humano proficuo* cited in Marius' *De elementis* concerns the proof that the soul is an immortal substance, while the *De humano proficuo* attributed to Petrus Alfonsi is about summoning angels for transmutation. He supports the hypothesis of a Salernitan origin of the work. He also studied the similarities between Marius' *De elementis* and the *De philosophia mundi* of "Alcantarus Chaldaeorum philosophus", and put forward the hypothesis of one unique author for both those treatises on the basis of their terminology, their implicit opposition to astrology, and their complementarity³⁰. In a recent article³¹, Barbara Obrist proves that the *De philosophia mundi* is actually a long version of the *Liber de orbe* attributed to Māshā'allāh (without a known Arabic version), containing forty chapters (the short version contains twenty seven chapters).

Finally, in an article about matter in 2009, Michela Pereira briefly mentions that the *Porta elementorum*, which will be studied hereafter, presents some similarities with the *De elementis* in its way of analyzing the various combinations of elements³².

(28) D. GOTTSCHALL, « Marius Salernitanus und Gottfried von Viterbo », *Sudhoffs Archiv, Zeitschrift für Wissenschaftsgeschichte*, 75 (1991), p. 111-113.

(29) BURNETT, « The Works of Petrus Alfonsi », p. 55-61. In his book on Petrus Alfonsi, Tolan explains Reuter's theory and considers the hypothesis plausible, but stresses the weakness of her evidence, cf. TOLAN, *Petrus Alfonsi and His Medieval Readers*, p. 207-208.

(30) The *De elementis* mainly deals with the elementary theory and the sublunary world, and the *De philosophia mundi* concerns cosmology and astronomy.

(31) OBRIST, « William of Conches, Māshā'allāh ». A list of the manuscripts is found p. 64-68.

(32) M. PEREIRA, « 'Materia' nell'alchimia », *Bulletin de philosophie médiévale*, 51 (2009), p. 18-19: « Il riferimento [in Bacon's treatises] al *De anima in arte alchemiae* rinvia a un testo pseudo-avicenniano di tradizione arabo-latina, che si apre con un ampio prologo intitolato "Porta elementorum": qui la costituzione dei corpi è spiegata con lo strutturarsi delle "res absconditae, quae sunt in elementis" (ovvero le *nature* o qualità elementari) mediante reciproche trasformazioni degli elementi, che danno luogo a una dinamica combinatoria (*diversitates*) la cui scansione presenta analogie col *De elementis* di Mario Salernitano ».

II. NEW EVIDENCE

1. *The Porta elementorum of Pseudo-Avicenna's De anima*

The alchemical *De anima* is a long alchemical treatise wrongly attributed to Avicenna³³. It is in fact a compilation and a translation of three Arabic treatises lost up to this day. The translation likely dates from 1226 or 1235, but it is impossible to place the compilation stage (we do not know whether it was compiled before or after the translation)³⁴. It is also impossible to assert whether the translation and the compilation were made by one or different persons. The main part of the work, the second one (*DA*, p. 28-420) was composed between the third quarter of the 11th century and the mid-13th century³⁵. The third part of the text (*DA*, p. 420-468) does not contain specific information for dating.

(33) The information summarized here about the alchemical *De anima* is taken from Moureau, *Le « De anima in arte alchemiae » du pseudo-Avicenne*, which includes a critical edition, translation and study of the *De anima* and will be published within the next years. Celsi's edition was not critical (made in 1572, cf. p. 148). In this article, I abbreviate the title in *DA*, referring to my critical edition, but using the pagination of Celsi's edition, to make it easier for the reader. I propose a critical edition of the *Porta elementorum* in the appendix at the end of this article, giving Celsi's page numbers in the margin, and referring to those numbers in the article. As for older studies about the *De anima*, cf. M. BERTHELOT, *Histoire des sciences. La chimie au Moyen Âge*, vol. I, Imprimerie nationale, Paris 1893, p. 293-305; M. STEINSCHNEIDER, « Zur alchimistischen Literatur der Araber », *Zeitschrift der deutschen morgenländischen Gesellschaft*, 58 (1904), p. 309-315; ID., *Die Europäischen Übersetzungen aus dem Arabischen bis Mitte des 17. Jahrhunderts*, Carl Gerold's Sohn, Vienna 1904, § 143; J. RUSKA, « Die Alchemie des Avicenna », *Isis*, 21 (1934), p. 13-51; ID., « Zum Avicennatext des Cod. Vadianus 300 », *Sudhoffs Archiv*, 27 (1934), p. 499-510; G. C. ANAWATI, « Avicenne et l'alchimie », in *Oriente e Occidente nel Medioevo: filosofia e scienze. Convegno internazionale 9-15 aprile 1969*, Accademia nazionale dei Lincei, Rome 1971, p. 286-288; M. ULLMANN, *Die Natur- und Geheimpwissenschaften im Islam*, Brill, Leiden 1972, p. 222-224; G. C. ANAWATI, « L'alchimie arabe », in R. RASHED (ed.), *Histoire des sciences arabes*, t. III: *Technologie, alchimie et sciences de la vie*, Seuil, Paris 1997, p. 134-135; S. MOUREAU, « Some Considerations Concerning the Alchemy of the *De Anima in Arte Alchemiae* of Pseudo-Avicenna », *Ambix*, 56 (2009), p. 49-56; ID., « Questions of Methodology About Pseudo-Avicenna's *De Anima in Arte Alchemiae* », in M. LÓPEZ PÉREZ – D. KAHN – M. REY BUENO (ed.), *Chymia. Science and Nature in Early Modern Science (1450-1750)*, Cambridge Scholars Publishing, Newcastle 2010, p. 1-19; ID., « *Ratio et sensus*: les sens au service de l'acquisition des connaissances dans le *De anima in arte alchemiae* du pseudo-Avicenne », in T. BÉNATOUÏL – I. DRAELANTS (ed.), « *Expertus sum* ». *L'expérience par les sens en philosophie naturelle médiévale*, Sismel-Edizioni del Galluzzo, Florence 2011, p. 269-288; S. MOUREAU, « *Elixir Atque Fermentur*. New Investigations About the Link Between Pseudo-Avicenna's Alchemical *De Anima* and Roger Bacon: Alchemical and Medical Doctrines », *Traditio*, 68 (2013), p. 277-325.

(34) These translation dates are taken from colophons in two manuscripts, but it is impossible to assert whether these dates are real or fake: Kues, Bibliothek im St. Nikolaus Hospital, Cusanus 299, f. 49v; Montreal, McGill University, Osler 480, f. 225r (and in Celsi's edition, p. 468, of which this manuscript is the direct model).

(35) This dating is established by: the frequent use of a coin, the maravedis (*morabetini*, i.e. *al-murābiṭūn*, the Almoravids), which begins to be used during the third quarter of the 11th century (*terminus post quem*); and the quotations of the text in Vincent of Beauvais' *Speculum doctrinale* and *Speculum naturale* (*trifaria* version), finished between 1258 and 1260, cf. M. PAULMIER-FOUCART,

In this article, I will focus on the first part of the book (*DA*, p. 4-23), entitled *Porta elementorum*³⁶. It is a short treatise about elemental physics which introduces the alchemical *De anima*, describing the elements, their properties, and the various combinations and proportions of elements in the things of the sublunary world. This analysis of elementary compounds is the basis of the alchemy of the *De anima*³⁷. The *Porta elementorum* has been written in the form of a dialogue between a master (*magister*) and his disciple (*discipulus*). Its attribution to Avicenna is due to the forged attribution of the other parts of the alchemical *De anima*, but no sign of an Avicennian composition is found in the *Porta elementorum*³⁸. Although the Arabic original is now lost, several traces indicate that the *Porta elementorum* is a Latin translation of an Arabic text. First of all, the title is an interesting sign: the expression *Porta elementorum* (literally «door of the elements») is a translation from the Arabic, the Arabic word *bāb* meaning «door», but also «chapter». This translation is not necessarily a mistake, because of the medieval translation method called *verbum de verbo*³⁹:

Vincent de Beauvais et le Grand Miroir du Monde, Brepols, Turnhout 2004, p. 12-14, p. 119-120 (*terminus ante quem*).

(36) I do not include the prologue and the table of contents, as they do not belong to the *Porta elementorum*, but maybe to the original state of the second part of the alchemical *De anima* (before the compilation), or to compiler's additions. For more information about this, cf. MOUREAU, *Le De anima in arte alchemiae du pseudo-Avicenne*, vol. I, part 1, p. 46-47.

(37) The alchemical doctrine of the work is almost entirely inspired by the corpus of texts attributed to Jābir ibn Ḥayyān. For information about this corpus, cf. P. KRAUS, *Jābir ibn Ḥayyān, contribution à l'histoire des idées scientifiques dans l'Islam*, vol. II: *Jābir et la science grecque*, Institut français d'archéologie orientale, Le Caire 1942; ID., *Jābir ibn Ḥayyān, contribution à l'histoire des idées scientifiques dans l'Islam*, vol. I: *Le corpus des écrits Jābiriens*, Institut français d'archéologie orientale, Le Caire 1943; H. CORBIN, «Le livre du Glorieux de Jābir Ibn Ḥayyān», *Eranos Jahrbuch*, 18 (1950), p. 47-114; F. SEZGIN, *Geschichte des arabischen Schrifttums*, t. IV: *Alchemie – Chemie – Botanik – Agrikultur, bis ca. 430 H.*, Brill, Leiden 1972, p. 132-269; ULLMANN, *Die Natur- und Geheimwissenschaften im Islam*, p. 198-208; JĀBIR IBN ḤĀYYĀN, *Dix Traités d'alchimie, les dix premiers traités du livre des Soixante-dix*, trad. P. LORY, Sindbad, Paris 1983; ID., *Tadbīr al-iksir al-āḡam. L'élaboration de l'élixir suprême, Quatorze traités de Ġābir Ibn Ḥayyān sur le Grand œuvre alchimique*, ed. P. LORY, Institut français de Damas, Damas 1988; S. N. HAQ, *Names, Natures and Things. The Alchemist Jābir Ibn Ḥayyān and His Kitāb al-Aḡjār (Book of Stones)*, Kluwer Academic Publishers, Dordrecht 1994; F. SEZGIN, *Jābir Ibn Ḥayyān: Texts and Studies*, 3 vols., Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, Frankfurt 2002.

(38) The name of Avicenna is even not quoted in the *Porta elementorum*, while it is found many times in the rest of the *De anima*.

(39) This is a translation method extremely close to the original text, a word by word translation. For more information about this method, cf. C. BURNETT, «Translating from Arabic into Latin in the Middle Ages, Theory, Practice, and Criticism», in S. G. LOFTS – P. W. ROSEMAN, *Éditer, traduire, interpréter. Essais de méthodologie philosophique*, Peeters, Louvain-la-Neuve 1997, p. 57-78, and ID., «Translation from Arabic into Latin in the Middle Ages», in H. KITTEL et alii (ed.), *Übersetzung. Translation. Traduction. Encyclopédie internationale de la recherche sur la traduction*, vol. II, De Gruyter, Berlin 2008, p. 1234-1237; J.-M. MANDOSIO, «Humanisme ou barbarie? Formes de la latinité et mémoire de l'Antiquité dans quelques traductions médiévales de textes philosophiques

this method insists on the use of one Latin term to translate each Arabic term, whatever the context, and this led the translator to name the treatise *Porta elementorum*, i.e. «door of the elements», probably translating the expression *bāb al-arkān* or *bāb al-ustuqūsāt*, which in Arabic means «chapter on the elements». This word *porta* is used four times in the *Porta elementorum*, always with the Arabic meaning «chapter»⁴⁰. We find in the *Porta elementorum* the transcribed word *alginz*⁴¹: on account of a gloss present in two manuscripts (*id est genus*), maybe a gloss of the translator himself, this term can be identified as a transliteration of the Arabic *al-jins*, i.e. «genus». Moreover, *alginz* is a form that derives from Arabic most probably through a Spanish intermediary, due to the linguistic transformation⁴². An Arabic concessive formula literally translated into Latin is found, «Et non putes quod in via philosophorum omnes possint pergere nisi illi qui naturam habent philosophorum»⁴³: this syntactic construction is usual in Arabic, but not very common in Latin. Another sentence in the *Porta elementorum* shows a trace of Arabic syntax, though less obvious, «et postquam se facit subtus terram ubi non est calor et non debet esse calidum»⁴⁴: the use of the *et* to introduce the main clause after a subordinate causal clause is not a Latin use, but is very likely the translation of the Arabic conjunction *fa*, of which the use in this context is normal. The other Arabic traces are more tenuous: many cases of polysyndeton, a series of adjectives without coordinating conjunctions, some

arabes », in H. CASANOVA-ROBIN – P. GALAND, *Écritures latines de la mémoire de l'Antiquité au XVI^e siècle*, Classiques Garnier, Paris 2010, p. 227-263.

(40) However, these four occurrences appear in the last paragraph of the *Porta elementorum*, which could be an addition of the compiler (this is an argument for a compilation made before the translation, but nothing sure can be said about this hypothesis, as arguments *contra* are also found). The title *Porta elementorum* is itself quoted twice (counted within the four here above): *DA*, p. 22 (below p. 204-206, l. 330-338) «Et explanabimus capitula uniuscuiusque singulatum et portas cum verbo largo et intellectu completo, secundum quod volumus facere in isto libro. [...] quia qui operatus fuit de isto libro antequam portam istam elementorum bene intelligat in vanum laborat...»; and *DA*, p. 23 (below p. 206, l. 342-345): «Lege multum portam istam et stude in eam, et lege et intende, et ad Deum te commendo. Laudetur Deus quia complevimus portam elementorum et incipimus primam dictionem de decem dictionibus libri nostri in nomine Domini ».

(41) *DA*, p. 10 (below p. 182, l. 113-118): «Modo ostendam tibi quod omnia quae sunt in mundo sunt creata de istis quatuor elementis. Debes scire quod sunt res in quibus duo elementa sunt maiora et duo minora; et sunt res in quibus tria sunt maiora et unum minus; et sunt res in quibus unum maius est et tria minora; et sunt in quibus omnia aequaliter se habent. Isti quatuor modi sunt alginz id est genus ».

(42) On the Castilian origin of these phonetic phenomena, cf. G.B. PELLEGRINI, *Gli arabismi nelle lingue neolatine con speciale riguardo all'italia*, vol. I, Paideia editrice, Brescia 1972, p. 43-128 and 453-488. The two other parts of the *De anima* contain more obvious signs that their translation was made in a Spanish milieu. Moreover, the second part of the book was written in an Andalusian milieu.

(43) *DA*, p. 22 (below p. 204-206, l. 335-337). However, this formula is found in the last paragraph of the *Porta elementorum*, which could be an addition of the compiler, cf. n. 40.

(44) *DA*, p. 16 (below p. 192, l. 212).

constructions that resemble Arabic syntax⁴⁵, and several formulas (*laudetur Deus, si Deo placuerit*). The text of the *Porta elementorum* is heavily corrupted and incomprehensible in many passages; and the Latin language is very poor and arid. About the corruption stage of the *Porta elementorum*, different hypotheses may be put forward: the text could have been corrupted in Arabic, before any compilation or translation; the text could also have been badly translated because of the poor understanding of the translator; finally, the corruption could have been done after the translation, directly in Latin. To the second hypothesis may be added the argument that the other parts of the Pseudo-Avicennian *De anima* are also badly translated, but this remains hypothetical as they could have been translated by different translators⁴⁶.

2. Links between Marius' *De elementis* and the *Porta elementorum*

Thanks to the help of Charles Burnett, I have been able to find a very close connection between the *De elementis* and the *Porta elementorum*. But in considering these links one must keep in mind the corrupted state of the *Porta elementorum*. The texts share many common points, but also differ in various features. To allow the reader to closely observe the affiliation, I supply in the appendix a critical edition of the *Porta elementorum* with the corresponding extracts of the *De elementis* preceded by an explanation of each similarity. The observations explained hereafter are a synthetic summary of some links between the two texts⁴⁷; but the reader may have a more precise idea of it by reading the two appendix, to which references are made in notes for each argument.

The most obvious similarity between the two treatises is found in their form: both are written in the form of a dialogue between a master and his disciple. Several introductions, transitions and conclusions of arguments are very alike⁴⁸. The *De elementis* contains typical systematic tables showing all the possible combinations of elements; the *Porta elementorum* shows very similar lists and calculations of combinations, but these are incomplete, chaotic and heavily distorted⁴⁹. The corruption of these tables in the *Porta elementorum* is obvious, and they cannot be understood without the *De elementis*. In addition to these

(45) *DA*, p. 15 (below p. 192, l. 200-201): «[...] et non debes aliquam ignorare de 145 diversitatibus, in quo loco uniuscuiusque illarum est res vitalis et herbalis ».

(46) The variation of vocabulary between the three parts of the *De anima* suggests it, but, because of the method of the *verbum de verbo* and its literality, this variation could come from a variation of vocabulary between the three Arabic texts (even if they were already compiled).

(47) Each example is followed by the reference to the extract in the appendix, but not the complete reference to the notes in the translation concerning the subject; the reader has to read the passage in the translation of the *Porta elementorum* in the appendix in order to see all the explanations I propose, as well as the corresponding extracts in the second appendix.

(48) Cf. for example appendix, p. 192, l. 204-209 and p. 194, l. 238-244.

(49) Cf. p. 182, l. 114-117 and 117-131, p. 184, l. 131-138, 139-140 and 141-146, p. 196, l. 249-262.

formal links, the two treatises also share many common doctrinal assertions. The subject of both texts is the physics of the sublunary world, and both specifically focus on the elements and the compounds of the four elements. The proofs for various doctrinal affirmations in describing the elements are similar: fire is hot because it dries humours/humid things⁵⁰; before explaining the qualities of air, both texts prove that air exists by giving an argument about bellows⁵¹; air is hot because water turns into air when it is heated, and air is the nutriment of fire⁵²; air is moist because steam turns into water when it condenses when touching a cold place⁵³; air is light because it is above water⁵⁴; air lets everything enter into itself, so some people (the *Porta elementorum* says fools) think it does not exist⁵⁵; water is cold because it cools the body of persons who are in direct contact with water⁵⁶. When speaking about the place of fire, both the *Porta elementorum* and the *De elementis* refer to the same extracts of Plato's *Timaeus* and Aristotle's *De generatione et corruptione*⁵⁷. Both texts add to the four elemental properties (the so-called Aristotelian properties, heat, coldness, moisture and dryness) two specific additional properties: *ponderositas* and *levitas*⁵⁸. These additional properties are called *proprietates* in the *De elementis* (the elemental properties being called *naturae*)⁵⁹, and *res absconditae in elementis/naturae absconditae* in the *Porta elementorum*. The *ponderositas* and *levitas* of each element are the same in both texts, and therefore the hierarchy of weights of the elements is also the same, though this hierarchy is very usual, from the lightest to the heaviest: fire, air, water, earth. However, the *Porta elementorum* also describes a peculiar third additional property, *solutio* (cf. below). Nevertheless, these additional properties are secondary properties, they do not enter into the basic system of classification of the elements in the two texts, which are mainly using the Aristotelian properties⁶⁰. In both texts, we find the assertion that air is the nutriment (*cibus/dieta*) of fire and its proof: we see that, when we close the inlet of air of a lamp, the fire

(50) Cf. p. 172, l. 25-27.

(51) Cf. p. 172, l. 29-39.

(52) Cf. p. 174, l. 39-51. Cf. also below in the paragraph.

(53) Cf. p. 176, l. 52-58.

(54) Cf. p. 176, l. 59-63.

(55) Cf. p. 176, l. 59-63.

(56) Cf. p. 178, l. 71-75.

(57) Cf. p. 188, l. 160-164.

(58) Cf. p. 170, l. 12-15.

(59) Cf. n. 91.

(60) If the heaviness and the lightness are already found in the description of the elements in Plato's *Timaeus*, they are not the usual properties used to classify the elements in the Middle Ages, neither in the neoplatonic system nor in the Aristotelian system. On this complex question, cf. the recent study I. CAIAZZO, « La forme et les qualités des éléments : lectures médiévales du *Timée* », in F. CELIA – A. ULACCO (ed.), « *Il Timeo* ». *Esegesi greche, arabe, latine*, Edizioni PLUS (Pisa University Press), Pisa 2012, p. 307-344.

goes out⁶¹. In addition to this, both say that the nutriment and what receives the nutriment must have a common nature (common property), but must also differ (i.e. the intensity of the property must be different), in order not to be the same thing: for example, air and fire are hot, but they differ, fire being hotter than air; because both are hot, air can be the nutriment of fire⁶². When explaining the transformation of elements into each others, the same proofs are again found in both texts: water turns into air (steam) when it is heated, air turns into fire when a lamp is burning, fire turns into air when it is extinguished⁶³, and air turns into water when it condenses⁶⁴. As in the *De elementis*, the *Porta elementorum* insists on the fact that opposite elements, when they are mixed according to the same amount, cancel each other out⁶⁵. In both texts, the assertion that all things in the sublunary world are compounded of the four elements is repeated several times⁶⁶. About this affirmation, both texts give the example of milk, in which the four elements can be observed, and which can be divided into the four elements by distillation⁶⁷. But if things of the world are all compounded of the four elements, they contain the four elements/properties in potency, not in act, as for instance, in a fruit, say both texts⁶⁸: for example, if the fruit was water in act, it would be liquid and flow⁶⁹. We find in both texts, when talking about the creation of glass, a discussion about the temperature in the depths of the earth. It is considered hot during the winter, and cold during summer, because of the sun which heats the surface of the earth during summer, and this heat recedes into the depths of the earth during the winter: this can be observed by the fact that water in wells is found to be cold during the summer, and hot during the winter⁷⁰. Both texts have this same reasoning, but the *Porta elementorum* differs slightly, adding a sentence that invalidates the argument (maybe a later gloss). And finally, both texts prove that glass is made by the coction of earth in the depths of the earth by the same arguments: when craftsmen use an earthen instrument to melt silver, this instrument vitrifies when it is heated often and at a very high temperature⁷¹. When considering all these similarities, at first glance, the *Porta elementorum* seems like a kind of a corrupted reworking of the *De elementis*, but, as I will explain below, it seems that the case is a little bit more complicated.

(61) Cf. p. 174, l. 39-51.

(62) Cf. p. 174, l. 39-51 and p. 176, l. 63-70, and translation n. 19.

(63) Cf. p. 180, l. 95-104.

(64) Cf. p. 176, l. 52-58 and p. 180, l. 105-106.

(65) Cf. p. 198, l. 270-274.

(66) Cf. for example p. 186, l. 146-152.

(67) Cf. p. 190, l. 181-185, l. 185-190 and l. 190-197.

(68) Cf. p. 186, l. 156-159, and p. 188, l. 160-164 and l. 167-171.

(69) Cf. p. 188, l. 164-167.

(70) Cf. p. 192, l. 212-225.

(71) Cf. p. 194, l. 227-238.

3. *Marius' De elementis and the Porta elementorum: two versions of one Arabic treatise?*

A possible explanation for these links between the *De elementis* and the *Porta elementorum* may be proposed. At first, we have observed that the *Porta elementorum* contains obvious traces that it is a translation from Arabic, and we notice that its actual state is corrupted. Secondly, we have seen that the *Porta elementorum* and the *De elementis* share important similarities in their content and their form. As the *Porta elementorum* is a translation from Arabic, the *De elementis* cannot be its direct source; and because of its corrupted and lacunary state, the *Porta elementorum* cannot be the direct source of the *De elementis*. Therefore, the origin of the *De elementis* must have been a text close to the origin of the *Porta elementorum*. Thus, these two texts are in all likelihood two versions, or more precisely two reworkings of one single Arabic treatise. It is nevertheless impossible to assert whether they are two different Latin translations of the same Arabic text or two reworkings of the same Latin translation of one Arabic text. If the *Porta elementorum* shows obvious traces that it is translated from Arabic, the *De elementis*, written in a polished Latin, shows no internal element allowing one to assert that it is a translation, but could be a translation made in the style of the literary translations from Arabic into Latin, which are often more like a rewriting than a translation⁷². Perhaps the fact that the *De elementis* is a translation was explained in the beginning of the text, which is lost, but it is possible, and even very probable, that the treatise was presented as an original work: some medieval translators did not hesitate to appropriate texts that they had translated, as, for instance, Constantine the African. In addition to this, the *De elementis* shows a linguistic trace of the Italian language. The text contains the word *carrublae* (carob)⁷³: this word, taken from the Arabic *kharrūb*, is an Italian transcription of this term, the Castilian transcription being (still now) *algarroba* (or *garrova*)⁷⁴. We may therefore go farther and put forward the hypothesis of two channels of reworking/translation into Latin, one made by an Italian or in an Italian milieu (to which Marius' *De elementis* pertains), and the other made by a Spaniard or in a Spanish milieu (to which the *Porta elementorum* pertains). In accordance with the more obscure, corrupted and lacunary state of the *Porta elementorum*, we may suggest that the original was closer to the *De elementis*. In order to check the reasoning explained here and support it, the differences between the two treatises will be analysed in the next section.

The translation of the *Porta elementorum* cannot be dated precisely: we may only argue that the system of the *verbum de verbo* used by the translator suggests a

(72) On the medieval translation methods, cf. the articles cited in the n. 39.

(73) DALES, *Marius: On the Elements*, p. 167: « Quedam post multi temporis diuturnitatem, ut palme et carruble ».

(74) On the phonetic changes of this Arabic word in Italian and Castilian, cf. PELLEGRINI, *Gli arabismi nelle lingue neolatine*, vol. I, p. 56 and p. 188.

later translation than for the *De elementis*, but this suggestion is too hypothetical to be given serious credence⁷⁵. The *Porta elementorum* could have been translated before or after the compilation of the Pseudo-Avicennian *De anima* and it could have been reworked and corrupted before, during or after its translation from Arabic into Latin. The dating of the Arabic original source of the *Porta elementorum* and the *De elementis* (or the possible intermediaries between them) is even more complicated, and we may only suggest that it was diffused in the beginning of the 12th century. The dating signs of the *De elementis* described in the *status quaestionis* remain valid, but the assumed dating of composition corresponds henceforth to the reworking/translation, and no longer to the composition. The reworking/translation could therefore have been made before 1151⁷⁶. As has been said before, close links have been found between the *De elementis* and the long version of the *Liber de orbe* attributed to Māshā'allāh: their terminology, their implicit opposition to astrology, and their complementary subject matters. A thorough study would certainly bring new information about both treatises. This could show a relevant link between authors or translators, as those texts seem to be reworkings/translations from Arabic. It could also bring new elements explaining the chronology between the long and short versions of the *Liber de orbe*. The attribution of the *Liber de orbe* to Māshā'allāh is doubtful and the name "Alcantarus philosophus Chaldaeorum" is still not clearly explained⁷⁷. As Barbara Obrist showed, no mention of a treatise which could be the original of the *Liber de orbe* is found in pages about Māshā'allāh in Ibn al-Nadīm's *Fihrist*. The same may be asserted about the *De elementis* and the *Porta elementorum*. Unfortunately, the names *De elementis* – *Kitāb (fī) al-arkān*, *Kitāb (fī) al-uṣṭuqusāt?* – and *Porta elementorum* – *Bāb (fī) al-arkān*, *Bāb (fī) al-uṣṭuqusāt?* – are so common that it would be difficult to find the original, unless by chance. In addition to this, a detailed study of the influence of the *Liber de orbe* and the *De elementis* on the *Apex physicae* would be interesting; the *De elementis* and the long version of the *Liber de orbe* seem to have been used by the author of the *Apex physicae*: the *De elementis* is obviously the source of Book II, especially for the tables⁷⁸, and the prologue of the long version of the *Liber de orbe* contains similarities with the prologue of the *Apex physicae*⁷⁹.

(75) On this subject, cf. MANDOSIO, « Humanisme ou barbarie ? », in which Jean-Marc Mandosio gives a precious analysis of medieval translations methods and brings a new point of view to the usual classification of medieval translations.

(76) This is based on the dating of the *Apex physicae*, which uses the *De elementis* as a source for its second book, cf. above.

(77) Cf. OBRIST, « William of Conches, Māshā'allāh », p. 33-34.

(78) Because of its lacunary state, the *Porta elementorum* can clearly not be a source of the *Apex physicae*. On the *De elementis* being a source of the *Apex physicae*, cf. « *Apex phisice Anonymi* », ed. LEMKE – MAURACH, p. 174-175; and BURNETT, « The Works of Petrus Alfonsi », p. 60.

(79) Cf. OBRIST, « William of Conches, Māshā'allāh », p. 50-51. These links had already been suggested in GARRIGUES, « L'*Apex Physicae* », p. 313, p. 316.

Concerning the identity of Marius, the *Salernitanus* reference is not invalidated by the new evidence, and the suggestion that he might be the *Marius Salernitanus* whom Godfrey of Viterbo names as his master remains valid⁸⁰, but Marius would now have to be considered the translator or reworker, not the author. As has been said, the date 1206 or 1217 that Thomson found in the register of the dead persons of Salerno's San Matteo church has been invalidated by palaeographic studies of the manuscripts (mid-12th century); in addition, I have found two other Marius's in Galante's revision of the register: a *Marius presbiter et cardinalis* dead in 1119 (in this case, he could not be the master of Godfrey of Viterbo, who was born in 1125), and a *Marius de Curte* dead in 1169 or 1170⁸¹. The milieu of this translation seems likely to be Italy (because of the word *carrublae*), maybe Salerno⁸². The observations about the differences between Marius' and Petrus Alfonsi's work are still valid⁸³, and the hypothesis of a composition by Petrus Alfonsi remains very improbable, particularly since no mention is made about this author in the *Porta elementorum*.

4. Differences between the *De elementis* and the *Porta elementorum*

If the *De elementis* and the *Porta elementorum* share many doctrinal and formal points, they nevertheless differ in various aspects. It is necessary to mention these differences and analyse them in order to strengthen the arguments proposed in the previous section.

The most considerable difference between the two texts is that the *Porta elementorum* is much more obscure than the *De elementis*. In some passages, the *Porta elementorum* is totally incomprehensible without the help of Marius' *De elementis*, as in the explanation of the various combinations of elemental proportions in things, which means nothing in the *Porta elementorum*. This lack of legibility is in all likelihood due to corruptions in the *Porta elementorum*: as has been said, these corruptions could have been done by scribes in Arabic or in Latin, but also by the translator, who could have misunderstood the content of the treatise. Conversely, the explanations in the *De elementis* are nearly always more precise⁸⁴, except those pertaining to alchemy (cf. below). Another important difference lies in the wording and the vocabulary. Both texts deal with the same subjects, but the terms are often different: for example, the denomination of

(80) Cf. above n. 28.

(81) On the Marius cited by THOMSON, «*Liber Marii De Elementis*», cf. n. 16. The *Marius presbiter et cardinalis* and the *Marius de Curte* are respectively found in GALANTE, «Un necrologio e le sue scritture», p. 106-107, p. 320-321.

(82) Monte Cassino is also a possibility. Concerning the milieu of the other works contained in the second part of the manuscript Cotton Galba E IV, which show close links with the possible milieu of the translation of the *De elementis*, cf. BURNETT, «Physics Before the Physics», p. 66-70.

(83) As explained above, according to BURNETT, «The Works of Petrus Alfonsi», p. 55-61.

(84) Cf. p. 198, l. 270-274.

additional properties⁸⁵, or various words as *fumus/vapor*, *cibus/dieta*, *lampas/candela*⁸⁶, etc. This variation substantiates the idea of two different Latin translations. The order of the texts is also quite different. For example, the order of the description of the elements is not the same : the *De elementis* presents a logical order, from the heaviest/lowest element to the lightest/highest – earth (not preserved in the manuscript, but obviously in the missing folio in the beginning), water, air, fire –, and the *Porta elementorum* gives a different sequence – earth, fire, air, water. This change of order likely comes from the reworkings, the *Porta elementorum* being probably farther from the original. As for the length of the treatises, it varies considerably. The *Porta elementorum* is 3883 words, and the *De elementis* is more than 15 000 words. If the corrupted and lacunary state of the *Porta elementorum* certainly plays a part in this difference of length, the study of the passages that are in only one of the two treatises brings very interesting information. Many passages found in Marius' *De elementis* are not in the *Porta elementorum*. The *Porta elementorum* does not contain several arguments in the discussions about elements and elementary properties and part of the description of elementary properties; the discourse about substance (*substantia*); the discourses about accidents and about the link between heat and movement and between coldness and rest; the discourse about creation of various stones; the discourse about composition and creation of metals; the discourse about plants; the discourse about animals; and the discourse about the *anima rationalis* and man. These omitted extracts could show that the compiler (same as the reworker and the translator?) kept only the notions that he considered to be necessary in order to introduce the *De anima*, i.e. an alchemical treatise⁸⁷. The points that have been kept are useful for explaining the principles of the alchemy of the *De anima*. The large number of omissions seems to indicate an intent to abridge. Several subjects have been left aside to avoid redundancy : the composition and creation of metals and various stones, for instance, are explained in *dictio* 1 of the *De anima*⁸⁸, so the compiler/translator could have wanted to avoid repetition. We also notice that the most complex arguments have been neglected, maybe because of a lack of understanding. But what is more interesting is that some passages seem to have been omitted to make the text agree with the doctrinal content of the *De anima*. For instance, in the description of elementary properties, the *De elementis* affirms that properties cannot be isolated from substance, that they

(85) Cf. p. 158.

(86) Cf. p. 174, l. 39-51 and p. 176, l. 63-70.

(87) However, the corrupted state of the *Porta elementorum* does not allow one to assert it peremptorily.

(88) The ten chapters of the Pseudo-Avicennian *De anima* are called *dictiones* (singular *dictio*), literal translation of the Arabic *maqāla*, which designates a book section. These chapters are independent from the three sections mentioned above : the *Porta elementorum* is not counted in these chapters, the second part goes from *dictio* 1 to chapter 4 of *dictio* 7, and the third goes from chapter 4 of *dictio* 7 to *dictio* 10.

cannot exist *per se*⁸⁹. No similar assertion is found in the *Porta elementorum*, maybe because of the alchemical system of the *De anima*. The treatise is mainly inspired by Jābirian alchemy; this alchemy implies the possibility of isolation of elementary properties⁹⁰, called natures⁹¹: elements are characterised by two properties, but one of these properties can be reduced in order that elements become characterised by only one property, fire being hot, air moist, water cold and earth dry; properties are like elements anterior to elements and are not simple accidents⁹². Properties can be isolated from each other actually, not only intellectually; the principles of things, i.e. the four elements, are assimilated to the four properties, they nearly become the four properties (but materialised)⁹³. This position enables the development of the elixir theory, which implies this isolation of elementary properties⁹⁴. If this isolation of properties is clearly explained in the

(89) DALES, *Marius: On the Elements*, p. 79: «De qualitibus autem non ignoras, quia non existunt per se, immo ipsi semper adherent substantie, sed adveniunt et recedunt, nec inveniuntur per se, nec tamen adveniunt de longe ».

(90) Cf. n. 94. However, they are perceptible only by spirit (*Kitāb al-Sab'in*, 44, quoted in KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 180-181). We read the same assertion about elements (not properties) in the *Porta elementorum*, p. 17 (below p. 196, l. 240-242): «[...] et qui dicebat quod in petra non erant quatuor elementa nihil dicebat, per haec quae diximus, quia si non possunt ibi inveniri visu inveniuntur mente ». In the *Porta elementorum*, the assertion is meant to prove that all the things of the sublunary world are compounded of the four elements even if these four elements are not perceptible by the senses: the author explains, for example, that there is air in a fruit because it floats, even if we do not see air in the fruit. In other passages of the *De anima*, however, the assertion that properties are only perceptible by the spirit seems to refer specifically to the Jābirian Science of the Balance (*'ilm al-mizān*), as in the prologue, *DA*, page not numbered (first page): «ideo quia anima altior est corpore et non potest videri oculis sed mente –quia oculus tantum rem accidentem videt et mens videt prioretatem, ideo altiora sunt ea quae videntur mente quam ea quae videntur oculis ».

(91) This is Arabic nomenclature, in which elementary properties are called *ṭabī'a*, plural *ṭabā'i'* (nature).

(92) Cf. KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 163-172. Aristotle asserts that elements cannot be divided in *Metaphysica*, V, 3 (1014a-1014b), cf. also about this subject R. P. MCKEON, «Medicine and Philosophy in the Eleventh and Twelfth Centuries: The Problem of Elements», *The Thomist*, 24 (1961), p. 214-216. In the Western tradition, authors like Nemesius also assert that properties are incorporeal (*ibid.*, p. 222). According to Paul Kraus, the independence and corporality of the natures explained in Jābirian texts could come from the Stoics (KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 168-169); Syed Nomanul Haq suggests that this conception could be due to the synthesis of Plato and Aristotle that the Neoplatonists began to undertake (HAQ, *Names, Natures and Things*, p. 49, p. 61).

(93) For more details about the Jābirian elements theory, cf. KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 161-185, and HAQ, *Names, Natures and Things*, p. 49-62.

(94) Indeed, this alchemy postulates that it is possible to change the elemental proportion, or rather the proportion of elementary properties, of a metal into the properties proportion of gold or silver, by the way of elixirs: these are compounded of isolated elements, extracted from specific materials called «stones» (*ḥajar*, plural *ahjār*); these isolated elements are prepared in order to be characterized only by one property (fire is only hot, air is moist, water is cold and earth is dry). These elixirs balance the proportion of elementary properties of a metal to give it the proportion of gold or silver. For more information about this theory, cf. KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 1-18, and M. PEREIRA, «Teorie dell'elixir nell'alchimia latina medievale», in *Le crisi dell'alchimia/The Crisis of Alchemy, Micrologus*, 3 (1995), p. 103-148.

Jābirian corpus, it is not explicitly said in the alchemical *De anima*, but only implicitly suggested, as its alchemical system requires it : we find in the beginning of the seventh *dictio* recipes about the preparation of elements (isolated from each other by the distillation of specific matters, i.e. blood, hair and eggs), which is very close to the purification of elements done for the purpose of isolating properties as found in Jābirian texts⁹⁵. This interpretation seems very similar to the idea found in Constantine the African's *Pantegni* that the elements are actual and perfect properties : fire is hot, air is moist, water is cold and earth is dry, the second property being given by the contiguous element⁹⁶. But in the Jābirian texts and in the *De anima*, it is possible for man to prepare elements so that they become actual properties. Maybe the above cited assertion about elementary properties (*non existunt per se immo ipsi semper adherent substantie*) that was in the Arabic original of the *De elementis* and the *Porta elementorum* was not maintained by the compiler/translator of the *De anima* because it contradicted fundamental principles of its theory. On the other hand, some passages are found in the *Porta elementorum* which are not in the *De elementis*⁹⁷. The assertion that the *Porta elementorum* is essential for understanding the *De anima*, as well as the conclusion of the *Porta elementorum* which introduces the *diciones* of the *De anima*, are not in the *De elementis* and are in all likelihood additions written by the compiler of the *De anima*. Two examples of calculation of the amount of elementary properties in two bodies are only present in the *Porta elementorum*. These examples contradict some passages of the *De elementis* and the *Porta elementorum* itself in which is asserted that elements do not contain an equal

(95) KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 8-9. Cf. also MOUREAU, *Le «De anima in arte alchemiae» du pseudo-Avicenne*, vol. I, part 1, p. 150-157. The elixir is only once explicitly defined as a mixture of properties in the *De anima*, in a quotation of Morienus (the legendary alchemist, but the quotation is not identified), cf. *DA*, p. 64 : « Et adhuc magis dixit regi : Noster pulvis de nostra alexir est mixtus de septem naturis : de calore, de frigore, de siccitate, de humiditate, de levitate, de ponderositate, de parvitate ». In the rest of the treatise, the elixir is a mixture of prepared elements (*i.e.* likely elements in which only one property is actual). On this quotation of Morienus, cf. also translation n. 4.

(96) CONSTANTINE THE AFRICAN, *Pantegni*, Theorica I, 4, in BURNETT, « *Verba Ypocratis* », p. 85-86 : « Palam est ergo elementa esse quattuor quae sensu apparent simpla intellectu vero composita. Nunquam enim subsistit terra sine aquae, ignis aeris, parte aliqua, neque cetera similiter. Quodcumque tamen horum sua propria qualitate est contentum, illud proprie est elementum. Quod, etsi non sensui patet, tamen intellectui. Unde philosophi dixerunt in mundo quattuor esse elementa, id est calidum, frigidum, siccum, humidum. Neque in his solas qualitates intelligunt, set subiecta earum. Calidum enim actualiter perfectum ignem esse dicunt, frigidum actuale et perfectum, aquam, humidum actualiter perfectum aerem, siccum actualiter et perfecte dicunt terram esse ». This idea is probably based on the assertion of Aristotle that each element has an affinity with one property (fire is more hot than dry, etc.), cf. *De generatione et corruptione*, II, 4, 331a. Cf. also MCKEON, « The Problem of Elements », p. 229, and CAIAZZO, « The Four Elements in the Work of William of Conches », p. 28-30.

(97) It is important to keep in mind that, as the *De elementis* is acephalous, it is possible that some supposed additions of the *Porta elementorum* were originally in the *De elementis*.

amount of their two properties⁹⁸; this contradiction lets it be conjectured that the two examples are an addition of the compiler/reworker/translator, aiming to clarify the obscure *Porta elementorum*. A quite complicated allusion about the degrees of properties (allusion to Galen's system) in the *Porta elementorum* is not found in the *De elementis*⁹⁹. This addition is difficult to explain, but its place, i.e. just after the examples of calculation and just before the conclusion of the *Porta elementorum* also suggests an addition of the compiler/reworker/translator. As for other extracts found in the *Porta elementorum* which are not in the *De elementis*, they seem to show an « alchemisation » of the text, or rather a more thorough explanation of doctrinal points concerning specifically alchemy. Indeed, we find in the *Porta elementorum* a third additional property, the *olutio*, i.e. the ability of a thing to dissolve slowly or quickly¹⁰⁰: the interest of this property for alchemists is obvious. The distillation process in order to divide a thing into its four elements is also much more detailed in the *Porta elementorum*, in both the examples of the fruit and milk¹⁰¹. This distillation process is described many times in other parts of the *De anima*¹⁰². To explain that air is moist, both texts give the evidence that air becomes water when it condenses; however, the *Porta elementorum* adds an alchemical comparison: « Hoc scrutare et potest scire in cucurbita aquae rosaceae, et ibi invenies, et in cucurbitis distillationis lapidum nostrorum »¹⁰³. This is not said in the *De elementis*. As a last obvious alchemical allusion, we find a sentence in which the *magister* repeats a well known alchemical leitmotiv, when proving that glass is made by the coction of earth « quia quod facit natura cum calore intus in ventre terrae in centenis annorum facimus nos in paucis diebus »¹⁰⁴. This sentence is not in the *De elementis*. All these alchemical passages could come from a reworking before the compilation or translation, but seem more likely due to the compiler of the *De anima*, who developed the extracts that interested him within the scope of an alchemical treatise. However, the contrary would also be possible, i.e. that the *De elementis* intentionally deleted the alchemical passages, but, as has been said, the *De elementis* seems closer to the original and does not seem opposed to alchemy.

(98) Cf. translation n. 19 and n. 26.

(99) *DA*, p. 21-22 (below p. 202-204, l. 317-325).

(100) Cf. translation n. 4, p. 176, l. 63-70 and p. 194, l. 225-227.

(101) Cf. p. 188, l. 171-177 and p. 190, l. 190-197. Those examples of the fruit and milk are quoted in the *De elementis*, but the distillation process is not so precisely described.

(102) For example, *DA*, *dictio* 7, cap. 1, p. 401-403.

(103) Cf. p. 176, l. 52-58.

(104) Cf. p. 194, l. 227-238.

III. WITNESSES OF THE *PORTA ELEMENTORUM* AND PRINCIPLES OF EDITION AND TRANSLATION

1. *Witnesses*

The *Porta elementorum* is found in the following witnesses¹⁰⁵:

L = Oxford, Bodleian Library, Laud Misc. 734, f. 5r-13r. 13th century, end - 14th century.

H = Glasgow, University Library, Hunter 253, f. 7r-10v. 13th century, end - 14th century.

F = Paris, BnF, Lat. 6514, f. 144v-146r. 13th century, end - 14th century.

C = Bernkastel-Kues, Bibliothek im St. Nikolaus Hospital, 299, f. 2r-4v. 14th century.

V = St. Gall, Stadtbibliothek (Kantonsbibliothek), Vadianus 300, f. 1r-2v. 14th century¹⁰⁶. Acephalous.

O = Montreal, McGill University, Osler Library, 480, f. VIIv-11v. 14th century.

S = London, British Library, Sloane 1754, f. 189r-193r. 14th century.

D1 and *D2* = Oxford, Bodleian Library, Digby 219, *D1*: f. 2v-5r, *D2*: f. 28v-32r. 16th century. This manuscript contains two versions of the text.

Celsi = edition (not critical) of the *Porta elementorum* in *Artis Chemicae Principes, Avicenna atque Geber*, ed. Mino Celsi, Pietro Perna, Basel 1572, p. 4-23.

As for other material, we find an important group of quotations¹⁰⁷:

A summary of the alchemical *De anima* with quotations in a compendium of alchemical texts attributed to Roger Bacon (1214-1294), the *Sanioris Medicinae Magistri D. Rogeri Baconis Angli, de arte chymiae scripta [...]*, Johann Saur et Johann Theobald Schönwetter, Frankfurt 1603, p. 17-66 (l. 6): « Excerpta de libro Avicennae de anima [...] per fratrem Rog. Bacon. [...] »¹⁰⁸.

(105) For a detailed description of these witnesses, cf. MOUREAU, *Le De anima in arte alchemiae du pseudo-Avicenne*, vol. I, part 1, p. 187-208.

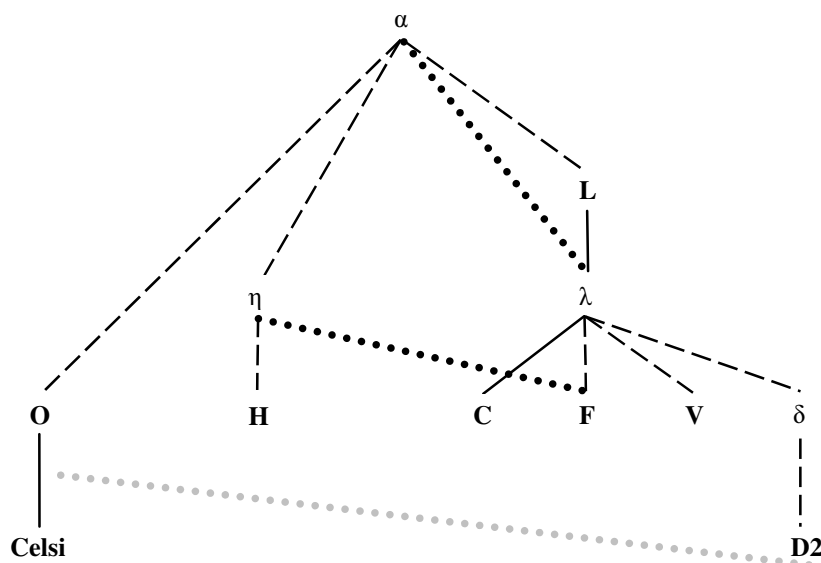
(106) Cf. RUSKA, « Zum Avicennatext des Cod. Vadianus 300 ».

(107) We also find numerous quotations of the *De anima* in Vincent of Beauvais' *Speculum doctrinale* (book 11 entitled *De artibus mechanicis*) and *Speculum naturale* (book 7 entitled *De corporibus quae continentur in terrae visceribus*). Cf. VINCENT DE BEAUVAIS, *Speculum Quadruplex sive speculum maius, naturale/doctrinale/morale/historiale*, Balthazar Beller, Douai 1624, p. 1053-1072 (of the *Speculum doctrinale*) and p. 425-492 (of the *Speculum naturale*). However, Vincent of Beauvais does not quote the *Porta elementorum*, but only the second part of the treatise. The *Speculum maius* was finished between 1258 and 1260, cf. PAULMIER-FOUCART, *Le Grand Miroir du Monde*, p. 12-14, p. 119-120. Cf. also S. MOUREAU, « Les sources alchimiques de Vincent de Beauvais », *Spicae. Cahiers de l'atelier Vincent de Beauvais*, nouvelle série, 2 (2012), p. 7-9, 17-21, 55-64.

(108) The same summary is found in two manuscripts: Philadelphia, University of Pennsylvania, codex 110, f. 42v-45v (first half of the 15th century), but without the attribution to Roger Bacon; and Oxford, Bodleian Library, Ashmole 1467, f. 1r-30r (16th century). I prepare at the moment a critical edition of this summary. At the point where the *Sanioris medicinae [...]* *scripta* stops quoting the

2. *Stemma codicum and principles of edition and translation*

When studying the Pseudo-Avicennian *De anima*, I have put forward the hypothesis of the *stemma codicum* shown below. I have not included here the complete discussion about this *stemma*, nor the detailed method (a Lachmaniann system), because of their length¹⁰⁹. Manuscript *S* and quotations are not in the *stemma*, as they are too short for a precise classification; they seem to belong to the *L C F V* family. The continuous lines indicate direct filiations, the discontinuous lines signify indirect filiations whose intermediaries are lost, and the dots indicate contaminations (the dots going from *O* to *D2* are lighter because the contamination is more hypothetical).



For the edition of the *Porta elementorum*, I had to leave aside some witnesses. The *D1* and *D2* versions, as they are something like the complete later rewriting of the *De anima*, were not taken into account. I could not study the complete manuscript *O* for practical reasons: the Osler Library would not make a copy of the manuscript because of its condition and provided a microfilm in which only half of the manuscript is legible. Fortunately, this manuscript *O* is the direct model

De anima at chapter 2 of *dictio* 5 and begins to quote the *Epistola ad Hasen regem de re recta*, the manuscripts continue the summary. The *Sanioris medicinae* [...] *scripta* were reprinted in 1620 (Frankfurt, Joannes Carolus Unckelius). On the link between Roger Bacon and the Pseudo-Avicennian *De anima*, cf. S. MOUREAU, « *Elixir Atque Fermentum* ».

(109) For the complete discussion, cf. MOUREAU, *Le De anima in arte alchemiae du pseudo-Avicenne*, vol. I, p. 209-244. My method is described in MOUREAU, « Questions of Methodology », p. 5-13.

of Celsi's edition, who did not change the text very much. The quotations were also left aside, due to their shortness. I follow the *LCFV* family: this family tends to correct the text less often (especially the Spanish forms), and is the most widespread state of the tradition (*textus receptus*). In this family, I give preference to manuscript *L*. As I edit the Latin translation of an Arabic lost treatise, I correct the text as little as possible, because it is often impossible to assert whether errors have been made by the translator or by the scribes. I follow the orthography of manuscript *L*, but I normalize some features: the classical diphthong *ae* is written *ae* though manuscripts indistinctly use the forms *ae*, *e* and *ę*; the assibilated *t* before *i* is written *ti* as we find in manuscripts both *ci* and *ti* indistinctly used; the letters *m* and *n* before a consonant are written *m* before *p*, *b* and *m*, and *n* in other cases¹¹⁰.

My English translation is intended to be as close as possible to the Latin text, which is inelegant. When the text is too obscure, I offer a conjectural translation and suggest an explanation in the notes (if possible). Words between brackets are added in English to help the reader, but are not present in the Latin text.

The corrections and additions that I propose are in italic in the edition, and are explained in the apparatus and notes. The following abbreviations and Latin expressions are used in the critical apparatus: *abbreviatio incerta* (uncertain abbreviation), *add.* (*addidit* or *addiderunt*, i.e. addition after the word quoted before *add.*), *add. rubricam* (addition of a rubric or a title), *al. m.* (*alia manus*, i.e. another hand), *cett.* (*cetera*, i.e. all the other witnesses), *corr.* (*correxerunt* or *correxerunt*, i.e. correction in the manuscript), *correxi* (personal proposal of correction), *difficile lectu* (text hardly readable), *ead. m.* (*eadem manus*, i.e. the same hand), *expunct.* (*expunctum*, i.e. a word marked with expunction points), *in mg.* (*in margine*, i.e. in margin), *iter.* (*iteravit* or *iteraverunt*, i.e. repetition), *maculatus* (spot on the manuscript), *mss.* (*manuscripta*, i.e. all the witnesses), *om.* (*omisit* or *omiserunt*, i.e. omission), *s. l.* (*supra lineam*, i.e. above the writing line), *supplevi* (personal proposal of addition, marked by the signs <> in the text and in the translation). Numbers in margin marked by the sign | are the page numbers of Celsi's edition. The extracts of the *De elementis* corresponding to the passages of the *Porta elementorum* are found at the end of the edition and translation of the *Porta elementorum*, with references to the lines of the edition. Before each extract, I propose an explanation of the similarity of the passage between the two texts. The extracts of the *De elementis* are quoted according to Dales' edition in DALES, *Marius: On the Elements*; the page numbers before each passage refer to this edition. The M. and D. abbreviations respectively mean *Magister* and *Discipulus*. The bold characters in the tables of the extracts indicate the elemental combinations that are found in the *Porta elementorum*.

(110) As for the letter *m* before other letters, I follow the rule of classical Latin (*numquam* instead of *nunquam*, *quamvis* instead of *quanvis*, etc.).

*PORTA ELEMENTORUM

Modo^a quaere sicut quaerunt^b a magistro et sis^c bonus discipulus.

Dicit discipulus^d : De quo est principium magisterii nostri^e?

Dicit magister : De^f sapientia elementorum^g.

5 Dicit^h discipulus : Quidⁱ sunt^j elementa?

Dicit^k magister : Ignis, et^l aer, et^m aqua, etⁿ terra.

Dicit^o discipulus : Cuius naturae^p est unumquodque istorum^q elementorum^r?

10 Dicit^s magister : Natura^t ignis^u caliditas et siccitas, ^v natura aeris caliditas et humiditas, ^w natura aquae frigiditas et humiditas, natura^x terrae frigiditas et siccitas^y.

Dicit^z discipulus : Quae sunt res absconditae quae sunt^a in elementis?

5 Dicit^b magister : Res absconditae quae sunt^c in elementis^d : in igne a | scensio^e ad caelum quia^f per ignem fit^g sol^h, aer estⁱ subter ignem quia minorem habet effectum^j, aqua est ponderata^k non tantum^l quantum terra, terra est nimium
15 ponderata^m. Terraⁿ solvitur tarde, aqua cito solvitur, aer cito solvitur sed non tam cito sicut^o aqua, ignis solvitur citius sed magis tarde quam aer solvatur^p et solvitur citius quam terra.

Dicit^q discipulus : Quomodo sciemus naturam elementorum?

**Textus in H, L, C, F, V, S invenitur, sed incipit postea in V (p. 172) atque explicit ante finem in S (p. 204).*

(a) *ante modo add. incipit incipit porta elementorum collocutio inter discipulum et magistrum de elementis de centum quinquaginta quinque complexionibus et de proprietatibus quatuor elementorum Celsi* (b) *quaere sicut quaerunt] quae sint quaere H* (c) *et sis] sic facit H* (d) *dicit discipulus om. CS* (e) *nostri add. ut S* (f) *de] in S* (g) *dicit discipulus de quo est principium magisterii nostri dicit magister de sapientia elementorum om. H* (h) *dicit om. S* (i) *quid] quot Celsi H* (j) *sunt add. 4 S* (k) *dicit om. Celsi S* (l) *et om. Celsi HS* (m) *et om. Celsi HS* (n) *et om. Celsi S* (o) *dicit om. S* (p) *cuius naturae] HS cui naturae Celsi de cuius naturae LC de cuius natura F* (q) *istorum] illorum Celsi* (r) *elementorum om. FS* (s) *dicit om. Celsi S* (t) *natura om. H* (u) *ignis add. est C* (v) *caliditas et siccitas] Celsi H calida et sicca LCF calida est et sicca S* (w) *caliditas et humiditas] Celsi H calida et humida LCFS* (x) *natura aquae frigiditas et humiditas natura om. S* (y) *siccitas add. per aquam intellige vel aquam lapidis vel azoz F add. rubricam de rebus absconditis in elementis Celsi* (z) *dicit om. S* (a) *quae sunt om. HF* (b) *dicit om. Celsi S* (c) *quae sunt om. C* (d) *dicit magister res absconditae quae sunt in elementis om. F* (e) *ascensio] accensio S* (f) *quia] quod C* (g) *fit om. H* (h) *quia per ignem fit sol om. S* (i) *est om. F* (j) *quia minorem habet effectum om. S* (k) *ponderata] ponderosa S* (l) *non tantum] tantum C iter. L* (m) *ponderata] ponderosa et S* (n) *quantum terra terra est nimium ponderata terra om. C* (o) *sicut] quam S* (p) *solvatur] solvitur H om. S* (q) *dicit om. Celsi S*

CHAPTER ON THE ELEMENTS

Ask now your questions as one asks a master, and be a good disciple¹.

The disciple says : Where does the principle of our magistry² come from ?

The master says : From the wisdom of the elements.

The disciple says : What are the elements ?

The master says : Fire, air, water, and earth.

The disciple says : Of which nature is each of these elements ?

The master says : The nature³ of fire is heat and dryness, the nature of air is heat and moisture, the nature of water is coldness and moisture, the nature of earth is coldness and dryness.

The disciple says : What are the hidden things that are in the elements ?

The master says : The hidden things that are in the elements⁴ (are) : in fire (is) the ascent to the sky because the sun is made of fire, air is under fire because it has a lesser effect, water is heavy (but) not as much as earth, earth is very heavy. Earth is slowly dissolved, water is quickly dissolved, air is quickly dissolved, but not as much as water, fire is quite quickly dissolved but slower than air and quicker than earth⁵.

The disciple says : How will we know the nature of the elements ?

(1) In the prologue of the Ps.-Avicennian *De anima*, the sentence «*Dixit Abuali Abincine*» (Avicenna said) is quoted five times, and the *magister* of the *Porta elementorum* is here supposed to be Avicenna (the disciple being his son Abuzalemi), as it will be said in *dictio* 1, but no direct mention of his name is found in the text of the *Porta elementorum*.

(2) I translate in this way the word *magisterium*, which designates sometimes the alchemical work, sometimes a part of it (an operation), namely a process which requires mastery.

(3) *Natura* (nature) is the translation of the Arabic word *ṭabī'a* (nature). In Arabic alchemy, this term has a technical meaning : it designates the elementary properties. This meaning is also found in Latin alchemical texts.

(4) The «hidden things that are in the elements» (*res absconditae quae sunt in elementis*), also called «hidden natures» (*naturae absconditae*) later in the text, are different from the four properties (hot, cold, dry and moist). In the *Porta elementorum* and in the second part of the *De anima*, things are characterized by seven properties, the four usual Aristotelian properties (hot, cold, dry and moist), and three others, of less importance : lightness (*levitas*), heaviness (*ponderositas*), and dissolution (*olutio*), i.e. ability to dissolve quickly or slowly. In the *Porta elementorum*, these three additional properties are called «hidden natures». Cf. p. 158 and p. 166. They do not change the elixir system, they are something like a minor theoretical addendum rather than a fundamental change of the properties' system. In the second part of the alchemical *De anima* (p. 64), the author quotes the legendary alchemist Morienus : in this quotation (not identified), the *olutio* property is replaced with a *parvitas* property, which likely designates the size of the particles of the metal. The lightness or heaviness of things are also found in the *De elementis* (called *proprietates*, the *naturae* being the four elementary properties), but not the «dissolution property», which seems to be an addition of the *De anima*, as the dissolution speed is an important information in alchemy. Cf. also *DA*, p. 30 : «*Quia in quacumque causa huius mundi debet homo quaerere septem proprietates et hae sunt calor, frigiditas, siccitas, humiditas, levitas, ponderositas,olutio; in omnibus rebus quae in hoc saeculo sunt debes scire in unaquaque quod sint istarum*».

(5) The order is then, from the slowest to the quickest : earth, fire, air, water.

- Dicit^r magister : Hoc scies^s duobus modis. Si accipias^t terram et ponas^u super
 20 carnem tuam^v, senties quod refrigerabit^w eam et siccabit^x tam^y quod sit^z ibi per
 diem unam. Secundus modus^a in^b aestate, quando maximus est calor et sol est
 iuxta nos, per^c magnum calorem siccatur humiditates^d aquarum^e quae sunt^f in terra
 et remanet terra simplex et^g cum paucis humoribus. Quando venit hyems^h et estⁱ
 sol longius^j a nobis, invenies terram in^k sua natura frigidam et siccam.
- 25 Dicit^l discipulus : Unde sciunt^m quodⁿ ignis est^o calidus et siccus^p ?
- Dicit^q magister : Omnis homo scit quod^r est calidus et siccus quia^s desiccatur
 humores. Et hoc scis^t per solem qui^u in hyeme^v se elongat^w a nobis et dimittit
 faciem terrae siccam ab^x humoribus^y.
- Dicit^z discipulus : Unde sciunt^a quod aer est calidus et humidus ?
- 30 Dicit^b magister : Prius debes scire si est aer, postea quaeres^c quid est^d.
- 6 Dicit^e discipulus : Dic mihi si est, et si est quid est^f.
- Dicit^g magister : Hoc modo potes^h scire quod estⁱ de barchinis^j ferrariorum^k :
 quia bene scis^l quia^m quandoⁿ trahitur impletur barchinis^o de^p aere^q, et quando
 dimittat^r sufflat^s ignem. Si accipias unum utrem^t et infles^u illum^v, tu videbis
 35 quod^w in^x quantum^y magis inflatur magis ampliatur, usque quo^z non possit
 magis^a inflari. Et^b postea quando^c aperueris^d exiet^e aer et senties illud^f cum^g
 tetigerit^h in corpore tuo. Cum istisⁱ rationibus potes^j scire^k quod^l aer^m est ventusⁿ,
 et cum aliis multis.

(r) dicit om. *Celsi* S (s) hoc scies om. S (t) accipias] accipies LF (u) ponas] pones L (v) carnem tuam] * *legere non potuit* tuam *Celsi* carnes tuas F (w) refrigerabit] LFS refrigerat *Celsi* frigerabit H refrigebit C (x) et siccabit om. S (y) tam] L tamen HFS tum C (z) sit om. C (a) secundus modus] secundis modis C add. est S (b) eam et siccabit tam quod sit ibi per diem unam secundus modus in om. *Celsi* (c) per] L propter *Celsi* CFS et prope nos et H (d) siccatur humiditates] siccatur humiditas S (e) aquarum] aquae *Celsi* FS om. H (f) sunt] est S (g) et? om. CFS (h) hyems] hyemps HF (i) est om. *Celsi* (j) est sol longius] sol est remotus multum H sol longus est S (k) in] et C (l) dicit om. *Celsi* S (m) sciunt] sciam H (n) quod incipit V (o) est] sit S (p) siccus add. quia desiccatur humores *Celsi* (q) dicit om. *Celsi* S (r) quod] quia ignis *Celsi* quod ignis H (s) omnis homo scit quod est calidus et siccus quia om. S (t) scis] scit C (u) qui] quia FV (v) hyeme] hyempine V I in hyeme om. H (w) elongat] longat C (x) ab] de F (y) humoribus add. *rubricam* quaerit discipulus de aere *Celsi* (z) dicit om. S (a) sciunt] sciam S add. id *Celsi* (b) dicit om. *Celsi* S (c) quaeres] quaere S om. H (d) est] LCS sit *Celsi* HF I dicit discipulus unde sciunt quod aer est calidus et humidus dicit magister prius debes scire si est aer postea quaeres quid est om. V (e) dicit om. *Celsi* S (f) quid est iter. V (g) dicit om. *Celsi* S (h) potes] potest FV (i) est] cum H om. V (j) barchinis] *Celsi* L FV barchinis H barrathinis C barchinos S (k) ferrariorum] ferta^{onum} F (l) scis] sis S (m) quia] LFS quod H quia non C om. *Celsi* V (n) quando] quomodo CV (o) barchinis] L FV barchinus *Celsi* HS barratinis C (p) de om. HS (q) aere] aer F (r) dimittat] LC emittit *Celsi* H dimittit F dimittitur VS (s) sufflat add. in S (t) utrem] F urcem H urceum LV urtem C om. *Celsi* S (u) infles] impleas H (v) illum] illam V (w) quod] quia V (x) in om. F (y) quantum] quanto H (z) quo] quod *Celsi* (a) magis om. V (b) et om. S (c) quando] quomodo LC (d) aperueris] LCF aperies *Celsi* H aperuis V apperis S (e) exiet] exit S (f) illud] illum S (g) cum] ubicumque *Celsi* HS (h) tetigerit] HFVS tetigit *Celsi* tetigeris L contingerit C (i) istis om. H (j) potes] potest VS (k) scire] sciri S (l) quod] L quia *zett*. (m) aer al. m. in mg. C om. V (n) ventus] in ventis *Celsi* add. natura quia aer est esse ventum C

The master says : You will know it by two means. If you take earth and put it on your flesh, you will feel that it will cool and dry (your flesh) as much as if it had been there for a day⁶. Secondly in summer, when heat is greatest and the sun is close to us, it dries moistures of the waters that are in the earth because of its great heat, and the earth remains in a pure state⁷ and with few humours. When winter comes and the sun is farther from us, you will find the earth cold and dry in its nature.

The disciple says : From what do we know that fire is hot and dry ?

The master says : Each man knows that (fire) is hot and dry because it dries humours. You know it from the sun which, in winter, goes farther from us and leaves the surface of earth dry from its humours⁸.

The disciple says : From what do we know that air is hot and moist ?

The master says : You must first know if there is air, then you will search what it is.

The disciple says : Tell me if there is air, and if there is, what it is.

The master says : You can know that there is (air) thanks to blacksmiths' bellows. You well know that when bellows are drawn, they fill with air, and when we release them, they blow (on) the fire. If you take a goatskin and inflate it, you will see that the more you inflate, the wider it gets, until it cannot be inflated anymore. And afterwards, when you open (it), the air will go out and you will feel it when it will touch your body. With these arguments and many other you can know that air is a wind⁹.

(6) The word *tam* has here the meaning of *ita*, but the meaning of the end of the sentence is rather obscure.

(7) Literally : remains simple. The nature of earth can be observed when it is not mixed with humours anymore.

(8) This means that the sun dried humours of the earth during the summer and that it leaves it dry in the winter. It is only in the spring that earth is again filled with humours.

(9) The source of this passage could be a citation of the beginning of the *Pneumatica* of Hero of Alexandria, in which the author describes vacuum and explains that air exists. The extract is very interesting as its beginning is found only in the *De elementis* and the end of the arguments of the *Porta elementorum* (*aer est ventus*), which is not in the *De elementis*, seems to be the subsequent assertion of Hero. This may be another evidence that both texts used the same Arabic treatise, whose source was Hero's *Pneumatica*, but both texts shortened the argument in a different way. However, Hero's text is likely not a direct source of the original, as this passage is the only one which shows similarities (cf. also translation n. 28). Hero's *Pneumatica* were likely translated into Arabic, but no fragment of this translation has been found to this day (cf. W. SCHMIDT, *Heronis Alexandrini opera quae supersunt omnia*, vol.I: *Supplementum. Die Geschichte der Textüberlieferung, griechisches Wortregister*, Teubner, Leipzig 1899, p. 43; M. BOAS, « Hero's *Pneumatica* : A Study of Its Transmission and Influence », *Isis*, 40 [1949], p. 38-48; and E. GRANT, « Henricus Aristippus, William of Moerbeke and Two Alleged Mediaeval Translations of Hero's *Pneumatica* », *Speculum*, 46 [1971], p. 656-669). The extract is : « The vessels which seem empty to many (people) are not, as they assume, empty, but full of air. Air, as those who deal with physics agree, is compounded of thin and small bodies which are invisible to us for the most part. If one pours water into a vessel which

Dicit^o discipulus : Verum est quod^p aer ventus est. Modo dic mihi^q unde hoc^r
 40 scierunt^s quod^t aer^u erat^v calidus et humidus sicut mihi dixisti^w.

Dicit^x magister : Hoc sciunt duobus modis cur^y aer calidus^z : quia quando tu^a
 vis aquam vertere in aerem^b, hoc facere non^c potes^d absque igne ; alia^e quia aer est
 cibus ignis^f.

Dicit^g discipulus : Unde sciam^h quodⁱ aer est^j cibus ignis et cibus est^k natura
 45 viventis^l?

Dicit^m magister : Si vis videre oculis quod aer estⁿ cibus ignis, accipe
 lampadem^o et mitte^p ibi^q de oleo sufficienter, et mitte illam^r in urceo terreo^s et
 cooperi os^t : et cito extinguetur^u lampas^v ideo quia^w aer est inclusus^x et non habet
 unde vivat ignis. Et si vis scire quod cibus est^y natura^z viventis, vide^a quod^b

(o) dicit *om.* *S* (p) quod] quia *C* (q) mihi] modo *V* (r) hoc *om.* *V* (s) scierunt] *HL* sciverunt *Celsi*
FS scierunt *C* sciunt *V* (t) quod] quia *C* (u) aer *om.* *F* (v) erat] est *HF* scit *S* (w) sicut mihi dixisti *om.*
F (x) dicit *om.* *S* (y) cur] cum *H* quod *F* (z) calidus *om.* *F* *add.* est *Celsi* *HFVS* (a) tu *om.* *F*
 (b) aerem] arem *C* (c) non] modo *V* (d) potes] potest *FV* (e) alia] aliter *HF* *om.* *V* *add.* causa *S*
 (f) ignis *add. rubricam* quod aer est cibus ignis *Celsi* *add.* et cibus est de natura viventis *S* (g) dicit *om.*
Celsi *S* (h) sciam] sciunt *F* (i) quod] quia *Celsi* *C* (j) est *om.* *HC* (k) est *add.* a *H* *add.* de *S*
 (l) viventis] in ventis *Celsi* inventus *H* (m) dicit *om.* *S* (n) est] sit *V* *om.* *L* (o) lampadem] lampadam *L*
add. unam *Celsi* *HVS* (p) mitte] mente *C* (q) ibi] in eo *F* (r) illam] illum *H* eam *S* (s) terreo] ferreo *V*
om. *S* (t) cooperi os] cooperias *H* cooperies *F* (u) extinguetur] extinguitur *H* (v) lampas] lampos *C*
 (w) ideo quia] ideo quia *H* *difficile lectu* *V* ideoque *S* (x) inclusus] exclusus *F* (y) est] a *H* de *S* *om.* *C*
 (z) natura] vita *F* (a) vide] unde *H* (b) quod] *L* quia *cett.*

The disciple says : It is true that air is a wind. Tell me now from what it had been known that air is hot and moist, as you told me.

The master says : Why air is hot is known by two means : firstly when you want to turn water into air¹⁰, you cannot do it without fire; secondly because air is the nutriment of fire.

The disciple says : From what can I know that air is the nutriment of fire, and that the nutriment is of the nature of the living¹¹ ?

The master says : If you want to see with your eyes that air is the nutriment of fire, take a lamp and put oil in it sufficiently, then put the lamp in an earthy jar and close the opening : the lamp will quickly be extinguished because the air has been isolated and the fire has nothing by which it can live. If you want to know that the nutriment is of the nature of the living, see that

seems to be empty, air will leave the vessel in the same quantity as water enters into it. One may observe what is said (here) in this (example). If you turn upside down a vessel which seems empty and push it into water while keeping it turned downward, water will not enter into it, even though it be entirely covered (with water) ; therefore, it is obvious that air, being a body, does not let the water enter because it takes up the entire space in the vessel. If one pierces the bottom of the vessel, the water will go into the (vessel) through the mouth and the air will go out through the hole (that one made). Again if, before piercing the bottom, one lifts up uprightly the vessel from water and turn it upside down, one will see that the entire inner surface of the vessel is free from moisture, as it was before being put (in the water). Therefore, we must assume that air is a body. When it is moved, it becomes wind ; wind is nothing else but moved air. If, when the bottom of the vessel is pierced and the water is going into it, one put the hand near the hole, one will feel the wind going out of the vessel : this is nothing else but the air being expelled by the water». Greek text, W. SCHMIDT, *Heronis Alexandrini opera quae supersunt omnia*, vol. I: *Pneumatica, Automata*, Teubner, Leipzig 1899, p. 5-6: «τὰ ἀγγεῖα τὰ δοκοῦντα εἶναι τοῖς πολλοῖς κενὰ οὐκ ἔστιν, ὥς ὑπολαμβάνουσι, κενά, ἀέρος δὲ πλήρη. Ὁ δὲ ἀήρ ἐστίν, ὡς τοῖς περὶ φύσεως πραγματευσαμένοις ἀρέσκει, ἐκ λεπτῶν καὶ μικρομερῶν σωμάτων συνεστηκὸς ἀφανῶν ἡμῖν ὄντων ὡς ἐπὶ <τὸ> πολὺ. Ἐάν γοῦν εἰς τὸ δοκοῦν ἀγγεῖον κενὸν ὑπάρχειν ἐγγέη τις ὕδωρ, καθ' ὅσον ἂν πλῆθος τοῦ ὕδατος εἰς τὸ ἀγγεῖον ἐμπίπτῃ, κατὰ τοσοῦτον πλῆθος ἀήρ ἐκχωρήσει. Κατανοήσεις δ' ἂν τις τὸ λεγόμενον ἐκ τοῦ τοιούτου: ἐάν γάρ εἰς ὕδωρ καταστρέψας ἀγγεῖον τὸ δοκοῦν εἶναι κενὸν πιέξης εἰς τὸ κάτω ἀκλινὲς διαφυλάσσων, οὐκ εἰσελεύσεται τὸ ὕδωρ εἰς αὐτό, κὰν ὅλον αὐτὸ κρύψῃς: ὥστε δῆλον εἶναι ὅτι σῶμα ὑπάρχων ὁ ἀήρ οὐκ ἔα παρῆλθῃν τὸ ὕδωρ διὰ τὸ πεπληρωμέναι πάντα τὸν ἐν τῷ ἀγγεῖῳ τόπον. Ἐάν γοῦν τρυπήσῃ τις τὸν πυθμένα τοῦ ἀγγεῖου, τὸ μὲν ὕδωρ διὰ τοῦ στόματος εἰς αὐτὸ εἰσελεύσεται, ὁ δὲ ἀήρ διὰ τοῦ τρυπήματος ἐξελεύσεται. Πάλιν δὲ πρὸ τοῦ τρυπήσαι τὸν πυθμένα ἐάν τις ὀρθὸν ἐκ τοῦ ὕδατος τὸ ἀγγεῖον ἐπάρῃ, ἀνατρέψας ὄψεται πᾶσαν τὴν ἐντὸς τοῦ ἀγγεῖου ἐπαφάνειαν καθαρὰν ἀπὸ τοῦ ὑγροῦ, καθάπερ ἦν καὶ πρὸ τοῦ τεθνήναι. Διὸ δὴ ὑποληπτέον εἶναι σῶμα τὸν ἀέρα. Γίνεται δὲ πνεῦμα κινήσεις: οὐδὲν γὰρ ἕτερόν ἐστι τὸ πνεῦμα ἢ κινούμενος ἀήρ. Ἐάν γοῦν τετρυπημένου τοῦ ἀγγεῖου κατὰ τὸν πυθμένα καὶ εἰσπίπτοντος τοῦ ὕδατος παραθῇ τις τῷ τρυπήματι τὴν χεῖρα, αἰσθήσεται τὸ πνεῦμα ἐκπίπτον ἐκ τοῦ ἀγγεῖου: τοῦτο δὲ οὐκ ἄλλο τί ἐστίν ἢ ὁ ἐκκρουόμενος ὑπὸ τοῦ ὕδατος ἀήρ.» I thank William Newman for identifying this source for me.

(10) I.e. evaporate water, by boiling it.

(11) When the author speaks of living (*vivens*) and links it to the nutriment (*cibus*), he means the fed, the one who receives the nutriment (in the summary of the alchemical *De anima* attributed to Roger Bacon, the word *cibatus* is used, cf. *Sanioris Medicinae Rogeri Baconis*, 1603, p. 21). Both the nutriment and what receives the nutriment must have a common nature (here heat, but they differ in the intensity of this heat).

- 7 50 | homo quando comedit panem vivit^c; si comederet^d scamoneam moreretur^e, quia panis est naturalis cibus hominis^f et scamonea^g non est^h.

Dicitⁱ discipulus : Unde scire potuerunt^j quod aer est humidus?

- Dicit^k magister : Hoc^l duobus modis sciverunt. Unus modus^m illorumⁿ est quod^o humiditas balnei humidat^p corpora nostra. Secundus^q est^r aer quod^s 55 coniungitur^t et cadunt^u inde^v guttae et humidat^w se. Hoc scrutare^x et potest^y scire^z in cucurbita aquae rosaceae^a, et ibi^b invenies, et^c in cucurbitis^d distillationis^e lapidum nostrorum.

Dicit^f discipulus : Bene intellexi quod natura aeris est caliditas et humiditas^g. Modo^h dic mihi quaeⁱ est natura eius^j abscondita.

- 60 Dicit^k magister : Natura aeris abscondita^l est levitas^m et festinata solutio : levitas eiusⁿ quae^o est super aquam^p et dimittit omnia corpora ingredi in eum, et ideo multi stulti putaverunt^q quod aer^r non esset^s in saeculo^t quia omnia corpora^u ingrediebantur^v in eum^w. Et festinata solutio^x est^y eo quod^z citius vertitur^a in aquam^b et cito vertitur in ignem, quia tu vides quod quando^c incendis^d parum^e 65 ignem^{et} mittas^g ibi^h de pingui oleoⁱ, videbis quod crescit^j multum flamma eius^k, magis quam sit^l quantitas^m ignis.

(c) vivit *add.* quia *F* (d) si comederet] eius commedimus *C* si comederit *S* (e) moreretur] *LF* moretur *Celsi* *C* morentur *H* morietur *VS* (f) hominis] hominibus *C* (g) scamonea] scammonia *Celsi* scamoneam *S* (h) est *om.* *LV* (i) dicit *om.* *Celsi* *S* (j) scire potuerunt] scire potueris *H* scire poterunt *F* sciunt *S* (k) dicit *om.* *S* (l) hoc *om.* *H* (m) modus *om.* *H* (n) illorum] istorum *H* (o) quod] quia *V* (p) balnei humidat] balne humiditas *V* balnei humectat *S* (q) secundus] secunda *LCFV* (r) est *om.* *H* (s) est aer quod] est aer *V* quia aer *S* (t) coniungitur] *Celsi* *S* iungitur *H* coniugitur *L* (*et add. al. m. s. l.* id est inspissatur) coniugitur inspissatur *C* inspissatur cum coniungitur *F* cum iungitur inspissatur *V* (u) cadunt] cadit *LC* (v) inde] in *C* (w) humidat] humectat *S* (x) scrutare] scrutari *F* (y) potest] potes *Celsi* *HS* (z) scire] sciri *F* (a) rosaceae] rosaciae *Celsi* (b) et ibi] et isti *C* ubi *S* (c) et *om.* *H* (d) cucurbitis] cucurbite *V* (e) distillationis] distillationes *H* *om.* *S* (f) dicit *om.* *S* (g) caliditas et humiditas] calida et humida *V* *add. rubricam* de natura abscondita aeris *Celsi* (h) modo] magister *Celsi* magis *H* (i) quae] quod *C* quid *V* (j) eius] aeris *Celsi* (k) dicit *om.* *S* (l) dicit magister natura aeris abscondita *om.* *Celsi* (m) levitas *add.* eius quia super aquam *C* (n) eius *om.* *C* (o) quae] quia *H* quod *C* (p) est super aquam] superest *V* *add.* id est natat *F* (q) putaverunt] putant *Celsi* *HS* (r) aer *om.* *H* (s) esset] sit *HS* (t) saeculo] solutio *V* oleo *S* (u) corpora *om.* *H* (v) ingrediebantur] ingrediebant *F* (w) eum] eo *S* (x) et festinata solutio] in festina solutione *H* et festina solutio *S* (y) est *om.* *H* (z) eo quod] *LC* quod *Celsi* *HF* in eo eo quod *V* quia *S* (a) vertitur] vertura *abbreviatio incerta* *C* (b) aquam] aqua *L* (c) quod quando] quomodo *C* quando *FS* (d) incendis] incendas *Celsi* accendas *H* incendes *F* (e) parum] parvum *Celsi* *S* *om.* *H* (f) et] vel *H* (g) mittas] mittis *FS* mittatur *V* (h) ibi *add.* parum *H* (i) oleo] oculo *C* (j) crescet] *Celsi* *HFV* cresceret *LC* crescit *S* (k) eius *om.* *H* *add.* nam aeris sit sed quia tam cito vertitur in ignem *Celsi* (l) sit] fuit *F* (m) quantitas *add.* eius *Celsi*

man lives when he eats bread; if he ate scammony he would die, because bread is man's natural nutriment and scammony is not¹².

The disciple says : From what might it have been known that air is moist?

The master says : It has been known by two means. Firstly, the moisture of a bath moistens our body¹³. Secondly, (see) the air that condenses, drops fall and (the air) is moistened¹⁴. One may observe and know it in a cucurbit of rose water, and there you will find (it), and in the cucurbits in which we distil our stones¹⁵.

The disciple says : I have well understood that the nature of air is heat and moisture. Tell me now what is its hidden nature.

The master says : The hidden nature of air is lightness and quick dissolution : its lightness is greater than water (lightness)¹⁶, and it lets all the bodies enter into itself; therefore many fools thought that there was no air in the world, because all the bodies enter into it. Quick dissolution is because (air) quite quickly turns into water and quickly turns into fire, because you see that, when you light a little fire and put some fatty oil in it, its flame increases much more than the amount of fire¹⁷.

(12) This last evidence is not very clear. The solution may probably be found in the fact that scammony is considered a very hot and dry plant (Avicenna says hot and dry at the third degree, but more hot than dry, cf. the *Canon*, in IBN SĪNĀ, *Al-Qānūn fī al-ṭibb*, vol. I, Mu'assasa 'Izz al-dīn, Beyrouth 1993, p. 639-640 (Maktaba al-muthannā, Baghdad, p. 385), s. v. *saqamūniyā*) and, therefore, that this plant is bad for a healthy man as the complexion of a healthy man must be close to the equality. Eating scammony (while not suffering a specific disease) creates a disequilibrium in man's complexion, and kills him. As for bread, its properties are less powerful.

(13) Steam is considered air.

(14) Literally : the second (means) is the air that condenses and then drops fall and it is moistened.

(15) This last sentence is clearly an addition which shows an « alchemisation » of the text, and has no corresponding extract in the *De elementis*. The word *lapis* (stone) is here the Latin translation of the Arabic word *ḥajar* (stone), which, in Arabic alchemy, designates all the matters from which the elixir is made.

(16) Literally : its lightness is above water. The order of the weight of elements corresponds to their natural place (from the lightest/highest to the heaviest/lowest) : fire, air, water, earth.

(17) The fact that air turns into water was explained above by condensation. The transformation of air into fire is shown by the oil : oil is considered a compound containing mainly air (sometimes fire, especially among Arabic alchemists), because it goes above water (it floats). If we project oil into fire, the flame increases; the air contained in the oil must therefore have been turned into fire.

Dicitⁿ discipulus : Intellexi totam materiam^o aeris, sed^p quia^q tam cito vertitur in ignem^r cur non est de calore^s ignis ?

8 Dicit^t magi | ster : Si esset totum^u de uno calore^v, esset cibus et vivens unum^w,
70 et cibus^x non debet^y unum^z esse cum vivente, sed debet esse^a de sua materia^b.

Dicit^c discipulus : Postquam scio de aere, dic^d de qua^e natura^f est^g aqua^h.

Dicitⁱ magister : Natura aquae^j est frigiditas et humiditas.

Dicit^k discipulus^l : Unde hoc scire potuerunt^m ?

Dicitⁿ magister : Propter^o illos^p qui natant in aqua^q, quia refrigeratur corpus^r
75 eorum et humidatur^s.

Dicit^t discipulus : Quia^u vidi multos natantes in aqua^v et calefiebat^w corpus^x eorum.

Dicit^y magister : Hoc accidens fuit, non fuit^z res naturalis^a, quia aqua frigida quando tetigit^b corpus refrigerat^c illud et fugit calor naturalis; et quando^d deficit^e
80 aqua exit calor ut^f calefaciat^g quod^h aquaⁱ tetigit^j. Et calor ille^k fuit^l talis. Si^m multaⁿ est aqua^o multum refrigerabit^p corpus hominis. Sed^q aqua humida est quia est currens^r.

(n) dicit *om. Celsi S* (o) materiam] naturam *F* (p) sed] scilicet *Celsi* (q) quia] quod *V add.* non *Celsi* (r) ignem] igne *LCV* (s) de calore *om. S* (t) dicit *om. Celsi S* (u) totum] tantum *V* (v) calore] colore *Celsi C* (w) unum] vivum *F* (x) cibus *add.* et *C* (y) debet] oportet *V om. F* (z) unum] vivum *F* (a) cum vivente sed debet esse *om. Celsi H* (b) materia] natura *S add. rubricam* quaerit discipulus de aqua *Celsi* (c) dicit *om. Celsi S* (d) dic *add. mihi HV* (e) qua] quaquam *C* (f) natura] *S* materia *ceff.* (g) qua natura est *om. V* (h) qua natura est aqua] natura aque *S* (i) dicit *om. Celsi S* (j) aquae *om. C* (k) dicit *om. Celsi S* (l) dicit discipulus *om. V* (m) potuerunt] poterunt *F* (n) dicit *om. Celsi S* (o) propter] per *FS* (p) illos] istos *H* (q) aqua] aquam *Celsi* (r) corpus *iter. V* (s) humidatur] humectatur *S* (t) dicit *om. Celsi S* (u) quia *om. S* (v) aqua] aquam *H* (w) calefiebat] caleficiebatur *F* calefiebat *VS* (x) corpus] corpora *S* (y) dicit *om. Celsi S* (z) non fuit] et non *Celsi H* non sunt *C* non *S* (a) naturalis] naturales *C* (b) tetigit] *Celsi LF* tangit *H* tetigerit *CV* tegit *S* (c) refrigerat] refrigeratur *V* (d) quando] quomodo *C* (e) deficit *add. calor Celsi* (f) ut] et *H* (g) calefaciat] *Celsi CF* calefacit *L* calefacit illud *H* calefiat *VS* (h) quod] et *V* (i) aqua] aquam *Celsi* (j) tetigit] tetigerit *C* (k) ille] iste *S* (l) fuit *om. Celsi* (m) si] et *V* (n) si multa] *Celsi HFS* simulata *LC* et multa *V* (o) aqua *add. humida C* (p) refrigerabit] refrigerat *H* (q) sed] si *H* (r) quia est currens quia currens *C* quia currit *S om. F add. rubricam* exemplum de melle *Celsi*

The disciple says : I understood all the matter¹⁸ of air, but, as it turns so quickly into fire, why has it not the heat of fire¹⁹?

The master says : If the whole had the same heat, the nutriment and the living would be one, and the nutriment must not be one with the living, but it must be of its own matter²⁰.

The disciple says : Now that I know about air, tell me of which nature²¹ is water.

The master says : The nature of water is coldness and moisture.

The disciple says : From what might it have been known?

The master says : Because of those who swim in water, because their body is cooled and moistened.

The disciple says : But I have seen many (people) swimming and their body was getting warm.

The master says : This was an accident, not a natural thing, because when cold water touched a body, it cools it and the natural heat recedes; and when the water falls off, the heat comes out to heat what water has touched²². The heat that you speak about was of this kind. If the amount of water is great, it will cool the body of the man very much. But water is moist because it is fluid²³.

(18) The word *materia* is strange here, we would expect *natura* at first. This hypothesis is plausible, because of the close abbreviations of these words. However, the word *materia* is often used by medieval translators to translate the Arabic word *jawhar*, which often designates matter, but is more usually used in philosophical and scientific texts to designate the substance. For instance, substance and matter are often confused in texts of the Jābirian corpus (HAQ, *Names, Natures and Things*, p. 49-62). We also find an example of this confusion in the translation of the *Sirr al-khalīqa* of Balīnūs (Ps.-Apollonius of Tyana), where the word *jawhar* is sometimes translated by Hugo of Santalla by the word *materia*, though it has the meaning of « substance », cf. Arabic text BALĪNŪS [PS.-APOLLONIUS OF TYANA], *Buch über das Geheimnis der Schöpfung und die Darstellung der Natur (Buch der Ursachen) von Pseudo-Apollonios von Tyana*, ed. U. WEISSER (Sources and studies in the history of Arabic-Islamic science 1), Institute for the History of Arabic Science, University of Aleppo, Aleppo 1979, p. 247, Latin translation F. HUDRY, « Le *De secretis nature* du Ps. Apollonius de Tyane, traduction latine par Hugues de Santalla du *Kitāb sirr al-khalīqa* », *Chrysopaia*, 6 (1999), p. 71.

(19) The author explained above that air must be hot because the nutriment and the fed must have a common nature (heat). However, he asserts that the heat of fire is greater than the heat of air, otherwise air and fire would be the same thing. This affirmation contradicts the examples of calculation given at the end of the *Porta elementorum* (cf. also translation n. 26). But the assertion that the heat of the fire is different from the heat of the air is also found in the *De elementis* (DALES, *Marius : On the Elements*, p. 51) and goes back to Aristotle (*De generatione et corruptione*, II, 4, 331a). The calculations at the end of the *Porta elementorum*, in which each element is characterized by two properties with the same intensity, seem to be an addition of the translator/reworker/compiler and have no correspondent passage in the *De elementis*.

(20) Cf. translation n. 18.

(21) The answer allows one to assume that the word *materia* (found in almost all the witnesses) is here due to a confusion of the abbreviations (cf. translation n. 18).

(22) The heat recedes inside the body, and comes out when water falls off. In the context of an alchemical treatise, this passage seems to refer to the system of interior and exterior properties : each metal is characterized by two exterior properties, and holds the two opposite properties inside itself (cf. also translation n. 27).

(23) Literally : running.

Dicit^s discipulus : Si omne^t currens est frigidum mel cur est calidum?

Dicit^u magister : Mel est calidum^v per vim^w et^x non^y per factum^z, et^a verum
 85 est quod maior pars currentium^b est frigida. Et est aliud signum quia aqua est^c
 humida : quia^d dimittit^e res ingredi^f in corpore suo^g, et^h quiaⁱ non est sua^j
 humiditas^k quanta est aeris, non ingrediuntur ibi omnes^l res sicut faciunt in aere^m.
 9 | Dicitⁿ discipulus : Intellexi quod aqua est frigida et humida^o. Modo^p dic^q
 quae sunt naturae absconditae de aqua^r.

90 Dicit^s magister : Naturae absconditae^t de aqua^u sunt pondera et leves
 solutiones^v.

Dicit^w discipulus : Ne^x cures^y mecum laborare ut dicas mihi rationes per
 naturas absconditas de aqua^z, quia iam intelligo bene naturas quatuor
 elementorum et naturam absconditam uniuscuiusque^a et rationes super^b omnia.

95 Dicit^c magister : Benedictus sis quia tam bonum habes intellectum^d. Iam
 perfecimus^e rationes^f quatuor elementorum per naturas^g quae sunt extra et quae
 sunt intra^h, modo debesⁱ scire unumquodque elementorum quomodo vertitur in
 naturam alterius elementi. Primum scias quia^j cum decoquis aquam ad ignem
 tamdiu quod non remaneat de ea, non potest esse quod omnino desinat^k esse, quia
 100 fumus efficitur et fumus^l est aer et aer est ignis. Si^m tu accendasⁿ lampadem^o, scis^p
 quod non vivet absque coniunctione aeris. Ergo aqua est ignis^q et ignis^r vertitur in
 aquam per vim^s. Quomodo? Si tu accipias^t lampadem^u et extinguas, ubi^v erit^w
 10 ignis vertetur^x in aerem^y quia non potest esse quod corpus ignis | in nihilum
 redigatur nec ullum^z corpus in^a quo sit^b longitudo^c et latitudo in nihilum vertitur^d.
 105 Et si tu iungas illum aerem^e quando^f extinguis ignem, totum vertetur^g in aquam.

(s) dicit om. *Celsi* S (t) omne add. corpus S (u) dicit om. S (v) dicit magister mel est calidum om.
F add. naturaliter L (w) vim add. id est naturaliter CF (x) et om. FS (y) non add. accidentaliter L add.
 accidentaliter et C add. accidentaliter et non F (z) factum] actum *Celsi* (a) et om. C (b) currentium
 add. res LCFV (c) est om. C (d) quia] quis F (e) dimittit] dimittat C (f) ingredi al. m. in mg.
 L (g) corpore suo] corpus suum S (h) et om. V (i) quia add. tanta V (j) sua] eius H (k) humiditas add.
 tanta HF (l) omnes] omnis L om. F (m) aere] aer C (n) dicit] dixit F om. *Celsi* S (o) humida add.
rubricam de naturis absconditis aquae *Celsi* (p) ante modo add. magister *Celsi* (q) dic add. mihi
 S (r) de aqua] aquae HS (s) dicit om. *Celsi* S (t) absconditae om. H (u) de aqua] aquae HS | dicit
 magister naturae absconditae de aqua om. C (v) leves solutiones] solutiones F levis solutio
 S (w) dicit om. *Celsi* S (x) ne] non V (y) cures] cures F (z) per naturas absconditas de aqua]
 naturarum absconditarum aquae S (a) uniuscuiusque] unius L add. al. m. cuiusque (b) super] sunt
Celsi (c) dicit om. *Celsi* S (d) intellectum add. *rubricam* de conversione elementorum in alterutrum
Celsi add. divisione unius elementi in alio C (e) perfecimus] perficimus C (f) rationes] naturas
 F (g) per naturas om. F (h) intra] V infra cett. | iam perfecimus rationes quatuor elementorum per
 naturas quae sunt extra et quae sunt intra om. S et add. *rubricam* nota conversionem cuiusque elementi
 in aliud M pro magister (i) debes] debet H (j) quia] quod H (k) desinat] *Celsi* HCS desinit L deficiat
 F dimittat V (l) fumus] fimus C om. S (m) si] non C (n) accendas] attandas C ascendas
 V (o) lampadem] lapidem C add. tu H (p) scis] sitas sic C scias S (q) est ignis] vertitur in ignem
 H (r) et ignis om. V (s) per vim om. H (t) accipias] accendas H (u) lampadem] lapidem C (v) ubi]
 nisi L nisi ubi V (w) erit] erat *Celsi* FS (x) vertetur] LCS vertitur *Celsi* HFV (y) aerem] *Celsi* HS aere
 LCV aer F (z) ullum] nullum C illum V (a) in om. F (b) sit] est H (c) longitudo] latitudo F (d) in
 nihilum vertitur] in nihilum revertatur S om. LCV (e) illum aerem] illa aer *Celsi* (f) quando] quomodo
 LCF add. tu S (g) vertetur] LC vertitur *Celsi* HV verteretur F revertetur S

The disciple says : If every fluid is cold, why is honey hot²⁴?

The master says : Honey is hot in potency and not in act²⁵, and it is true that the greatest part of fluids is cold. There is another sign that water is moist : it lets things enter into its body, and as its moisture is not as great as the moisture of air, not all things enter into it like they do in air²⁶.

The disciple says : I understood that water is cold and moist. Tell me now what are the hidden natures of water.

The master says : The hidden natures of water are heaviness and easy dissolutions.

The disciple says : Do not undertake to tell me arguments about the hidden natures of water, because I already well understand the natures of the four elements and the hidden nature of each one, as well as arguments about it.

The master says : Be blessed because you have so good an intellect. We have completed the arguments about inner and outer natures of the four elements²⁷; now you must know how each element turns into the nature of another element²⁸. Know first that when you heat water with fire so long as nothing remains of it, it is impossible that (water) completely ceases to exist, because it makes steam, and steam is air, and air is fire²⁹. If you light a lamp, you know that it cannot live without being joined to air. So water is fire³⁰ and fire potentially turns into water. How? If you take a lamp and extinguish it, fire will turn into air³¹, because it is impossible that the body of fire be reduced to nothing, or that a body in which there are length and width is reduced to nothing. And if you condense this air (that you have) when you extinguish the fire, the whole turns into water³².

(24) Honey is considered by Avicenna hot and dry at the second degree (IBN SĪNĀ, *Al-Qānūn fī al-tibb*, vol. I, p. 671 [Baghdad ed., p. 402], s. v. 'asal).

(25) The words *naturaliter* and *accidentaliter* added in *L*, *C* and *F* seem to be a later gloss, as the expressions *per vim* and *per factum* are used elsewhere in the treatise without any gloss (and this is not the first occurrence).

(26) Again, this assertion that water is less moist than air (water being colder) contradicts the calculations of the end of the *Porta elementorum*, cf. translation n. 19.

(27) The inner and outer natures can be understood in two ways. It could be a further allusion to the alchemical system of interior and exterior properties (cf. translation n. 22), or a distinction between the four elementary properties (exterior) and the three additional properties (called hidden natures).

(28) The transmutation of elements into each other is already mentioned by Aristotle in the *De generatione et corruptione*, II, 4 (331a). Plato also describes the transformation of the elements into each other, but asserts that earth cannot be transformed into another element, in the *Timaeus* (56d-57c). Cf. also translation n. 33. On this subject, cf. also CAIAZZO, « The Four Elements in the Work of William of Conches », p. 17-26; EAD., « La forme et les qualités des éléments ». Some of the examples of transformation given here are also found in the *Pneumatica* of Hero of Alexandria, but the similarities are too general to assume a link (cf. also translation n. 9).

(29) Here and in the rest of the paragraph, the author repeats doctrinal points which have been proved above. Air is fire, i.e. it turns into fire, as we see when we throw oil in fire.

(30) Water turns into air, which turns into fire, so water turns into fire.

(31) Literally : the place where fire will be will turn into air.

(32) The meaning of the word *iungas* is not clear; I propose « condense », as the text says that it makes air turn into water.

Ergo ignis per vim vertitur^h in aquamⁱ. Et^j sic potes scire quod aer vertitur in ignem et aquam^k, et aqua^l in aerem^m, et ignis in aeremⁿ. Et terra^o vertitur in ignem : et tu vides quod de terra surgit^p pulvis, ille^q pulvis^r vertitur in aerem et aer^s in ignem. Et^t ignis vertitur^u in terram, quia tu^v scis quod aer vertitur in
 110 ignem^w et aer vertitur in aquam^x, et aqua^y, quando congelatur^z et calor tetigit eam, non potest^a cito deleri^b. Et iam dictum est quod omnia^c elementa vertuntur in alia^d.

Modo^e ostendam tibi quod omnia quae sunt in mundo sunt creata^f de^g istis^h quatuor elementisⁱ. Debes scire quod sunt^j res in quibus^k duo elementa sunt
 115 maiora et duo minora^l; et sunt res in quibus tria sunt maiora et unum minus^m; et sunt resⁿ in quibus unum maius est^o et tria minora^p; et^q sunt^r in quibus omnia aequaliter se habent^s. Isti quatuor^t modi sunt alginz^u id est genus^v. Modo dividam^w per^x diversitates sive^y differentias^z sive^a per^b partes^c.

(1) Una^d diversitas est^e quod ignis et aer sunt maiora;

11 120 (2) secunda quod ignis^f et aer sunt mino | ra;

(3) tertia^g quod ignis^h et aqua sunt maiora;

(4) quartaⁱ quod ignis et aqua sunt minora^j;

(5) quinta^k quod ignis et terra^l sunt maiora^m;

(6) sextaⁿ quod ignis et terra sunt minora;

125 (7) septima^o quod^p aer et aqua^q sunt maiora;

(8) octava^r quod aer^s et aqua sunt^t minora;

(9) nona quod aer et terra^u sunt^v maiora;

(10) decima quod aer et terra^w sunt minora;

(h) vertitur] vertetur C (i) ergo ignis per vim vertitur in aquam om. H (j) et om. S (k) et aquam om. LCS (l) aqua] aquam F (m) aerem] aere C (n) et ignis in aerem om. S (o) terra] iterum V (p) surgit] fit H (q) ille] iste H (r) pulvis om. C (s) aer add. vertitur C (t) et om. V (u) vertitur om. S (v) tu om. Celsi (w) et ignis vertitur in terram quia tu scis quod aer vertitur in ignem om. F (x) aquam] aqua L (y) aqua] aquam F (z) congelatur] gelatur F (a) potest add. tam V (b) deleri] desiccari V (c) omnia om. F add. numerum 4 V (d) alia add. rubricam ostensio quod omnia quae sunt in mundo sunt de quatuor elementis Celsi add. rubricam respondet quod omnia corpora sunt composita ex IIII elementis F (e) ante modo add. item magister S (f) creata] compilata Celsi H add. et compilata F (g) de] ex H (h) istis om. S (i) elementis add. et F (j) sunt om. V (k) quibus] qua V (l) et duo minora om. V (m) et unum minus om. C | et sunt res in quibus tria sunt maiora et unum minus om. S (n) minora et sunt res in quibus tria sunt maiora et unum minus et sunt res om. Celsi (o) est om. V (p) minora] maiora F (q) et add. unum minus C (r) sunt add. res S (s) habent] habeant C (t) quatuor om. H (u) alginz] LVS aliquid Celsi algin et HC alciores F (v) id est genus] F id est unum genus S om. Celsi HLCV (w) dividam] dicam VS (x) per om. V (y) sive] seu V (z) differentias] duras C (a) sive] seu V (b) per om. Celsi FV (c) partes] partas H add. rubricam de diversitatibus elementorum Celsi (d) una] prima Celsi unum S add. est F (e) est add. unam S (f) ignis add. est F (g) tertia add. est H (h) quod ignis iter. F (i) quarta add. est H (j) quarta quod ignis et aqua sunt minora om. C (k) quinta add. est H (l) et terra om. C (m) quarta quod ignis et aqua sunt minora 5 quinta quod ignis et terra sunt maiora corr. al. m. quartam quintamque diversitatem C (n) sexta add. est H (o) septima add. est H (p) quod] et C (q) aqua] terra H (r) octava add. est H (s) aqua sunt maiora 8 octava quod aer om. C add. al. m. in mg. (t) sunt om. LC (u) terra] aqua S (v) sunt iter. L (w) terra] aqua S

So fire potentially turns into water. By this way you can know that air turns into fire and water, that water (turns) into air, and that fire (turns) into air. Earth turns into fire : you see that dust rises up from earth, this dust turns into air³³ and air into fire. Fire turns into earth, because you know that air turns into fire and water, and water, when it is frozen and (when) heat has touched it, cannot be easily destroyed³⁴. So we have said that all the elements turn into each other.

Now I will show you that everything that is in the world is created from these four elements. You must know that there are things in which two elements exist (in) greater (amount) and two exist (in) smaller (amount); there are things in which three elements exist (in) greater (amount) and one exists (in) smaller (amount); there are things in which one (element) exists (in) greater (amount) and three (in) smaller (amount); there are things in which all the elements are equal. These four modes are *alginz*, i.e. genus³⁵. Now I will divide my discourse according to the diversities, or differences, or parts³⁶.

- (1) The first diversity is more fire and air;
- (2) the second, less fire and air;
- (3) the third, more fire and water;
- (4) the fourth, less fire and water;
- (5) the fifth, more fire and earth;
- (6) the sixth, less fire and earth;
- (7) the seventh, more air and water;
- (8) the eighth, less air and water;
- (9) the ninth, more air and earth;
- (10) the tenth, less air and earth;

(33) This assertion contradicts the Aristotelian doctrine. Aristotle (*De generatione et corruptione*, II, 4, 331a) explains that the elements can be transmuted into each others, but that this transmutation is quick when elements have a common property, and slow when they do not have. So Aristotle asserts that earth (cold and dry) turns faster into fire (hot and dry) and water (cold and dry) than into air (hot and moist), contrary to what seems to be said here. The assertion that earth is hardly transformed, and even never completely transformed into another element, is already found in Plato's *Timaeus* (56d). Cf. also translation n. 28.

(34) The text seems here corrupted; the meaning could be that ice cannot be destroyed, whether it is frozen (turned into earth) or heated (turned into air), but the *cito* is problematic. The expected meaning is that water turns into earth when it is frozen. The text of the *De elementis* is much more intelligible.

(35) The word *alginz* is the transcription of the Arabic *al-jins* (genus, species), derived from the Greek γένος. This term allows one to assume the hypothesis of a translation/reworking made in Spain or in a Spanish milieu, cf. p. 156. The gloss is interesting as it shows the method of translators using the *verbum de verbo* to clarify the transliteration (as the word is a technical term here) : they add a gloss, which is here a translation of the Arabic term. Concerning this practice, cf. BURNETT, « Translation from Arabic into Latin in the Middle Ages », p. 1236.

(36) The word *diversitas* (diversity) designates here the commixtions, i.e. the various proportions of elements in things (as complexion in medicine designates the proportion of humours). I translate it very literally using the term « diversity ». The very clear and systematic tables of the *De elementis* are only incomplete lists in the *Porta elementorum*. The meaning of the next passages is incoherent.

- (11) undecima quod aqua et terra sunt maiora;
 130 (12) duodecima est diversitas^x aqua^y et terra^z minima^a.
 Iam habes primum genus et modo habes diversitates^b secundas^c. Modo^d
 habebis diversitates tertias^e :
 (1) prima diversitas^f ignis, aer^g et^h aqua sunt maioraⁱ;
 (2) secunda ignis^j, aer et aqua sunt minora^k;
 135 (3) tertia aer, aqua^l, terra sunt^m maiora;
 (4) quarta aer, aquaⁿ, terra^o minora;
 (5) quinta ignis et^p aqua et^q terra^r maiora^s;
 (6) sexta ignis et^t aqua et^u terra^v minora.
 Et in hoc modo si dividas illos^w modos veniunt^x tibi de primis 16, de secundis
 140 64^y, de tertiis 47^z, de quartis – de quibus modo dicemus^a – 18^b. Sunt omnes^c 145^d.
 Modo dicam tibi de quarta diversitate.
 (1) Ignis multus^e, aer minus, aqua minus, terra minus.
 (2) Secunda diversitas aer multus, aqua minus, terra minus, ignis minus.

(x) est diversitas] quod *Celsi HS* est quod diversitas *F* (y) aqua] aquae *F* (z) terra] terrae
F (a) minima] sunt minora *Celsi HS* (b) modo habes diversitates *om. S* (c) secundas *add. rubricam*
 de tertia diversitate *Celsi* (d) modo] nunc *V* (e) modo habebis diversitates tertias *om.*
Celsi (f) diversitas *add. est S* (g) aer *add. et C* (h) et *om. Celsi CF* (i) maiora] minora *expunct. et*
corr. ead. m. in mg. S (j) ignis *iter. et add. et L* (k) minora *corr. al. m. in maiora C* l sunt minora *in mg.*
V (l) aqua *add. et H* (m) sunt *om. L* (n) aqua *add. et H* (o) terra *add. sunt HFS* (p) et *om. HF* (q) et
om. CF (r) terra *add. sunt HF* (s) quarta aer aqua terra minora 5 quinta ignis et aqua et terra maiora
ordinem diversitatis quartae quinaeque mutaverunt et numeris erraverunt Celsi HCVS (t) et *om.*
HCFS (u) et *om. CFVS* (v) terra *add. sunt HFS* (w) illos] istos *H* (x) veniunt] venient *H* erunt
S (y) 64] LXXIII *F* (z) 47] XLIII *F* (a) dicemus] dicimus *C* (b) 18 *add. et S* (c) omnes *in mg. L om.*
C (d) 145 *add. rubricam* de quarta diversitate *Celsi* (e) multus] multis *C add. est H*

- (11) the eleventh, more water and earth;
- (12) the twelfth, very little water and earth.

You already have the first genus, now you have the second diversities. Now you will have the third diversities :

- (1) the first diversity, more fire, air and water;
- (2) the second, less fire, air and water;
- (3) the third, more air, water and earth;
- (4) the fourth, less air, water and earth;
- (5) the fifth, more fire, water and earth;
- (6) the sixth, less fire, water and earth.

By this way, if you divide these modes, you will have 16 first diversities, 64 second, 47 third and 18 fourth, about which we will speak soon. They are 145 (in total)³⁷. Now I will tell you about the fourth diversity :

- (1) much fire, less air, less water, less earth;
- (2) second diversity, much air, less water, less earth, less fire.

(37) Without the *De elementis*, it is impossible to understand the calculation of the *Porta elementorum*, which is erroneous. All the things that are in the world are compounded of the four elements, and it is by their elemental proportion that they differ. The Arabic original analysed the different combinations of elements : these combinations are unintelligible in the *Porta elementorum*, but they are easy to understand in Marius' *De elementis*. I do not show here all the tables, as they may be found in Dales' edition. The *De elementis* counts 145 combinations, divided into three sections :

- 1. 18 combinations of two elements : 6 equal compounds, 12 unequal compounds.
- 2. 52 combinations of three elements : 4 equal compounds, 48 unequal compounds (24 in which three elements are unequal, and 24 in which two elements are equal and the third is not).
- 3. 75 combinations of four elements : 1 equal compound, 74 unequal compounds (8 in which three elements are equal and the fourth is not, 6 in which elements are equal in twos, 36 in which two elements are equal and two are unequal, 24 in which the four elements are unequal).

The calculation proposed in the *Porta elementorum* is not clear, but the result is 145 as in the *De elementis*. Nevertheless, the calculation of the *De elementis* is about all the possible combinations (*De elementis*, p. 129 : « Quas si omnes simul connumerer, CXLV invenies, quorum quasdam corporeo sensu percipies, alias vero nequaquam nisi ratione intelliges »), contrary to the *Porta elementorum*, in which it is said that those combinations are the possible combinations of things of this world, which are all compounded of the four elements : therefore only 75 combinations should be extent (in the sublunary world).

This system of elements and commixtions has to be linked with Galen's theory of humours and complexions, corresponding to elements : blood – air (hot and moist), yellow bile – fire (hot and dry), black bile – earth (cold and dry), phlegm – water (cold and moist). The system of elemental commixtions was applied very early to alchemy, already in texts attributed to Jābir ibn Ḥayyān (end of the 8th c.-9th c.) : if there is an imbalance of humours the body is ill, by balancing humours it is possible to cure the body; the same is said by alchemists about metals (considering elements instead of humours). The elixir system of the Arabic alchemy comes from medical theories, cf. M. ULLMANN, « Iksīr », *The Encyclopaedia of Islam. New Edition*, vol. 3, 1971.

- Et quia scio^f quia^g tu es acuti ingenii et primus^h, tu trahesⁱ omnes istas^j 145
 12 145 diversitates^k ad lucem^l | et figurabis^m easⁿ quod^o bene eas^p intelligas et scias
 omnia corpora aequitata^q. Et debes^r intelligere hoc quia scias^s de omnibus rebus
 quae^t sunt compositae^u in saeculo^v et videas^w quae sunt primae^x, secundae^y,
 tertiae aut^z quartae et^a in quo loco illarum^b est. Et quando haec^c intellexeris^d scies
 omnes res^e quomodo^f sunt^g et unde^h suntⁱ.
- 150 Scias^j quia^k omnes res quae sunt creatae in saeculo^l, vitales, herbales et^m
 naturales, omnes sunt compositae de istis quatuor elementis et ad ista quatuor ele-
 menta se solvuntⁿ. Verbi^o gratia tu vis solvere pomum ad^p quatuor elementa unde
 captum fuit. Primum debes^q videre in quo loco est : et si est^r de^s prima diversitate^t
 in quo loco est primae diversitatis, et^u si est de secunda diversitate et^v in quo loco^w
 155 eiusdem^x est, et si est de tertia^y et in^z quo loco eiusdem est^a, et^b si est^c de^d quarta
 et^e in quo loco eiusdem^f est. Tu^g debes scire quod pomum est calidum et^h frigi-
 dum etⁱ siccum et humidum per fortitudinem^j, non per factum^k : quod si^l calidum
 esset per factum^m si quis tangeretⁿ eum^o combureretur^p, si frigidum^q esset^r per
 factum^s si quis tangeret eum^t refrigeraretur^u, et sic de siccitate et humiditate^v.

(f) et quia scio] quod scio et C (g) quia] quod F (h) ingenii et primus] ingenii et puri H ingenii et primo F generis id est ingenii S (i) trahes] trahas H trahens C extrahes S (j) istas add. et F (k) 145 diversitates] diversitates 15 V 145 differentias S (l) lucem] invicem V (m) figurabis] filgurabis C (n) eas] ea S (o) quod om. L (p) eas] ea C omnes F om. H (q) aequitata] quietata Celsi H aequitates F add. quae sunt omnia corpora aequitata V (r) debes] debet H (s) quia scias] ut H (t) et debes intelligere hoc quia scias de omnibus rebus quae om. LCFV (u) compositae] composita HCF (v) saeculo] secunda H (w) et videas] et videbis H om. F (x) primae add. et quae sunt H (y) secundae add. et quae H (z) aut] et Celsi HF add. quae H om. S (a) et om. C (b) illarum] illa res Celsi ista res H (c) haec om. F (d) intellexeris] intellexis C (e) res add. et C (f) quomodo] quae S (g) sunt] fiunt F (h) unde] unum H (i) sunt] fiunt F add. et FS (j) scias] scies FV (k) quia] quod F a' (pro aut?) V (l) saeculo] mundo H (m) et om. CFS (n) solvunt] solincere o ponuta (sic) C (corr. al. m.) add. rubricam exemplificabo dictorum F add. rubricam quomodo quatuor elementa se solvunt Celsi (o) verbi] verba C (p) ad] in Celsi (q) primum debes] primo debet H debes S (r) est om. H add. primi C (s) de] in HV (t) diversitate add. et CS (u) et om. F (v) et om. HF (w) loco om. V (x) eiusdem om. Celsi H (y) tertia add. diversitate F (z) et in] in F om. H (a) est om. C (b) et om. H (c) si est de tertia et in quo loco eiusdem est et si est] sic de tertia et S (d) de] in V (e) et om. F (f) eiusdem add. et si C (g) tu add. etiam F (h) et om. F l est calidum et om. H (i) et om. F (j) fortitudinem add. id est per vim id est per suam naturam occultam LC add. id est per vim sive per suam naturam occultam F add. et HV (k) per factum] factum Celsi perfectam F (l) si om. S (m) per factum] perfectum F (n) tangeret] tangerit C (o) eum add. refrigeraretur F (p) combureretur] comburetur C (q) frigidum] frigidus C (r) esset om. S (s) per factum] perfectum F (t) eum om. LCV (u) refrigeraretur] refrigeretur HC frigidaretur S (v) de siccitate et humiditate] desiccet et humidat H

And as I know that you have a sharp and excellent mind³⁸, you will shed light on all these 145 diversities and picture them so that you could well understand them and know all the balanced bodies³⁹. And you must understand this because you must know about all the things that are compounded in the world and see whether they pertain to the first, the second, the third or the fourth diversity, and in which place of them they are. When you will have understood this, you will know how all the things are and where they come from.

Know that all the things that have been created in the world, animal⁴⁰, vegetal and natural⁴¹, are all compounded of these four elements and are dissolved into them. For example if you want to dissolve a fruit into the four elements from which it has been taken, you must first see in which place it is : if it pertains to the first, the second, the third or the fourth diversity, and in which place of them it is. You must know that the fruit is hot, cold, dry and moist in potency, not in act : if it was hot in act, one would be burned when touching it, if it was cold in act, one would be cooled when touching it, and for dryness and moisture likewise.

(38) In the *De anima*, the word *primus* is used sometimes with the ordinal meaning (first), sometimes with the qualitative meaning (first in quality, i.e. excellent).

(39) The meaning of the word *aequitata* is not clear here. It is likely a reference to the necessity for the alchemist to take a stone (matter from which the elixir is made) which is as balanced as possible, i.e. in which the elementary properties are as equal as possible, cf. *DA*, p. 397 (here about the humours, which are compounded by elements) : « Sicut iam diximus hic est sanguis de quo operamur, sed de quibus hominibus accipiemus dicimus : non accipias de fleumatico nec de colerico nec de melancolico nec de sanguineo, sed tantum de illo accipias in quo sunt omnes quatuor humores aequales, et non accipias in tempore tali in quo aliquis humor sit superexcellens ».

(40) In Ps.-Avicenna's *De anima*, the animal world is designated sometimes by the word *vitalis*, sometimes by the term *animalis*. Paola Carusi suggests to read it as the translation of the Arabic terms *ḥayawānī* (having a *ḥayāt*, i.e. life, *vitalis*) and *naḥsānī* (having a *naḥs*, i.e. soul/spirit, *animalis*, once translated *spiritualis* [*DA*, p. 50]).

(41) In the *De anima*, the mineral world is almost always designated by the word *naturalis*, which is uncommon. A more usual reading would be *mineralis*. The hypothesis of a confusion between the abbreviations of these terms is plausible, but not really convincing : indeed, a passage of chapter 11 of the first *dictio* describes the natural stone (the author distinguish a stone for each kingdom, it is therefore one of the three kingdoms, as the animal and the vegetal stones) and the term *mineralis* is not relevant in this passage (*DA*, p. 84) : « Lapis naturalis est illa res quae efficitur in ventre terrae sine opere. Et lapis noster naturalis est res quae per se ipsam nascitur et non crescit et non minuitur. Et lapides naturales sunt : aurum vivum, auripigmentum, sal armoniacum, sulphur ; hii sunt naturales et spiritales. Et lapis herbalis non potest esse quod non nascatur et non crescat, et naturalis nascitur et non crescit quia si cresceret non esset inter ea divisio. Acetum, urina, sperma sunt medicinae nostri lapidis naturalis. Et utilitates nostri lapidis naturalis non possunt numerari, quia aqua nostri lapidis naturalis indurat mercurium et tingit omnes res sicut spiritualis. Et inter spiritalem et naturalem sunt duae differentiae, prima differentia est quia naturalis statim operatur et spiritualis non nisi in termino statuto ». The word *naturalis* seems therefore to mean « natural and/or mineral », i.e. « everything which is neither animal nor vegetal ». Moreover, ps.-Avicenna uses in several passages the more precise term *petralis*, which clearly designates the mineral kingdom. In addition to this, it is interesting to notice that the Arabic word *ma'dīn*, which means « mine » and from which the adjective *ma'dīnī*, « mineral », derives, can also be translated as « origin », « source », « intrinsic nature » ; *naturalis* could therefore be a less precise translation of the Arabic *ma'dīnī*.

- 160 Et si^w pomum ignis esset per factum^x, ascenderet^y super aera^z per vim, ubi est ignis ad suam naturam^a. Secundum Platonem | ascenderet^b ad stellas, secundum
 13 Aristotelem^c super^d aera^e, quia Plato dicit^f quod ignis est^g de stellis et Aristoteles^h dicit quod ignis est in altiori loco – quidem est prope stellasⁱ et propter^j cursum^k stellarum^l fervescit aer et efficitur ignis naturalis. Et si esset aer
 165 pomum, non esset corpus ponderatum^m et si quisⁿ sursum^o elevaret eum non premeretur ad terram. Et si esset aqua^p esset res^q mollis^r currens. Et si esset terra esset tanti ponderis quod non teneret se in arbore. Sed quia^s est mixtum de aere et^t aqua^u, de^v igne et^w terra, processit inde^x res quae^y non est^z simplex, sed^a sunt ibi omnes^b per vim^c : quia tu scis^d si^e miscueris aliquod^f elementum simpliciter^g cum
 170 alio simplici, procedet^h inde res alia quaeⁱ non erit^j elementum, sed erunt ibi duo elementa quae miscuisti per vim^k. Et si tu^l vis solvere ea^m et redigere in suam naturam verbi gratia in pomoⁿ : tere^o illud et mitte^p illud^q in cucurbita cum alembic^r, et mitte ignem^s et distilla^t illud sicut distillatur aqua rosacea^u. Et exiet^v inde^w primum^x aqua simplex, et quod remanebit^y combustum est in eo aliquid^z
 175 ignis cum terra mixtum^a : et habebis inde aquam^b, et terram, et ignis qui^c versus fuit^d in fumum^e et ignis qui remansit in aqua^f, et aer^g qui versus^h estⁱ in aquam^j quia^k non habuit unde procederet^l. Et qui dicebat^m quod aer non eratⁿ in pomo^o, proiciat^p eum^q super^r aquam et nabit, et quia natat aer est in pomo^s et non potest
 14 | mergi^t subtus. Modo audisti^u et intellexisti quomodo pomum^v est de quatuor
 180 elementis et solvit se ad quatuor elementa^w.

(w) si om. V (x) per factum] perfectum F om. H (y) ascenderet] ascendere L ascend' (pro ascendis?) C ascendit V (z) aera] aer L corr. al. m. ascenderet F (a) naturam add. unde F (b) ascenderet om. S (c) aristotelem] aristotilem LC (d) super] ad F (e) aera] aerem Celsi C (f) dicit om. H (g) est om. V (h) aristoteles] aristotiles F (i) quidem est prope stellas] LV qui est prope aeras Celsi quod est prope stellas H quid est prope stellas C et quidem propter stellas F qui est prope stellas S (j) propter] per S (k) cursum] cursus Celsi (l) stellarum om. S (m) ponderatum] ponderant C corr. al. m. (n) quis] quis F (o) sursum] rursum Celsi om. S (p) esset aqua] quidem H (q) res add. et LC (r) mollis add. et F (s) quia om. S (t) et] de H (u) aqua add. et FV (v) de] et S om. F (w) et add. de H (x) inde] patri H abbreviatione incerta (y) quae] quaedam S (z) est om. S (a) sed] quia F (b) ibi omnes om. H (c) per vim] proinde H pariter S (d) scis om. C (e) si add. tu L (f) miscueris aliquod] miscuueris alii quod C (g) simpliciter add. id est F (h) procedet] procedit S (i) inde res alia quae] inter ista quod H (j) erit] erat L est C (k) per vim] proinde H (l) tu om. S (m) ea om. V (n) pomo] HFS pomum Celsi LCV (o) tere] terre C (p) mitte] pone Celsi (q) et mitte illud] et mitte H om. F (r) alembic] LV alembis Celsi alembico HS galebit C alembhic F (s) ignem] in ignem Celsi in igne S (t) distilla] distillata C distilletur S (u) rosacea] resacea C (v) exiet] exibat Celsi exit H exiet V (w) inde] in V (x) primum] primo HS (y) remanebit add. in eo HF (z) aliquid] ad V (a) mixtum] mixti H (b) inde aquam iter. L (c) qui add. remansit F (d) fuit] est F (e) fumum] flutrum sic H (f) aqua] aquam F (g) aer] ignis V (h) versus] reversus S (i) est om. H (j) aquam] aqua LCV (k) quia] et H om. V (l) procederet] procedit C (m) dicebat] dixit S (n) erat] est HS (o) pomo] pomum LC (p) proiciat] HFV proiciat Celsi proiciet L prohiat C proicias S (q) eum] ipsum VS om. H (r) super] in S (s) pomo] pomum LC (t) mergi] iungi C (u) audisti] HLS audivisti Celsi CFV (v) pomum] pomo V (w) elementa add. rubricam exemplum de lacte et caseo Celsi add. discipulus S

And if the fruit was fire in act, it would potentially ascend above air, where fire is in its nature⁴². According to Plato it would ascend to the stars⁴³, and according to Aristotle it would ascend above air⁴⁴, because Plato says that fire comes from the stars and Aristotle says that (fire) is in a higher place – surely it is near the stars and, because of the course of the stars, air is heated and becomes natural fire. If the fruit was air, it would not be a weighty body, and it would not be attracted to earth when lifted up. If it was water, it would be a soft and fluid thing. And if it was earth, it would be so heavy that it could not hang in a tree. But because air, water, fire and earth have been mixed, then it produced a body which is not simple, but in which all (the elements) are in potency. Indeed, you know that if you simply mix an element with another simple (element), then it produces another thing which will not be an element, but in which will be in potency the two elements that you will have mixed. And if you want to dissolve and reduce them to their nature⁴⁵, for example in a fruit : grind it, put it in a cucurbit with an alembic⁴⁶, add fire and distil it as is distilled rose water. Then a simple water will come out first, and in what will remain burned there is a fire mixed with earth : then you will have the water, the earth, the fire which has turned into steam and the fire which has remained in water, and the air which has turned into water because it had no (way) to go out. And if somebody says that there was no air in the fruit, let him put it in water, it will float : as it floats there is air in the fruit and it cannot be submerged. Now you have heard and understood how a fruit is (made) of the four elements and how it is dissolved into them.

(42) Cf. translation n. 16.

(43) Cf. *Timaeus* (32b-c and 40a-b). On the probable translation of Plato's *Timaeus* in Arabic, cf. D. DE SMET, « L'héritage de Platon et de Pythagore : La "voie diffuse" de sa transmission en terre d'Islam », in *Entre Orient et Occident : La philosophie et la science gréco-romaines dans le monde arabe*, Fondation Hardt, Geneva 2011, p. 87-133 (p. 98-100).

(44) Cf. *De generatione et corruptione*, II, 3, 330b-331a.

(45) I.e. to their properties. This use of the word *natura* is strange here, because the distillation divides the fruit into its four elements, not into its four properties. The division into the four properties is made by the preparation of the four isolated elements. The distillation of a thing into its four elements is often described in the *De anima*, especially in the *dictio* 7, for instance, p. 401-403, p. 409-410, p. 416-417, in which the distillation of the three stones (i.e. the three substances from which the elixir is made, which are blood, hair and eggs) is explained. This division is the basis of the elixir system, cf. p. 164-165.

(46) The word *alembic* is here used in its older meaning : it does not designate the entire distillation apparatus, but only the head which is placed on the cucurbit.

- Qui portaret^x lac, dic mihi^y quomodo^z faceres^a et in quo loco diversitatum^b. Qui lac duceret^c tibi^d deberes^e dicere quod in eo est^f aqua multa et aer^g minus^h et terraⁱ minus^j et ignis^k minus^l. Et haec causa^m est una de quatuor diversitatibus; quiaⁿ sensus^o ostendit quod ibi^p sunt quatuor elementa quia bene^q vides in eo
- 185 aquam^r si facias^s illud congelari^t. Sed prius^u abstrahas^v ab eo butirum^w et habebis^x tres causas. Caseus quem^y inde abstraxeris^z est sua terra. Et^a butirum^b si^c proicias^d in igne^e, vertitur^f in flammam^g: ergo ostendit quod ipse^h aer, postquam est cibusⁱ ignis. Et serum^j quod exit^k inde est sua aqua. Et ignis est^l ibi quia lac^m est sanguis coctusⁿ, ergo^o sanguis est calidus et^p lac^q calidum^r, sed calor
- 190 ille est^s minimus^t et non videtur, sed per^u directam^v rationem^w bene^x est ibi. Et^y si vis eum^z solvere^a ad quatuor elementa sicut fecisti pomum, accipe lac dum^b calidum abstrahitur^c a bestia, et mitte in cucurbita^d cum alembic^e et distilla sicut aquam rosaceam^f. Videbis^g quia^h quodⁱ primum^j inde^k distillabis^l erit^m clarius lacrimaⁿ, et illud^o est aqua. Post distillabit^p inde^q alia non tam clara^r et^s vertitur^t in
- 195 colore citrino^u, et illud est aer. Postea remanebit terra combusta^v in fundo^w nigra.
- 15 Modo habes aquam, ae|rem^x, et^y terram^z; ignis evanuit^a in^b vaporibus et efficitur fumus, et fumus^c versus^d est in aquam. Et^e intellectum^f est^g quia omnia^h quaeⁱ sunt in mundo de vitali^j et herba^k sunt composita de istis^l quatuor elementis, et ad illa^m se solvuntⁿ. Ergo debes intelligere omnia quae sunt vitalia et herba^o in

(x) qui portaret] quae portant *H* (y) dic mihi *om.* *H* (z) quomodo] quid *S* (a) faceres] faceret *FS* (b) diversitatum] diversitatem *C* *add.* est magister *S* (c) duceret] duceres *Celsi* ducere *V* (d) tibi *om.* *F* (e) deberes] *Celsi* *LF* deberet *HCVS* (f) quod in eo est *om.* *S* (g) aer] aeris *H* (h) minus] nimis *F* (i) terra] terrae *H* ignis *F* (j) minus] nimis *F* *om.* *C* (k) ignis] terra *F* (l) et ignis minus *om.* *V* (m) causa *om.* *F* (n) quia] quod *V* (o) sensus] per sensum *S* (p) ibi *al. m.* *C* (q) bene] tu *H* *om.* *Celsi* (r) aquam] aqua *LC* (s) facias] videas *F* (t) congelari] coagulari *H* (u) prius] priseus *C* *om.* *Celsi* (v) abstrahas] abstrahans *C* extrahas *F* (w) butirum] butyrum *V* (x) habebis] habebit *C* (y) quem] quidem *F* (z) abstraxeris] extraxeris *Celsi* *H* abstraxis *C* abextrahis *F* (a) et *om.* *F* (b) et habebis tres causas caseus quem inde abstraxeris est sua terra et butirum *om.* *V* (c) si] non *C* (d) proicias] proicias *Celsi* proicias *C* (e) igne] ignem *Celsi* *F* (f) vertitur] convertitur *H* (g) flammam] flamma *CV* (h) ipse *add.* est *S* (i) cibus] cibum *S* (j) serum] seru *S* (k) exit] est *S* (l) et serum quod exit inde est sua aqua et ignis est *al. m.* in *mg.* *C* (m) est ibi quia lac *om.* *F* (n) coctus] totus *C* (o) ergo *add.* quia *F* (p) et *om.* *C* (q) lac *add.* est *H* (r) calidum] calidus *CFV* (s) est *om.* *F* (t) minimus] minus *L* *correxisse* *al. m.* videtur (u) per *add.* praedictam *V* (v) directam] rectam *C* (w) rationem *om.* *S* (x) bene] bonum *C* (y) et] sed *V* (z) eum] ipsum *S* *om.* *F* (a) solvere *maculatus* *V* (b) dum] de *LCV* (c) abstrahitur] extrahitur *HFS* *maculatus* *V* (d) cucurbita] curbita *C* (e) alembic] *Celsi* *L* alembico *HS* alinbith *F* habebit *V* alebit *C* (f) rosaceam] poseceam et *C* roseaceam *F* (g) videbis] videbimus *C* (h) quia *om.* *L* (i) quia quod] quia *C* quod per *V* (j) primum] primo *H* *add.* per vim *F* (k) inde *om.* *Celsi* *HF* (l) distillabis] distillatur *H* distillat *F* et *add.* inde alia non tam clara distillabit *V* (m) erit] est *H* erunt *V* (n) lacrima] lacryma *Celsi* (o) illud] ista *H* (p) distillabit] *LCFV* distillabis *Celsi* *HS* (q) post distillabit inde] postea vero distillabis *H* (r) non tam clara] candidiora *H* *add.* et illud *LCV* (s) et *om.* *CFV* (t) vertitur] urgens *F* (u) colore citrino] calore citrino *C* calorem citrinum *F* calorem citrinum *S* (v) combusta *om.* *C* (w) fundo] funda *L* (x) aerem] aer *LC* aeram *maculatus* *V* (y) et *om.* *HC* (z) terram] terra *LC* *add.* et *F* (a) evanuit] examinavit *L* *maculatus* *C* (b) in] cum *H* inde *C* (c) et fumus *om.* *L* (d) versus] visus *C* (e) et] ergo *H* (f) intellectum] intellectus *F* (g) est] et *V* (h) omnia *add.* se minima *V* (i) quae *om.* *L* (j) vitali *add.* et substantiali *F* (k) herba] herbabili *C* (l) istis] hiis *H* (m) illa] illas *LCV* (n) se solvunt] *Celsi* *FS* solvuntur *H* se solvit *LCV* *corr.* *al. m.* *C* (o) herba] herbabilia *C*

To him who would adduce (the example of) milk, tell me how you would proceed and in which place of the diversities (it is). To him who would give you milk, you should say that there is in it much water, less air, less earth and less fire. This thing pertains to the fourth diversity. (Common) sense shows that there are four elements in (milk): you see that there is water in it if you make it coagulate. But previously, extract butter from it and you will have three things. The cheese that you will then extract is its earth. And if you project the butter into fire, it turns into flame: thus it shows that it is air, because it is the nutriment of fire. The whey⁴⁷ that comes out next is its water. And there is fire in (milk) because milk is cooked blood, so blood is hot and milk too, but this heat is very little and is not seen, but it is there according to a simple reasoning⁴⁸. If you want to dissolve milk into its four elements as you did for the fruit, take milk when (it is still) hot, (when) it just has been extracted from the animal, put it into a cucurbit with an alembic, and distil it like rose water. You will see that what you will then first distil will be clearer than a tear, this is water. Then another (water) will be distilled, less clear, which will turn into yellow colour, this is air. Then earth will remain in the bottom, burned and black. Now you have water, air and earth: fire dispersed in vapour and turned into steam, and steam turned into water. It has been understood that all the animal and vegetal things that are in the world are compounded of these four elements and dissolve into them. Thus you must understand for all the things that are animal and vegetal in

(47) Or the serous liquid.

(48) Blood, as air, is hot and moist (*cf.* translation n. 37). As milk is cooked blood, according to the author, it must have a certain heat in it.

- 200 quo loco diversitatum^p sunt, et non debes aliquam^q ignorare de 145
diversitatibus^r, in quo loco uniuscuiusque^s illarum^t est res vitalis et^u herbalis.
Et^v si modo^w hoc^x non scis^y non *potes*^z operari de^a isto libro, et si hoc scis tua
natura erit natura philosophi^b et intelliges librum^c istum et amplius^d.
- Et^e postquam intellexisti quod^f omnia quae sunt in mundo de vitali et herballi
205 sunt composita de istis quatuor elementis et se^g solvunt^h ad illa, et nullumⁱ est ibi
quod non sit^j in aliqua de 145 diversitatibus, modo^k faciam te intelligere quia^l
quot^m res sunt in saeculo naturales, omnes sunt compositaeⁿ de quatuor elementis
et non est ibi aliqua quae non sit de aliqua^o de^p 145 diversitatibus^q, et solvunt se^r
ad quatuor elementa. Et^s incipiam dicere tibi prius^t in lapide^u sicciori^v omnibus
210 illis^w. In vitro^x sunt quatuor elementa, frigiditas et^y humiditas, calor^z et siccitas.
16 Et est unum | de secundis diversitatibus, de illa^a scilicet ubi^b aqua et^c terra sunt
maiora. Et si tu dicis^d quod calor non est subtus terram, et vitrum non^e est calidum,
et postquam se facit subtus terram^f ubi non est calor^g et^h nonⁱ debet esse calidum,
ego probabo^j tibi^k per iustam rationem quia^l calor est in ventre^m terrae etⁿ vitrum
215 est calidum. Nonne^o vides quod in diebus hiemis^p, quando^q facit^r magnum frigus,
quando^s facies terrae est nimium frigida et sicca^t, fugit calor ille^u in ventre^v terrae
quem fecit^w in ea aestas et calefacit omne^x quod ibi invenit^y? Et quando^z trahis
aquam^a de ventre terrae^b et^c invenies eam^d calidam, haec^e est^f ratio quod^g calor
est ibi^h. Et si homo ingredereturⁱ in loco illo^j pateretur ibi^k magnum calorem
220 in hieme^l et in aestate magnum frigus^m, non quodⁿ calor recedat^o penitus de

(p) quo loco diversitatum] quot diversitatum *Celsi* qua diversitate *H* (q) aliquam] *FS* aliqua *Celsi* *LCV* aliam *H* (r) diversitatibus] diversitates *LC* ditatibus *F* (s) uniuscuiusque] unicuique *Celsi* una cuiusque *H* (t) illarum] istarum *H* (u) et] aut *S* (v) et *om.* *F* (w) modo *om.* *S* (x) hoc] haec *Celsi* (y) non scis] non sis *C* nescieris *S* (z) potes] *correx*i cum *Celsi* potest *cett.* *add.* iterari sive *V* (a) de] in *S* (b) philosophi] philosophorum *Celsi* (c) librum *om.* *C* (d) amplius *add.* *rubricam* quod omnia sunt composita de quatuor elementis secundum diversitates *Celsi* (e) et *om.* *Celsi* (f) quod] quia *H* (g) se *al. m.* *C* (h) solvunt] solvit *Celsi* (i) et nullum] nullum et *LCV* (j) sit *om.* *F* (k) modo] e converso *V* (l) quia *om.* *H* (m) quot] quod *V* (n) compositae] compositi *F* (o) de aliqua] aliqua *V* *om.* *H* (p) de] re *F* (q) modo faciam te intelligere quia quot res sunt in saeculo naturales omnes sunt compositae de quatuor elementis et non est ibi aliqua quae non sit de aliqua de 145 diversitatibus *om.* *S* (r) se *om.* *V* (s) et *om.* *F* (t) prius *om.* *H* (u) lapide *add.* et *C* (v) sicciori] fortiori *H* sicciore in *F* (w) illis] istis *H* (x) vitro] vito *C* *add.* similiter *S* (y) et *om.* *Celsi* *HFS* (z) calor] caliditas *Celsi* *HF* (a) illa] ista *HV* (b) ubi] ibi *C* *corr. al. m.* (c) et *om.* *C* (d) dicis] dicas *H* (e) non *om.* *Celsi* *S* (f) et vitrum non est calidum et postquam se facit subtus terram *om.* *LCV* (g) calor] calidum *F* (h) et *om.* *FS* (i) non *s. l. L* (j) probabo] dico *V* (k) tibi *om.* *LC* (l) quia] quod *FV* (m) ventre] visceribus *F* (n) et *add.* quod *F* (o) nonne] non *H* (p) hiemis] *LC* hyemis *Celsi* *FVS* in hyeme *H* (q) quando] quomodo *LC* (r) facit] est *S* (s) quando] *Celsi* *HS* quomodo *LCFV* (t) sicca *om.* *S* (u) ille] iste *H* (v) ventre] ventrem *Celsi* *F* (w) quem fecit] quod facit *V* (x) omne *add.* illud *H* (y) ibi invenit] est ibi *H* ibi inveniet *C* (z) quando] quomodo *C* (a) aquam] aqua *C* (b) terrae *om.* *LCVS* (c) et *om.* *Celsi* *HS* (d) eam] cum *C* (e) haec] hoc *V* (f) est *om.* *H* (g) quod] quia *HV* (h) haec est ratio quod calor est ibi *om.* *S* (i) ingrederetur] veniret *S* (j) in loco illo] in locum illum *S* *om.* *H* (k) ibi *om.* *S* (l) hieme] *LC* hyeme *Celsi* *HFVS* (m) frigus *add.* propter tempus frigidum *V* *add.* et *Celsi* *H* (n) quod] quia *Celsi* *H* (o) recedat] recedit *H*

which place of the diversities they are, and you must not be ignorant of any of the 145 diversities, and in which place of these is (each) animal and vegetal thing. If you do not know this, you cannot⁴⁹ work from this book, and if you know it, your nature will be a philosopher's nature and you will understand this book and (even) more.

After you have understood that all the animal and vegetal things which are in the world are compounded of these four elements and dissolve into them, and that there is no one which does not pertain to one of the 145 diversities, I will now make you understand that all the natural things that are in the world are compounded of the four elements, that there is no one which does not pertain to one of the 145 diversities, and that they dissolve into the four elements. I will first tell you about the driest stone⁵⁰. In glass there are the four elements, coldness and moisture, heat and dryness⁵¹. It is one of the second diversities, i.e. in which there is more water and earth. And if you say that there is no heat under the earth, that glass is not hot, and that, since it is made under the earth where there is no heat, it must not be hot⁵², I will prove to you with a correct argument that there is heat in the depths of the earth and that glass is hot. Do you not see that during winter days, when there is a great cold, when earth's surface is very cold and dry, this heat that summer made in it recedes to the depths of the earth and heats everything it finds there? When you extract water from earth's depths and find it hot, this is evidence that there is heat in there. If a man entered into this place he would suffer a great heat in winter and a great cold in summer : not because heat recedes deep down

(49) *Celsi's* reading *potes* is preferred to the *potest* of the other witnesses because of the other personnal verbs of the sentence. The reading *potest* could be justified, if *operari* is considered a passive form; the word is a deponent verb, but the variant *operare* is sometimes found in medieval Latin. In the rest of the *De anima*, the form *operari* (deponent) is preferred to the form *operare* (used only several times).

(50) This expression here designates glass. Glass is often considered a stone in Arabic treatises. For example, it is described as a stone (*ḥajar*) in the lapidary of ps.-Aristotle (cf. J. RUSKA, *Das Steinbuch des Aristoteles, mit Literargeschichtlichen Untersuchungen nach der arabischen Handschriften der Bibliothèque nationale*, Carl Winter, Heidelberg 1912, Arabic text p. 117 [§ 43], German translation p. 171). As another testimony of this classification, a humorous sentence in which Avicenna considers glass as a stone is to be found in Gerard of Cremona's Latin translation of the *Canon of Medicine*, second book, s.v. *vitrum*: « Vitrum inter lapides est sicut stultus inter homines, declinat enim ad omnem tincturam et tingitur ea et frangitur et abscinditur cum eo ». I quote here the manuscript München, Bayerische Staatsbibliothek, Clm 13017, f. 69v. This sentence is not found in the Arabic version of the *Canon of Medicine*; I checked in the Arabic edition of Rome (Typographia Medicea, 1593), and in the editions of Baghdad and Beirut. Glass is considered by Avicenna as hot at the first degree and dry at the second degree (IBN SĪNĀ, *Al-Qānūn fī al-ṭibb*, vol. I, p. 496-497 [Baghdad ed. p. 305], s. v. *zujāj*).

(51) I.e. there are the four elements in glass, and therefore there are the four properties. A confusion between elements and properties is however also possible, as it sometimes occurs in the *De anima*.

(52) The *et* before *non debet esse calidum* is very likely the translation of an Arabic *fa* that introduces the main clause after a subordinate causal clause.

- ventre terrae^p, sed homo^q habet in^r diebus^s hiemis^t frigus propter tempus frigidum, et quando^u trahit illam aquam putat^v quod sit calida et ipsa^w non mutatur de^x sua natura, et similiter in aestate putat^y quod sit frigida et non^a mutatur^b de^c sua natura^d. Et^e ex his^f quae^g diximus intelligatur^h quod est calor in
- 225 ventre terrae. Modo probabo tibi quod vitrum est calidum : quia solvitⁱ se et omne^j quod in igne solvit^r calidum est^k, non tantum^l quod calor sit^m superhabundansⁿ super omnia elementa^o sed est ibi calor aliquantulus. Non^p vidisti quod illi^q qui
- 17 operantur argentum, quan | do volunt^r solvere argentum, faciunt instrumentum ex^s terra^t et aqua simplici^u, et frangunt argentum per partes, et mittunt in
- 230 instrumento et incendunt^v ignem de subtus : et quando^w hoc multotiens faciunt in^x instrumento, efficitur^y instrumentum illud vitreum^z? Et ille artifex solus^a non facit hoc, quia^b figuli^c faciunt hoc, et qui^d faciunt caldaria^e et fabri^f faciunt similiter, et qui operantur^g in magisterio solutionis^h, quiaⁱ quando^j solvunt^k in^l instrumento^m terrae multotiens efficitur vitreumⁿ. Hoc est verbum verum et
- 235 non putes^o quod tantum de figulis^p dicam tibi sed^q ipsi^r qui faciunt tegulas^s hoc faciunt^t, quia si accipias^u tegulam^v et^w multotiens et diu^x decoquatur^y efficitur vitreum^z, quia quod^a facit^b natura cum calore^c intus^d in ventre terrae in centenis annorum facimus nos in paucis^e diebus. Modo bene intellexisti quia^f

(p) terrae] terreae *H* (q) homo] hoc *VS* (r) in *om.* *V* (s) diebus] temporibus *H* (t) hiemis] *LC* hyemis *Celsi HFS* yemis *V* (u) quando] quomodo *C* (v) trahit illam aquam putat] trahis istam aquam putas *HV* (w) ipsa] illa *F* (x) de] a *Celsi H* (y) putat] putas *H* (z) et *om.* *Celsi* (a) non *om.* *C* (b) mutatur] mittatur *C* (c) de] a *H* in *V* (d) et similiter in aestate putat quod sit frigida et non mutatur de sua natura *om.* *F* (e) et *om.* *V* (f) his] eis *H* (g) quae] quod *S* (h) intelligatur] *CFV* intelligis *Celsi* intelligitur *HS* intelligam *L* (i) quia solvit] qui absoluit *Celsi* (j) omne] omnem *C* (k) est] et *V* *om.* *Celsi* (l) tantum] tamen *Celsi H* (m) sit *add.* ibi *S* (n) superhabundans] superabundans *Celsi* abundans *H* (o) super omnia elementa *om.* *S* (p) non] nonne *S* (q) illi] ibi *H* (r) volunt] voluit (s) ex] de *HF* (t) ex terra] extra *C* (u) simplici] *H* simplex *Celsi LC* simpliciter *FV* *om.* *S* (v) incendunt] condunt *C* (w) quando] quomodo *C* (x) in *om.* *LCVS* (y) efficitur] faciunt *H* efficiatur *C* (z) illud vitreum] vitreatum *S* (a) solus] solis *H* (b) quia *om.* *C* (c) figuli] singuli *CV* (d) et qui *om.* *C* (e) caldaria] calidaria *C* (f) fabri] fabra *C* (g) operantur *om.* *S* (h) solutionis] solum *Celsi* (i) quia *om.* *F* (j) quando] quomodo *C* (k) solvunt] fundunt *H* (l) in *om.* *C* (m) instrumento *add.* efficiatur instrumentum *C* (n) vitreum] vitrum *HF* | quia quando solvunt in instrumento terrae multotiens efficitur vitreum *om.* *Celsi* (o) putes] potes *Celsi* putas *S* (p) figulis] singulis *Celsi HS* (q) sed] scilicet *Celsi* (r) ipsi] ipsis *V* *om.* *H* (s) tegulas] regulas *F* (t) hoc faciunt *om.* *L* (u) accipias] *LCS* accipis *Celsi FV* accendis *H* (v) tegulam] tegulum *LC* regulam *F* (w) et] in *C* (x) et diu] diuque *Celsi* *om.* *H* (y) decoquatur] coquatur *S* (z) vitreum] vitrea *H* (a) quod] hoc *Celsi* (b) facit] fuit *V* (c) cum calore *om.* *H* (d) intus *add.* cum *H* (e) paucis] pausis *C* (f) quia] quod *H*

earth's depths⁵³, but man feels cold during winter days because of cold weather, and when he draws this water he thinks that it is hot but it is not changed from its nature, and in summer likewise, he thinks that it is cold but it is not changed from its nature⁵⁴. From what we have said it can be understood that there is heat in earth's depths. Now I will prove to you that glass is hot: it dissolves, and everything that dissolves in fire is hot, not really because heat is more abundant in it than all the (other) elements⁵⁵, but there is a little heat in it⁵⁶. Have you not seen that those who work on silver, when they want to melt it, they make an instrument out of earth and simple water, pull silver to pieces, put it in the instrument and light fire underneath, when they do this many times in the instrument, this instrument vitrifies⁵⁷? And these craftsmen are not the only ones, potters, boilermakers, and casters also do this, as well as those who work in the magistry of dissolution, because when they dissolve many times in an earth instrument, it vitrifies. What I say is true, and do not think that I tell you this only about potters, but tilers do the same, because if you take a tile and cook it often and for a long time, it vitrifies; for what nature does with heat in earth's depths in hundreds of years, we do it in several days⁵⁸. Now you have well understood that

(53) Or: completely recedes from earth's depths.

(54) This last sentence actually invalidates the arguments proposed above. The *De elementis* gives the same arguments about heat in the depths of the earth, but does not add this last sentence, which could be a later gloss, cf. p. 218, l. 212-225.

(55) Here is found an obvious confusion between properties and elements, cf. translation n. 51.

(56) In the rest of the *De anima*, it is the humidity property which is generally linked with the ability to dissolve/melt, cf. for example DA, p. 128: « Natura ferri est calida et sicca, et siccitas eius est maior omnibus illis quae se elongant, et ideo non potest fundi nisi cum magno magisterio ». (Iron is very difficult to melt, it needs a very high temperature, 1535 °C when it is pure).

(57) When heated at a very high temperature, a clay crucible may vitrify. This phenomenon was well known, as vitrified pots were often used for various operations, cf. H. E. STAPLETON – R. F. AZO – M. HIDĀYAT ḤUSAIN, « Chemistry in 'Irāq and Persia in the Tenth Century A. D. », *Memoirs of the Asiatic Society of Bengal*, 8/6 (1927), p. 325.

(58) This assertion is often found in alchemical treatises. The alchemist does quickly what Nature does in hundreds or thousands of years. We find in the *De aluminibus et salibus* (provisional ed. of Catherine Arbuthnott, *sermo de corporibus*): « Scias quod corpora mineralia sunt vapores qui inspissantur et coagulantur, secundum mensuram virtutis nature in spacio longo. Et primum quidem quod coagulatur est mercurius et sulphur. Et sunt duo elementa minere et sunt aqua et oleum super quod assiduatur decoccio equalis cum caliditate et humiditate donec congelata sunt. Et ex eis corpora generantur et permutantur gradatim donec fiunt argentum et aurum in milibus annorum. Et si remanerent ista corpora in mineris suis, prepararet ea Natura donec pervenirent ad aurum et argentum. Posuit ergo Deus excelsus de sapientia sua in hoc mundo sublimi minori, qui est compar mundo maiori, ut consequantur ista corpora cum auro et argento in die una, subtilitate Dei et ipsius misericordia. Et nominant ea sulphura terre ». At chapter 1 of *dictio* 1 of the *De anima*, the same argument as in the *Porta elementorum* is found, about glass proving the possibility of transmutation, but the affirmation is a bit different; it is not the alchemist who does what Nature does, but the fire which does what the heat of the sun does, with the help of the alchemist, DA, p. 37: « Quia quod coquit calor solis per centena annorum, coquimus nos ad ignem in paucis temporibus sicut illi dixerunt superius de vitro ». Cf. also B. OBRIST, « Art et nature dans l'alchimie médiévale », *Revue d'histoire des sciences*, 49 (1996), p. 249-259 (the quotations on p. 231, n. 47 and p. 251, n. 121 do not come from the *De anima*, but from the *Declaratio lapidis physici Avicennae*).

omnes res quae sunt in saeculo^g vitales, herbales et^h naturales quodⁱ sunt
 240 compositae^j de quatuor elementis et^k in ipsa^l revertuntur et se solvunt, et qui
 dicebat^m quod in petraⁿ non erant quatuor elementa nihil dicebat^o, per haec^p
 quae^q diximus^r, quia si non possunt^s ibi^t inveniri^u visu inveniuntur^v mente^w. Tu
 intellexisti^x qualiter omnes res^y quae sunt^z in mundo se habent ad^a quatuor
 elementa^b.

245 – Et^c dic mihi in qua diversitate esset^d lac.

– Iam^e dixi tibi in quo loco est et quomodo se solvit ad quatuor elementa.

18 Modo bene intellige su | per hunc locum quia exponam tibi totum^f magisterium
 unde tu^g possis^h trahereⁱ totum magisterium^j.

In diversitate quarta^k dixi tibi verbum parvum et complebo tibi hic^l. Debes
 250 videre^m in rebusⁿ quae sunt in saeculo si in eis^o invenire potueris^p de istis
 diversitatibus^q. Et^r sunt istae^s diversitates :

(1) ignis^t, aer^u maiores, aqua et^v terra minores : ignis maior super omnia^w, aer
 minor^x igne, aqua maior^y terra^z et^a minor aere, terra minor aqua.

(2) Diversitas^b aeris et aquae^c grandes, de terra et igne minores : aer maior
 255 aqua^d, aqua minor aere et maior terra, terra^e minor aqua et maior igne, ignis minor
 terra.

(3) Diversitas^f de aqua et terra grandes, ignis et aer minores : aqua maior
 quam^g terra, terra minor^h quamⁱ aqua et maior quam^j igne^k, ignis minor^l quam^m
 terra et maiorⁿ quam^o aer^p, aer minor^q igne^r.

(g) saeculo] solutione S (h) et om. S (i) quod] *Celsi HC* quae *LVS* quaedam *F* (j) compositae om. S (k) et om. H (l) in ipsa] ipsa C nulla F (m) dicebat] dicebant CVS (n) in petra] impetra F (o) dicebat] dicebant CVS (p) haec] *Celsi L* hoc *cett.* (q) quae] quod HC (r) diximus] dicimus V (s) possunt] possint *Celsi H* possumus F (t) ibi om. V (u) inveniri add. L (pro id est?) C (v) inveniuntur add. tamen H add. in L (w) non possunt ibi inveniri visu inveniuntur mente] ibi non possumus invenire visu tantum mente inveniuntur F (x) tu intellexisti] intellexi H (y) res om. H iter. L (z) quae sunt om. F (a) ad iter. L (b) elementa add. dic mihi qui tibi ducent lac aut sanguinem quomodo solves eum ad quatuor elementa *Celsi add.* dic mihi qui duceret tibi lac aut sanguinem quomodo solves tu eum ad 4 elementa S (c) et om. HS (d) esset] est HS (e) lac iam] lacius V (f) totum om. H (g) tu om. S (h) possis] posses F (i) trahere] extrahere H (j) magisterium add. *rubricam* de diversitate quarta *Celsi* (k) quarta] 10^a S (l) hic] hoc HCV add. tu H (m) videre add. invenire poteris de istis C (n) in rebus] res S (o) eis add. inde videre C (p) invenire potueris] venire poteris C invenire poteris S (q) diversitatibus] de versitatibus C (r) et] si V (s) istae] illae VS (t) ignis add. et HC (u) aer add. et V (v) et om. *Celsi FVS* (w) omnia add. et H (x) minor add. in V (y) maior] *Celsi HS* minor LCV (z) terra] terrae CV | aqua maior terra om. F (a) et om. H (b) diversitas] diversitates *Celsi* (c) aquae] aqua CV (d) aqua] HF om. *cett.* (e) terra om. C (f) diversitas] diversitates *Celsi* (g) quam om. H (h) minor] maior *Celsi* (i) quam om. HVS (j) quam om. S (k) et maior quam igne] et maior quam ignis *Celsi F* aqua minor igne V (l) minor] F maior *Celsi HLCV* (m) quam om. H (n) maior] F minor *Celsi HLCV* (o) quam om. H (p) aer] aere H (q) minor om. H (r) minor quam terra et maior quam aer aer minor igne om. S

all the animal, vegetal and natural things that are in the world are compounded of the four elements, and that they are reduced and dissolved into them, and he who would say that the four elements are not in a stone would say nothing (good), according to what we have said, because if (the four elements) cannot be found there by vision, they can be found by mind⁵⁹. You have understood how all the things that are in the world are (compounded) of the four elements.

– Tell me in which diversity would be milk⁶⁰.

– I already told you in which place it is and how it dissolves into the four elements. Understand now in which place it is⁶¹, because I will show you the whole magistery from which you will be able to draw the whole magistery.

I told you only a few word about the fourth diversity, I will complete it here. You must see if you can find one of these diversities in the things that are in the world. And these diversities are :

(1) more fire and air, less water and earth : more fire than everything, less air than fire, more water than earth and less than air, less earth than water;

(2) diversity (containing) more air and water, less earth and fire : more air than water, less water than air and more than earth, less earth than water and more than fire, less fire than earth;

(3) diversity (containing) more water and earth, less fire and air : more water than earth, less earth than water and more than fire, less fire than earth and more than air, less air than fire;

(59) Cf. p. 164, especially n. 90.

(60) The reference to milk is strange in this place; it shows again the corrupted state of the *Porta elementorum*.

(61) The meaning of the expression *intellige super hunc locum* is obscure.

260 (4) Diversitas^s ignis et terra^t maiores, aer et aqua minores : ignis maior terra, terra minor^u igne et maior aere, aer^v minor^w quam^x terra^y et maior quam^z aqua, aqua^a minor quam aer^b.

Et^c de istis diversitatibus facias^d quod facere potueris^e, quia propter^f istas diversitates dicunt^g unamquamque rem^h calidam et siccā, aut calidam et
 265 humidamⁱ, aut frigidam^j et siccā^k, aut frigidam^l et humidam. Verbi^m gratia tu scisⁿ quod ignis est magis calidus quam aer^o et aer^p contrarius igni in humiditate;
 19 et terra | est frigida et sicca^q, et sua frigiditas non potest expellere calorem ignis et sua siccitas crescit in^r siccitate ignis, et^s est contra^t aerem^u in^v omnibus modis; aqua est frigida et humida^w, et^x contra ignem^y in^z omnibus modis, quia ignis est
 270 calidus et siccus et aqua^a frigida et humida^b. Et si^c tu misceas pondera recta^d de aqua et igne, quod vellet^e ignis calefacere^f aqua^g infrigidat^h et eⁱ converso, et^j quod vult^k ignis^l desiccare^m aqua humectat etⁿ e converso^o. Ideo^p quod mixtum est^q de^r igne et aqua non calet^s nec infrigidat^t, nec desiccatur nec humidat^u; in^v eundem modum aer^w cum terra.

275 Mittamus^x exemplum de diversitatibus^y de quibus dicimus^z ut sint^a ignis et^b aer grandes, et^c aqua et^d terra minores : ignis maior, aer minor quam ignis^e et^f maior^g aqua, et^h aqua minor quam aerⁱ et maior^j terra, et terra minor^k aqua. Mittamus^l de igne unum^m, de aereⁿ medium, de aqua quartum, de terra^o octavum^p. In^q igne habet^r medium de calore et^s medium de siccitate, in aere^t quartum
 280 de calore^u et quartum de humiditate, in aqua octava^v de frigiditate et octava^w de humiditate, in terra media octava^x de frigiditate et^y media octava^z de siccitate.

(s) diversitas] diversitates *Celsi* (t) terra] terrae *H* (u) minor] maior *H* (v) aer] et *C* corr. al. m. in mg. (w) minor] maior *S* (x) quam om. *HLS* (y) terra] terrae *L* (z) quam om. *HS* (a) aqua om. *F* (b) quam aer] aere *HS* aquae aeri *C* (c) et om. *FV* (d) facias om. *S* (e) potueris] poteris *S* (f) quia propter] quapropter *Celsi H* quia per *C* (g) dicunt] dicam *F* (h) rem] tam *H* (i) humidam add. et siccā aut calidam humidam *V* (j) frigidam] frigida *C* (k) siccā] sicca *C* | aut frigidam et siccā om. *F* (l) frigidam] frigida *C* (m) verbi] verba *C* (n) scis] sis *C* (o) est magis calidus quam aer] calidior est aere *V* (p) aer add. est *HFV* (q) aut calidam et humidam aut frigidam et siccā aut frigidam et humidam verbi gratia tu scis quod ignis est magis calidus quam aer et aer contrarius igni in humiditate et terra est frigida et sicca om. *S* (r) in] ex *H* (s) et om. *C* (t) contra] contraria *V* *S* (u) aerem] *Celsi LF* aeri *HCVS* (v) in om. *F* (w) et humida om. *S* (x) et om. *V* (y) contra ignem] contraria igni *H* (z) in om. *Celsi CFVS* (a) aqua add. est *H* (b) humida add. et contra ignem omnibus modis *V* (c) si om. *F* (d) recta] recte *Celsi* (e) vellet] velit *H* vivet *V* (f) calefacere add. et *L* (g) aqua] quia *V* (h) infrigidat] refrigeraret *S* (i) e om. *C* (j) et om. *H* iter. *L* (k) vult] vellet *F* (l) ignis add. calefacere *V* (m) desiccare] exsiccare *F* (n) et add. in *C* (o) converso add. *rubricam* de mistura ignis et aquae *Celsi* add. et *V* (p) ideo] de ipso *F* (q) est om. *C* (r) de] ex *V* (s) calet] cale^t (*pro* calefaciet?) *V* (t) infrigidat] infrigidet *V* (u) nec desiccatur nec humidatur nec desiccatur nec humectatur *H* nec deseciat nec dehumidatur *C* om. *S* (v) in] et *C* (w) aer] aerem *HF* (x) mittamus] mutamus *F* (y) diversitatibus] versitatibus *C* (z) dicimus] diximus *S* (a) ut sint] *S* ubi sint *Celsi* ut *H* non sint *L* ut sicut *C* ut sunt *F* non sunt *V* (b) et om. *S* (c) et om. *H* (d) et om. *CF* (e) quam ignis] quia ignis *V* igne *S* (f) et] est *HV* (g) maior] maior quam *F* minor *V* (h) et om. *Celsi FV* (i) quam aer] quod aer *C* aere *S* (j) aer et maior om. *F* (k) minor add. quam *F* (l) mittamus] mutamus *F* (m) unum] vivum *F* add. et *H* add. pondus *S* (n) aere add. et *S* (o) de terra om. *S* (p) octavum] *H* om. cett. (q) in] de *Celsi* (r) habet] habes *F* est *S* (s) et om. *S* (t) aere] aer *F* (u) calore] calor *C* (v) octava] *LCV VII Celsi* octavum *HF* (w) octava] *LCV VII Celsi* octavum *HFS* (x) media octava] medium octavum *H* medium optavi *F* media octavum *S* (y) et om. *H* (z) media octava] medium octavum *H* medium *F* me et expunct. 8^m *S*

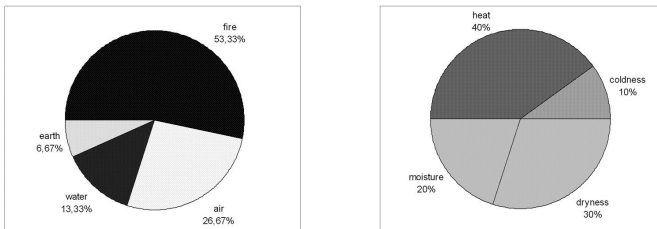
(4) diversity (containing) more fire and earth, less air and water : more fire than earth, less earth than fire and more than air, less air than earth and more than water, less water than air.

Make what you can from these diversities, for it is from these diversities that one says that each thing is hot and dry, or hot and moist, or cold and dry, or cold and moist. For example, you know that fire is hotter than air and that air is opposite to fire in moisture; (you know that) earth is cold and dry, that its coldness cannot repel fire heat, that its dryness increases with fire dryness and that it is opposite to air in all properties; (you know that) water is cold and moist, and that it is opposite to fire in all properties because fire is hot and dry and water is cold and moist. And if you mix specific weights⁶² of water and fire, what fire wants to heat, water cools and vice versa, and what fire wants to dry, water moistens and vice versa. Therefore a compound of fire and water does not heat nor cool, nor dry nor moisten; and air with earth does the same.

Let us set an example of the diversities we are talking about, (containing) more fire and air, less water and earth : more fire, less air than fire and more than water, less water than air and more than earth, less earth than water. Let us put 1 (part) of fire, 1/2 of air, 1/4 of water and 1/8 of earth⁶³. In fire there is 1/2 of heat and 1/2 of dryness, in air 1/4 of heat and 1/4 of moisture, in water 1/8 of coldness and 1/8 of moisture, in earth 1/16 of coldness and 1/16 of dryness. We have 1/2 of heat in fire and 1/4 in air, thus there is in this body $1 - 1/4 (= 3/4)$ of heat.

(62) *Pondera recta* must here be understood as *pondera aequalia*, because water and fire must be in the same amount in order that the properties cancel each other out (whether we consider that they are characterised by properties in the same amount or in a different amount, fire being in the latter case more hot than dry and water being more cold than moist).

(63) The two examples given at the end of the *Porta elementorum* contradict some passages of the *De elementis* and the *Porta elementorum* itself, in which it is asserted that elements do not contain an equal amount of their two properties, cf. translation n. 19 and n. 26. In the calculation in this example and in the next one (both are correct), weights are given in comparison to the most abundant element of the compound, not in comparison to the compound itself. Thus in the first example, the body is a compound of : 3/4 of heat (1/2 from fire and 1/4 from air), 3/16 of coldness (1/8 from water and 1/16 from earth), 9/16 of dryness (1/2 from fire and 1/16 from earth), and 3/8 of moisture (1/4 from air and 1/8 from water). The proportions are calculated in comparison to the amount of fire; to help the reader, I propose here sketches with proportions given in comparison to the entire compound :



It is possible to assert that the compound is hot and dry, because, after the neutralization of the opposite properties, 30 % of heat and 10 % of dryness remain.

Habemus^a in igne mediam^b caloris^c et in aere^d quartam^e caloris, ergo habet^f in isto^g corpore de calore unum minus quartam^h. Habemusⁱ in igne medium siccitatis et in^j terra mediam octavam^k siccitatis^l, ergo habet^m in istoⁿ cor-
 20 285 | pore quatuor octavas siccitatis et^o media. Habetur^p in isto corpore^q de frigiditate in aqua una^r octava et^s in terra media octava^t, et sunt^u octava et^v media. Habet^w in^x isto corpore de^y humiditate in aere quarta, in aqua una^z octava, et^a sunt tres octavae^b. Modo auferamus^c de calore^d frigiditatem quae est octava et media^e, et^f remanent^g in isto corpore quatuor octavae et media^h. Modo auferamus de siccitate
 290 humiditatem, et est humiditas tresⁱ octavae^j, de quatuor octavis^k et media, remanet^l de siccitate una octava^m et media. Ergo corpus istudⁿ est calidum et siccum, quod^o si vult^p octava et media^q frigiditatis quae^r est ibi^s frigescere, octava et^t media caloris non dimittit^u, et si velint^v tres^w octavae^x humiditatis humidare^y, non dimittunt hoc^z tres^a octavae siccitatis quas cepimus^b. Ergo corpus istud^c est
 295 calidum et siccum, quia haec duo, scilicet^d caliditas et frigiditas, non calefaciunt nec frigidant, ^e quia^f calefactio quam hoc corpus facit est propter calorem nimium qui ibi^g est, et^h sic fit de siccitateⁱ et humiditate^j.

Et postquam habemus^k calidum et siccum per haec quae praediximus^l, modo faciamus^m exemplum de frigidoⁿ et humido. Accipe corpus quod sit in^o

(a) habemus] huic V (b) mediam] medium HS (c) caloris] coloris V (d) aere] aer F (e) quartam] quartum H (f) habet] habes F est S (g) isto] illo H (h) quartam] quartum Celsi H (i) habemus] habens Celsi (j) in om. L (k) mediam octavam] LCV octavam Celsi octavum H medium optavi F medium 8 S (l) siccitatis] siccitas C corr. al. m. s. l. (m) habet] habes F sunt S om. H (n) isto] illo H (o) et] Celsi om. H (p) in isto corpore quatuor octavas siccitatis et media habetur om. LCV (q) habetur in isto corpore] habemus S (r) una] 4 V unum S (s) et om. S (t) in isto corpore quatuor octavas siccitatis et media habetur in isto corpore de frigiditate in aqua una octava et in terra media octava] de siccitate medium et octavam medii habemus octavam frigiditatis in terra medium octavae F (u) et sunt] ergo sunt in isto corpore S (v) et om. H (w) habet] habetur S (x) in] de H (y) de] in H (z) una om. S (a) et om. S add. in terra media octava Celsi | et in terra media octava et sunt octava et media habet in isto corpore de humiditate in aere quarta in aqua una octava et om. LCV (b) octavae] Celsi HS octava LCV | et sunt octava et media habet in isto corpore de humiditate in aere quarta in aqua una octava et sunt tres octavae om. F (c) auferamus] auferimus Celsi L (d) calore add. propter F (e) octava et media] Celsi V octava media H octavam et mediam LC (f) et om. L (g) remanent] Celsi remanent sic H remanet LCV (h) quae est octava et media et remanent in isto corpore quatuor octavae et media] aquae et terrae octavam et medium octavae ergo habemus in isto corpore de calore medium et duas et medium octavae F | modo auferamus de calore frigiditatem quae est octava et media et remanent in isto corpore quatuor octavae et media om. S (i) tres] IIII C (j) tres octavae om. F (k) de quatuor octavis om. H (l) remanent] remanent H add. ergo F (m) una octava] duae octavae F (n) istud] illud HS (o) quod] et C (p) si vult] simul vel S (q) et media om. S add. caloris C (r) quae] Celsi HVS qui LCF (s) ibi] in isto corpore H add. * legere non potuit Celsi add. et V (t) et om. C (u) dimittit] dimittat L (v) et si velint om. S (w) tres] IIII C (x) octavae al. m. s. l. L (y) humidare] humiditare C (z) hoc] haec F hee S (a) tres om. Celsi H (b) cepimus] ceperamus H (c) istud] illud HCS (d) quia haec duo scilicet] cum hoc duo quae H (e) frigidant] Celsi LF infrigidant HVS infrigidant C (f) quia] sed F (g) ibi om. C (h) et om. C (i) siccitate] frigiditate S (j) et humiditate om. H (k) habemus] habes Celsi (l) haec quae praediximus] hoc quod praediximus V hoc praedicimus C haec quae diximus S (m) faciamus] faciemus CF (n) frigido] frigida V (o) in] de Celsi (k) habemus] habes Celsi

We have $1/2$ of dryness in fire and $1/16$ in earth, thus there are in this body $4/8$ and $1/16 (= 9/16)$ ⁶⁴ of dryness. There is in this body $1/8$ of coldness in water and $1/16$ in earth, which makes $1/8$ and $1/16 (= 3/16)$. There is in this body $1/4$ of moisture in air and $1/8$ in water, which makes $3/8$. Now let us remove from heat the $1/8$ and $1/16 (= 3/16)$ of coldness, $4/8$ and $1/16 (= 9/16)$ of heat remain in this body⁶⁵. Now let us remove from the $4/8$ and $1/16 (= 9/16)$ of dryness the $3/8$ of moisture⁶⁶, $1/8$ and $1/16 (= 3/16)$ of dryness remain. Thus this body is hot and dry : for if the $1/8$ and $1/16 (= 3/16)$ of coldness which are in it want to cool, the $1/8$ and $1/16 (= 3/16)$ of heat (that are opposite) do not allow it; and if the $3/8$ of moisture want to moisten, the $3/8$ of dryness that we have removed do not allow it. Thus this body is hot and dry : because these two, i.e. heat and coldness⁶⁷, do not heat nor cool, for the heating produced by this body comes from the surplus heat that is in it, and the same goes for the dryness and moisture.

After giving (an example) of a hot and dry (thing) in what we have said hereabove, I will now give an example of a cold and moist (thing). Take a body⁶⁸

(64) Literally : four eighths and a half.

(65) Heat and coldness are opposite, thus one must subtract the amount of coldness from the amount of heat to know the degree to which the body is hot.

(66) Literally : let us take off humidity from dryness, and humidity is three eighths, from the four eighths and a half.

(67) Those « two » are the $3/16$ of coldness and the $3/16$ of heat which are opposed to them. Those do not heat nor cool, but the surplus $9/16$ of heat makes the body hot.

(68) The word « body » has here a more general meaning (close to « thing »), but usually designates the metals in the *De anima* and in most alchemical medieval treatises (Arabic and Latin), and more specifically, in the context of the alchemical work, the metal which will be transmuted.

300 diversitate quarta de qua superius diximus^p quod sint^q in eo aqua^r, aer^s grandes,
 et terra^t, ignis minores: aqua grandis^u, aer minor aqua et^v maior^w terra, terra
 21 minor aere et maior igne, ignis | minor quam^x terra. Aqua^y unum^z, aer^a medium^b,
 terra quarta^c, ignis octava^d. In aqua^e medium frigiditatis et medium humiditatis,
 in^f aere^g quartum caloris et quartum humiditatis, in terra octava^h frigiditatis
 305 et octavaⁱ siccitatis, in igne media octava^j caloris^k et media octava^l siccitatis.
 Ergo habentur^m in isto corpore de caloreⁿ duae^o octavae^p et media, de frigi-
 ditate^q quinque^r octavae^s, de siccitate octava^t et media^u, de humiditate sex
 octavae^v. Ergo quando^w tollimus siccitatem quae est octava et^x media de sex
 octavis de humiditate, <remanent quatuor octavae et media de humiditate>^y,
 310 et quando^z tollimus calorem qui^a est duae octavae et media^b de frigiditate quae
 sunt quinque octavae^c, remanent^d duae octavae^e et^f media de frigiditate^g. Ergo
 corpus illud^h est frigidum et humidum, quia superantⁱ in frigiditate duae octavae^j
 et media et^k de humiditate quatuor octavae et media: quia^l si calor quem^m
 tollimus de frigiditateⁿ vult calefacere, infrigidabit frigiditas quam^o tollimus^p,
 315 et sic est^q inter^r humiditatem^s et siccitatem^t. Ergo corpus istud^u est frigidum et
 humidum.

Et non subtiliamus^v multum quia oportet^w facere librum in
 ponderibus et in^x speciebus quae sunt calidae et^y frigidae et^z siccae et
 humidae, et unaquaque earum^a in quo gradu est et quae est ante gradum et in
 320 gradu^b. Et^c explanabis^d quod istae^e 145 diversitates sunt ante gradus,

(p)superius diximus] praediximus F (q)sint] Celsi CFS fuit H sicut L si est V (r)aqua add. et HFS (s)aer] terra V (t)terra add. et Celsi HFS (u)grandis] grandes C add. et H (v)et] est HL (w)maior] minor H (x)quam om. HF (y)aqua] aquae H (z)unum] vivum F (a)aer] aeris H (b)medium maculatus V (c)quarta] quartam Celsi quartum HFS (d)octava] octavam Celsi C octavum HFS (e)aqua] qua C add. est H (f)in] inde V (g)aere add. est H (h)octava] HS octavum Celsi oc LC octavam F ac V (i)octava] HS octavum Celsi oc LC octavam F ce V (j)octava] octavae F (k)caloris] cali (pro calidi?) S (l)octava] H octavae F om. Celsi LCV (m)habentur] habemus F (n)de calore om. F (o)media octava siccitatis ergo habentur in isto corpore de calore duae om. S (p)octavae] octava LC (q)frigiditate add. et H (r)quinque] cum C (s)octavae] octa L oc C octava V (t)octava] octa LV (u)media] demedia C (v)octavae] octa L oc C octava V (w)quando] quomodo C (x)et om. H (y)remanent quatuor octavae et media de humiditate] supplevi om. mss. (z)quando] quomodo C (a)qui] quae Celsi F (b)duae octavae et media] correxi secunda octava media Celsi I octava et media H secundus octa media L II octava media CV octava et media F in octava et media S (c)octavae] octavas LV octa C (d)remanent] remanet L (e)duae octavae] II octavas LCV (f)et om. C (g)frigiditate add. quae sunt V id est quinque octava remanent II octa et media de frigiditate F (h)illud] istud LF (i)superant] Celsi HL superatum C superatur F frig'iant (pro frigeriant?) V superavit S (j)octavae add. octava S (k)et om. VS (l)quia] quare F (m)quem] quae L quam S (n)frigiditate] aeri C (o)quam] quae LV quem F (p)tollimus add. de frigiditate V (q)est om. S (r)inter add. frigiditatem Celsi add. frigidum H (s)humiditatem] calidum H caliditatem F (t)siccitatem] siccum H (u)istud] illud HVS (v)subtiliamus] subtiliabimus Celsi (w)oportet add. te S (x)in ponderibus et in] in ponderibus de H de ponderibus et S (y)et] tibi C (z)et om. H (a)unaquaque earum] C unaquaque earum Celsi S de unoquoque H unaquoque earum L (b)gradu] gradum LCS (c)et om. LC | et in gradu et om. V (d)explanabis] Celsi LS explanabo HC explanabit VF (e)istae] illae F

which is in the fourth diversity about which we have been talking above (and) in which there is more water and air, less earth and fire: much water, less air than water and more than earth, less earth than air and more than fire, less fire than earth⁶⁹. (Let us put) 1 (part) of water, 1/2 of air, 1/4 of earth and 1/8 of fire. There are in water 1/2 of coldness and 1/2 of moisture, in air 1/4 of heat and 1/4 of moisture, in earth 1/8 of coldness and 1/8 of dryness, and in fire 1/16 of heat and 1/16 of dryness. Thus there are in this body 2/8 and 1/16 (= 5/16) of heat, 5/8 of coldness, 1/8 and 1/16 (= 3/16) of dryness, and 6/8 (= 3/4) of moisture. Thus when we remove the 3/16 of dryness from the 6/8 of moisture, <4/8 and 1/16 (= 9/16) of moisture remain>⁷⁰, and when we remove the 2/8 and 1/16 (= 5/16) of heat⁷¹ from the 5/8 of coldness, 2/8 and 1/16 (= 5/16) of coldness remain. Thus this body is cold and moist, because 2/8 and 1/16 (= 5/16) of coldness and 4/8 and 1/16 (= 9/16) of moisture remain: for if the heat that we have removed from the coldness wants to heat, the coldness that we have removed will cool, and the same goes for moisture and dryness. Thus this body is cold and moist.

We do not much refine (our discourse) because a book has to be made about weights and species that are hot, cold, dry and moist, (to explain) for each of them the degree in which it is and which (species) is before the degree or in the degree⁷². And you will explain⁷³ that these 145 diversities are before the degree,

(69) Contrary to what is said, this diversity has not been cited above. This could come from a confusion, or it could be a reference to a very close diversity quoted above (the elements are ordered here from the most to the less abundant): air, water, earth, fire (the example here is water, air, earth, fire).

(70) The context and the other passages of the first example and of this second example allow one to fill the lacuna of all the witnesses (saut du même au même), in which the result of the subtraction is given.

(71) The readings of *Celsi* and *L* (*secunda octava media* and *secundus octa media*) come from a bad reading of the number 2 (or II); I propose as a correction the amount correctly explained above.

(72) The degrees cited here are likely a reference to the system of the intensity degrees of Galen, also found in Jābirian treatises (cf. KRAUS, *Jābir ibn Ḥayyān*, vol. II, p. 187-303). There is only one other mention (very short) of these degrees in the whole alchemical *De anima*, at chapter 15 of *dictio* 6, p. 288-289: « Quid prodest theorica (*theorica de physica*, i.e. theoretical medicine) magisterio? Ut sciamus res in quibus gradibus sunt frigidae aut humidae aut calidae aut siccae ». The intensity degrees are not found in the *De elementis*. On Galen's theory of the degrees, cf. G. HARIG, *Bestimmung der Intensität im medizinischen System Galens. Ein Beitrag zur theoretischen Pharmakologie, Nosologie und Therapie in der Galenischen Medizin*, Akademie Verlag, Berlin 1974, p. 117-126.

(73) Abuali (Avicenna) asks his son to write a book about weights and species. This is also said at the end of the *De anima*: in the very short tenth *dictio*, Abuali asks his son to write a book *De ponderibus* (DA, p. 467-468: « Sed per fidem quam mihi debes, fili mi, fac librum de ponderibus ut liber ille sit lumen meis ponderibus, quia aliter non posses illuminare librum meum, nam in aliis liber meus apertus est quia nihil dimisi ad illuminandum nisi hoc ».). This addition in the *Porta elementorum* and in the tenth *dictio* was probably done by the compiler (and/or translator). The reading *explanabo* given in *H* and *C* could also fit.

- 22 et quando^f aliquis^g dicit « haec species est^h calida et siccaⁱ, | frigida et humida^j »
vult dicere ante gradus, et quando^k homo vult reducere^l eam^m in gradum,
ponderatⁿ eam in hunc modum et facit^o eam calidam et siccam, aut calidam et
humidam, aut frigidam et siccam^p, aut frigidam et humidam^q, de quacumque
325 diversitate sit^r istarum^s diversitatum^t.

- Postquam intellexisti quod omnes^u res huius^v mundi, vitales, herbales et^w
naturales, sunt compositae de quatuor elementis et sunt in aliqua^x diversitate
praedictarum^y et solvunt^z se ad quatuor elementa, postquam^a bene intellexisti
– et^b bene est^c –, modo est hora quod^d dividamus sermonem quatuor elementorum
330 et incipiemus^e loqui in dictionibus nostri libri^f singulatim^g. Et^h explanabimusⁱ
capitula^j uniuscuiusque^k singulatim^l et portas cum verbo largo^m etⁿ intellectu
completo, secundum quod volumus facere in isto libro. Et viam philosophorum
ibi^o tenebimus^p, si Deo placuerit, cum fortitudine illius^q qui fecit mundum. Sed si
tu vis facere secundum rationem aliquod opus istius^r libri, quanta locuti sumus^s
335 hucusque scrutare et^t intellige^u, sin autem^v in vanum laboras^w. Et non putes^x
quod^y in via philosophorum omnes possint^z pergere nisi illi qui naturam habent

(f) quando] quomodo C an V (g) aliquis] quis *Celsi HCFS* (h) est] esse V om. F (i) sicca add. et *Celsi* (j) calida et sicca frigida et humida] calida et frigida et humida et sicca F (k) quando om. S (l) reducere om. LCFV (m) eam] eum S (n) ponderat] ponderet H (o) facit om. V (p) aut calidam et humidam aut frigidam et siccam om. *Celsi* (q) aut frigidam et siccam aut frigidam et humidam om. H (r) sit] fit *Celsi* (s) istarum add. et C (t) diversitatum add. *rubricam* quod omnes res sunt compositae de quatuor elementis *Celsi* add. cumque vis abluere vel abluere sic vel permiscere corpora scias in qua diversitate ex praedictis sit illud et haec debet scire alkymista in 9^one (pro coniunctione sive complexione sive compositione) corporum et spirituum S et postea explicat (u) quod omnes om. *Celsi* (v) huius om. LCV (w) et om. LCV (x) aliqua] alusa H corr. al. m. in mg. (y) diversitate praedictarum] praedictarum diversitatum H (z) solvunt] solvit V (a) postquam] prius quam H (b) et om. F (c) est] LCFV scivisti *Celsi* H (d) quod] ut H (e) incipiemus] incipiamus HV (f) nostri libri] libri nostri *Celsi* HC (g) singulatim] singula H sigillatim V (h) et om. C (i) explanabimus] explorabimus *Celsi* exemplabimus H (j) capitula] capitulo C (k) uniuscuiusque] uniuscuius L (l) singulatim] singularum H sigillatim V (m) verbo largo] libro largo C et iter. corr. al. m. in mg. (n) et om. LV (o) ibi om. *Celsi* H (p) tenebimus] intendimus V (q) illius] eius H (r) qui fecit mundum sed si tu vis facere secundum rationem aliquod opus istius om. V (s) sumus] fuimus *Celsi* HFV (t) et om. L (u) intellige] *Celsi* H intelligere LCFV (v) sin autem] sine autem C sententiam V (w) laboras] labores *Celsi* (x) putes] putas LV (y) quod] te esse H add. sis *Celsi* (z) possint] possunt C possit V

and when one says « this species is hot and dry, cold and moist », one means before the degree, and when one wants to reduce it in the degree, one weighs it in this way and makes it hot and dry, or hot and moist, or cold and dry, or cold and moist, whatever would be its diversity.

After you have understood that all the animal, vegetal and natural things of this world are compounded of the four elements, are in one of the diversities mentioned above, and dissolve into the four elements, after having well understood it – and it is good –, it is now time to divide our talk about the four elements and to begin the *dictiones* of our book one by one. We will explain one by one the chapters and sections⁷⁴ of each (*dictio*) with a large discourse and a complete understanding⁷⁵, according to what we want to do in this book. We will hold there the way of the philosophers, if it pleases God, with the power of Him Who created the world. But if you want to make any work of this book in accordance with reason, examine and understand everything that we have said to this point, otherwise you work in vain⁷⁶. And do not believe that everybody can go into the way of philosophers: only the ones who have the nature of

(74) Literally « doors », from the Arabic *bāb*, which means not only « door », but also « chapter », as in the title of the *Porta elementorum*. Cf. p. 155-156.

(75) This expression could also be translated « with a complete intellect », in a more neoplatonic interpretation.

(76) The science of the elements and elementary properties is the principle of the alchemy of the *De anima*, it is therefore necessary to understand it deeply.

philosophorum^a, quia qui operatus fuit de^b isto^c libro antequam portam istam
 23 elementorum bene intelligat in vanum laborat, et ita ince | dit^d ut asinus ad
 cervam^e, non videt^f. Verbi gratia si tu vis facere aliquem^g calcem aut aliquod^h
 340 lavamentumⁱ aut iungere^j aliquod corpus cum alio^k, debes scire corpora in^l qua
 diversitate sunt, et^m *cur iungitur*ⁿ et qua intentione faciunt calcem et lavant, et^o
 qua intentione dicemus^p quicquid^q dicimus et^r quicquid^s facimus. Lege^t multum
 portam istam et stude in eam^u, et lege et intende^v, et ad Deum te commendo^w.
 Laudetur Deus^x quia^y complevimus portam^z elementorum et^a incipimus^b
 345 primam dictionem de decem dictionibus libri nostri^c in nomine Domini^d.

(a) omnes possint pergere nisi illi qui naturam habent philosophorum *om. Celsi H add.*
 et *C* (b) fuit de] fuerit in *Celsi* fuerit de *C* (c) isto *om. F* (d) incedit] *HL* intendit *Celsi* incedet *C*
 incindet *F* sedet *V* (e) cervam] *Celsi L* doctrinam *H* cenam *CFV add.* qui *F* (f) videt] videns
H (g) aliquem] aliquam *HF* (h) aliquod *om. H* (i) lavamentum] linimentum *Celsi* lavamen
H (j) iungere] tingere *V* (k) alio *add. tu H* (l) in *add. quo C* (m) et *om. Celsi* (n) *cur iungitur*] *correx*
lectionem L qualiter iuncta id est composita *Celsi H* *cur iungitur CV* *cur iugitur L* sic iuguntur *F* (o) et
add. in C (p) dicemus] dicimus *H* dicamus *F* dicamus dicit *V* (q) quicquid] quae *F* (r) et *om. Celsi*
add. qua H (s) quicquid] quae *F* (t) lege *om. V* (u) in eam] eam *Celsi* in ea *HF* (v) intende] intellige
Celsi | et lege et intende *iter. LF* (w) commendo] commenda *H* (x) laudetur deus] laudemus
L (y) quia *iter. L* (z) portam] partem *V* (a) et *om. C* (b) incipimus] incipimus *Celsi HF* (c) nostri
add. et HFV (d) domini *add. explicit* explicit porta elementorum *Celsi*

philosophers can⁷⁷, because the one who works from this book before understanding well this *Porta elementorum* works in vain, and goes like a donkey goes towards a doe, he does not see. For example if you want to make a *calx*⁷⁸ or a washing, or unite a body to another, you must know in which diversity the bodies are, why they are united, with what intention one makes the *calx* and one washes, and with what intention we will say everything we say and everything we do. Read this *Porta* often and study it, read it and understand it, and I commend you to God. Praise be to God, for we have finished the *Porta elementorum* and we begin the first of the ten *dictiones* of our book, in the name of the Lord.

(77) Literally : that all can go into the way of the philosophers except this one who has the nature of the philosophers. This sentence is one of the numerous Arabic concessive formulas literally translated into Latin in the *De anima*. Cf. p. 156.

(78) The word *calx*, literally «lime», designates in alchemy the powder resulting from the calcination of a metal (oxide and/or salts), i.e. the body reduced in its primary nature (after some other processes), cf. *DA*, p. 189 : « Calcem faciunt ut reddant in naturam suam pristinam et ut reddant de natura in naturam, ut allevietur et colligit ibi combustionem ».

APPENDIX

CORRESPONDING EXTRACTS OF MARIUS' *DE ELEMENTIS*

The extracts of Marius' *De elementis* (Dales edition) are hereafter quoted as *DE*. All quotations are preceded by an explanation. The reader needs to remember the very corrupted state of the *Porta elementorum* when reading the corresponding extracts of Marius' *De elementis*, as well as its different order.

1. 12-15. The hierarchy of the weight of the elements is the same as the hierarchy proposed in the *De elementis*. However, this hierarchy is very usual. What is more interesting to observe is that both texts add specific properties to the elements: the so called *naturae absconditae* in the *Porta elementorum* (cf. translation n. 4), corresponding to the *proprietates* in the *De elementis*. *DE*, p. 87 :

M. Sed et hoc sciendum, quia horum IIII^{or} elementorum terra quidem grossissima est atque ponderosissima; ignis vero subtilissimus atque levissimus; aqua autem respectu terre levis et subtilis, sed grossa et ponderosa respectu aeris; aer etiam similiter respectu aque subtilis est et levis, grossus vero atque ponderosus respectu ignis.

1. 25-27. Fire is hot and dry, it is proved by the fact that it dries humours; the *De elementis* says that fire is hot because it dries humid things. The description of earth which precedes in the *Porta elementorum* is not in the *De elementis*, but we could guess that it was in the lost beginning of the treatise, as the present text begins with the description of the nature of water (but earth is not described in the rest of the treatise). *DE*, p. 53 :

D. Non est absconditum michi scias, sed que est ignis natura vel eiusdem proprietates ?

M. Calidus nempe est et siccus. Sed ad calorem ostendendum nullum est necessarium argumentum, cum nemini sit incompertum. Argumentum autem est ad eius comprobendam siccitatem quod humida omnia desiccat usque ad ipsorum dissolutionem.

1. 29-39. Before speaking about the properties of air, both texts are interested in the proof of its existence. The arguments are closely linked, but not exactly the same; both speak about filling bellows, but the argument of the amphora in the water of the *De elementis* is not found in the *Porta elementorum*: the source (likely indirect) of this passage could be the *Pneumatica* of Hero of Alexandria, cf. translation n. 9. *DE*, p. 47-49 :

D. Et que est natura aeris ?

M. Natura aeris est calor cum humiditate, licet prius debeas inquirere si existat aer necne. Negarunt enim multi atque adhuc negant illum in mundo inveniri posse.

D. Quod igitur dabis argumentum quo approbes inveniri posse illum ?

M. Quod melius queris argumentum quam de inflatione follium? Quippe qui nisi corpus aliquod subingrederetur, nequaquam utique implerentur. Item: Si amphoram accipias et directe eam ore subterius in aquam mittas, videbis quia de hac aqua nichil subintrabit; sed hoc nisi quia aere plena est non evenit.

D. Ex his sane que dixisti et aliis multis huiusmodi, intelligo ego aerem posse inveniri.

1.39-51. The two arguments about the heat of air are very close to the arguments proposed in the *De elementis*, even if they are described in a more precise and detailed way in Marius' treatise. The first argument is: air is hot because water is turned into air when it is heated by fire. The second argument is: air is the nutriment of fire (which is proved by the necessity for a lamp/candle to have air to be on fire), and both the nutriment and what receives the nutriment must have a similarity in nature. So air and fire must have one similar nature (cf. also, l. 63-70, and translation n. 19). A proof of this latter fact is added in the *Porta elementorum*, in which is made a comparison with the nutriment of man. *DE*, p. 49-51 (also quoted below):

D. [...] Sed quomodo poteris probare aerem calidum et humidum esse?

M. Utique de calore possum ego argumenta duo dare: unum quidem quod non consurgit vapor aque nisi vel ex solis vel ex ignis calore; aliud vero quod dieta ignis extat aer ipse. Quia nusquam potest ignis diu stare, ubi aerem moveri non sit possibile. Quod si visibiliter velis inspicere, accipe candelam atque illam accensam in dolium mitte, atque ita foramina cuncta claude quod aer nec intrare possit nec exire, statimque videbis quoniam extinguetur ignis. Item quod aer dieta sit ignis, flamma enim que apparet in foco non fit nisi vel ex lignis vel ex oleo vel ex cera, vel ex alio quolibet ignis postquam in vaporem vertitur nutrimento. Unde etiam dubitat nullus quia flamma nichil est aliud quam aer igni calefactus. Et quod flamma fiat ex vapore, possum tibi ita ostendere. Igni siquidem, cere vel pici vel cuilibet alii pingui materie adherenti, si tunc in ignem proicias aliquid aque, non tantum tamen quod ignem possit extinguere, videbis utique flammam subito multipliciter crescere et sursum altissime emicare. Sed nullum corpus augmentatur nisi ei aliud adiungatur, corpus autem quo flama (*sic*) ita crevit procul dubio vapor aque fuit. Vides igitur et intelligis perpatenter quia ignis dieta est aer. Sed nichil est dieta alicuius rei quod in aliquo simile non sit ei. Cum vero ignis sit calidus, calidus est et aer, qui est dieta illius, cum in aliqua qualitate alia quam calore similis non sit eius.

1.52-58. The passage about the proofs that air is moist may be compared to two extracts of the *De elementis*. The *De elementis* also asserts that condensed air turns into water, which proves that air is moist, but it does not mention the more empirical argument of the moistened bodies in baths. *DE*, p. 51-53:

D. Argumentatum est quod sufficit de calore aeris, sed de eius humiditate nunquid aliquod argumentum dabis?

M. Etiam certe duo. Unum quidem quod vapor ille qui ex aqua surgit cum tantum usque conscendit, quod locum frigidum repperit, superius emicare non potest; immo iterum in aquam conversus, in inferius repente recidit quemadmodum et

vapor urcei, cum operimentum quo urceus est opertus offendit, ulterius nequit transcendere, et rursus in aquam vertitur et in urceum redescendit. Quod nisi nulla preter calorem esset differentia inter vaporem et aquam, deficiente calore, non verteretur vapor in aquam, patit igitur aerem esse humidum, sicut et aquam.

DE, p. 63 (also quoted below) :

M. [...] Sed e regione, aer in aquam convertitur; cum enim aer, vapor videlicet qui ex lebate consurgit, frigidum locum reperit, conrescit in guttas, et ita inferius recidit.

1. 59-63. Both proofs about the lightness of air are found in both texts (but in a different order). The *Porta elementorum* is much shorter about the place of air above water (one short sentence, when the *De elementis* is much more prolix). *DE*, p. 53 :

M. [...] Aliud autem de aeris humiditate argumentum est quia ipse inanis et laxus est, nec prohibet hominem de loco ad locum penetrare per se, sicut facit soliditas terre. Unde nonnulli (*correx*i non nulli in *Dales' edition*) illum non posse dixerunt inveniri.

D. Bene argumentis tuis ostendisti de aere quia calidus est et humidus. Sed que est proprietas illius ?

M. Conscendere in altum, et inde est argumentum unum quia lebate aque plena calefacta est igne, semper vaporem videbis sursum emigrare. Alterum, quia si utrem acceperis, et aere illum impleveris, atque firmissime os ligaveris, et ad aquam profundam veniens usque in fundum aque vi demiseris, si tamen ibidem dimiseris statim usque ad aque superficiem emicare videbis, ad locum videlicet alterius aeris.

1. 63-70. No mention of the «dissolution property» is found in the *De elementis*, but the argument about it in the *Porta elementorum* is very close to a passage of the *De elementis*. The explanation that the nutriment and what receives the nutriment must differ, although they have a common nature (I remind that nature means here property), is the same (*cf.* translation n. 19). *DE*, p. 51 (also quoted above) :

M. [...] Item quod aer dieta sit ignis, flamma enim que apparet in foco non fit nisi vel ex lignis vel ex oleo vel ex cera, vel ex alio quolibet ignis postquam in vaporem vertitur nutrimento. Unde etiam dubitat nullus quia flamma nichil est aliud quam aer igni calefactus. Et quod flamma fiat ex vapore, possum tibi ita ostendere. Igni siquidem, cere vel picis vel cuilibet alii pingui materie adherenti, si tunc in ignem proicias aliquid aque, non tantum tamen quod ignem possit extinguere, videbis utique flammam subito multipliciter crescere et sursum altissime emicare. Sed nullum corpus augmentatur nisi ei aliud adiungatur, corpus autem quo flama (*sic*) ita crevit procul dubio vapor aque fuit. Vides igitur et intelligis perpatenter quia ignis dieta est aer. Sed nichil est dieta alicuius rei quod in aliquo simile non sit ei. Cum vero ignis sit calidus, calidus est et aer, qui est dieta illius, cum in aliqua qualitate alia quam calore similis non sit eius.

D. Calidum sane esse aerem probatum est satis, sed quare non est tam calidus quam et ignis?

M. Non potest esse tam calidus. Si enim ita esset, iam aer ignis esset et non dieta illius.

l. 71-75. The arguments are close but not exactly the same; both texts mention the examples of people being in direct contact with water. *DE*, p. 47 (beginning of the manuscript, acephalous):

... aque que est?

M. Frigida utique est et humida, et in duo similiter habemus argumenta. Unum quidem eorum corpora qui aquam bibunt assidue vel eam frequentant, ut piscatores et naute ac multi alii, etsi non sint de aqua, algentia tamen sunt semper et humectantia.

l. 87-91. Again, the «hidden natures» are partly the same, the «dissolution property» being absent from the *De elementis*. *DE*, p. 47:

D. Et que eius (i.e. aquae) proprietas?

M. Procul dubio que et terre, videlicet ponderositas.

l. 95-104. Both texts mention the transmutation of elements into each other. The argument about the transformation of water into steam (which is considered air) is the same, but again, the *Porta elementorum* is shorter when explaining the argument about air turned into fire when burning and fire turned into air when extinguishing a lamp. The second extract of the *De elementis* corresponds to the more laconic sentence of the *Porta elementorum*: «Ergo aqua est ignis et ignis vertitur in aquam per vim». *DE*, p. 63-65:

D. Adhuc restat unum quod iam ecce volo exequaris, videlicet quod promisisti de elementis te in sequentibus ostensurum quomodo unum converti in aliud videre nos dixeris.

M. Notum est quia vapor ex aqua consurgit et vapor aqua fit. Sed cum vaporem aeris esse speciem supra probatum sit, non debet dubitari aquam in aerem commutari. [...] Notum est etiam aerem converti in ignem. Neque enim dieta esset ignis, nisi mutaretur in ignem; et cum videmus ignem crescere propter aliquem qui se ei adiungit vaporem, cum vapor aer sit, dubium non est aerem converti in ignem. [...] Quod autem ignis in aere commutetur ex candela cum extinguitur patenter percipitur; nam eius ignis visibiliter aeri commiscetur et nusquam ulterius invenitur. Est enim aeris humiditas tanta et siccitas ignis illius tam exigua, quod ex humiditate siccitas adnullatur; et sic ignis ille totus aer efficitur. Neque enim potest esse quod omnino perierit ignis ille. Nullum quippe est corpus de his visibilibus quod tribus constat dimensionibus quod omnino adnichilari dicere valeamus; immo in aliud commutatur corpus.

DE, p. 65 (also quoted below):

M. [...] Quia ergo probatum est aquam in aerem et aerem in ignem converti, probatum est etiam aquam in ignem commutari. Rursus cum ignis in aerem et aer vertatur in amnem, sequitur etiam quod et ignis mutetur in amnem.

1. 105-106. The argument about condensed air is not clear in the *Porta elementorum*, but seems to be linked with this first extract of the *De elementis*. The end of the sentence recalls the second extract (already mentioned before). *DE*, p. 63 (also quoted above):

M. [...] Sed e regione, aer in aquam convertitur; cum enim aer, vapor videlicet qui ex lebetes consurgit, frigidum locum reperit, conrescit in guttas, et ita inferius recidit.

DE, p. 65 (also quoted above):

M. [...] Quia ergo probatum est aquam in aerem et aerem in ignem converti, probatum est etiam aquam in ignem commutari. Rursus cum ignis in aerem et aer vertatur in amnem, sequitur etiam quod et ignis mutetur in amnem.

1. 109-111. The arguments about earth are not the same, we just find a similar mention about ice being water turned into earth, but the text of the *Porta elementorum* is quite obscure. *DE*, p. 65:

M. [...] De terra autem quod in alia tria commutetur elementa, sive in terram ea ipsa, notum quidem multis est sed non fit, nisi in tempora longa. Sicut aqua cum usque adeo frigescit quod congelatur. sane unum quid quod idem est terre efficitur glacies, videlicet frigida et sicca, et meatum sustinet hominum sicut terra.

1. 111-112. The answer of the disciple in the *De elementis* corresponds to the conclusion of the master in the *Porta elementorum*. *DE*, p. 67:

M. [...] Cum vero, ut dictum est, et terra in amnem, et aqua in aerem, et aer mutetur in ignem, ergo terra et in aerem vertitur et in ignem. Et converso.

D. Inexpugnabili argumento ostendisti elementorum unumquodque in aliud converti.

1. 113-114. The introduction to the discussion about the things of the world being compounded of the four elements is the same. The *De elementis* mentions here the Arabic root *JMD* (freeze, congeal, harden) which is used in Arabic to designate minerals (*jamād*). In the *Porta elementorum* (actually in the whole alchemical *De anima*), the word *naturalis* is used to designate minerals, but sometimes the term seems to designate a wider genus than minerals (cf. translation n. 41). *DE*, p. 107:

D. Iam igitur michi vellem dari argumenta quod animalia atque virentia et ea que vocant Sarraceni congelata, sicut vivum argentum, sulphur, et metalla cuncta, composita sunt de IIII^{or} elementis cuncta.

1. 114-117. This passage of the *Porta elementorum* does not strictly correspond to an extract of the *De elementis*, but is more like a summary of the various possible compounds of the four elements, which are exposed in the tables of the *De elementis*.

1. 117-131. The explanation of the *Porta elementorum* seems to be similar to the first extract of the *De elementis* below (the order of the combinations may be traced), and could also correspond to some cases of other tables. *DE*, p. 119 :

Tabula ad VI alias species in IIII^{or} elementis, ubi sunt equalia inter se duo in maiori, et duo in alia inter se equalia in minori, sed inequalitas est inter bina.

Equalia In Maiori		Equalia In Minori	
Ignis	Aer	Aqua	Terra
Aqua	Terra	Ignis	Aer
Ignis	Aqua	Aer	Terra
Aer	Terra	Ignis	Aqua
Ignis	Terra	Aer	Aqua
Aer	Aqua	Ignis	Terra

DE, p. 121 :

Tabula ad XII^{cem} species in IIII^{or} elementis, ubi duo de ipsis inter se sunt equalia, et alia duo inequalia et inter se et erga alia que sunt equalia, sed de equalibus plus est in compositione quam de inequalibus; de inequalibus vero, de altero minus equalibus et de altero minori minus.

Equalia inter se sed plus est in commixtione quam de inequalibus		Inequalia	
		Minus quam de equalibus	Minus quam de omnibus
Ignis	Aer	Aqua	Terra
Ignis	Aer	Terra	Aqua
Ignis	Aqua	Aer	Terra
Ignis	Aqua	Terra	Aer
Ignis	Terra	Aer	Aqua
Ignis	Terra	Aqua	Aer
Aer	Aqua	Ignis	Terra
Aer	Aqua	Terra	Ignis
Aer	Terra	Ignis	Aqua
Aer	Terra	Aqua	Ignis
Aqua	Terra	Ignis	Aer
Aqua	Terra	Aer	Ignis

DE, p. 125 :

Tabula ad tercias XII species in IIII^{or} elementis, ubi duo de ipsis inter se sunt equalia, et alia duo inequalia et inter se et erga alia que sunt equalia, sed est de equalibus in compositione, de altero magis quam de suo inequali et de altero magisquam de equalibus ; de (e)qualibus vero minus quam de omnibus.

Inequalia		Equalia	
Magis quam de suo in equalibus	Magis quam de inequalibus	Minus quam de equalibus	Minus quam de omnibus
Aqua	Terra	Ignis	Aer
Terra	Aqua	Ignis	Aer
Aer	Terra	Ignis	Aqua
Terra	Aer	Ignis	Aqua
Aer	Aqua	Ignis	Terra
Aqua	Aer	Ignis	Terra
Ignis	Terra	Aer	Aqua
Terra	Ignis	Aer	Aqua
Ignis	Aqua	Aer	Terra
Aqua	Ignis	Aer	Terra
Ignis	Aer	Aqua	Terra
Aer	Ignis	Aqua	Terra

1. 131-138. The third diversity of the *Porta elementorum* is not complete, as only six are mentioned, instead of the eight possible combinations of the *De elementis*. DE, p. 119 :

Tabula ad VIII species in III^{or} elementis ubi tria equalia sunt in commixtione et quartum inequale plus minusve

Equalia			Inequale	
			Plus	Minus
Ignis	Aer	Aqua	Terra	
Ignis	Aer	Aqua		Terra
Ignis	Aer	Terra	Aqua	
Ignis	Aer	Terra		Aqua
Ignis	Aqua	Terra	Aer	
Ignis	Aqua	Terra		Aer
Aer	Aqua	Terra	Ignis	
Aer	Aqua	Terra		Ignis

1. 139-140. The calculation of the *Porta elementorum* (erroneous) cannot be understood without the *De elementis* (cf. translation n. 37). *DE*, p. 129 :

M. Bene fecisti; bene tabulas descripsisti. Iam igitur ex hoc nunc scire potes quia de quattuor elementis binis et binis equaliter et inequaliter commixtis, X^{cem} VIII^o proveniunt compositorum species. Sed ternis vero et ternis equaliter et inequaliter adiunctis, LII^e. De IIII^{or} autem totis equaliter et inequaliter simul iunctis, LXX^{ta} V^{que}. Quas si omnes simul connumereres, CXLV invenies, quorum quasdam corporeo sensu percipies, alias vero nequaquam nisi ratione intelliges.

1. 141-146. The explanation of the fourth diversity in the *Porta elementorum* is very short in this passage, only two examples are given. A wider explanation is found later in the treatise, corresponding to a table in the *De elementis*, cf. 1. 249-262 (extract *DE*, p. 127, the two examples here correspond to lines 1 and 7 of the table).

1. 146-152. Both texts insist on the importance of understanding that all vegetal, animal and mineral things are compounded of the four elements. *DE*, p. 129 :

D. Iam quidem partim cognosco ex elementorum commixtionibus his, et maxime ex LXXV, que de IIII^{or} elementis quidem convenientia atque similia in mundi valeant inveniri creaturis. Et hoc utique video ego esse argumentum quod animalia, virentia et congelata de IIII^{or} sint composita elementis, sed idem vellem adhuc si possis lucidius approbares de ipsis.

1. 156-159. The example of the fruit is found in both texts. In addition to this, they both insist on the fact that the fruit is hot, cold, dry and moist (or compounded of fire, air, water and earth) in potency, not in act. *DE*, p. 147 :

M. Sic, discipule mi dilecte, intelligas volo quod cum elementa IIII^{or} corpus aliquod componunt, nullum illorum in corpore composito actu invenitur nisi potentia dum taxat. Verbi gratia : In pomo ex IIII^{or} elementis composito, nullum illorum actu sed potentia reperitur. Si enim ignis in pomo actu esset, absque dubio calidum reperiretur.

1. 160-164. The *Porta elementorum* inserts in the example of the fruit a mention of the place of fire according to Plato and Aristotle (identification in translation nn. 43 and 44) that is also found in the *De elementis* but in another place (this citation is also slightly distorted in the *Porta elementorum*). *DE*, p. 57 :

D. [...] Sed quis est ille locus in quo terminatur ignis accensus, et ad quem cum venerit requiescit ?

M. Secundum Platonem quidem usque ad solem, sed secundum Aristotilem et alios qui de naturalibus agunt, usque ad finem aeris superiorem. Dicunt enim exinde locum totum usque ad lune circulum esse ignem, quia enim motui firmamenti locus ille vicinus extitit, ex ipso motu concaluit atque ignis qualitates recepit.

1. 164-167. The arguments about the elements being only in potency in the fruit may be compared : the argument about air is different, but the explanation

about water and fire in the *Porta elementorum* is also found in the *De elementis*. *DE*, p. 147 :

M. [...] Si vero aer ipsi malo actu inesset, ignis in eo actu existens ipsum aerem pessundaret, pomumque durabile non esset. Sed multis mensibus pomum durare cernimus. Si autem aqua pomo actu inesset, vel certe diflueret vel ob vim ignis in eo actu existentis in vaporem redigeretur. Quod si terra pomo actu inesset, sua sine ambiguitate gravitas esset sibi causa ruine.

1. 167-171. The very long explanation of the *De elementis* about the mixture of elements is highly summarized and simplified in the *Porta elementorum*. *DE*, p. 147-149 :

M. [...] Manifestum igitur est pomum consistere nequire nisi unumquodque quod in eo est elementorum in aliud mutetur quam esset priusquam pomum fieret. Cum vero ignis in mali compositione aque obviet, ignis in aqua operatur, et aqua eius opera suscipit; aqua quoque eodem modo in igne operatur, et ignis aque opera suscipit. Unumquodque autem eorum aliud a natura sua removere nititur; quoniam cum ignis in aqua operatur, calefacit eam et siccatur; et cum e converso aqua in igne operetur, ipsum frigidum humidumque reddit. Cumque eodem modo in pomi constitutione terre aer obviet, utrumque eorum alterum a natura sua propellere luctatur, et alterutrum in altero operatur et alterius suscipit opera. Cum enim terra in aere operetur ipsum gelidum aridumque reddit. Cum autem aer prius in terra operetur, illam calidam humidamque efficit. Hac itaque de causa ex illis IIII^{or} elementis alia commixtio, alia temperatio, aliaque complexio quam prius esset efficitur, quoniam unumquodque eorum ex eo genere quod prius in actu erat in aliud mutatur. Nec aliquod eorum in pomo eius generis cuius prius fuerat reperietur, cum unumquodque mutetur.

1. 171-177. Contrary to most parts of the texts, the explanation of the distillation of the fruit to divide it into its four elements is much more detailed in the *Porta elementorum* than in the *De elementis* (which only asserts that this element's extraction is possible, and refers to the passage about milk, in which it is said that milk can be divided into its four elements by distillation, cf. l. 181-185). This is probably due to the interest of the compiler (and/or reworker and/or translator) in alchemy. Indeed, the distillation of matters into their four elements is precisely and often explained in the other parts of the Pseudo-Avicennian *De anima* (cf. translation n. 45). *DE*, p. 151 :

D. [...] Elementorum quoque illorum unumquodque per se extrahi potest, sicut de lacte superius declaratum est.

1. 179-180. The same conclusion is found in both texts. *DE*, p. 149 :

D. [...] Et hoc modo predicto intelligo pomum esse et quodcumque de IIII^{or} constat elementis.

1. 181-185. As the example of the fruit, the example of milk is found in both texts. *DE*, p. 129 :

M. Si ergo aliquis lac tibi afferret et cui harum CXLV specierum simile esset inquireret, quid inde ei responderes ?

D. Notum profecto est lac esse liquidum, spissum, et pingue, liquidum quidem valde, spissum vero minusquam liquidum, sed plusquam pingue. Et liquidum est aqua, spissum terra, pingue aer. Ignem vero in eo nequaquam possumus visibiliter invenire, sed possumus experimento approbare ipsum in eo esse, calefit enim homo ex lactis comestione. Vere igitur dici potest de igne minus quam de omnibus esse in lacte. Responderem itaque lac esse simile speciei illi ubi magis est de aqua, minus de terra, minus etiam de aere, minimum vero omnium de igne.

1. 185-190. The discussions about finding the elements in milk are very close. Both texts speak about butter (which is considered air because it turns into fire) and whey, and assert that fire is perceptible in milk only by reasoning. The assertion that what remains in the bottom of the distillation vessel is the earth as explained in the *De elementis* is also quoted in the next sentences of the *Porta elementorum* (cf. the next extract of the *De elementis*, corresponding to l. 190-197), but the *Porta elementorum* also adds that cheese is considered earth. *DE*, p. 131 (also partly quoted below) :

M. Si itaque aliquis lac moveret, nunquid non statim pinguedo, hoc est butirum, superemineret ?

D. Utique faceret.

M. Quod si emissa pinguedine quod remanet in vas commiserit, ac sicut de aqua rosata fit de eo fecerit, scias quia dulcis inde atque potabilis aqua exibat. Si vero etiam fecem que in vasis fundo remanserit comburet, cinis quidem atque ita terra fiet.

D. De terra et aqua patenter video quod ex lacte redit; de piguedine vero quam aerem esse dixisti, non intelligo quod aer sit.

M. Quippe nisi aer, nequaquam ignem dietaret, sed ignem inde dietari cunctis visibiliter apparet.

D. Bene ostensum est de terra, aqua et aere; sed quomodo ostendes in lacte ignem esse ?

M. Parum nempe est in eo de igne, quare et percipi non valet nisi ratione; sed et dici potest quoniam illud parum alii igni se adiunxit in spissitudinis combustionem.

1. 190-197. The extract of the *De elementis* quoted here is also partly quoted in the previous note, but only because of the same assertion about earth remaining in the bottom of the distillation vessel. Actually, the *Porta elementorum* is more precise about the distillation operation, maybe because it is pertaining to alchemy (as in the example of the fruit, cf. l. 171-177 and p. 166). *DE*, p. 131 (also quoted above) :

M. Si itaque aliquis lac moveret, nunquid non statim pinguedo, hoc est butirum, superemineret ?

D. Utique faceret.

M. Quod si emissa pinguedine quod remanet in vas commiserit, ac sicut de aqua rosata fit de eo fecerit, scias quia dulcis inde atque potabilis aqua exibat. Si vero etiam fecem que in vasis fundo remanserit comburet, cinis quidem atque ita terra fiet.

1. 197-199. The conclusion to the example of milk is the same. *DE*, p. 131 (also quoted below):

M. [...] Ecce igitur lucidum atque evidens habes argumentum quod ea que prediximus animalia et cetera composita sunt cuncta ex adiunctione III^{or} elementorum. Et quidem hec duo, animalia scilicet atque virentia, ex III^{or} elementis sint facta, assertio est quod nullum eorum diu vivit ubi de ipsis III^{or} elementis aliquod omnino defecerit.

1. 204-209. The same introduction to the proof that mineral things are compounded of the four elements is found in both texts (twice in the *De elementis*). *DE*, p. 131-133 (also partly quoted above):

M. [...] Ecce igitur lucidum atque evidens habes argumentum quod ea que prediximus animalia et cetera composita sunt cuncta ex adiunctione III^{or} elementorum. Et quidem hec duo, animalia scilicet atque virentia, ex III^{or} elementis sint facta, assertio est quod nullum eorum diu vivit ubi de ipsis III^{or} elementis aliquod omnino defecerit. De tercio vero, videlicet de congelatis, diverse date sunt sententie ab antiquis. Quidam enim ex duobus, alii ex tribus, et alii ex III^{or} dicunt ea esse composita elementis. Ego autem, veriore reor auctoritatem secutus, III^{or} dico esse elementa in ipsis.

DE, p. 137:

D. Iam nunc patenter intelligo ex tuo sermone ea que inveniuntur in terra, aqua, et aere, ex III^{or} elementis composita cuncta esse. Sed modum quo fiat volo te michi aperire.

M. Libenter faciam, ac de bis que patentiora sunt et ad ostendendum leviora incipiam, de congelatis videlicet primum agam.

1. 212-225. Only a part of the arguments about the creation of glass and the presence of heat in the depths of the earth is the same: both texts assert that there is heat in the depths of earth (proving it by the water in wells), but the *Porta elementorum* differs at the end, when it explains that the heat does not really change, and that this change is only due to the perception of man. This addition, which invalidates the argument, could come from a bad understanding of the discussion about the contraries that directly follows in the *De elementis* (not quoted here, *DE*, p. 139-141), or be a later gloss. *DE*, p. 137-139:

M. Non itaque mirum videri tibi debet, aut impossibile, si eodem modo vitrum tellus procreet intra se.

D. Et hoc quidem fieri reor possibile. Sed quomodo tantus calor intra terram poterit inveniri quo terra excoqui ac vitrum fieri valeat sicut igni?

M. Nunquid non nosti quod tantundem valeat longo tempore calor parvus quantum breviori tempore calor magnus?

D. Hoc nempe est perpatens omnibus ; sed nondum video, nec fert michi animus ut concedam, quod in terra sit calor sive magnus sive parvus.

M. Et hoc quoque visibiliter possumus nos approbare. Inde enim argumentum est quod tempore hiemali calide in puteis inveniuntur aque respectu frigiditatis quam habent in estate ; sed et putei quanto profundiores sunt, tanto calidior est in eis aqua in hieme.

D. Ergo secundum te dici est necesse terram calidam nec frigidam esse.

M. Non utique. Est enim calor ille in terra tantum in hieme ; quod si terra calida esset, et in estate et hieme equaliter in ea esset calor ille.

D. Que est caloris illius causa ?

M. In diebus quidem estatis calefacta superficie terre calore solis, calefiunt humiditas et vapores qui commiscuntur terre glebis. Diebus vero hiemis, secedit calor ad interiora telluris utpote suum contrarium fugiens, frigus videlicet quo terre superficies circumvenitur tunc temporis, et ideo tellus superficietenus quidem frigida, interius vero semper calida est diebus illis.

1. 225-227. Again, when describing dissolution, the passage in the *Porta elementorum* is not present in the *De elementis*.

1. 228-238. The explanation of instruments made of earth being transformed into glass when put in fire is the same, but a very important difference lies in the assertion « quia quod facit natura cum calore intus in ventre terrae in centenis annorum facimus nos in paucis diebus » which is not in the *De elementis*. This sentence is a well known alchemical leitmotiv, cf. translation n. 58. *DE*, p. 137 :

M. [...] Vidisti itaque unquam auri artificem argentum vel aurum in urceo fundere ?

D. Vidi utique et sepe.

M. Et nosti tu quia de terra macerata cum aqua fit urceus ille ; et cum in eo funditur aurum vel argentum semel et iterum ac multa vice, vidisti quia soleat quandoque virescere et fieri perlucidum, quasi vitrum, atque ultra visum recipere ?

D. Et hoc quoque vidi multa vice, neque contingit hoc aurifici tantum, immo his omnibus qui cuprum vel ferrum et metalla reliqua in urceo solent dissolvere.

DE, p. 141 :

M. Calor in interioribus terre existens lutum intus usque adeo decoquit, donec in vitrum post annos innumeros redigatur, quemadmodum urceum aurifabri vis ignis immensa decoquens in vitrum redigit.

D. Perspicue equidem intellexi.

M. Nostin etiam amphoram figuli quandam vitri speciem esse ? Sed quia ab igne non diu decocta fuit, ideo nec vitrum est. Si enim ab igne diu coqueretur, in vitrum clarum et nitidum ut aurifabri urceus redigeretur.

1. 238-244. The conclusion of this discussion in the *Porta elementorum* could correspond to the three extracts of the *De elementis* hereafter, especially the first, in which it is said that the « eyes of the heart » (corresponding to the *mens* in the *Porta elementorum*) are necessary to understand that all the four elements are found in glass (in a stone). *DE*, p. 145 :

M. [...] Inde igitur animadverti potest ex IIII^{or} vitrum constare elementis. Manifeste tamen illud ut potius intelligas propalabo. Verumtamen ad hoc intelligendum tui cordis oculi sunt necessarii. Quoniam nisi hoc intellexeris, aliquid in terra compositum nequaquam considerare poteris.

DE, p. 151 :

D. [...] Liqueat ergo nunc omnibus quod congelata omnia ex IIII^{or} constant elementis. In quibus congelatis priusquam deficiant, omnia insunt potentia elementa. Cum autem defecerint, unumquodque eorum remotum elementum in actu fuerit. Sic quoque in rei veritate et de animalibus et de virentibus est.

DE, p. 153 :

M. Bonum est argumentum, sicque intelligere debes de universis que ex IIII^{or} sunt elementis composita. Item concedendum est quod omnia congelata ex his IIII^{or} sunt composita elementis.

1. 249-262. The explanation of the fourth diversity in the *Porta elementorum* has already been mentioned, but in a less detailed way, cf. l. 141-146. The four examples correspond to the four bold lines in the table of the *De elementis* hereafter. DE, p. 127 :

Tabula ad XXIII species, ubi in composito de IIII^{or} elementis, est inequale unumquodque ab alio ; de secundo videlicet minus quam de primo, de tercio minus quam de secundo, de quarto minus quam de omnibus

Primum	Secundum	Tercium	Quantum
Ignis	Aer	Aqua	Terra
Ignis	Aer	Terra	Aqua
Ignis	Aqua	Aer	Terra
Ignis	Aqua	Terra	Aer
Ignis	Terra	Aer	Aqua
Ignis	Terra	Aqua	Aer
Aer	Aqua	Terra	Ignis
Aer	Aqua	Ignis	Terra
Aer	Terra	Aqua	Ignis
Aer	Terra	Ignis	Aqua
Aer	Ignis	Aqua	Terra
Aer	Ignis	Terra	Aqua
Aqua	Terra	Ignis	Aer
Aqua	Terra	Aer	Ignis
Aqua	Ignis	Terra	Aer
Aqua	Ignis	Aer	Terra
Aqua	Aer	Terra	Ignis
Aqua	Aer	Ignis	Terra

Terra	Ignis	Aer	Aqua
Terra	Ignis	Aqua	Aer
Terra	Aer	Ignis	Aqua
Terra	Aer	Aqua	Ignis
Terra	Aqua	Ignis	Aer
Terra	Aqua	Aer	Ignis

1. 270-274. The explanation about the mixture of opposite elements is found in both treatises, but is much more detailed and precise in the *De elementis*. *DE*, p. 109 :

M. [...] Repugnabit itaque calor ignis frigiditati terre, quare et compositum nec frigidum nec calidum erit nimium, sed temperatum in utroque. Quia vero et ignis et terra conveniunt in siccitate, ideo commixtum necesse est siccissimum futurum esse; quia etiam et ignis subtilis et terra grossa existit, compositum quidem nec subtile nec grossum sed medium inter utrumque erit. Quoniam autem terre appetitus cum appetitu ignis adiungitur, commixtum quoque vehementer appetitum efficietur. Item terra visum constringit, et ignis aperit; unde et compositum nec alteram omnino virtutem habebit nec alteram, sed inter medium abibit. Sed quoniam levitas ignis ponderositati contraibit terre, ideo et commixtum nec ponderosum erit nec leve, sed temperatum utrinque. Quoniam vero non dietatur terra, sed dietatur vehementer ignis, ideo et compositum dietari quidem queret, sed nequaquam quantum ignis. Erit igitur illud quod ex igne et terra proveniet compositum calore et frigiditate temperatum inter subtile et grossum, temperatum quoque in constringendo et aperiendo visum, inter leve et ponderosum; sed erit vehementer siccum, nimium habet appetitum, ac dietari volet paulum.

DE, p. 149 :

D. Quod dixisti optime intelligo. Audivi enim superius te affirmantem quod cum duo elementa contraria sibi obviaverint, utrumque eorum aliud a natura sua remove laborat quousque a natura sua que prius in actu fuit removeatur. Verbi gratia : Quando ignis aque pari addicione in potentia sic adiungitur quod ignis non pars tanta adsit que ad aque perdicionem sufficiat, neque aque tantum quod ignem queat extinguere, utrumque eorum in altero operatur et alterius opera suscipit. Nam si ignis in aqua operatur, et eius geliditatem ac humiditatem minuit. Si vero in igne aqua operatur, caliditatem que prius infuerat siccitatemque aminuit. Sicque unum alii repugnat donec illa convenient, et ex eis res tertia efficiatur que sane dici potest quod ignis in eo non actu immo potentia est sicque etiam aqua non actu verum potentia inest. Quoniam si quodlibet eorum in eo actu esset, non convenirent, nec corpus tertium ex eis componeretur, quod nulli illorum simile est. Quod si corpus illud vi defecerit, unumquodque elementorum ipsorum in actu sicut prius erit.

1. 275-345. From this paragraph, the rest of the *Porta elementorum* does not contain any passage linked with the *De elementis*. The *Porta elementorum* ends with two examples of calculation of properties, and a conclusion. The examples could have been added before or during the reworking and/or compilation and/or translation stages. As for the conclusion, it seems likely an addition of the compiler.