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Dividing Science by Ten

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Abstract

The *Ġāyat al-ḥakīm* ("the Aim of the Sage"), the Arab ancestor of the celebrated *Picatrix* on astral magic, includes a curious tenfold classification of the sciences, with five disciplines said to be compulsory "for the legislators" and five "for the philosopher". This classification was once described by Hellmut Ritter and Martin Plessner as "ein Unikum in der umfangreichen Einteilungsliteratur". This paper is a survey of medieval texts concerned with a tenfold classification of the sciences, ranging from a wide collection of sources including the world chronicles of Agapius and Girgīs al-Makīn, the *Ādāb al-falāsifa*, the *Sindbādnāma*, the Pseudo-Avicennian alchemical *De anima*, and Roger Bacon's edition of the *Secretum Secretorum*. It appears from this survey that the *Ādāb al-falāsifa* certainly played a crucial role in the transmission of these traditions, but that other texts, in particular amongst the Pseudo-Aristotelian *Hermetica*, may have been influential as well. Regarding the ultimate origin of this material we are reduced to mere speculations, although various elements invite us to consider Middle Persian literature as a more plausible formative stage than Greek literature in the conception of tenfold classifications of knowledge.

Keywords

classification of science – *Ġāyat al-ḥakīm* – Agapius – Girgīs al-Makīn – *Ādāb al-falāsifa* – *Sindbādnāma* – Pseudo-Aristotelian *Hermetica* – Roger Bacon – *Secretorum Secretorum*

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Résumé

Le *Ġāyat al-ḥakīm* (« Le but du sage »), ancêtre arabe du célèbre *Picatrix* sur la magie astrale, comprend une curieuse classification du savoir en dix parties, avec cinq disciplines dites obligatoires « pour les législateurs » et cinq « pour le philosophe ». Hellmut Ritter et Martin Plessner ont autrefois décrit cette classification comme « ein Unikum in der umfangreichen Einteilungsliteratur ». Cet article donne un aperçu des textes médiévaux portant sur la division du savoir en dix parties à partir d'une vaste collection de sources comprenant notamment les chroniques universelles d'Agapius et de Girgīs al-Makīn, l'*Ādāb al-falāsifa* gnomologique, le *Sindbādnāma*, le *De anima* alchimique du Pseudo-Avicenne, ainsi que l'édition du *Secretorum Secretum* par Roger Bacon. Il ressort de cette enquête que l'*Ādāb al-falāsifa* a certainement joué un rôle crucial dans la transmission de ces traditions, mais que d'autres textes, en particulier parmi les *Hermetica* pseudo-aristotéliciens, ont sans doute eu aussi une influence. En ce qui concerne l'origine première de ce matériel, nous en sommes réduits à de simples conjectures, mais divers éléments nous invitent à considérer la littérature médio-persane comme une étape formative plus plausible que la littérature grecque dans la conception des classifications du savoir en dix disciplines.

Mots-clés

classification des sciences – *Ġāyat al-ḥakīm* – Agapius – Girgīs al-Makīn – *Ādāb al-falāsifa* – *Sindbādnāma* – *Hermetica* pseudo-aristotéliciens – Roger Bacon – *Secretorum Secretorum*

Picatrix, the most famous treatise on astral magic that has come down to us from the Middle Ages, includes a chapter designed "to show that the sciences necessary to this art are ten, [to show] how this science benefits from them and in what the root of the science of nigromancy consists."[1] This is Chapter 5 of Book Four, where indeed is found a brief explanation regarding these sciences which the ancient sages (*sapientes antiqui*) defined as "ten arts you should know as a pre-requisite" (*prius decem artibus scitis*) and which they grouped in two categories, "five of which are regarded as necessary for the legislators, and five [as a requisite] for the philosophers (*quarum quinque leges studentibus, quinque vero studentibus philosophiam necessarie repuntantur*)." But the Latin text presents us with a problem here since the number of sciences, whether

1 *Picatrix*, ed. Pingree, p. 198: "Ostendit que sunt decem sciencie huic arti necessarie, et qualiter ex eis hec sciencia adiuvatur, et que sit radix sciencie nigromancie."

considered as such or by trying to account for their possible subdivisions, does not amount to ten in any conceivable way. It is obvious that the Latin version as we have it has several serious omissions.

To get the full picture of the ten disciplines and their subdivisions we need to go back to the Arabic original, namely to the *Ġāyat al-ḥakīm*, now correctly ascribed to the tenth-century scholar Maslama b. Qāsim al-Qurṭubī.[2] The texts reads:

(1) The first among them is the science of agriculture, husbandry and navigation, which are necessary as a priority for the foundation of cities and the prosperity of their population. It is a must to have previous knowledge and preliminary awareness of them, as well as of the books written about them.

(2) Then the science of the commandment of armies, war strategies, taming of animals, veterinary medicine, and falconry.

(3) Then the civic science, which is in charge of administration of the parts of a city such as grammar, language, literature, the principles [of jurisprudence], estate planning, knowledge of the ordains of a certain religious community and studying them, all types of writing under which chancellery is classified. Under this art is included all that is employed for the development of the cities of any religious community.

(4) Then all the political sciences. Some of them are general, such as the policies of cities altogether; some are in between the general and the specific, such as the governance of a particular city for what is specific to it; some were dictated as intermediate [type of governance], such as the governance of a house; some are particular, such as man's governance of himself.

(5) Then the science of ethics, and the books written about it.

(6) Then all the mathematical sciences, and they are of four kinds:
   1. arithmetic, consisting of transactions, algebra, and the science of inheritance calculations;
   2. geometry, both theoretical and practical, consisting of surveying, the science of fractions, weight lifting, ballistics, aquatic and aerial devices, burning mirrors, and optics;
   3. the science of the stars, consisting of [solid] geometry, astronomy, value distribution, and financial calculations/judgements under which [the science of] multiplications [is found];
   4. music, consisting of rhythm and prosody.

2 Fierro, "Bāṭinism"; de Callataÿ, "Magia en al-Andalus"; de Callataÿ and Moureau, "Again on Maslama".

(7) Then comes the science of logic, as contained in eight books, with which the first sage guided us, and illuminated our perceptions.
(8) Then the science of medicine in its entirety, both as a science in its totality, and action as a practice under which fall pharmacology and manual operations in the form of surgeries and eye treatment.
(9) Then comes the natural science contained in a number of books which the sage wrote down. After him, [certain] men took over their explications, and applied themselves to this as much as they can. One is *The Book of Physics*, then *The Book of Heaven and the World*, *The Book of Generation and Corruption*, *The Book of the Metereology*, *The Book of Minerals*, *The Book of Plants*, *The Book of Animals*, *The Book of the Soul*, *The Book of Sense and Sensibilia*, *The Book of Health and Illness*, *The Book of the Local Motions of Animals*. Whoever takes them up and becomes expert in their knowledge, will become expert in the natural science as perfectly as can be.
(10) Then comes the science of metaphysics, which the sage contained in thirteen treatises whereby he enabled the reader to reach that which he desired, and help him attain [his] goal and desire.[3]

Ten "Aristotelian" Sciences

As this passage has already been discussed at some length in another recent publication,[4] I shall here restrict myself briefly to summarize the points which I consider most relevant to the present contribution. In the first place, it must be recalled that in Maslama's view these ten sciences – or, better said, groups of sciences – are the pre-requisite to two other sciences, namely alchemy (*kīmiyā'*) and magic (*sīmiyā'*, by which is meant astral magic) in the second place. It is to these two occult sciences, referred to by the author himself as "the two lofty conclusions" (*al-natīǧatān al-rafīʿatān*) of philosophy, that Maslama devoted the *Rutbat al-ḥakīm* (written between 950 and 953 CE) and the *Ġāyat al-ḥakīm* (written between 954 and 960 CE). Strictly speaking, this means that for the Arabic original as well as for the thirteenth-century Latin version, Maslama's classification of knowledge is a tenfold system only when one exclusively

3 *Ġāyat al-Ḥakīm*, IV. 5, pp. 333-335. For the omissions of the Latin version with respect to the Arabic, see: Ritter and Plessner, *Picatrix*, p. 349: "Die im arab. App. gemachte Angabe, daß das Stück im Lateiner fehlt, bezieht sich nur auf die Hamburger Hs.; in anderen Hss. sind 1-3 mit denen im arab. Original identisch, arab. 4-5 fehlen dort, 6 hat der Lateiner in 4-7 aufgelöst, 7-10 arab. = 8-10 lat."
4 de Callataÿ, "Encyclopaedism".

refers to these preliminary sciences. With the addition of two supplementary scales for the occult issues, the "philosophical ladder of ascension" of Maslama b. Qāsim al-Qurṭubī is in reality a twelvefold system. Regarding the distribution of the ten pre-requisite disciplines into five "for the legislators" (*bi-wāḍiʿī l-namūs*) and five "for the philosopher" (*bi-l-faylasūf*, note the singular in the Arabic), we observe at once that whereas the philosophical part is relatively classical in its structure, the "legal" section offers a much more motley combination in which Greek – and markedly Aristotelian – disciplines appear to have been mixed with genuinely Islamic legal-religious matters and even with *adab*. What is also worth noting here is the emphasis on the science of governance as found in the literary tradition of the mirrors for princes. In particular, it seems reminiscent of the Pseudo-Aristotelian *Sirr al-asrār* ("the Secret of Secrets") – a work which Maslama refers to in the *Ġāya*[5] – with its typical merging of moral and educational precepts with more practical issues such as the control over cities and armies. In spite of the numerous comparisons that can be made with other texts, it remains that Martin Plessner was fundamentally right when he affirmed that the division of knowledge as found in the *Ġāya*/*Picatrix* is "ein Unikum in der umfangreichen Einteilungsliteratur."[6]

An important text relevant for our discussion of tenfold classifications of knowledge is the *Kitāb al-ʿUnwān* ("The Book of Headings"), a world chronicle compiled in the tenth century by the bishop Agapius, also known as Maḥbūb b. Quṣṭanṭīn. In this book is found a passage about the ten sciences in relation with the people of the fourth clime:

> The books of these peoples [of the fourth clime] reveal that they have gathered together in their country the wonders and the ten sciences, namely (*wa-fīhim tadullu al-kutub annahu iǧtamaʿat ʿindahum al-ʿaǧāʾib wa-l-ʿulūm al-ʿāšara aʿnī*): (1) "al-asṭrunūmiyā", that is, the motions of the stars (*al-asṭrunūmiyā awwalan ayy ḥarakāt al-nuǧūm*); (2) "al-asṭrulūǧiyā", that is, the decrees [of these stars] and the rules pertaining to them (*wa-l-asṭrulūǧiyā ṯāniyan ayy al-qaḍāyā fīhā wa-l-aḥkām ʿalayhā*); (3) "al-ǧāwmaṭriyā", that is, land survey, geometry, measurements and fractions (*wa-l-ǧāwmaṭriyā ṯāliṯan ayy al-misāḥa wa-l-handasa wa-l-maqādīr wa-l-muhmala*); (4) "al-āritmīṭīqā", that is, the books of numbers (*wa-l-āritmīṭīqā rābiʿan ayy kutub al-ʿadad*); (5) "al-mūsīqā", that is, the composition and the execution of melodies (*wa-l-mūsīqā ḫāmisan*

5 See for instance Ritter and Plessner, *Picatrix*, p. 119. For elements of comparison between the *Sirr al-asrār* and the *Ġāya*, see also: Saif, *The Arabic Influences*, pp. 37-45.

6 Ritter and Plessner, *Picatrix*, p. 349.

> *ayy ta'līf al-aḥlān wa-waḍʿuhā*); (6) "al-ayaṭrīkī", that is, the art of medicine (*al-ayaṭrīkī sādisan ayy ṣanʿat al-ṭibb*); (7) "al-sawmiyā'", that is, the knowledge of alchemy (*wa-l-sawmīyā' sābʿan wa-hiya maʿrifat al-kīmiyā'*); (8) "al-miḥādnīqī", that is, the books of tricks (*wa-l-miḥādnīqī ṯāminan wa-hiya kutub al-iḥtiyālāt*); (9) "al-āraḥīnī"(?), from which are derived the books of talismans, and the like (*wa-l-āraḥīnī tāsiʿan minhā kutub al-ṭillasmāt wa-mā yušbihuhā*); (10) "al-qāṭiġūriyās", that is, the predicates made of terms of logic, which is the art of approaching and grasping the real from what is not (*wa-l-qāṭīġūriyās ʿāšaran fa-hiya al-maqūlāt min ḥudūd al-manṭiq allatī hiya al-ṣanʿa allatī tuqrabu wa-tufhamu* [corr. from *tufqamu*] *al-ḥaqā'iq min ġayrihā*).[7]

An interesting feature of Agapius's text is that the sciences are all named in a way suggesting that they were originally Greek. The transliterations are transparent for: "*al-asṭrunūmiyā*", "*al-asṭrulūǧiyā*", "*al-ǧāwmaṭriyā*", "*al-āritmīṭīqā*", "*al-mūsīqā*", "*al-ayaṭrīkī*" (for ἰατρική τέχνη), "*al-sawmiyā*" (for σημεῖα), "*al-kīmīyā*" and "*al-qāṭīghūriyās*" (for κατηγορίαι).[8] Things are less obvious for the two remaining sciences. Indeed, "*al-miḥānīkī*" (for μηχανική) is an emendation suggested in a footnote by Louis Cheikho for a word given in his edition as المحادنيقي. This suggestion is given some weight by the term's proximity to the Arabic word for "tricks" or "devices" (الاحتيالات), itself an emendation for the less plausible الاختيالات. Here we may think in particular of the well-attested "*ʿilm ḥiyāl al-mīkānīkiyya*" ("the science of mechanical devices"), but this should nevertheless be considered conjectural in the absence of a closer examination of the testimonies at hand. The most serious difficulty remains the identification of الارحيني, a science which our text relates to the talismanic art. Cheikho suggests to read it as "الارميني (ἑρμηνεία), h. e. interpretatio rerum occultarum", but here again this cannot be regarded as more than a plausible hypothesis.

Along the same lines we now turn to another world chronicle known as *al-Maǧmūʿ al-Mubārak* ("The Blessed Collection"), a work compiled in the thirteenth century by the Coptic historian Girgīs al-Makīn (or George Elmacin, d. 1273 AD). The original Arabic of this work still awaits to be edited but the chapter on Alexander the Great is available thanks to the translation which

7 Agapius, *Kitāb al-ʿUnwān*, ed. as *Agapius Episcopus Mabugensis. Historia Universalis*, p. 26.

8 The reason why the *Categories* are mentioned here, preferably to any other part of logic, is not clear, but we may perhaps conjecture that this was a result of Aristotle's categories being ten in number, like the ten sciences here described. The ten categories are mentioned in the *Ġāyat al-ḥakīm* (ed. Ritter, pp. 96-101), in a passage modelled upon the Ǧābirian *Kitāb al-Baḥṭ*.

Ernst Alfred Wallis Budge made from the Ethiopian version and which he published in 1896 in *The Life and Exploits of Alexander the Great*.[9] In this chapter, al-Makīn makes a rather extensive use of Pseudo-Aristotelian material, and in particular of the influential Arabic corpus of magic treatises usually referred to in modern scholarship as the Pseudo-Aristotelian Hermetica, to which we shall later return.[10] In one place is found the following statement:

> Now there are some who say that Aristotle, the sage, the teacher of Alexander, taught the ten sciences of the earth and established them, and that he composed many treatises on the healing of the body, besides other well-known books. And he compiled for Alexander a work, which we have mentioned in a previous place, and titled it "The Book of the Knowledge of the Laws of Destiny," and in it [he treated of] the science of talismans, and the art of astrology, and he drew therein magical figures which [were to be used] for frightening and terrifying [men], and he further gave instructions to him that would use them to make use of them all.[11]

In the original Arabic, which I here reproduce from the seventeenth century codex Oxford Huntington 188, the same passage reads:

> It has been said: Aristotle, the sage, the teacher of Alexander, mastered the ten sciences (*qāla wa-kāna Arisṭuṭālīs al-ḥakīm muʿallim al-Iskandar qad atqana al-ʿulūm al-ʿašara*) and composed many treatises, philosophical or others. His writings are famous. He compiled for Alexander the book which we have previously mentioned and whose title is *al-siyāsa fī tadbīr al-riyāsa* ("The Book of Governance on Managing Leadership") comprising regulation, talismans, medicine and astrology (*ḥukm wa-ṭillasmāt*

9 Wallis Budge, *The Life*, pp. 355-385.

10 See for instance: Van Bladel, *The Arabic Hermes*, p. 101. In his introduction to the edition of the *Liber Antimaquis*, a Latin avatar of the same tradition, Charles Burnett once defined this influential collection of texts as "a fluid corpus of Arabic Hermetic magic which is given different names in different manuscripts. These names mean nothing in Arabic but perhaps are transliterations, or pretend to be transliterations, of Greek terms, and include *Kitāb al-Ustuwwaṭās*, *Kitāb al-Ustūṭās*, *Kitāb al-Madīṭīs*, *Kitāb al-Isṭamāṭīs*, *Kitāb al-Isṭamāḥīs*. [...] The Arabic corpus purports to be the instructions of Aristotle to Alexander, his royal pupil, in which Aristotle reports the secret sayings of Hermes" (Burnett in: Bos et al. (eds), *Hermes Trismegistus*, here p. 179). For further information about the manuscript tradition of the Pseudo-Aristotelian Hermetica, see: Saif, "From *Ġāyat al-ḥakīm* to *Šams al-maʿārif*," here pp. 307-308.

11 Wallis Budge, *The Life*, p. 382.

wa-ṭibb wa-naǧāma). In this book, he designed a terrible and dreadful figure. And he provided instructions for using it.[12]

It is most likely that the work referred to here as *al-siyāsa fī tadbīr al-riyāsa* – and which Girgīs al-Makīn indeed already alludes to a few pages before[13] – is the one that includes the *Sirr al-asrār* ("Secret of Secrets"), one of the most important works that were ever ascribed to Aristotle.[14] Yet for us the most remarkable element in the passage quoted above is the assertion that "Aristotle, the sage, the teacher of Alexander, mastered the ten sciences". What are these ten sciences? Al-Makīn does not tell us in this passage, and in the absence of any publication of the rest of his work, modern scholars has thus far remained silent about this issue. A passage with the ten Aristotelian sciences does appear, however, in the *Maǧmūʿ*. This passage is found in the chapter about Adam and, remarkably, is part of a reflection on the merits of the fourth clime, at the centre of the *ecumene* (that is, the inhabited quarter) in the traditional representations of geographers. Thus after mentioning some famous cities and regions – as

12 Makīn, *al-Maǧmūʿ al-Mubārak*, MS Oxford, Huntington 188, f. 130v. I am grateful to Liana Saif for providing me with a copy of this manuscript. Note that a statement very similar to this one is also to be found in a late anonymous Christian Arabic text of geography preserved in the MS Vat. Ar. 286 from the Vatican Library and which was translated into French by Olga de Lébédew; see: *Codex 286 du Vatican*, p. 4: "Cet Aristote, qui connaissait en perfection toutes les dix sciences, a écrit pour lui [Alexander] un livre sur la politique, manuel pour gouverner l'État; il y a mis de sages conseils, des talismans et des informations médicales touchant l'homme et les animaux. Et il lui conseilla de prendre ce livre comme guide pour la conservation de sa santé ainsi que pour le gouvernement de son État."

13 Makīn, *al-Maǧmūʿ al-Mubārak*, trans. Wallis Budge, *The Life*, p. 357: "Now Aristotle was skilled in every branch of learning, and he composed for Alexander a book of philosophy on the ordering of his ways, wherein were written certain mystical signs and symbols, that is to say talismans, and astrological calculations; and he ordered him to direct his own bodily exertions and to rule over his own kingdom by what was [written] therein".

14 See for instance: Steele (ed.), *Opera hactenus*, p. 12: "It is unlikely that the Syriac text, if it should ever be found, will bear the name of the *Secrets of Secrets*. Perhaps the traditional name preserved by al-Makīn, *The Book of the knowledge of the Laws of Destiny*, or the *Kitāb al-siyāsa* of Ibn Khaldūn, its alternative title in Arabic, may afford some clue. It is quite possible, even, that the Syriac original may correspond to a part only of the original Arabic form". See also: Forster, *Das Geheimnis*, p. 35: "Das beschriebene Buch ist nicht nur vom Inhalt her ziemlich sicher das *Sirr al-asrār*, auch der Titel scheint *Kitāb al-Siyāsa fī tadbīr al-riyāsa* zu übersetzen. Der Historiker Ibn al-ʿAmīd dürfte sich – auch wenn es diese Inhaltsangabe noch nicht unbedingt vermuten lässt – am meisten für die Staatstheorie des *Sirr al-asrār* interessiert haben; etwas später zitiert er nämlich noch das Oktagon der Gerechtigkeit, welches selbst durch die doppelte Übersetzung ins Äthiopische und von da ins Englische noch als aus dem *Sirr al-asrār* stammend zu erkennen ist".

for instance, Damascus, Baghdad, Rayy and the isles of Rhodes, Cyprus and Sicily –, al-Makīn explains:

> And this clime is in the middle of the Earth and for this reason it is the best of climes for the temperance and for the equilibrium of natures and for this its inhabitants are sages and experts in philosophy, astrology, culture, medicine (*ahl ḥikma wa-aṣḥāb falsafa wa-nuǧūm wa-ādāb wa-ṭibb*) and they have investigated about the things (*wa-faḥaṣa ʿan al-umūr*) and gathered together the wonders and the ten sciences (*wa-ʿindahum iǧtamaʿat al-ʿaǧāʾib wa-l-ʿulūm al-ʿašara*), namely the science of the [celestial] sphere and the motions of the stars and the rules pertaining to them (*wa-hiya ʿilm al-falak wa-ḥarakāt al-nuǧūm wa-l-ḥukm ʿalayhā*), and the science of propaedeutics, geometry, surveying, magnitudes and measurements (*wa-ʿilm al-riyāḍī al-handasa wa-l-misāḥa wa-l-maqāyīs wa-l-maqādīr*); the science of the number (*wa-ʿilm al-ʿadad*); the science of music, that is, the composition and execution of melodies (*wa-ʿilm al-mūsīqī ayy taʾlīf al-alḥān wa-waḍʿuhā*); the science of the art of medicine, for the recovery of all the living beings from all their diseases, and it is divided into two kinds, treatments for rational living beings and treatments for non-rational [illegible] birds, and the like (*wa-ʿilm ṣināʿat al-ṭibb li-burūʾ al-ḥayawanāt ǧamīʿihā min sāʾir ʿilalihā wa-hiya tanqasimu ʿalā qismayni minhā muʿālaǧa al-ḥayawān al-nāṭiq wa-minhā muʿālaǧa al-ḥayawān al-ġayr nāṭiq wa-l-ṭayr wa-ġayrihi*); the science of the art of alchemy and magic (*wa-ʿilm ṣināʿat al-kīmiyāʾ wa-l-sīmiyāʾ*); the science of tricks and talismans (*wa-ʿilm al-iḥtiyālāt wa-l-ṭillasmāt*); the science of the formulas [taken] from the art of logic, which discriminates what is real from what is not (*wa-ʿilm al-maqūlāt min ṣināʿat al-manṭiq allatī tumayyizu al-ḥaqāʾiq min ġayrihā*); the science of philosophy, which is the divine science (*wa-ʿilm al-falsafa wa-huwa al-ʿilm al-ilāhī*). The inhabitants of this clime are people of wisdom and philosophy and they are better in this respect than the inhabitants of the third clime. And the people of this clime have also a way of reasoning (*rayy*) that is specific to them and which comes from the high level of their intellect and knowledge, something which they share with nobody else.[15]

It is not absolutely clear how this motley list of sciences can be arranged into ten categories. The word *ʿilm*, which is repeated all along the passage, would seem to indicate the transition between one category and the next, but in

15 Makīn, *al-Maǧmūʿ al-Mubārak*, MS Oxford, Huntington 188, ff. 14v-15r.

fact it is found only nine times in the passage, so that one of such defined categories needs to be broken into two. Would that be the section beginning, in a rather odd manner, the *riyāḍiyyāt* (which I here take as referring to the propaedeutics)[16] with geometry and related issues, or should we rather divide another section, such as the one with "tricks" and "talismans" or that with "alchemy" and "magic"? It is impossible to decide on the basis of this text alone. Fortunately, we have at our disposal other testimonies that offer us some help. One is provided by the same Huntington manuscript, in which a section of its own, presumably compiled by the copyist, has been inserted on the first folios, immediately before the text of the *Mafātīḥ*. In this section, purposefully entitled "Names of the ten sciences" (*asmāʾ al-ʿulūm al-ʿašara*), there is no ambiguity about the numbers of disciplines involved, since the ten sciences (or rather groups of sciences, once again) are visually separated from one another by red dots (see fig. 1). For the sake of convenience, these marks have been replaced in the following translation with the corresponding numbers in the sequence:

> (1) the science of the sphere and the motions of the stars and the rules pertaining to them; (2) propaedeutics; (3) geometry, land survey, magnitudes and measurements; (4) music, that is the composition and the execution of melodies; (5) magic; (6) alchemy; (7) the art of medicine in order to cure all living beings from all their diseases, and there are two kinds [of beings]: rational and non-rational, and the like; (8) the science of the number; (9) philosophy, which is the divine science; (10) the science of tricks, talismans and the formulas taken from the art of logic, which is to discriminate what is real from what is not. Completed and perfected with the assistance of God the Greatest.[17]

Comparing this list with the other, we observe that propaedeutics is now more understandably separated from the geometrical disciplines and that magic and alchemy each receive a place of its own. In the other way round, we note that tricks, talismans and logic are here all put together whereas they form two different groups in the former statement. What is also notable, of course, is that the order in which the sciences are named is not the same as before.

16 On the ambiguity of *riyāḍī* as meaning both "propaedeutical" and "mathematical," see: Baffioni, "Oggetti," here p. 28; Baffioni, *On Logic*, pp. 24-28. My choice to translate "*riyāḍī*" here with "propaedeutics" rather than with "arithmetic" is due to the presence in the same list of "the science of the number", which cannot correspond to anything else than arithmetic.

17 MS Oxford, Huntington 188, f. 2r.

Whichever testimony one considers, this statement about the ten Aristotelian sciences is curious in several respects. It was very probably meant to include the four disciplines making up the classical quadrivium of mathematical sciences (arithmetic – geometry – astronomy – music), although these do not appear to form a group as such here.[18] None of the disciplines that usually constitute the group of physical or natural sciences is mentioned, and there is no trace either of sciences like ethics or governance that are most generally found in medieval classifications.[19] Logic is present, but only in relation to matters such as talismans and tricks – a rather unorthodox combination of disciplines that one would hardly have expected here. As for philosophy, in spite of being called the divine science, it does not seem to have been assigned any place of particular significance in the sequence. In fact, one is left with the impression that the author of this list did not care much to offer a coherent and comprehensive system. What can however be retained as a striking feature of this enumeration of sciences is its emphasis on the occult. In addition to the above mentioned science of mechanical tricks and talismans, our two lists also include magic and alchemy, which are there given the same appellations as in Maslama's twin treatises. Although not stated as such, we can also assume with confidence that by "the science of the sphere and the motions of the stars" was meant a discipline that did not make any clear distinction between astronomy and astrology.[20]

As one quickly realizes, al-Makīn's version differs from Agapius's in some interesting respects. A textual comparison enables us to make some remarks about the process by which differences between our testimonies might have appeared. It would seem, for instance, that while astronomy and astrology are counted together by al-Makīn as making up the first science of the list, each originally occupied its own position in the list. Conversely, it also appears that while Agapius had "*al-sawmiyā*'" and "*al-kīmiyā*'" conflated in the rather unintelligible "magic, which is the knowledge of alchemy", al-Makīn's gives them a separate place.

All in all, it appears from our textual comparisons that in addition to the classical four sciences of the quadrivium, a tradition existed which identifies ten sciences that included medicine, magic, alchemy, as well as another science having to do with tricks and talismans. Taking into account, as said

18 On the quadrivium (and trivium) in Islam, see: de Callataÿ, "Trivium et quadrivium"; Cottrell, "Trivium and Quadrivium".

19 See: Hein: *Definition*; Biesterfeldt, "Medieval Arabic Encyclopaedias"; *idem*, "Arabisch-islamische Enzyklopädien"; de Callataÿ, "The Classification of Knowledge".

20 On the inexistence of any such frontier between astronomy and astrology in the scientific literature of medieval Islam, see for instance: Samsó, "Astrology," here pp. 267-268.

FIGURE 1 MS Oxford, Huntington 188 (dated 17th century), f. 2r (copyright from the Bodleian Library, Oxford)

before, that astrology was not distinguished from astronomy amongst the mathematical disciplines, we may confirm that the emphasis on the occult sciences could hardly have been stronger. To find medicine ranged amongst the occult sciences is in no way exceptional. A list comparable to this one, and which includes medicine as well, is provided in the short version of the epistle on magic from the *Rasā'il Iḫwān al-Ṣafā'*, about the rituals and the secrets of the Ṣābi'ans.[21]

Another remarkable aspect of the passages of al-Makīn and Agapius on the ten sciences is that they bring this system in relation to the theory of climes. More exactly, the text affirms that the knowledge of the entire collection of these sciences is a prerogative of the inhabitants of the fourth clime. The same doctrine is found again in the "Book of Curiosities of the Sciences and Marvels for the Eyes" (*Kitāb Ġarā'ib al-funūn wa-l-mulāḥ al-ʿuyūn*), an eleventh century

21 Iḫwān al-Ṣafā', *Ep*. 52a, p. 14 of the Arabic text.

anonymous Egyptian treatise recently edited by Yossef Rapoport and Emilie Savage-Smith.[22]

The Fourth Clime

The exaltation of the fourth clime is a *topos* of Islamic geographical literature. Following the footsteps of their predecessors in Sasanid times, for whom Babylon was the *omphalos* of the *ecumene*, the geographers of medieval Islam generally insisted that the fourth clime is the most suitable balanced of all and therefore provides the best possible conditions of living for its inhabitants. Typically, these geographers laud the incomparable fertility of these temperate regions, the unparalleled richness of their flora and fauna, the unrivalled beauty of their landscapes. They also usually give much attention to the description of admirable cities such as Bagdad or Aleppo and stress the importance of what humans have accomplished in the Mesopotamian region. All this is quite conventional, as we said, but ascribing to inhabitants of the fourth clime the unique privilege of possessing all the sciences together is obviously something very different, which sharply contrasts with all these generalities.

In the description of the climes that forms the backbone of their epistle on geography, the Iḫwān al-Ṣafāʾ also have something remarkable to say about the fourth clime. Regarding the fourth clime, they assert:

> This clime is the clime of the prophets and the sages (*wa-hāḏa al-iqlīm huwa iqlīm al-anbiyāʾ wa-l-ḥukamāʾ*), since it is in the middle of the climes, three of them being southern and three being northern, and also because it is in the part of the Sun (*fī qismat al-šams*), the brightest of lights. The

22 *Kitāb Ġarāʾib al-funūn*, p. 173 (ed. as Rapoport and Savage-Smith, *An Eleventh-Century Egyptian Guide to the Universe*): "This clime is the middle of the earth and is the most excellent of climes for the blending of its temperaments. Its inhabitants are people of intelligence, philosophy, reason, geometry, and culture. They have become experts in the study of beings, essences, natural elements, and the mind. They have understood the books and the wonders as regards the ten sciences (*wa-fahima bi-l-kutub wa-l-ʿaǧāʾib min al-ʿulūm al-ʿašara*)." As can be seen, this text does not offer more than an abridged version of the reports by Agapius and al-Makīn, with no mention of any particular science. Otherwise, it confirms the standing popularity of the "ten sciences" tradition over the centuries. That this tradition underwent changes and deformations of some sort is also evident from the fact that the "wonders and the ten sciences" as stated by Agapius have here become "the wonders of the ten sciences".

> inhabitants of this clime are the most suitably balanced of people in terms of natures and moral dispositions.[23]

Nothing of this kind is reported for the other six climes. The statement that the fourth clime is the clime of the prophets "has no parallel in cognate geographical works or, for that matter, in any other Muslim sources," as was recently pointed out by Ignacio Sánchez and James Montgomery, the editors of the epistle on geography.[24] From a strictly Islamic point of view, as the two editors also observe, this statement is striking, and even shocking, for it is plainly irreconcilable with the fact that the prophet Muḥammad was born in Mecca, in the second clime.[25]

Between planets and climes, the Iḫwān adopt the following system of correlations, in which the planets are ranged according to their decreasing order of distance from the Earth: Saturn in clime 1 (the extreme south of the *ecumene*, adjacent to the equator); Jupiter in clime 2; Mars in clime 3; the Sun in clime 4; Venus in clime 5; Mercury in clime 6; and the Moon in clime 7 (the extreme north of *ecumene*). This is the so-called "Chaldaean order", which posits the Sun at the centre of the system. The same system of correspondences between planets and climes is also found in Abū Maʿšar, al-Masʿūdī and al-Qummī.[26] The *Rasāʾil* abound in passages justifying why the Sun, as befits the king of a community or the heart in the human body, is the planet naturally qualified to rule over the central, and therefore best, region of the *ecumene*. In addition to the prophets, the Iḫwān also connect the fourth clime with the "sages". Under their pen, this means the accomplished philosophers whose souls may hope to reach the angelic status, thanks to the purity of their moral conduct and the superiority of their wisdom. This is quite reminiscent of the passages from Agapius's *Kitāb al-ʿUnwān* and the anonymous *Book of Curiosities*, for which the inhabitants of the fourth clime are also philosophers of an incomparable stature, uniquely able to master all the human sciences.

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23 Iḫwān al-Ṣafāʾ, *Ep*. 4, p. 43 of the Arabic edition.

24 Sánchez and Montgomery, *On Geography*, p. 37.

25 Sánchez and Montgomery, *On Geography*, p. 38: "This statement is in keeping with how the fourth clime is treated by the Ikhwān in other epistles, but it is puzzling. How can it be reconciled with the location of the sacred city of Islam? In all extant versions of this epistle, Mecca belongs to the second clime and, consequently, and by implication, Muḥammad would be excluded from the land of the prophets. By linking geographical position and prophecy, the Ikhwān seem to preclude any possibility of harmonizing ideology and religions by a way of a double omphalic system such as that of Ibn Khurradādhbih. But they do not make any attempt to explain this oddity either". For a tentative explanation of this issue in line with the Iḫwānian conception of prophetic cycles, see: de Callataÿ, "'For Those with Eyes to See'".

26 Honigmann, *Die Sieben Klimata*, pp. 141-142.

Hermes the Thrice-Wise and "the Ancient Kings"

Sánchez and Montgomery show that the passage on the fourth clime in the Brethren's epistle of geography provided the inspiration, directly or indirectly, to two thirteenth-century geographical descriptions and that in these two works Hermes is explicitly cited in relation to the fourth clime. The first is Ibn Shaddād's *al-Aʿlāq al-ḫaṭīra fī ḏikr umarāʾ al-Šām wa-l-Ǧazīra*, in which Hermes himself is credited with the view that the fourth clime is the best of all climes on earth. The second text is Ibn al-ʿAdīm's *Buġyat al-ṭalab fī taʾrīḫ Ḥalab*, for which Hermes was the first author to divide the *ecumene* into seven climes.[27] Hermes does not appear in the epistle on geography, but in the short version of the epistle on magic, the Iḫwān mention him as one of the "ancient chiefs" (together with Agathodaimon, Homer and Aratus) of the sciences of talismans as cultivated by "the Ṣābiʾans, the Ḥarrānians, and the Ḥanīfs".[28] Interestingly, in the epistle on astronomy "Hermes Trismegistus" also appears in the company of various authorities such as Ptolemy, Aristotle, Pythagoras, the Messiah or Muḥammad to back up the doctrine of the ascension of the souls. The text reads:

> It is reported concerning Hermes the Thrice-Wise (*Hirmis al-muṯalliṯ bi-l-ḥikma*) who is the prophet Idrīs – peace be upon him – that he ascended to the sphere of Saturn and revolved with it for thirty years until he had witnessed all the states of the sphere. Then he descended to the Earth and instructed the people in the science of the stars.[29]

"In the view of the Brethren of Purity," as Van Bladel points out in reference to this passage from the *Rasāʾil*, "Hermes could learn all the states of the heavenly sphere by abiding with the outermost planet through one of its cycles,"[30] thirty years being the usual approximate value for Saturn's sidereal revolution. In his study, Van Bladel brought together a large number of sources about the legendary ascent of Hermes (usually identified with the Biblical Enoch and the Qurʾānic Idrīs), showing that

> the Arabic myth of Hermes as an ancient teacher of universal appeal and a prophet of science resulted from the combination of several pre-Islamic and Islamic elements: the legends of Enoch, the role of Hermes

27 Ibn Shaddād, *al-Aʿlāq*, p. 36; Ibn al-ʿAdīm, *Buġyat*, vol. 1, p. 443.
28 de Callataÿ and Halflants, *On Magic I*, pp. 44-45 of the Arabic edition.
29 Ragep and Mimura, *On Astronomia*, pp. 88-89 of the Arabic edition.
30 Van Bladel, *The Arabic Hermes*, p. 181.

> as a teacher of astrological sciences in the ancient Greek Hermetica, the Ḥarrānian claim that Hermes was their prophet, the teaching of the early Ismāʿīlī mission about Hermes, and the wisdom literature ascribed to Hermes.[31]

Significantly, along with the lost Syriac chronicle by the astrologer Theophilus of Edessa (a major source for Agapius), the anonymous *Kitāb al-Tuffāḥa* and the celebrated *Sirr al-ḫalīka* by the Pseudo-Apollonius of Tyana, these sources also include the corpus of Pseudo-Aristotelian Hermetica, in which the same mode of transmission of wisdom from Hermes to Aristotle is presumed.

Al-Hamdānī's *Ṣifat Ǧazīrat al-ʿArab* includes a "division into climes" ascribed to "Hermes the Sage" (*Hirmis al-ḥakīm*), with the following correspondences: 1) India; 2) Ḥiǧāz and Yemen; 3) Egypt; 4) Babylon; 5) Rūm; 6) Gog and Magog; 7) China. The passage has it that Hermes "put the fourth clime in the middle, and the other six in circle around it in such a manner that the first and the seventh meet each other".[32] Resulting from an amalgamation of theories quite common with the scientists of his time, al-Hamdānī calls "clime" (*iqlīm*) what should in reality be rather referred to as a "*kišwār*" (from the Persian "*kēšvar*"). Indeed, the distribution of regions he is presenting here corresponds, not to the classical Greek system in which climes are rectangular bands sitting one on top of the other from the equator to the pole, but to the ancient Iranian division of the world into seven "*kišwār*-s", with six regions circumscribing a seventh, the Īrānšāhr, at the centre of the representation.[33] As opposed to the Greek distribution, which is based upon astronomical measurements, the Iranian distribution, whose origin goes back to Sasanid times, supposedly reflects the territories dominated by "ancient kings" at the dawn of creation. In the epistle of geography, which also keeps traces of this amalgamation of ideas, the Iḫwān mention by their names five of these ancient kings, namely "Alexander the Greek, Tubbaʿ al-Ḥimyarī, Sulaymān b. Dāwūd the Israelite, Afrīdūn the Nabatean, and Ardašīr ibn Bābakān the Persian".[34]

Similarly, one finds in al-Bīrūnī's *Tafhīm li-awāʾil ṣināʿat al-tanǧīm* the affirmation that "the Persians divided the world by the kingdoms into seven regions (*kišwārāt*), and attributed this division to Hermes".[35] In the *Taḥdīd nihāyat al-amākin*, the same author also holds the ancient kings responsible for the

31 Van Bladel, *The Arabic Hermes*, pp. 164-184 ("The Heavenly Ascent of Hermes").

32 Al-Hamdānī, *Ṣifat Ǧazīrat al-ʿArab*, vol. 1, p. 6.

33 On this amalgamation, see for instance: Miquel, *La géographie humaine*, pp. 56-68.

34 Iḫwān al-Ṣafāʾ, *Ep*. 4, p. 21 of the Arabic edition. On all this, including references to Sasanid sources, see: de Callataÿ, "Kishwār-s".

35 Bīrūnī, *Tafhīm*, § 240, p. 142.

Iranian system of *kišwār*-s. There, Bīrūnī's statement is accompanied in manuscripts by a visual representation of the seven regions and the peoples they each include. Although it goes into more details than al-Hamdānī's sketchy list of peoples, al-Bīrūnī's division of the *ecumene* entirely agrees with it.[36] In a passage of his *Muʿǧam al-buldān* where reference is made not only to al-Bīrūnī but also to the eighth-century scholar Ibrāhīm al-Fazārī, Yaqūt seems to assimilate Hermes himself to the ancient kings at the origin of the *kišwār* theory.[37] Yāqūt's report is clear evidence that Fazārī made use of a Persian source, as both David Pingree and Kevin Van Bladel have observed.[38] In medieval Armenian cosmologies such as those compiled in the thirteenth century by Vardan Arewelc'i and Išox, both Hermes and Aristotle are recorded as "philosophical" authorities for the conception of the inhabited world being divided into seven regions.[39]

The Book of Hermes on the Spiritualities

In the collection of Pseudo-Aristotelian Hermetica, there is one treatise structured upon the division of the *ecumene* into seven "climes" (*aqālīm*) and which defines itself as the *Kitāb al-Usṭuwwaṭās* or *Kitāb al-Usṭūṭās*. This work is preserved in Paris, Bibliothèque nationale de France, ar. 2577, where it is meant to be the second part of a treatise otherwise called "the Book of Hermes on the Spiritualities" (*Kitāb Hirmis fī l-rūḥāniyyāt*). The treatise includes a detailed cosmological model in which tenets commonly found in classical astrology (as, for instance, the "melothesia" which connects the parts of the human body to the zodiacal signs) are mixed up with an elaborate narrative on the appearance

36 Bīrūnī, *Taḥdīd*, p. 101.

37 Yāqūt, *Muʿǧam al-buldān*, p. 27: "Abū al-Rayḥān (al-Bīrūnī) said: 'Hermes upheld this (Persian) division (of the inhabited world into 7 kišwār-s), according to that which Muḥammad ibn Ibrāhīm al-Fazārī attrributed to him in his *zīj*. Since Hermes was one of the ancients, it appears that in his time no other division was used; otherwise, matters pertaining to mathematics and astronomy were more particularly within the province of Hermes'" (trans. Pingree in "al-Fazārī," here p. 115).

38 Pingree, "al-Fazārī," here p. 115: "This quotation from al-Bīrūnī demonstrates al-Fazārī's use of a Persian source which passed under the name of Hermes"; Van Bladel, *The Arabic Hermes*, pp. 29-30: "Because relatively few Middle Persian texts are known to have been translated into Arabic by the time in which Māshāʾallāh and al-Fazārī were working, and because they were undoubtedly working in an Iranian tradition of astrology, there is every reason to think that these eighth-century figures were using not Arabic, but Middle Persian Hermetica even though the manuscript traditions preserve only the Arabic writings of these authors themselves".

39 Thomson, "A Medieval Armenian View," here p. 203.

of the created beings on the surface of the earth according to the revolutions of the zodiacal signs and the varieties of "spiritualities" generated from these millenary cycles. The text also provides a curious variant of the story of Adam and Eve (whose names are given here as Admānūs and Haywānūs) meant to have taken place under the reign of Virgo, some 50,000 years after the creation of the world, "when the planets were all in their exaltations, except for Saturn".[40] Embodying the most perfect achievement of God's creation, man is praised for his unique capacity to have a thorough knowledge of the realities of the world, both spiritual and physical. Above all, Adam's race is set apart from the rest of creation for being the only species able, by controlling appropriately the spiritualities of the heavenly bodies, to manipulate nature. The instructions to do this in practice is what occupies the greatest part of the *Kitāb Hirmis fī l-rūḥāniyyāt*, which therefore may qualify as a handbook of astral magic in its own right. All through the *Usṭuwwaṭās*/*Usṭūṭās* we find repeated formulas such as "Hermes said" (*qāla Hirmis*) or "Aristotle said that Hermes said" (*qāla Arisṭāṭālīs qāla Hirmis*), but in the second part – the properly called *Book of Hermes on the Spiritualities* – the authority of Ḥunayn b. Isḥāq is also regularly invoked, as for instance in the following passage:

> Ḥunayn b. Isḥāq said: This is from what we found of the books of Aristotle and translated from the Greek tongue into Arabic: the book of the cause of the spiritualities of Hermes and the division of the seven climes (*aqālīm*) and their qualities and their actions. This is the book in which Aristotle explained the causes of the spiritualities and *nīranǧāt* and their essences and their differences, divided according to the seven climes. And this is what Alexander demanded from Aristotle the Wise at the time of the completion of the *Kitāb al-Isṭamāḥīs*, which he had composed for him on his journey to Persia.[41]

As has been already mentioned, the *Kitāb al-Isṭamāḥīs* is another text pertaining to the group of Pseudo-Aristotelian Hermetica. It is preserved in the Oxford, Bodleian Library, Marsh 556, and its contents partly overlap that of the *Usṭuwwaṭās*/*Usṭūṭās*. The *Kitāb al-Isṭamāḥīs* is explicitly referred to in various places of the *Ġāyat al-ḥakīm*.

40 *Kitāb al-Usṭuwwaṭās*, MS Paris, Bibliothèque nationale de France, Arabe 2577, f. 8bis r.

41 *Kitāb al-Usṭuwwaṭās*, MS Paris, Bibliothèque nationale de France, ar. 2577, f. 38r (translation slightly modified from Charles Burnett's in: Bos et al. (eds), *Hermes Trismegistus*, p. 180). See also: Burnett, "The *kitāb al-Isṭamāṭīs*," here p. 8. On *nayranǧāt*/*nīranǧāt*, see: Burnett, "Nīranj".

However, a tenfold enumeration of the sciences such as that provided by Maslama b. Qāsim al-Qurṭubī in the *Ġāya* is nowhere to be found in these works. What we find there in terms of scientific classifications is only a brief passage in which a certain Hādūs is said to have taught Admānūs "the secrets of four sciences, that is, the secrets of the science of the stars and of their causes, and the secrets of medicine and its causes" (*asrār arbaʿa ʿulūm asrār ʿilm al-nuǧūm wa-ʿilalihā wa-asrār al-ṭibb wa-ʿilalihi*).[42] The passage is somewhat reminiscent of another fourfold classification of sciences (in this case, medicine – alchemy – astrology and the science of talismans) which, according to the Iḫwān al-Ṣafāʾ, were taught in secrecy amongst the Ṣābiʾans,[43] but it is evident that we are here concerned only with occult matters and not, as in Maslama's division, with the disciplines considered a pre-requisite to their study. Admittedly, the network of correspondences between planets and climes in the *Kitāb Hirmis fī l-rūḥāniyyāt* is very different from what we have described above when dealing with the *kišwār* theory and the superior status of the "fourth clime". Indeed, instead of reserving the fourth clime (with the Īrānšahr as omphalos) to the Sun, our treatise does not appear to privilege any region or clime in particular, having the following assocations: 1) Saturn = India; 2) Jupiter = Rūm; 3) Mars = Turks; 4) Sun = China; 5) Venus = Arabia; 6) Mercury = Persia; 7) Moon = Babylon.[44] Finally, it must be added that the text as we have it does not appear to make reference to the "ancient kings", either.

Ādāb al-falāsifa and *Sindbādnāma*

Still, the mention of Ḥunayn b. Isḥāq as a transmitter of this Pseudo-Aristotelian work deserves some further attention. To this ninth-century Nestorian scholar, the most prolific translator of Greek material in ʿAbbasid times, is traditionally attributed the compilation of the famous collection of aphorisms and anecdotes about philosophers known as *Ādāb al-falāsifa*. This *gnomologium* includes a chapter on Aristotle's childhood in which an edifying story is told about the philosopher's admirable precocity. At the time of the king Rufisṭānīs, so we are told, "Plato the teacher, the sage" (*Aflāṭūn al-muʿallim al-ḥakīm*) was appointed by the sovereign to teach his son Niṭāfūris, but he was a very stupid boy, unable to understand anything. Amongst Plato's disciples was also the

42 *Kitāb al-Isṭamāḫīs*, MS Oxford, Bodleian Library, Marsh 556, f. 37v.

43 de Callataÿ and Halfants, *On Magic I*, pp. 80-81 of the Arabic edition.

44 For a lists of correspondences coinciding in part with this, see: Abū Maʿshar, *On Historical Astrology*, vol. 2, pp. 513-519 (= Appendix 1: *The Cities and their Climes, Signs, and Planets*).

young Aristotle who also used to listen to the master's lessons, but in secret. On a certain day, an elaborate ceremony took place in the king's "houses of wisdom" (*buyūt al-ḥikma*) to celebrate, as was the tradition, the end of the prince's education. The public examination naturally turned out to be a disaster for Niṭāfūris, but it also gave the opportunity to the young Aristotle to reveal his incomparable philosophical skills to both his master and the whole audience since he was able to reproduce every single teaching Plato had previously delivered to the prince. Next in the same passage some aphorisms are given designed to illustrate ancient wisdom. What makes worth recalling here the chapter as a whole is that it concludes on the following tenfold curriculum of science:

> This is (1) the kind [of maxims] which the Sage teaches the disciple first (*wa-ḥāḏā l-ṣanf awwal mā yuʿallimuhu l-ḥakīm li-l-tilmīḏ*), that is, in the first year, along with Greek writing (*al-ḫaṭṭ al-yūnānī*). Then he raises him from there to (2) grammar (*naḥw*) and (3) poetry (*šiʿr*), and then successively to (4) arithmetic (*ḥisāb*), (5) geometry (*handasa*), (6) astronomy/astrology (*nuǧūm*), (7) medicine (*ṭibb*), (8) music (*mūsīqā*), and then, after that, he [the disciple] ascends to (9) logic (*manṭiq*) and to (10) philosophy (*falsafa*), which is the science of the upper phaenomena (*ʿulūm al-aṭār al-ʿulwiyya*). These are the ten sciences which the disciple learns in ten years (*fa-hāḏihi ʿašara ʿulūm yataʿallamuhā l-mutaʿallim fī ʿašara sinīn*). When Plato the Sage realized how scrupulously Aristotle had memorized what he had taught Niṭāfūris, he was pleased with his talents at memorizing and with his [other] natural qualities. And when he realized that the king had ordered him to choose him, he chose him and devoted his attention to him and taught him the sciences until he knew by heart the ten sciences (*ḥattā waʿā l-ʿulūm al-ʿašara*). [And so Aristotle] became a sage philosopher in all that has been described above (*wa-ṣāra faylasūfan ḥakīman ǧāmiʿan li-mā taqaddama naʿtuhu*).[45]

As usual, the list includes the quadrivium of mathematical sciences, with the addition of medicine. It is preceded, not by the properly so-called trivium of liberal arts consisting in grammar, logic and rhetoric (which never existed as

45 *Ādāb al-falāsifā*, p. 55. In the Hebrew version edited and translated into German by Loewenthal, law is mentioned in addition to the other disciplines, between poetry and arithmetic (Loewenthal, *Honein Ibn Ishâk*, p. 69). Rosenthal regarded the lack of this mention in the Arabic original as an omission (Rosenthal, *The Classical Heritage*, p. 273), but its inclusion in the enumeration leads to an implausible list of eleven disciplines in all.

such in the Islamic world), but by grammar, poetry and edifying aphorisms and Greek writing to be learnt at the very beginning of the curriculum. At the other end of the list, logic and philosophy occupy the last two positions, as they also do, albeit in the reverse order, in the list of sciences designed to elucidate al-Makīn's text in the Huntington manuscript. The sciences of nature are conspicuously absent, in much the same way as they are in that other testimony. Philosophy is called "the science of the upper phaenomena", an appellation usually reserved for the *Meteorologica* but which we also find, interestingly enough, in the *Rutbat al-ḥakīm* to designate philosophy *per se* as a culmination to the ten propaedeutical sciences.[46]

Modern scholarship has shown that the *Ādāb al-falāsifa* (or *Nawādir al-falāsifa*, according to the version preserved in the important Istanbul Köprülü 1608) is the result of a long and complicated process of compilation and that Ḥunayn b. Isḥāq was neither its author nor its translator but only one amongst various scholars who contributed to the transmission of this influential work. As was recently argued by Mohsen Zakeri, the text as we have it today rather appears to be "an independent book which the tenth-eleventh-century author Muḥammad ibn ʿAlī ibn Ibrāhīm al-Anṣarī prepared by using several smaller tracts of a number of earlier authors, among them ʿAlī ibn ʿUbayda al-Rayḥānī (d. 834), al-Kindī (d. 865), Ḥunayn ibn Isḥāq (d. 873), Isḥāq ibn Ḥunayn (d. 908) and others".[47] What Zakeri as well as others have also convincingly demonstrated is that the origin of the work should not be sought for in a Greek model but, in all likelihood, in a Middle Persian tradition.[48] The above story – or better said, legend – about Plato and Aristotle at the court of the king Rufisṭānīs is a good illustration of this point:

> The story is, in its all colorful form and pomp, Persian. Towards Persia point also the strange names of the king and the prince. […] That Syriac literature was under a strong influence from Persia is firmly established, and Baumstark names Syriac translations of *Kalīla wa Dimna*, Pseudo-Callisthenes, and *Sindbādnāma* as examples. The golden palaces

46 *Rutbat al-ḥakīm*, MS Istanbul, Ragıb Paşa, 965, f. 51r: "Indeed, these propaedeutical sciences yield to the science of philosophy, which is for the Ancients the knowledge of the upper phaenomena, and they have not mentioned any other science behind that one" (*ṯumma hāḏihi al-riyāḍiyya tantiḫu ʿilm al-falsafa allatī hiya ʿindahum maʿrifat al-aṯār al-ʿulwiyya wa-lam yaḏkurū baʿda ḏālika ʿilman ġayran*).

47 Zakeri, "Before Aristotle Became Aristotle," p. 649. See also: Zakeri, "'Alī ibn 'Ubaida ar-Raḥānī". For a general overview of the Arabic biographical material on Aristotle, see also: Gutas, "The Spurious and the Authentic". See now also: Olsson, "The Reputation".

48 Zakeri, "*Ādāb al-falāsifa*."

> and temples covered by marble and filled with golden statues point towards Persia too. Utterly Persian is the whole courtly "philosophers gatherings", which we find also in the Persian-Byzantine-Indian kings tales.[49]

Actually, it is with the *Sindbādnāma* that the story shows the most striking resemblances, as Zakeri observes in the same place:

> This recalls the famous *Sindbādnāma*, where the ten golden words, the essence and summary of all human wisdom originally written on the walls of the palace of Āfrīdūn (Frētōn), were copied on the walls of the house wisdom and Sindbād was to teach them to the prince.[50]

According to the *Sindbādnāma*, the king's house of wisdom was in the form of a cube and the six faces of the edifice corresponded respectively to: (1) the science of the stars; (2) good manners; (3) medicine; (4) music; (5) geometry; (6) governance.[51] Interestingly enough, as has been shown elsewhere, the same text also inspired the Iḫwān al-Ṣafāʾ for an allegorical king fable narrated in Epistle 26 on "Man as a Microcosm".[52] The only modifications with respect to the original version is that a hemispherical cupola surmounts the cube and that the sixfold division of science is now given as: (1) science of the stars (on the cupola); (2) geography "with its climes" (on the soil of the squared courtyard, beneath the cupola); (3) medicine and the natural sciences (on the front wall); (4) crafts and professions (on another lateral wall); (5) religion, confessions, laws, and traditions (on another lateral wall); (6) governance and administration (on another lateral wall). The *Sindbādnāma* was translated into Arabic in the eighth century.[53] The Iḫwān al-Ṣafāʾ could have read it either in Arabic or in the Persian original.

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49 Ibid., pp. 181-182.

50 Ibid., p. 181.

51 See Zāhirī al-Samarqandī, *Sindbādnāma*, pp. 337-340. A French translation of the passage is given in: Bogdanovic, *Zahiri de Samarkand*, p. 53. For a discussion of this passage, with references to Middle Persian sources, see also: Perry, *The Origin*, pp. 77-80.

52 de Callataÿ, "Encyclopaedism," pp. 862-865. The sixfold division of knowledge taken up by the Brethren in Epistle 26 does not tally well with the purposefully-conceived classification of the sciences as described in Epistle 7 ("On the Scientific Arts"). For a detailed analysis of that other system, see: de Callataÿ, "Classification".

53 Zakeri, "*Sindbādnāma*," here p. 47.

The Pseudo-Avicennian Alchemical *De anima*

Julius Ruska already mentioned the existence of a tenfold classification of the sciences in a work attributed by tradition to Ibn Sīnā.[54] The edition of this sizeable and important treatise, today referred to as the Pseudo-Avicennian alchemical *De anima*, has just been completed by Sébastien Moureau.[55] As Moureau has shown, this work is in reality the Latin adaptation, compiled in al-Andalus, of three works now lost in the original Arabic. The passage relevant to our purposes reads:

> There are ten sciences (*scientiae sunt decem*). Mother sciences (*matres scientiae*) are four. Only who knows the work (*magisterium*) is called a philosopher, and one cannot know the work before one knows the four mothers and six daughters (*donec sciat quatuor matres et sex filias*). Who knows them knows the work. Who is the philosopher? He who loves wisdom. What is wisdom? This work. Which are the mother sciences? [They are]: (1) dialectics (*dialectica*); (2) geometry (*geometria*); (3) [the science of] natures (*naturae*, i.e., elementary properties); and (4) the science of the firmament (*scientia firmamenti*). Which are the six daughter sciences? [They are:] (5) algorism (*agorismus*); (6) arithmetic (*arismetica*); (7) the theory of medicine (*theorica de physica*); (8) music (*musica*); (9) astronomy (*astronomia*); (10) the science that pervades the whole world, that is, the work which is called philosophy (*scientia quae habitat totum mundum, hoc est magisterium istud et vocatur philosophia*).[56]

The mention of a tenfold classification divided into two groups in an Andalusī alchemical work is something that inevitably reminds us of Maslama. The two classifications also have in common the four sciences of the quadrivium and medicine. What is more, in both texts is found the affirmation that only he who masters all the ten sciences may genuinely be called a philosopher. But the similarities between the two systems stop at this point, since the two groups are made of four and six disciplines here, whereas Maslama divides human knowledge into two groups of five sciences. Besides, the notion of some sciences being regarded as mothers and the rest as daughters is totally absent

54 Ruska, "Die Alchemie des Avicenna," here pp. 39-40.
55 Moureau, *Le* De anima.
56 Ibid., vol. 2, p. 623.

from the *Ġāyat al-ḥakīm*. It is not clear whether the author of the alchemical *De anima* knew of the *Ġāya* and the *Rutba*.[57]

Roger Bacon and the *Liber decem scienciarum*

In the final words of his edition of the *Secretum Secretorum*, Roger Bacon explains that this treatise is called by some "The Book of Ten Sciences" (*Liber decem scienciarum*).[58] Robert Steele, the editor of the text, observes that this is "a name otherwise unknown in Latin, but with Arabic authority".[59] To back up this affirmation, Steele limits himself to producing the relevant quotation from al-Makīn's *al-Maǧmūʿ al-Mubārak* which, as we have seen, indeed probably refers to the *Sirr al-asrār* but does not allow one to identify any of the ten sciences. In his harsh review of Steele's edition, Martin Plessner rejects this filiation with al-Makīn and points instead towards the ten sciences enumerated in the *Ādāb al-falāsifa*:

> Die 10 Wissenschaften endlich, von denen Steele S. XXIII nach al-Makīn spricht, haben natürlich nichts mit den 10 Büchern des Secretum zu tun, sondern beziehen sich ohne Zweifel auf die 10 Wissenschaften, die Aristoteles durch 10 Jahre gradatim seine Schüler lehrte, vgl. Ḥunain Ibn Isḥāq, *Ādāb al-Falāsifa*.[60]

57 Moureau (ibid., vol. 1, pp. 145-146) cites an anecdote about Hermes that is found in both texts, but this is of course insufficient to establish any kind of filiation between our texts. Much work remains to be done in this field before we get a clearer picture. In passing, we may note that in the introductory lines of the Ǧābirian *Kitāb al-Baḥṯ* ("The Book of Investigation," MS Istanbul, Süleymaniye Kütüphanesi, Carullah 1721, f. 2r) mention is made of a group of about ten sciences in line with the talismanic art (*ṣināʿat al-ṭilasmāt*). In addition to the four sciences of the quadrivium (*aritmāṭīqī*, *handasa*, *ṣināʿat al-nuǧūm*, and *ʿilm al-taʾlīf*), this list includes the science of natures (*ʿilm al-ṭabāʾiʿ*, that is, the elemental properties as in the Pseudo-Avicennian alchemical *De anima*), physics (*ʿilm al-ṭabīʿa*), alchemy (referred to as "the science of the Art" (*ʿilm al-ṣināʿa*), the "science of the nature of the planets" (*ʿilm ṭabīʿat al-kawākib*), and "the science of the quiddity of the soul and of the intellect" (*ʿilm māhiyyat al-nafs wa-l-ʿaql*). The text is not clear enough to establish with certainty in which sense these nine sciences are to be considered with respect to talismanry. I am grateful to Liana Saif for pointing this passage to me.

58 Roger Bacon, *Secretum*, p. 172: "*Explicit Liber Secreti Secretorum Aristotelis ad regem Alexandrum, qui liber intitulatur liber decem scienciarum, cum quibusdam declaracionibus fratris Rogeri Bacun de ordine minorum*".

59 Roger Bacon, *Secretum*, p. xxiii.

60 Plessner, "Secretum secretorum," here p. 919.

Plessner is making an important point here, for it is hardly conceivable that Bacon's appellation should derive from the fact that the complete Latin translation of the *Sirr al-asrār* by Philip of Tripoli consists of ten chapters. Bacon himself reorganized his own recension into four parts, something he would never have done if he had attached any significance to the tenfold structure of the treatise in that recension. The real problem with Bacon's appellation is that the treatise itself, whether in the original Arabic or in the Latin, does not appear to be concerned with ten specific sciences in the way we could suppose Bacon might have mean. As was pointed to me informally by Steven J. Williams, the *Secretum* is for Bacon a work that is first and foremost about alchemy, astrology, physiognomy, onomancy, talismans, magic plants, and magic stones, but it seems impossible to identify three more disciplines to reach the number required.[61] What is also evident is that one cannot establish correspondences between these disciplines and those enumerated in the *Ādāb al-falāsifa*. Roger Bacon's interest in the sciences and classifying them needs no extensive treatment here. Not only do we know that he was well-informed about the scholarly discussions of his time on this issue, but he also himself provided a detailed classification in the *Communia naturalium*, and the number "ten" is not part of it.[62] On the other hand, we know for sure that Bacon made extensive use of the above-mentioned alchemical *De anima*.[63] Whatever the case, Bacon's reference to the *Liber Decem Scienciarum* can hardly be considered the result of a mistake or a negligence on his part,[64] but his motivation to describe the *Secretum Secretorum* this way in the very final words of his own edition remains at present something of a mystery.

61 On Bacon and the *Secretum*, see: Williams, "Roger Bacon and his edition"; Williams, "Roger Bacon and the *Secret of Secrets*"; Williams, *The Secret of Secrets*. See also: Cottrell, "Ekphrasis", p. 361: "The ten chapters of the Long Form do not show any attempt to present a division of the text in ten sciences or thematics. Beyond that, the reference comes somewhat earlier than the description of the *Sirr*'s contents. If the *Sirr al-Asrār* does have a reference to the quadrivium shortly before the chapter on physiognomy in Badawī's edition, no reference to a curriculum of ten sciences can be found in the book".

62 Hackett, "Roger Bacon," here p. 57, with respect to the *Communia naturalium*: "Bacon, then, begins with a brief account of the division of learning in his own works. This is best seen in the following schema: I. First in the order of exposition is grammar in regard to latin and foreign languages, together with logic. II. Mathematics, which is divided into common and special. III. Natural philosophy, which is divided into common (the exposition of Aristotle) and special (the outline of the seven sciences). IV. Metaphysics. V. Moral philosophy. Bacon sees moral philosophy as the end of all the other sciences".

63 Newman, "The Alchemy"; Newman, "The Philosophers' Egg"; Newman, "An Overview". See also: Moureau, "*Elixir Atque Fermentum*".

64 It may be recalled that the same expression also appears at the beginning of the work; see: Roger Bacon, *Secretum*, p. 25.

Conclusions

In this article we have gathered together a certain number of references to tenfold systems of classifying human knowledge. The least that can be said is that these lists vary from one another to a great extent. In spite of presenting some common features, these systems are hardly reconcilable with one another: some are subdivided into groups whereas others are not, some reflect a progression in knowledge while others do not, some include the esoteric disciplines and others not, and so on. The most elaborate of these systems is certainly the classification with which we have begun, namely that of the *Ġāyat al-ḥakīm*/*Picatrix*. Comparison with the other classification systems suggests that Maslama b. Qāsim al-Qurṭubī might have elaborated it to serve his own purposes, although he probably knew of pre-existing traditions about the ten sciences. It may be interesting in this context to recall that versions in which the *Ādāb al-falāsifa* and the *Sirr al-asrār* were attached to one another are known to have circulated in al-Andalus.[65]

It appears from our survey that Pseudo-Aristotelian works played a crucial role in the transmission of these traditions. The gnomological *Ādāb al-falāsifa* must have largely contributed to disseminate the notion of a tenfold curriculum of sciences attached to Aristotle's name, but other texts, in particular amongst the Pseudo-Aristotelian Hermetica, may have been influential as well. As we have seen, al-Makīn's statements about this filiation is corroborated, at least in part, by the Hermetic sources themselves.

Regarding the ultimate origin of this material we are reduced to mere speculations, although it seems to me that the hypothesis of an ancient Greek provenance may be discarded altogether, since we do not have the slightest indication in this direction. In contrast, as I hope to have made clear in the above survey of texts, various elements invite us to consider Middle Persian literature as a plausible formative stage in the conception of tenfold classifications of knowledge.

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65 See: Bizarri, *Secreto de los secretos*, pp. 36-40.

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