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Stavros Lazaris

## Some Thoughts on the Development of Medieval Hippocratic Science in the Mediterranean Region

Since the publication of my book on science in Byzantium,<sup>1</sup> I am sometimes asked by colleagues, especially modernists, whether it is appropriate to speak of science in relation to the Middle Ages. Many researchers still assume that this historical period, sometimes described as premodern, was obscurantist, steeped in naïve beliefs, and could not have contributed to scientific development.

However, man has always been engaged in scientific endeavours; it could almost be one of mankind's hallmarks. Science is part of humans' innate curiosity, constantly seeking knowledge. The mastery of fire and, even more so, the possibility of making a fire—significantly, we often speak of the discovery/invention of fire—is the result of repeated observations, initiatives, risk-taking, failures, perseverance and repetition. All modern researchers are familiar with these processes. We must therefore consider that there always existed a scientific practice, even if people in earlier periods and the Byzantine era in particular did not comply with the same methodological criteria currently in use in scientific practice.<sup>2</sup>

It is indisputable that definitions of what is 'scientific' have changed considerably. For a medieval scholar, heir to Aristotelian epistemology, what was scientific was what could be demonstrated logically. Without being completely absent, the experimental approach as presented in the Aristotelian corpus—most extensively in the first chapter of the first book of *Metaphysics* (*Metaphysica*, A.1) and in the last chapter of the second book of the *Posterior Analytics* (*Analytica posteriora*, II.19)—is ambiguous.<sup>3</sup>

In his *Aphorisms*, Hippocrates describes experience as perilous (ἡ δὲ πείρα σφαλερῆ, *Aphorismi*, I, 1). The comments that medieval physicians wrote on this first aphorism are enlightening. Following Galen (*Hippocratis de humoribus liber et Galeni in eum commentarius I*, VII [519]), they reiterated that the medical art stands on 'two

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1 S. LAZARIS, *A Companion to Byzantine Science*. *Brill's Companions to the Byzantine World*, 6. Leiden / Boston, Mass. 2020.

2 On this point and with previous bibliography, see LAZARIS, *A Companion* (as footnote 1 above), 6–11.

3 As pointed out by P. Gregorić and F. Grgić, "Aristotle's notion of experience plays an important role in his epistemology as the link between perception and memory on the one side, and higher cognitive capacities on the other side. However, Aristotle does not say much about it, and what he does say seems inconsistent" (P. GREGORIĆ / F. GRGIĆ, Aristotle's Notion of Experience. *Archiv für Geschichte der Philosophie* 88 (2006), 1–30).

legs': experience (ἐμπειρία) and reason (λόγος). The notion of experience (which here includes acquired experience and experimentation, particularly pharmacological) is understood in two ways: either as empirical trial and error, legitimate for the historical founders of a science, such as Hippocrates, but unworthy of his successors, heirs to a 'doctrine', i.e. a set of principles verified through their implementation from generation to generation; or as experimentation carried out systematically, but with unreliable results, as these are subject to variations that are difficult to explain rationally.

I will not dwell on this controversy, whose ramifications extend beyond science to the historical period as a whole, namely the Middle Ages, or to monotheistic religions, particularly Christianity, and their role and place in the development (or not) of science.<sup>4</sup> Yet, as has been demonstrated in several recently published books on medieval science, many Byzantine scholars contributed to the development of science in their time.<sup>5</sup> Of course, and this is a fact that I am studying in a book in preparation, the practice of science in all periods depends not only on the intellectual tools available to scientists, but also on material tools. There is a close and inseparable link between the two. Solving a problem may require the creation of suitable tools, and conversely, a tool may then be used to provide evidence for certain theories.

If we assume that medieval people, with their technological and intellectual resources and their philosophical and theological ideas, contributed to the growth of science in their time, can we hypothesise that the Mediterranean region became a place of exchange and confrontation of cultures, which caused an intellectual dynamic that, in turn, accelerated the production of new knowledge?

Before I can answer this question, through a specific case study, I would like to make a few comments on the Mediterranean region in modern historiography, in order to better define the context of this study. The history of the Mediterranean, conceived as a coherent geographical and human entity, has gained prominence in the historiographic landscape since the publication of F. Braudel's work on the Mediterranean world at the time of Philip II.<sup>6</sup> Braudel gave this sea its place in history, by taking an interest in the long term,<sup>7</sup> and by taking into account the different environments

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<sup>4</sup> On this point, see the excellent counter-arguments by J. Hannam (J. HANNAM, *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution*, Washington, D.C. 2011).

<sup>5</sup> Some of these are listed in S. LAZARIS, Introduction, in Lazaris, *A Companion* (as footnote 1 above), especially n. 70.

<sup>6</sup> F. BRAUDEL, *La Méditerranée et le monde méditerranéen à l'époque de Philippe II*. Paris 1949 (there were three other editions: 1966, 1976, 1975. The 1966 edition was a significantly updated version). Before him, other historians had approached the history of the Mediterranean by emphasising the human contacts fostered by the sea (e.g., H. PIRENNE, *Mahomet et Charlemagne*. Paris 1937).

<sup>7</sup> *La Méditerranée et le monde méditerranéen à l'époque de Philippe II* served as a testing ground for Braudel's idea that history involved a triple temporality: the *longue durée* of an "almost motionless" history, which concerns man's relationship with his geographical environment; the 'slowly paced' time of the social history of groups and associations; and finally, the 'rapid' time of the history of

linked by the sea. Braudel was interested in what happened in the Mediterranean basin as a whole, that is to say, essentially, on its land and soil.

More recently, P. Horden and N. Purcell have studied the agricultural history of countries on the shores of the Mediterranean.<sup>8</sup> While highlighting the influence of the ‘romantic’ legacy of Braudel’s vision of the Mediterranean, they propose a new approach to Mediterranean history. This is a kaleidoscopic vision of Mediterranean spaces, with microregions of extreme diversity, since people have responded differently to environmental givens, shaping their territories according to the complementary relationships of their ecological environments with the surrounding land. The ecological and anthropological continuum that the Mediterranean represents is established thanks to a formidable “connectivity,” a concept used by the authors to describe the constant interrelationships between highly varied fragmented areas. Thus, each Mediterranean site can only be understood if it is integrated into its network of more or less neighbouring micro-regions, in the “connectivity” of the whole Mediterranean, to borrow one of Horden and Purcell’s main ideas. Their vision of a shattered and fragmented Mediterranean is therefore opposed to that proposed by Fernand Braudel of a “centre/periphery” division.

Another historian interested in the Mediterranean is D. Abulafia.<sup>9</sup> Unlike the previous scholars, he has chosen to focus his attention on what is happening on the surface or in the immediate vicinity of the vast body of water that defines the region. He also differs from his predecessors, particularly Braudel, in that he is interested in the actions of individuals and, even more so, of groups (ethnic, social and professional) in history. As a result, he resolutely places his narrative in human time and presents it from a human perspective. Abulafia’s history of the Mediterranean is thus firmly centred on the sea itself. Before being a region, the Mediterranean was a sea, an obvious fact that Braudel and his students tended to forget.

Despite their different points of view and approaches, for all these historians (and many others)<sup>10</sup> the Mediterranean has played a role of primary importance in

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individuals and individual actions. Braudel did not have much regard for the latter; he was far more interested in the ‘longue durée’ and the geographical influences (exerted by the topographic relief, the climate, the vegetation and the pace of the seasons), in which he saw the most powerful factor in history.

**8** P. HORDEN / N. PURCELL, *The corrupting sea: a study of Mediterranean history*. Oxford 2000. See also P. HORDEN / N. PURCELL, *The boundless sea: writing Mediterranean history. Variorum collected studies*, CS1083. London 2020.

**9** D. ABULAFIA, *The great sea: a human history of the Mediterranean*. Oxford 2013.

**10** E.g. W. V. HARRIS, *Rethinking the Mediterranean*. Oxford / New York, N.Y. 2005; I. MALKIN, *Mediterranean Paradigms and Classical Antiquity*. London / New York, N.Y. 2005; F. TABAK, *The waning of the Mediterranean, 1550–1870: a geohistorical approach*. Baltimore, Md. 2008; G. PITERBERG / T. F. RUIZ / G. SYMCOX, *Braudel revisited the Mediterranean world, 1600-1800. UCLA Clark Memorial Library series*, 13. Toronto 2010; M. FUSARO / C. HEYWOOD / M.-S. OMRI, *Trade and cultural exchange in the early modern Mediterranean Braudel’s maritime legacy. International library of historical stu-*

the history of human civilisation by allowing, for thousands of years, numerous opportunities for various populations to interact. These encounters have been beneficial in many ways and have greatly helped to stimulate curiosity about others, their habits and customs and to increase knowledge. As a thousand-year-old melting pot of diverse civilisations, the Mediterranean has never ceased to be the receptacle of a dense and fertile interweaving of peoples and cultures.

Its medieval past, which was stigmatised for so long in the name of political and religious rifts (see also above), is no exception to this rule and is increasingly marked by the significance of contacts and scientific and cultural exchanges. Placing the latter at the centre of historical considerations highlights the permanent circulation and permeability of different societies, in this case those of the medieval Mediterranean area. Different actors<sup>11</sup> played an important role in the scientific-cultural transfers. Among them are the translators. Indeed, in the history of science, interactions between scholars can be seen, in particular, through translations (and/or bilingual works), which helped these scholars to better understand the knowledge of other cultures, but also to criticize it, to deepen it, to reject it as invalid or, on the contrary, to appropriate it. Translations of scientific treatises and their contribution to the transmission of scientific knowledge have experienced a great boom in recent decades and I do not intend to return to them in extenso in this chapter. My objective here, through the specific case of some hippiatric texts, is to highlight these intellectual exchanges and to verify whether, in this particular case, we can speak of a Mediterranean scientific *métissage*.<sup>12</sup>

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*dies*, 67. London 2010; P. HORDEN / S. KINOSHITA (ed.), *A companion to Mediterranean history*. Wiley Blackwell companions to world history. Chichester 2014; C. PICARD, *La mer des califes: une histoire de la Méditerranée musulmane, VIIe-XIIe siècle*. *L'Univers historique*. Paris 2015. More generally, see also: R. ABDELLATIF / Y. BENHIMA / D. KÖNIG, *Construire la Méditerranée. Penser les transferts culturels. Approches historiographiques et perspectives de recherche*. *Ateliers des Deutschen Historischen Instituts Paris*, 8. München 2012; R. ABDELLATIF / Y. BENHIMA / D. KÖNIG, *Acteurs des transferts culturels en Méditerranée médiévale*. *Ateliers des Deutschen Historischen Instituts Paris*, 9. München 2012. A comprehensive bibliography can be found here: <https://hcmh.haifa.ac.il/2017/11/02/mediterranean-bibliography/>

**11** Generally speaking, any person, group or institution acting, voluntarily or involuntarily, with the aim of transferring a cultural good in geographical space, time and socio-cultural setting is defined as an actor.

**12** The word *métissage* (miscegenation) preserves in its very etymology the traces of its history: first used in Portuguese and then in Spanish, the *mestizo* (mixed blood, a term derived from the Latin *mixtus*) originally referred to the category of children of European-Indian unions. After the end of the colonial era, cultural *métissage* became a synonym for a multidimensional and pervasive cultural phenomena, and is now seen as inseparable from the construction and evolution of cultures.

## 1 Greek hippiatry: translations and inspiration for Arabs and Westerners

The Byzantine encyclopedia known as the *Hippiatrica* preserved important Greek texts on horse medicine.<sup>13</sup> It consists of fragments of texts from seven authors: Anatolius of Berytus (4th C.), Apsyrus of Clazomenae (4th C.), Eumelus (late 3rd or early 4th C.), Hierocles (4th C.), Hippocrates the hippiatrician (4th C.), Pelagonius (4th C.),<sup>14</sup> and Theomnestus (4th C.). The treatises of these seven authors circulated independently of each other until they were brought together in the *Hippiatrica*. This work is therefore composed of extracts, mostly divided by subject, from texts that have now been lost. Other small treatises accompany the texts attributed to these authors,<sup>15</sup> but they are of less importance and were considered so in the past given that there are not necessarily present in every recension of the *Hippiatrica*.<sup>16</sup> This is how the *Recentio prima* (= A) of the *Hippiatrica* was born. These texts were probably assembled at the very beginning of the sixth century.<sup>17</sup> The *Recentio prima* was not preserved.

**13** The title suggests it forms a unified treatise, but there are numerous manuscripts with highly different versions of the collection (ed. E. ODER / K. HOPPE, *Corpus hippiatricorum Graecorum* (t. 1. *Hippiatrica Berolinensia*; t. 2. *Hippiatrica Parisina, Cantabrigiensia, Londinensia, Lugdunensia*). *Bibliotheca scriptorum Graecorum et Romanorum Teubneriana*, 1357–1358. Leipzig 1924–1927.

**14** Beside the texts by Greek authors, the *Corpus hippiatricorum Graecorum* has also preserved the Greek translation of the work of Pelagonius. On this Latin author, see J. N. ADAMS, Pelagonius, Eumelus and a lost Latin Veterinary Writer, in G. Sabbah (ed.), *Le Latin médical. La constitution d'un langage scientifique. Réalités et langage de la médecine dans le monde romain. Actes du IIIe Colloque international "Textes médicaux latins antiques". Centre Jean Palerne – Mémoires*, 10. Saint-Étienne, 1984, 7–32; J. N. ADAMS, Pelagonius and latin veterinary terminology in the Roman empire. *Studies in Ancient Medicine*, 11. Leiden, 1995; V. GITTON-RIPOLL, Contribution de la prosopographie à une possible datation de l'*Ars veterinaria* de Pélagonius. Sur l'apparition du titre de *spectabilis* au IVe siècle. *Revue de Philologie, de littérature et d'histoire anciennes* 79,1 (2005), 69–93; V. GITTON-RIPOLL, Pélagonius Saloninus, Recueil de médecine vétérinaire. *Collection des universités de France. Série latine*, 424. Paris 2019; V. GITTON-RIPOLL, *Proxima aetate: éléments pour une chronologie de la composition du recueil hippiatrice de Pélagonius*. *Revue d'histoire des textes* N.S. 15 (2020), 199–235.

**15** Tiberius: among the agricultural writers. His work included treatments for both horses and cows; Julius Africanus: many excerpts from his work are found in one of the recensions of the *Hippiatrica*; Προγνώσεις καὶ ἰάσεις: this anonymous work relied on cautery and avoided "irrational remedies."

**16** Seventeen authors are mentioned in total, but aside from the seven authors already mentioned, the names of the authors are only linked to a few chapters every time. On the *Hippiatrica*, see A. MCCABE, A Byzantine encyclopaedia of horse medicine. The sources, compilation, and transmission of the *Hippiatrica*. *Oxford studies in Byzantium*. Oxford / New York, N.Y. / Auckland 2007; S. LAZARIS, Veterinary Medicine, in S. Lazaris (ed.), *A Companion* (as footnote 1 above), 404–428, especially 414–424.

**17** Just like the *Geoponica*, the production of the *Hippiatrica* had for a long time been placed during the reign of Constantine VII. K. Krumbacher in the first edition of his work on the history of Byzantine literature had even suggested that Hierocles had written these two works at the time of the emperor Constantin VII. His idea had the advantage of explaining the many common passages between the

To this date, we only know four recensions (= M, B, D and RV 3, a-b), to which can be added two ‘new’ works coming from the *Hippiatrica*. These are the *Epitome*, which dates roughly to the same period as the *Recentio prima* and Hierocles’ recomposed work, from a later date, and which I call for convenience “Hierocles recomposed.” The text of the *Epitome* is known in eleven copies<sup>18</sup> of five recensions (= HIG, S, QZF, Jj and RV 2),<sup>19</sup> which have reached us through nine manuscripts, among which two are illustrated.<sup>20</sup> The “Hierocles recomposed” is preserved in four manuscripts and divided in two families (= I, [X]<sup>21</sup> and RV 1).<sup>22</sup>

Indeed, at first, the *Hippiatrica* was epitomized.<sup>23</sup> This process resulted in the creation of a summarised text, an *Epitome*,<sup>24</sup> according to the title in one of the manuscripts, which reproduced this text: *Vatican, Biblioteca Apostolica Vaticana, Pal. gr. 365, f. 204r*: Ἱατρικὸν ἐν ἐπιτόμῳ ἄριστον περὶ ἵππων κατ’ ἐκλογὴν ἔχον κεφάλαια διάφορα (“excellent medical epitome on horses, containing different chapters selected”).<sup>25</sup> Thereafter, we witness the opposite phenomenon of that which had prevailed in the production of the *Hippiatrica*. While the latter was based on the use

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*Geoponica* and the *Hippiatrica* (see K. KRUMBACHER, *Geschichte der Byzantinischen Litteratur: von Justinian bis zum Ende des Oströmischen Reiches (527–1453). Handbuch der Klassischen Altertums-Wissenschaft*. München 1891, 67–68). See also S. LAZARIS, *Art et science vétérinaire à Byzance. Formes et fonctions de l’image hippiatrice. Bibliologia*, 29. Turnhout 2010, 31–35.

**18** Until recently we only knew 10 copies preserved in eight manuscripts, but I have discovered a new copy (= j) for which I will publish a codicological notice.

**19** See LAZARIS, *Art et science* (as footnote 17 above), 9–35 and 135.

**20** *Leiden, Bibliotheek der Rijksuniversiteit, Voss. gr. Q. 50*, middle of the fourteenth century and *Paris, Bibliothèque nationale de France, gr. 2244*, fol. 1–74 and 90–195, late fourteenth century. On these manuscripts and their illustration, see LAZARIS, *Art et science* (as footnote 17 above), 41–61.

**21** The *Paris, Bibliothèque nationale de France, gr. 2419*, fol. 159r-v (= [X]) only contains Hierocles’ introduction to his second book. His siglum is between brackets to indicate that philologists have not yet confirmed the historical accuracy of this piece of evidence.

**22** On the various manuscripts, see LAZARIS, *Art et science* (as footnote 17 above), 150–151.

**23** On the abbreviation of texts in late antiquity and Byzantium, see for example: P. VAN DER EIJK, *Principles and Practices of Compilation and Abbreviation in the Medical ‘Encyclopaedias’ of Late Antiquity*, in M. Horster / C. Reitz (ed.), *Condensing texts – condensed texts. Palingenesia*, 98. Stuttgart 2010, 519–554; H. INGLEBERT, *Lactance abrégiateur de lui-même. Des Institutions divines à l’Épitomé des Institutions divines: l’exemple de l’histoire des religions*, in M. Horster / C. Reitz (ed.), *Condensing texts – condensed texts. Palingenesia*, 98. Stuttgart 2010, 491–515; S. MARJANOVIĆ-DUŠANIĆ / B. FLUSIN, *Remanier, métaphraser. Belgrade 2011*; A. ZUCKER, *Qu’est-ce qu’épitomiser ? Étude des pratiques dans la Syllogé zoologique byzantine. Rursus 7 (2012)*, on-line: <http://rursus.revues.org/2961>.

**24** Let us mention that this *Epitome* includes practical indications, which are not found anywhere in the *Hippiatrica*. Furthermore, this *Epitome* is not a summary, *stricto sensu*, of the hippiatric collection, but picks up several passages of the latter. The writer(s) of the epitome genuinely sorted the data derived from the *Hippiatrica*, since everything relating to the field of zootechny and of hippology has been excluded and does not offer, for each topic, the views of various authors.

**25** Yet, this notion of summary does not appear in the titles of all the manuscripts, far from it (see LAZARIS, *Art et science* (as footnote 17 above), 24, n. 80).

of extracts borrowed from the original writings of several hippiatrists (see above), the “Hierocles recomposed” is based on another principle: extracts attributed to this author from the *Hippiatrica* were selected and compiled in the form of two books as if they had been the original and fully-fledged work of Hierocles.<sup>26</sup>

Without going into further detail, we can see the evolution of these hippiatric treatises in Byzantium: first as individual texts, then gathered into a collection, from which an epitome and an attempt to recreate the original text of one of the main authors of the *Hippiatrica* are derived. These literary ‘adventures’ reveal a Byzantine interest in these texts. Hippiatric knowledge was therefore most probably transmitted orally, but also, and above all, in writing. Indeed, as pointed out by R. McKitterick, the book was by far the most important method of exchanging knowledge in the medieval worlds.<sup>27</sup> It was the primary way of conveying information and scholarship from place to place, and from generation to generation. Therefore, the written word has been vital to the continuity and development of scientific thought over the years.

Translation is a first and highly important step in the transmission of learning from one culture to another. Thus, Apsyrtus’ treatise of Clazomenae was translated into Latin at a very early stage. Indeed, Vegetius (4th–5th C.), refers to it but also mentions that he only uses Latin authors (*Mulomedicina*, Prol., 1.6 ed. E. LOMMATZSCH, P. Vegeti Renati, *Digestorum artis mulomedicinae libri* (accedit Gargilii Martialis *De curis boum fragmentum*). *Bibliotheca Teubneriana*. Lipsiae 1903). Conversely, Pelagonius’ treatise was translated from Latin into Greek and forms part of the *Hippiatrica* (on this translation, see above, n. 14). Incidentally, some preserved fragments of Apsyrtus of Clazomenae in the *Hippiatrica* suggest that he either included passages from a previously existing translation of Columella’s *De Re Rustica* or translated them himself. Finally, we should mention that fragments of Vegetius’ *Mulomedicina* are quoted in the *Hippiatrica*, which implies a translation from Latin into Greek.<sup>28</sup>

Eventually, in later years, the horse-care manual of Theomnestos was translated into Arabic.<sup>29</sup> This translation was attributed in a colophon to Ḥunayn ibn Iṣḥāq

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**26** The reason for choosing Hierocles among the seven authors whose work was the foundation of the constitution of the *Hippiatrica* is unknown. It may be because of his general reliability and his eloquence. Ironically, his trustworthiness is due to the fact that Hierocles plagiarised Apsyrtus, one of the most brilliant hippiatrists in antiquity. And regarding his eloquence, it probably came from his real training as a lawyer (in the prologue of the first book of his treatise, he alludes twice to the tribunal), but harbouring a true passion for horses (A.-M. DOYEN-HIGUET, Les prologues de Hiéroclès: deux fleurs de rhétorique dans la Collection d’hippiatrie grecque. *Les Études classiques* 70 (2002), 27–51).

**27** R. MCKITTERICK, Books and sciences before print, in M. Frasca-Spada / N. Jardine (ed.), *Books and the Sciences in History*. Cambridge 2000, 13–34, especially 19.

**28** V. ORTOLEVA, La tradizione manoscritta della *Mulomedicina* di Publio Vegezio Renato. *Acireale* 1996, 61–86.

**29** The Arabic version was edited and translated into German by S. Saker (S. SAKER, Die Pferdeheilkunde des Theomnest von Nikopolis: ein Handbuch für den praktischen Tierarzt im arabischen Sprachraum des Frühmittelalters. *Akademie der Wissenschaften und der Literatur Mainz. Veröffentlich-*



(808–873), one of the most famous translators of Greek into Arabic.<sup>30</sup> It is thought he worked from an almost complete copy of Theomnestus' original treatise, rather than from the fragments preserved in the *Hippiatrica*. This translation is precious because it contains information that was not preserved in the *Hippiatrica*. As mentioned earlier, we only have excerpts from Theomnestus' book interspersed with excerpts from other texts on horse care and medicine.

Besides the shortcomings of the Greek text that this translation can help to overcome, it played an important role in the development of hippiatry in the Muslim world.<sup>31</sup> It was used by Muḥammad ibn Ya'qūb ibn Ghālib ibn 'Alī al-Khuttalī (c. middle of the 9th c.), known as Ibn Akhī Ḥizām, who wrote an significant work on horse medicine in the middle of the ninth century for Caliph al-Mutawakkil (r. 847–861).<sup>32</sup> Ibn al-'Awwām (d. 1158) used Ibn Akhī Ḥizām's book as a source when he compiled his book on agriculture in Seville in the twelfth century. It was also used as a source by Ibn al-Mundhir, known as al-Bayṭar, (d. 1340/1), when writing his book on horsemanship and veterinary medicine for the Mamluk Sultan Ibn Qalāwūn (r. 1293–1294, 1299–1309, 1310–1341). Other parallels with Theomnestus are found in Tāj al-Dīn's (d. 1307) book on veterinary medicine in the thirteenth century.<sup>33</sup> The influence of the

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*chungen der Orientalischen Kommission*, 49. Wiesbaden 2008). On this translation, see also the bibliographical references cited in note 32.

**30** On Ḥunayn ibn Ishāq, see S. H. GRIFFITH, Ḥunayn ibn Ishāq and the Kitāb Ādāb al-falāsifah: The Pursuit of Wisdom and a Humane Polity in Early Abbasid Baghdad, in G. A. Kiraz (ed.), *Malphonow-Rabo d-Malphone. Studies in Honor of Sebastian P. Brock. Gorgias Eastern Christian Studies*, 3. Piscataway, N.J. 2008, 135–160. See also G. M. COOPER, Ḥunayn Ibn Ishāq and the Creation of an Arabic Galen, in P. Bouras-Vallianatos / B. Zipser, *Brill's Companion to the Reception of Galen. Brill's Companions to Classical Reception*, 17. Leiden / Boston, Mass. 2019, 179–195.

**31** It is no coincidence if the Arabic word for horse-doctor, *baytar*, is derived from the Greek word for horse-doctor, ἵππιατρός (M. ULLMANN, *Die Medizin im Islam. Handbuch der Orientalistik*, 6,1. Leiden / Köln 1970, 217–218).

**32** E.g. R. G. HOYLAND, Theomnestus of Nicopolis, Hunayn ibn Ishaq and the beginnings of Islamic veterinary science, in P. F. Kennedy / R. G. Hoyland (ed.), *Islamic reflections, Arabic musings studies in honour of Professor Alan Jones*, Cambridge 2004, 150–169; V. WEIDENHÖFER, Ninth-century AD Arabian horse medicine. The Kitāb al-furūsiya wa-l-bayṭara of Muḥammad ibn Ya'qūb ibn aḥī ḥizām al-Ḥuttalī, in M.-T. Cam (ed.), *La médecine vétérinaire antique: sources écrites, archéologiques, iconographiques*. Rennes, 159–166; M. HEIDE, Das Buch der Hippieatrie – Kitāb al-Bayṭara von Muḥammad Ibn Ya'qūb Ibn aḥī Ḥizām al-Ḥuttalī. *Akademie der Wissenschaften und der Literatur Mainz. Veröffentlichungen der Orientalischen Kommission*, 51. Wiesbaden 2008. Ibn Akhi Hizām's work gives us a *terminus ante quem* for the translation of Theomnestus.

**33** See G. BJÖRCK, Griechische Pferdeheilkunde in arabischer Überlieferung. *Le Monde Oriental* 30 (1936), 1–12; J.-J. CLÉMENT-MULLET, Ibn al-Awwam, *Le livre de l'agriculture (Kitab al-felahah)*. Paris 1866–1867 (see also the revised edition by El Faiz [Arles 2000]); SAKER, *Die Pferdeheilkunde* (as footnote 29 above), 11–14.

translation from Baghdad to al-Andalus is therefore self-evident, which shows the Arabs' interest in hippiatric knowledge.<sup>34</sup>

More generally, the translation of Theomnestus' book was part of a much wider movement to translate Greek texts on science, medicine, and philosophy into Arabic,<sup>35</sup> something A. Sabra called the "appropriation and naturalization" of Greek science into Islamic culture.<sup>36</sup> This phenomenon is especially noticeable from the end of the eighth century and throughout the ninth and even the tenth centuries.

This process of assimilation<sup>37</sup> through translations also happened in the Latin West. This seems to be the case, for example, with the translations produced by Moses of Palermo,<sup>38</sup> a Jewish doctor and official translator at the court of Charles I of Anjou

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**34** As we shall see further, this hippiatric text was probably not the only one to be translated into Arabic.

**35** E.g. ULLMANN, *Die Medizin* (as footnote 31 above), 257–294; D. GUTAS, *Greek thought, Arabic culture the Graeco-Arabic translation movement in Baghdad and early 'Abbāsid society, 2nd–4th/8th–10th centuries*. London / New York, N.Y. 1998. See also G. CONTAMINE (ed.), *Traduction et traducteurs au Moyen Âge*. Actes du colloque international du CNRS, organisé à Paris, Institut de recherche et d'histoire des textes, les 26–28 mai 1986. *Documents, études et répertoires*. Paris 1989; B. VAN DEN ABEELE / A. TIHON / I. DRAELANTS (ed.), *Occident et Proche-Orient: contacts scientifiques au temps des croisades*. Actes du colloque de Louvain-la-Neuve, 24 et 25 mars 1997. *Réminiscences*, 5. Turnhout 2000.

**36** A. I. SABRA, *The Appropriation and Subsequent Naturalization of Greek Science in Medieval Islam: A Preliminary Statement*. *History of Science* 25 (1987), 223–243. On the notion of "appropriation," see also A. LEROI-GOURHAN, *Le geste et la parole* (t. 1. Technique et langage; t. 2. La mémoire et les rythmes). *Sciences d'aujourd'hui*. Paris / Bagnaux 1964–1965. Also very useful, although it does not concern the appropriation of Greek texts by the Arabs, but Greek and Arabic scientific treatises into Hebraic lore: G. FREUDENTHAL (ed.), *Science in Medieval Jewish Cultures*. Cambridge 2012, 13–110.

**37** I use this term here as a synonym for appropriation. Both refer to that act of the mind which makes the knowledge it acquires its own.

**38** On Moses of Palermo, apart from the references cited below, see J. MILLÁS VALLICROSA, *El traductor judaico Moisés de Palermo y la ciencia de la hipiatría en la edad media europea*. *Sefarad* 27,2 (1967), 299–300; C. SIRAT, *Les traducteurs juifs à la cour de Sicile et de Naples*, in G. Contamine (ed.), *Traduction et traducteurs au Moyen Âge*. Actes du colloque international du CNRS, organisé à Paris, Institut de recherche et d'histoire des textes, les 26–28 mai 1986. *Documents, études et répertoires*. Paris 1989, 169–191; D. TROLLI, *Studi su antichi trattati di veterinaria*. *Testi e studi*, 2. Parma 1990, 43–57; B. PRÉVOT / B. RIBÉMONT, *Le cheval en France au Moyen âge sa place dans le monde médiéval: sa médecine: l'exemple d'un traité vétérinaire du XIVe siècle, la 'Chirurgie des chevaux'*. *Medievalia*. Orléans / Caen 1994, 339–341; S. ARIETI, *Mosè da Palermo e le traduzioni dei trattati di mascalcia di Ippocrate Indiano*, in B. Rocco / N. Bucaria (ed.), *Gli Ebrei in Sicilia dal tardoantico al Medioevo*. Studi in onore di mons. Benedetto Rocco. Palermo 1998, 55–61; M. ZONTA, *La filosofia ebraica medievale in Sicilia*, in B. Rocco / N. Bucaria (ed.), *Gli Ebrei in Sicilia dal tardoantico al Medioevo*. Studi in onore di mons. Benedetto Rocco. Palermo 1998, 163–168. However, it should be noted that there may have been another Moses of Palermo who flourished either at the court of the Norman kings, in the 12th century, or at the court of Frederick II Hohenstaufen. A work attributed to Moses of Palermo, *Liber mariscaltie equorum et cura eorum*, is cited in the *De Medicina equorum* of Giordano Ruffo, thus indicating that the writer of this text lived in an ear-

(r. 1266–1282).<sup>39</sup> His name is primarily linked with the translation, from Arabic into Latin,<sup>40</sup> of a work of veterinary medicine ascribed to Hippocrates (*Liber de curationibus infirmitatum equorum quem translavit de lingua arabica in latinam Magister Moyses de Palermo*).<sup>41</sup>

The work begins with *Sapientissimus Ippocras medicus Indie fecit librum istum, ordinavit enim in hoc libro curam animalium irrationalium, sicut sunt equi, muli, bordoni, asini, et aliorum animalium irrationalium ...*<sup>42</sup> G. Björck has shown that passages from Moses' translation occur in Ibn al-'Awwām's *Kitāb al-flāḥa*, where they are attributed to Hippocrates the hippiatrician. This proves at least the existence of an Arabic

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lier period (<https://www.encyclopedia.com/religion/encyclopedias-almanacs-transcripts-and-maps/moses-palermo>).

**39** Moses' work continued the tradition of Jewish translation that flourished during the reign of Frederick II and his natural son Manfred. Frederick invited Jewish translators and scholars to his court: Judah b. Solomon ha-Kohen (Matkah), Samuel Ibn Tibbon, and Jacob Anatoli, took part in its lively and variegated intellectual life, discussing philosophy and disputing diverse issues with Christian scholars. The bibliography on the subject is very extensive. As an indication, see C. ROTH, Jewish Intellectual Life in Medieval Sicily, *The Jewish Quarterly Review* 47,4 (1957), 317–335; G. SERMONETA, Federico II e il pensiero ebraico nell'Italia del suo tempo, in A. M. Romanini (ed.), *Federico II e l'arte del Duecento italiano. Atti della Settimana di studi di storia dell'arte medievale dell'università. Collana di saggi e testi*. Galatina 1980 (t. 1), 183–197; D. ABULAFIA, The Servitude of Jews and Muslims in the Medieval Mediterranean. *Mélanges de l'École française de Rome* 112,2 (2000), 687–714; M. ZONTA, The Jewish Mediation in the Transmission of Arabo-Islamic Science and Philosophy to the Latin Middle Ages. Historical Overview and Perspectives of Research, in A. Speer / L. Wegener (ed.), *Wissen über Grenzen: Arabisches Wissen und lateinisches Mittelalter*. Berlin / New York, N.Y. 2008, 89–105; R. VEIT, Charles I of Anjou as Initiator of the *Liber Continens* Translation: Patronage Between Foreign Affairs and Medical Interest, in F. Wallis / R. Wisnovsky (ed.), *Medieval Textual Cultures: Agents of Transmission, Translation and Transformation*. Berlin / Boston, Mass. 2016, 145–158. On science in Frederick II's time, see also below (n. 61).

**40** A royal letter dated Venosa, 10 June 1277 states that the king ordered Maestro Matteo Siciliaco to give Latin lessons to Moses of Palermo, thus enabling him to translate scientific texts from the Arabic. Indeed, as we learn from this document, Moses was employed as a translator from the Arabic, not from the Greek (see I. A. C. SINGER, *The Jewish encyclopedia: a descriptive record of the history, religion, literature, and customs of the Jewish people from the earliest times to the present day*, New York, N.Y. 1905, 92, art. "Moses of Palermo"; K.-D. FISCHER, Moses of Palermo, translator from the Arabic at the Court of Charles of Anjou, *Histoire des Sciences Médicales* 17 (1982), 278–281, especially 280).

**41** See the edition of P. Delprato (P. DELPRATO, *Trattati di mascalcia attribuiti ad Ippocrate, tradotti dall'arabo in latino da maestro Moisè da Palermo, volgarizzati nel secolo XIII. Messi in luce per cura di Pietro Delprato, corredati di due posteriori compilazioni in latino e in toscano, e di note filologiche per cura di Luigi Barbieri. Collezione di opere inedite o rare dei primi tre secoli della lingua*, 12. Bologna 1865). Moses' translation probably dates from 1277 (Y. POULLE-DRIEUX, *Pratique de l'hippiatrie à la fin du Moyen Âge*, in M. Terrasse / E. Poulle / D. Jacquart (ed.), *Comprendre et maîtriser la nature au Moyen âge : mélanges d'histoire des sciences offerts à Guy Beaujouan. Centre de recherches d'histoire et de philologie de la IVe section de l'École Pratique des Hautes Études*, 73. Genève / Paris 1994, 329–336, especially 27).

**42** DELPRATO, *Trattati di mascalcia* (as footnote 41 above), 101.

work under Hippocrates' name, and such a work must have been the source of Moses' translation.<sup>43</sup> In all likelihood, this is the text of the *Epitome* attributed in some Greek manuscripts to Hippocrates.<sup>44</sup> This translation was known and used throughout the Middle Ages. Guillaume de Villiers (see further) was aware of it and used it.

Apart from these translations of hippiatric texts (from Greek into Arabic and Latin, from Latin into Greek or from Arabic into Latin), there are also translations from Greek into Latin that were produced at a later date than the one mentioned above for the text of Apsyrthus used by Vegetius. One of the earliest late medieval translators was Bartholomew of Messina, a translator of philosophical and medical texts. He was active at the Sicilian court of King Manfred (r. 1258–1266).<sup>45</sup> According to G. Björck, Manfred had the *Epitome* translated from Greek into Latin by Bartholomew of Messina.<sup>46</sup> Also according to G. Björck, Bartholomew in addition translated, or at least was involved in the translation of, Hierocles' work.<sup>47</sup> According to K.-D. Fischer, "what he was translated must have been in fact extracts from Hierocles reassembled from the compilation of the *Hippiatrika*."<sup>48</sup> In fact, it is what I call the "Hierocles recomposed" (cf. *supra*).<sup>49</sup>

According to A. McCabe, "there seems no reason to doubt the attribution of the translation to Bartholomew, since the incipit follows the formula with which he prefaced all of his known translations of Greek philosophical and medical texts."<sup>50</sup>

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43 BJÖRCK, Griechische Pferdeheilkunde (as footnote 33 above).

44 LAZARIS, Art et science (as footnote 17 above), 27–28, especially n. 80.

45 Manfred, Frederick's (r. 1220–1250) natural son, was crowned in Mainz as emperor of the Holy Roman Empire as well as King of Sicily and Jerusalem. He succeeded to the Norman throne in 1258 and shared his father's scientific interests. After his father's death, he edited the former's famous treatise on falconry, *De arte venandi cum avibus*. Just like his father, Manfred gathered scholars and translators to help him pursue these scientific interests.

46 G. BJÖRCK, Apsyrthus, Julius Africanus et l'hippiatrie grecque. Uppsala Universitets Årsskrift, 4 Uppsala 1944, 38. The Latin text of the *Epitome* had already been edited from a single manuscript (London, BL, Add. 27626): G. SPONER, Die Pferdeheilkunde des Ipcras indicus. Hannover 1966 (PhD Thesis). However, the editor did not realise that he had a Latin translation of the *Epitome* before him.

47 BJÖRCK, Apsyrthus, Julius Africanus (as footnote 46 above), 38.

48 K.-D. FISCHER, 'A horse! a horse! my kingdom for a horse'. Versions of Greek Horse Medicine in Medieval Italy. *Medizinhistorisches Journal* 34 (1999), 123–138, especially 134. On this idea, see G. BJÖRCK, Le Parisinus grec 2244 et l'art vétérinaire grec. *Revue des Études grecques* 48 (1935), 502–524, especially 509–510. This hypothesis has been taken up by many other researchers since then (see FISCHER, A horse (as footnote 48 above), n. 34).

49 As all the Greek manuscripts that have preserved this text are later in date (14th–15th centuries, see LAZARIS, Art et science (as footnote 17 above), 134–135), Bartholomew of Messina must have had access to one (or more) earlier manuscript(s) and it would be interesting to compare the version of his text with the Greek text of 'Hierocles recomposed'.

50 MCCABE, A Byzantine encyclopaedia (as footnote 16 above), 239. On this translation, see also POULLE-DRIEUX, Pratique de l'hippiatrie (as footnote 41 above), 25–26; S. LAZARIS, Contribution à l'étude de l'hippiatrie grecque et de sa transmission à l'Occident (XIIIe–XVe siècles), in M.-C. Amouretti / F. Sigaut (ed.), Traditions agronomiques européennes. Élaboration et transmission depuis

However, in a recent careful study, P. Beullens has shown that this attribution is more complex than we think<sup>51</sup>

Boniface of Calabria is a translator of the same period.<sup>52</sup> He is known from a work entitled *Tesoro dei cavalli* attributed to him in certain manuscripts. This treatise differs little from that of Lorenzo Rusio (see below). The two texts vary only in the prologue and in certain therapeutic practices. Moreover, as D. Trolli writes, “la maggior parte dei manoscritti che ce la conservano contengono anche altre opere (latine e volgari) dello stesso autore, configurandosi così come una sorta di ‘opera omnia’ di Bonifacio: alcuni opuscoli latini di medicina e di alchimia e il volgarizzamento di un compendio degli *Hippiatrica* ... che si cela sotto il titolo *Pratica* (o *Trattato*) *dei morbi naturali e accidentali, segni e cure de’ cavalli tratta dai libri di Ippocrate (e) de Damasceno*.”<sup>53</sup> Finally, in almost all the manuscripts that have preserved these texts, there is a biographical notice in which it is stated that Boniface was a Greek from Calabria who lived at the time of Charles I of Anjou (r. 1266–1282), who held him in high esteem, to the point that he was made a Knight and Master of his farms and that he offered him the fiefdom of Gerace.<sup>54</sup> It also states that the *Tesoro dei cavalli* was translated by the Dominican “Antonio da Pera mastro in teologia ...” (who probably died after 16 April 1440).

According to Y. Poulle-Drieux, the *Tesoro dei cavalli* is the Italian translation of Lorenzo Rusio’s hippiatric work produced by Antonio da Pera “d’un soi-disant traité composé en grec par un certain Boniface de Gérace”.<sup>55</sup> D. Trolli maintains, however,

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l’Antiquité. Actes du 120e congrès national des sociétés historiques et scientifiques. Section Histoire des sciences (Aix-en-Provence, 23–25 octobre 1995). Paris 1998, 143–169, especially 152; FISCHER, A horse (as footnote 48 above), 132–134.

51 P. BEULLENS, Bartholomew of Messina’s Role in the Transmission of the Greek *Hippiatrica*, *AKAN – Antike Naturwissenschaft und ihre Rezeption* 33 [in print]. See also A. DAMICO, Un’anonima traduzione latina del trattato di veterinaria di Ierocle nel Cod. *Vat. Reg. Lat.* 1010. *Rivista di cultura classica e medioevale* 47,2 (2005), 321–359.

52 On Boniface of Calabria, see DELPRATO, *Trattati di mascalcia* (as footnote 41 above), XXIV–XXIX; P. DELPRATO, La Mascalcia di Lorenzo Rusio: volgarizzamento del secolo XIV. *Collezione di opere inedite o rare dei primi tre secoli della lingua*. Bologna 1867 (t. 2), 29 & 39–41; F. RUSSO, Medici e veterinari calabresi (sec. VI–XV). *Ricerche storico-bibliografiche*. Napoli 1962, 55–61; F. SABATINI, Bonifacio, in *Dizionario biografico degli Italiani*. Roma 1970 (t. 12), 118 [on-line: [https://www.treccani.it/enciclopedia/bonifacio\\_res-7d441b86-87e8-11dc-8e9d-0016357eee51\\_%28Dizionario-Biografico%29/](https://www.treccani.it/enciclopedia/bonifacio_res-7d441b86-87e8-11dc-8e9d-0016357eee51_%28Dizionario-Biografico%29/)]; P. DI PIETRO, *Dei cavalli: la pratica di maestro Bonifazio dei morbi naturali e accidentali dei cavalli*. Firenze 1988.

53 TROLLI, *Studi su antichi* (as footnote 38 above), 70. This treatise is divided into four books, entitled: “*Capitulus primus (sic) primi libri Ypocratis et Darnasceni*”; “*Liber secundus*”; “*Principii (sic) tertii libri Ypocratis et Galieni*”; “*Altre cure utille alle sanitate de li cavalli da multi recogliamenti de fluri. Etiamdio da molti sapii homini e filosophi. Libro quarto.*”

54 SABATINI, Bonifacio (as footnote 52 above), 118; TROLLI, *Studi su antichi* (as footnote 38 above), 70.

55 Y. POULLE-DRIEUX, L’hippiatrie dans l’Occident latin, du XIIIe au XVe siècle, in G. Beaujouan / Y.

that the information in the biographical note concerning the translation by Antonio da Pera does not refer to the *Tesoro dei cavalli*, but to the *Pratica dei morbi naturali e accidentali, segni e cure de' cavalli tratta dai libri di Ippocrate (e) de Damasceno*,<sup>56</sup> which was in fact the translation of a Greek hippiatric work. According to him, Boniface, who knew Greek, had prepared this treatise which Antonio da Perra translated in the fifteenth century. His comment is supported by the information that Boniface lived at the time of Charles I of Anjou. It seems difficult to assume that Boniface could have consulted and subsequently translated Lorenzo Rusio's work (composed between 1288 and 1307).

## 2 Towards a medieval and Mediterranean hippiatric science?

Thus, we see that the hippiatric texts were translated, copied, quoted and used throughout the Mediterranean world. As outlined above, for both Arabs and Westerners, there was clearly a desire to appropriate Greek hippiatric knowledge. Similarly, the Byzantines, but to a lesser extent and only in late antiquity, were interested in some Latin hippiatric texts. This appropriation in turn became the driving force behind the production of new knowledge. It resulted in a profound intellectual effervescence in the Mediterranean basin. Through the concrete cases of Greek hippiatric texts translated into Arabic and Latin (and also into vernacular languages),<sup>57</sup> we can see how a 'simple' translation can become the lever of a more profound influence.

Indeed, translation is a crucial step in the transmission of knowledge from one culture to another. Producing a translated version of a text is a far more complex undertaking than simply switching from one language to another: the text is entirely re-written, with terminology changes or choices, intentional omissions or additions,

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Poulle / J.-M. Dureau (ed.), *Médecine humaine et vétérinaire à la fin du Moyen Age. Centre de recherches d'histoire et de philologie de la IVe section de l'École Pratique des Hautes Études*, 2. Genève / Paris 1966, 9–172, especially 41. F. Sabatini, without however providing any justification, believes that the original of this treatise was written "quasi certamente in latino (non in greco, come si sostiene sulla base di notizie fornite da un volgarizzatore) ed è perduto" (SABATINI, Bonifacio (as footnote 52 above), 118).

<sup>56</sup> TROLLI, *Studi su antichi* (as footnote 38 above), 71 and 81.

<sup>57</sup> See for example in A. BRUCE-WHYTE, *Histoire des langues romanes et de leur littérature depuis leur origine jusqu'au XIVe siècle*. Paris / Strasbourg 1841 (t. 2), 152–160 on *London, British Library, Harley 3535*. On this manuscript, see also A. Montinaro, *Un volgarizzamento inedito da Giordano Ruffo: Cola de Jennaro, Della natura del cavallo e sua nascita* (Tunisi, 1479), in V. Ortoleva / M. R. Petringa (ed.), *La veterinaria antica e medievale: testi greci, latini, arabi e romanzi: atti del II Convegno internazionale*, Catania, 3–5 ottobre 2007. *Biblioteca di Sileno*, 2. Lugano 2009, 471–529, especially 501, n. 134. The manuscript is available here: [http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Harley\\_MS\\_3535](http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Harley_MS_3535).

and accidental errors. As U. Eco wrote, “translation is always a shift, not between two languages but between two cultures – or two encyclopaedias. A translator must take into account rules that are not strictly linguistic but, broadly speaking, cultural.”<sup>58</sup> Translation was a fundamental aspect of the scientific process, and it became a self-perpetuating activity. The production of a new text stimulated new research in the field, which would then lead to more and better translations.<sup>59</sup>

Moreover, all these translations, which we have briefly outlined, influenced several other authors. We have seen this in particular with the Arabic translation of the text of Theomnestus (see above, pp. 397–398). We observe the same phenomenon in the West where texts translated into Latin and vernacular languages influenced, directly or indirectly, several authors covering a period of about three centuries (13th–15th). The first of these authors could be Giordano Ruffo di Calabria (or Jordanus Ruff[us]).<sup>60</sup> Ruffo was a member of a noble Norman family by the name of Rufo. Giordano Ruffo certainly held an important position with Frederick II, King of Sicily,<sup>61</sup> but it

**58** U. Eco, *Experiences in translation*. Toronto 2015, 17.

**59** GUTAS, Greek thought (as footnote 35 above), 110.

**60** On Giordano Ruffo, see R. ROTH, *Die Pferdeheilkunde des Jordanus Ruffus*. Berlin 1928 (PhD Thesis). This is the modern German translation of H. Molin’s edition (H. MOLIN, *Jordani Ruffi Calabriensis, Hippiatria*, Patavii 1818). According to D. Trolli, the author does not include the first seven chapters on hippology (TROLLI, *Studi su antichi* (as footnote 38 above), 17, n. 1). See also J. ZAHLTEN, *Die ‘Hippiatria’ des Jordanus Ruffus*. *Archiv für Kulturgeschichte* 53,1 (1971), 20–52; B. PRÉVOT, *La science du cheval au Moyen Age: le traité d’hippiatrie de Jordanus Rufus*. *Collection Sapience*, 2. Paris 1991, especially 3–7; B. PRÉVOT, *Le cheval malade: l’hippiatrie au XIIIème siècle*. Actes du 17e colloque du Centre universitaire d’études et de recherche médiévales d’Aix (février 1992), in *Le cheval dans le monde médiéval. Sénifiance*, 32. Aix-en-Provence 1992, 451–464; B. PRÉVOT, *La connaissance du cheval au XIIIe siècle: la ‘Maréchaucie des chevaux’ de Jordanus Rufus*, in L. Bodson (ed.), *L’histoire de la connaissance du comportement animal*. Actes du colloque international, Université de Liège, 11–14 mars 1992. *Colloques d’histoire des connaissances zoologiques*, 4. Liège 1993, 40; J.-L. GAULIN, *Giordano Ruffo et l’art vétérinaire*, *Micrologus. Nature, Sciences and Medieval Societies*. 2 (1994), 185–198; PRÉVOT / RIBÉMONT, *Le cheval en France* (as footnote 38 above), 336–338; MONTINARO, *Un volgarizzamento* (as footnote 57 above); S. BERTELLI, *Ruffo, Jordanie*, in L. G. Bianconi / F. Caglioti / M. Ciliberto (ed.) *Dizionario biografico degli italiani*, Roma (t. 89) 2017 [on-line: [https://www.treccani.it/enciclopedia/giordano-ruffo\\_%28Dizionario-Biografico%29/](https://www.treccani.it/enciclopedia/giordano-ruffo_%28Dizionario-Biografico%29/)]; A. MONTINARO, *Il ‘De medicina equorum’ di Giordano Ruffo. Tradizione romanza e spunti lessicali*, in A.-M. Doyen / B. Van den Abeele (ed.), *Chevaux, chiens, faucons. L’art vétérinaire antique et médiéval à travers les sources écrites, archéologiques et iconographiques*. Louvain-la-Neuve 2018, 267–287; A. MONTINARO, *La tradizione del ‘De Medicina Equorum’ di Giordano Ruffo con un censimento dei testimoni manoscritti e a stampa*, Milano 2018; B. COMMANDEUR, *On Horses – Two Medieval Authors, Their Manuscripts, Early Printed Books and Illustrations*, in A. van de Haar / A. E. Schulte Nordholt (ed.), *Figurations animalières à travers les textes et l’image en Europe du Moyen-Age à nos jours*. Leiden / Boston Mass., 146–163. See also: [https://pdnprod.unicaen.fr/bmc/personnesCheval/doc/pddn\\_p.BMC\\_3382.html](https://pdnprod.unicaen.fr/bmc/personnesCheval/doc/pddn_p.BMC_3382.html). Despite some errors, C. F. Heusinger’s publication is still useful (C. F. HEUSINGER, *Recherches de pathologie comparée*, Cassel 1844 (t. 1), 39–43).

**61** On the transmission and development of science at the court of Frederick II, see C. H. HASKINS,

is difficult to know more about his role and position in the court of Frederick II. It is very likely that he composed his treatise, *De medicina equorum* or *Hippiatria*,<sup>62</sup> after Frederick's death.<sup>63</sup> According to Y. Poulle-Drieux, Giordano Ruffo probably knew the *Hippiatrica*,<sup>64</sup> which is denied both by D. Trolli and by K.-D. Fischer.<sup>65</sup> Indeed, it is difficult to detect precisely what the author's sources were. In the present state of our knowledge, it is more prudent to put forward the hypothesis of an episodic and indirect influence of Greek sources. His Latin text flourished in the West and was translated into several vernacular languages.

Pietro de' Crescenzi (1230/33-1320/21)<sup>66</sup> was the author of a treatise dedicated to Charles II of Naples, on agricultural management (*Ruralium commodorum libri XII* or *De agricultura*), written between 1304 and 1309. The author was inspired by Latin and Greek agronomists and hippiatrists. His work was a great success and was very quickly translated into several languages, including French.

Lorenzo Rusio, the veterinary author active in Rome, dedicated his hippiatric work (*Hippiatria sive marescalia*) to Cardinal Napoleone Orsini (†1342)<sup>67</sup>. It must

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Studies in the history of mediaeval science. New York, N.Y. 1960<sup>2</sup>, especially the 3rd section "The Court of Frederick II"; A. M. IERACI BIO, La trasmissione della letteratura medica greca nell'Italia Meridionale fra X e XIV secolo, in A. Garzya / A. M. Ieraci Bio / G. Matino (ed.), Contributi alla cultura greca nell'Italia meridionale. *Hellenica et Byzantina Neapolitana*, 13. Napoli 1989, 133–257; A. PARAVICINI BAGLIANI / P. TOUBERT / L. ZICHICHI (ed.), Federico II e le scienze. Palermo 1994; O. VOSKOBOYNIKOV, Arts, savoirs et visions de la nature à la cour de Frédéric II. Paris 2006 (PhD Thesis); F. DELLE DONNE, La porte du savoir. Cultures à la cour de Frédéric II Hohenstaufen. Grenoble 2021. On Frederick II, see also D. ABULAFIA, Frederick II a medieval emperor. New-York / Oxford 1992.

**62** This treatise was edited several times (see MONTINARO, La tradizione (as footnote 60 above), 33–35).

**63** Cf. FISCHER, A horse (as footnote 48 above), n. 18.

**64** DRIEUX, Pratique de l'hippiatrie (as footnote 41 above), 17. Long before Y. Poulle-Drieux, C. F. Heusinger wrote that "Jordanus Ruffus pouvoit avoir connoissance des hippiatres grecs; mais en comparant son ouvrage avec les hippiatrica on ne pourra guère prouver, qu'il en fait usage; les hippiatres grecs connoissent plus de maladies que lui, et quelques maladies communes et générales sont mieux décrites par eux que par Jordanus" (HEUSINGER, Recherches (as footnote 60 above), 42).

**65** TROLLI, Studi su antichi (as footnote 38 above), 25–26; FISCHER, A horse (as footnote 48 above), 130–131 (on the different arguments, see the discussion in MONTINARO, La tradizione (as footnote 60 above), 23–26).

**66** On the author and his works, see P. TOUBERT, Crescenzi, in Dizionario biografico degli Italiani. Roma (t. 30), 1984, 649–657; J.-L. GAULIN, Pietro de'Crescenzi et l'agronomie en Italie: 12e–14e siècle. Paris 1990 (PhD Thesis). See also: [https://www.arlima.net/mp/pietro\\_de\\_crescenzi.html](https://www.arlima.net/mp/pietro_de_crescenzi.html).

**67** On Rusio, see DELPRATO, La Mascalcia (as footnote 52 above); L. SCHNIER, Die Pferdeheilkunde des Laurentius Rusius. Berlin 1939 (PhD Thesis); L. AURIGEMMA, La Mascalcia di Lorenzo Rusio, nel volgarizzamento del codice Angelicano V.3.14. *Studi e testi del Vocabolario dei dialetti della Sabina e dell'Aquilano*, 2. Alessandria 1998; L. BRUNORI CIANTI / L. CIANTI, Rusio, Lorenzo, in L. G. Bianconi / F. Caglioti / M. Ciliberto (ed.), Dizionario biografico degli italiani. Roma (t. 89) 2017 [on-line: [https://www.treccani.it/enciclopedia/lorenzo-rusio\\_%28Dizionario-Biografico%29/](https://www.treccani.it/enciclopedia/lorenzo-rusio_%28Dizionario-Biografico%29/)]; BERTELLI, Ruffo (as footnote 60 above); COMMANDEUR, On Horses (as footnote 60 above).



therefore have been composed between 1288 (the year of his elevation to the cardinalate) and 1307 (the year of his final departure from Italy to France).<sup>68</sup> Among his sources, the author mentions the names of a certain Hippocrates and a certain Galen. Most likely behind these two authors is the *Epitome*, a text sometimes attributed to these two Greek physicians (see above, n. 24). There are at least four versions of this work: in Latin, Italian, French and Flemish dialect.<sup>69</sup>

The *Cirurgie des chevaux* is another text, also derived from Greek sources. It is an anonymous French treatise<sup>70</sup> preserved in a single manuscript from the fourteenth century, when it was probably written. This work consists of eighty-four chapters. According to Y. Poulle-Drieux, its author was inspired (for chapters 8–59) by Hierocles' text and the *Hippiatrica*. As B. Prévot suggests, these sources may have been used, but only in a fragmentary way.<sup>71</sup> For his other chapters, the author used the chapter *De equo* from Albertus Magnus' *De animalibus*.

Finally, two other authors mention a certain Hippocrates as a source, which could be Hippocrates the hippiatrician or simply the *Epitome* (it should be noted that the *Epitome* is repeatedly presented in Greek tradition as the work of Hippocrates). The first is Juan Álvarez de Salamiella, who wrote a treatise in the late fourteenth or early fifteenth century entitled *de menescalia et de albeyteria et fisica de las bestias*.<sup>72</sup> The second is Guillaume de Villiers who compiled a hippiatric treatise in French (most likely in Normandy) in the middle of the fifteenth century.<sup>73</sup> Guillaume de Villiers does not hesitate to use magical practices (what he calls “chermes”) as a remedy to cure horses.<sup>74</sup>

<sup>68</sup> See TROLLI, *Studi su antichi* (as footnote 38 above), 69–70.

<sup>69</sup> AURIGEMMA, *La Mascalcia* (as footnote 67 above).

<sup>70</sup> This treatise was partially transcribed (POULLE-DRIEUX, *L'hippiatrie* (as footnote 55), 119–121) and edited (PRÉVOT / RIBÉMONT, *Le cheval en France* (as footnote 38 above), 363–404 with a glossary on pages 405–428). See also PRÉVOT, *Le cheval* (as footnote 60).

<sup>71</sup> POULLE-DRIEUX, *L'hippiatrie* (as footnote 55), 45); PRÉVOT / RIBÉMONT, *Le cheval en France* (as footnote 38 above), 354. Hierocles is mentioned by the author at the end of the work: “Heraclez, qui cognut les chevaux...”. On how Hierocles' name was distorted in the Western tradition, see for example BJÖRCK, *Apsyrtus, Julius Africanus* (as footnote 46 above), 38.

<sup>72</sup> This treatise was published by P. ONANGA, *El libro de menescalia et de albeyteria: édition du Traité de Médecine Vétérinaire Médiévale de Johan Alvarez de Salamiellas*. Paris 1990 (PhD Thesis). On Juan Álvarez de Salamiella, see C. A. PALAU, *Bibliografía Hispánica de Veterinaria y Equitación anterior a 1901*. Madrid 1973, 2–3; PRÉVOT / RIBÉMONT, *Le cheval en France* (as footnote 38 above), 341–342. See also <https://dbe.rah.es/biografias/59394/juan-alvarez-de-salamiella>.

<sup>73</sup> This text is unpublished. Y. Poulle-Drieux (POULLE-DRIEUX, *L'hippiatrie* (as footnote 55), 123–148) transcribed it partially from the three manuscripts that preserve the text. B. Prévot and B. Ribémont have announced a critical edition (PRÉVOT / RIBÉMONT, *Le cheval en France* (as footnote 38 above), n. 68).

<sup>74</sup> For an overview, see M.-T. LORCIN, *Prières pour un cheval malade*, in *Le cheval dans le monde médiéval. Sénéfiance*. Aix-en-Provence 1992, 323–336.

Finally, let us mention the work of Manuel Díez. Even if it is not directly inspired by Greek veterinarians, as Y. Poulle-Drieux pointed out, he used, among others, the work of Lorenzo Rusio who was inspired by Greek authors (see above). He collected the material for his hippiatric treatises, entitled *Libre de cavalls* and *Tractat de les mules*, both written c. 1424–1436 (very soon reunited in the *Libre de la menescalia*), as one of the heads of the royal house during and after the first Italic campaign of King Alfonso V of Aragon for the conquest of Naples (1420–1423).<sup>75</sup> The original text, only partially published (*Tractat de les mules*, from few manuscripts),<sup>76</sup> was written in Catalan and then translated into Neapolitan (*Libro de' cavalli*, c. 1488), French (*Livre de chevalz*, c. 1495), and Castilian (*Libro de albeitería*, 1495). The set was printed in Catalan (1515 and 1523) and in Castilian (1495–1545), and the minor work on the mules, in a new Castilian translation, still appeared in print in the second half of the sixteenth century (1564).

Therefore, the various Western authors succinctly mentioned in this brief inventory, and without any claim to exhaustiveness, were most likely not familiar with the Greek texts themselves but rather with the translations mentioned above. These various translations were therefore the basis for developing, extending and reworking Greek hippiatric ideas and passing them on to future generations, particularly through scientific education.<sup>77</sup> In the examples we have just seen, we are not witnessing a simple reception, *stricto sensu*, of Greek hippiatric texts, but rather a phenomenon of appropriation, which contributed to the development of scientific thought both among Arabs and among Westerners. Moreover, the translations in question were often not the work of an individual, but part of a collective effort that served a greater cause.

Nevertheless, can we speak of a Mediterranean hippiatric science? Even if caution must be exercised in this particular case, the answer could be positive, because these translations not only prevented a compartmentalization of hippiatric knowledge from one culture to another, but also provoked an intellectual effervescence throughout the Medi-

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<sup>75</sup> On the text, the author and the manuscripts that preserved it, see L. CIFUENTES / C. FERRAGUD, *El Libre de la menescalia de Manuel Díez: de espejo de caballeros a manual de albéitares*. *Asclepio* 51 (1999), 93–127. See also: L. CIFUENTES, Manuel Díez i el seu manual de menescalia: la culminació de la veterinària en el marc ibèric tardomedieval i renaixentista, in *Temes de Ciència.cat* [online: <https://www.sciencia.cat/temes/manuel-diez-i-el-seu-manual-de-menescalia>]; L. CIFUENTES / C. FERRAGUD, Díez, Manuel (València?, 1381/1382–Andilla, 1443), in *Ciència.cat DB* [online: <https://www.sciencia.cat/scienciadat-db?nom=16>]; <https://dbe.rah.es/biografias/16001/manuel-diaz-o-diez-de-calatayud-o-de-vilanova>.

<sup>76</sup> Ed. L. FARAUDO DE SAINT-GERMAIN, *El texto primitivo inédito del Tractat de les mules de Mossén Díez*. *Boletín de la Real Academia de Buenas Letras de Barcelona* 22 (1949), 23–62.

<sup>77</sup> On hippiatric teaching, see S. LAZARIS, Learning and memorising hippiatric knowledge in the late Antiquity and in Byzantium, in B. Andenmatten / A. Paravicini Bagliani / E. Pibiri (ed.), *Le cheval dans la culture médiévale*. *Micrologus' Library*, 69. Lausanne 2015, 269–294.

terranean region. But is this argument sufficient to speak of Mediterranean hippiatric science? Certainly, in spite of these translations and the influences that the translations had on the work of other hippiatrists both Arab and Western, the direct 'return' of their book production to Byzantium is limited.

Admittedly, A. McCabe has shown that the tenth-century re-edition of the *Hippiatrica* mentions oriental *materia medica*, such as ambergris and galangal, which were apparently not present in the original work of the hippiatrists whose texts were used for the composition of the *Hippiatrica*.<sup>78</sup> Thus, there was enrichment due to contacts with other cultures, and the Byzantine editor of the re-edition of the *Hippiatrica* (recension B) did not hesitate to add new medical material. However, despite these additions, the 'return' to Byzantium was only partial and indirect.<sup>79</sup> It is true that no new Byzantine hippiatric treatise appeared after the end of late antiquity in which Arabic and Latin hippiatric knowledge could have been added.<sup>80</sup> However, no Byzantine translation of one or more of these new Arabic and/or Latin texts was undertaken.<sup>81</sup> In the Byzantine recensions of the *Hippiatrica*, the knowledge produced among

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**78** A. McCABE, Imported *materia medica*, 4th–12th centuries, and Byzantine pharmacology, in M. M. Mango (ed.), *Byzantine trade, 4th–12th centuries: the archaeology of local, regional and international exchange*. Papers of the thirty-eighth spring symposium of Byzantine studies (St John's College, University of Oxford, March 2004). *Society for the Promotion of Byzantine Studies. Publications*, 14. Farnham / Burlington (Vt.), 273–292, especially 288–290. See also McCABE, *A Byzantine encyclopaedia* (as footnote 16 above), 271–272.

**79** Moreover, very often, these medical additions were due to travelers-merchants. They introduced Mediterranean cultures not only to unknown substances, but also to new texts and instruments. These innovations would then complete the knowledge that was already acquired and would help scholars to question that same knowledge. See for example D. JACOBY, *Commercial exchange across the Mediterranean Byzantium, the Crusader Levant, Egypt and Italy. Variorum collected studies series*, CS836. Aldershot / Burlington (Vt.) 2005; J. GOLDBERG, *Trade and institutions in the medieval Mediterranean. The Geniza merchants and their business world*. Cambridge / New York, N.Y. 2015.

**80** For a summary, see LAZARIS, *Veterinary* (as footnote 16 above).

**81** The only translations into Greek are from late antiquity. As has been pointed out, Apsyrtus may have translated or had available to him a translation from Latin of Columela's *De Re Rustica*. Similarly, the Latin text of Pelagonius was translated into Greek, at the latest, at the time of the constitution of the *Hippiatrica*, which is situated at the beginning of the sixth century (see above, p. 395). Finally, it is very likely that a translation of Vegetius' *Mulomedicina* was used by the compiler of the *Hippiatrica*. Unrelated to the *Hippiatric* texts, on translations into Greek in the Byzantine world, see, lastly, and with previous bibliography A. KALDELLIS, *Catalogue of Translations into Byzantine Greek from texts in any other language, 300–1453 AD*. 2018 (version III) [on-line: [https://www.academia.edu/36711128/Kaldellis\\_Catalogue\\_of\\_Translations\\_into\\_Byzantine\\_Greek\\_version\\_III\\_](https://www.academia.edu/36711128/Kaldellis_Catalogue_of_Translations_into_Byzantine_Greek_version_III_)]; R. FORRAI, *Translations from other Languages into Greek: Latin*, in S. Papaioannou (ed.), *The Oxford handbook of Byzantine literature*. New York, N.Y. 2021, 180–188; P. UBIERNA, *Translations from other Languages into Greek: Syriac*, in S. Papaioannou (ed.), *The Oxford handbook of Byzantine literature*. New York, N.Y. 2021, 189–195; C. MESSIS / S. PAPAIOANNOU, *Translations from other Languages into Greek: Arabic*, in S. Papaioannou (ed.), *The Oxford handbook of Byzantine literature*. New York, N.Y. 2021, 195–218; A. KALDELLIS, *Translations into Greek in the Byzantine Period*, in D. Gutas / C. Burnett / U. Vagelpohl

Arab and Western scholars in the field of hippiatry appears only in a very incomplete and indirect way. Intellectual collaboration in the field of hippiatry was therefore not comprehensive,<sup>82</sup> and one cannot claim to witness a cross-cultural transmission<sup>83</sup> with an integration of hippiatric knowledge.<sup>84</sup>

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(ed.), *Why Translate Science? Documents from Antiquity to the 16th Century in the Historical West (Bactria to the Atlantic)*. *Handbook of Oriental Studies. Section 1. The Near and Middle East*, 160. Leiden 2022, 397–444.

**82** In many other cases it happened, especially in medicine. Take, for example, the case of the treatise *De plantis*. This text was lost in Greek and recovered much later in Byzantium and circulated in small circles, re-translated into Greek from a Latin version, which had been translated from Arabic to Latin. The Greek version was later translated into Syriac and later still into Arabic. The treatise disappeared early in the Byzantine period and one must wait for the 14th century to find some interest in this lost text (on this treatise, see A. TOUWAIDE, *Medicine and Pharmacy*, in S. Lazaris (ed.), *A Companion* (as footnote 1 above), 354–403, especially 305–306). On Arabic-Greek interaction and transfer of knowledge in the field of medicine, see P. E. PORMANN, *The Parisinus Graecus 2293 as a Document of Scientific Activity in Swabian Sicily*, *Arabic Sciences and Philosophy* 13 (2003), 137–161; B. ZIPSER, *Griechische Schrift, arabische Sprache und graeco-arabische Medizin: Ein neues Fragment aus dem mittelalterlichen Sizilien*, *Mediterranean Language Review* 15 (2003/2004), 154–166; M. MAVROUDI, *Arabic Words in Greek Letters: The Violet Fragment and More*, in J. Lentin / J. Grand'henry (ed.), *Moyen arabe et variétés mixtes de l'arabe à travers l'histoire. Actes du premier colloque international (Louvain-la-Neuve, 10–14 mai 2004)*. *Publications de l'Institut orientaliste de Louvain*, 58. Louvain-la-Neuve / Paris 2008, 321–354, especially 329–341. More generally, see IERACI BIO, *La trasmissione* (as footnote 61 above); A. TOUWAIDE, *Medicina Bizantina e Araba alla Corte di Palermo*, in N. G. De Santo / G. Bellinghieri (ed.), *Medicina, scienza e politica al tempo di Federico II. Atti del convegno (Palermo, 4–5 ottobre 2007)*. Napoli 2008, 39–55; M.-H. CONGOURDEAU, *La médecine byzantine à la croisée de l'Orient et de l'Occident*, in A. Speer / P. Steinkrüger (ed.), *Knotenpunkt Byzanz Wissensformen und kulturelle Wechselbeziehungen. Miscellanea mediaevalia*, 36. Berlin / Boston, Mass. 2012, 223–231; P. BOURAS-VALLIANATOS, *Cross-cultural Transfer of Medical Knowledge in the Medieval Mediterranean: The Introduction and Dissemination of Sugar-based Potions from the Islamic World to Byzantium*. *Speculum* 96,4 (2021), 963–1008. This phenomenon of cross-cultural dissemination is also observed in astronomy (see for example A. TIHON, *Les textes astronomiques arabes importés à Byzance aux XIe et XIIe siècles*, in Draelants / Tihon / Van den Abeele (ed.), *Occident* (as footnote 35 above), 313–324; M. MAVROUDI, *Exchanges with Arabic Writers during the Late Byzantine Period*, in H. C. Evans (ed.), *Byzantium faith and power (1261–1557)*. New York, N.Y. / New Haven, Conn. / London 2004, 62–75, especially 65–71).

**83** On cross-cultural transmission, see S. BRENTJES / A. FIDORA / M. M. TISCHLER, *Towards a New Approach to Medieval Cross-Cultural Exchanges*. *Journal of Transcultural Medieval Studies* 1 (2014), 9–50, especially 30–33.

**84** However, in other areas of veterinary medicine the Byzantines did not hesitate to draw on Arabic and perhaps Latin sources. See S. LAZARIS, *La production nouvelle en médecine vétérinaire sous les Paléologues et l'œuvre cynégétique de Dêmétrios Pépagôménos*, in M. Cacouros / M.-H. Congourdeau (ed.), *Philosophie et sciences à Byzance de 1204 à 1453: les textes, les doctrines et leur transmission. Actes de la table ronde organisée au XXe Congrès international d'études Byzantines (Paris, 2001)*. *Orientalia Lovaniensia analecta*, 146. Leuven 2006, 225–267; S. LAZARIS, *Hunting in Byzantium: a case-study in falconry*, in C. Brunet / B. Van den Abeele (ed.), *Falconry in the Mediterranean Context during the Pre-Modern Era. Bibliotheca Cynegetica*, 9. Genève 2021, 261–276.

However, these cross-community exchanges are more complex to identify than they might seem. As mentioned above a ‘simple’ translation involves much more than the transcription into another language of the content of the original text.<sup>85</sup> This is even more apparent in the case of the acquisition of scientific instruments. Thus, the transmission to the West of the astrolabe, an instrument for measuring geographical positions and the height of the stars, cannot be reduced to a material transmission, as it also implies the transmission of abstract facts, such as mathematical imagination and the experience of the body.<sup>86</sup> This intertwining of the material and the immaterial is even more visible in the case of the game of chess, which was transferred from India (5th C.) to Western Europe (11th C.) via the Muslim world. It is obvious that one could not just transmit the material object alone, but also the rules of the game. This is why the game of chess naturally underwent, not only in its rules but also in its components, a long and complex adaptation. This can be seen in the metamorphosis of the vizier into a queen, of the elephant into a dolphin and then into a bishop, of the chariot into a tower and so on.<sup>87</sup> Another example is provided by M. Ouerfelli’s study of the diffusion of sugar in the Mediterranean. In this case, transmission has an abstract dimension that goes much further than the simple act of disseminating a commodity within the Mediterranean economy. Material transmission is strongly linked to the transmission of knowledge, particularly concerning the qualities, uses and production techniques of sugar.<sup>88</sup> This is also one of the conclusions of P. Bouras Vallianatos in his recent study on sugar-based medicinal recipes.

Moreover, as Bouras Vallianatos points out “The earliest reference to a sugar-based potion in a medical context in Byzantine literature is found in a manual on

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**85** The act of translation changes a text in many ways, ranging from errors in copying to intentional editing and rearrangement. With each new language a work is received in, even with each individual translation, the work itself will change, as well as and how it is viewed, understood, and used. This is not a matter of inaccuracy or misinterpretation, but of real developments in philosophical and scientific thought. The best and most used translations were not made by exactly transliterating individual words in a one-to-one correspondence; rather, it was necessary for the translator to understand the meaning of the text and completely re-write it in the new language.

**86** See for instance on this topic A. BORRELLI, Aspects of the Astrolabe: “Architectonica Ratio” in Tenth- and Eleventh-Century Europe. *Sudhoffs Archiv Beihefte*, 57. Stuttgart 2008.

**87** M. PASTOUREAU, Une histoire symbolique du Moyen Âge occidental. *La Librairie du XXIe siècle*. Paris 2004, 269–291, especially 282–284; O. R. CONSTABLE, Chess and courtly culture in medieval Castile: The ‘Libro de ajedrez’ of Alfonso X, el Sabio. *Speculum* 82 (2007), 301–437; H. HOLLÄNDER, Ein Spiel aus dem Osten, in O. Engels / P. Schreiner (ed.), Die Begegnung des Westens mit dem Osten. Kongressakten des 4. Symposions des Mediävistenverbandes in Köln 1991 aus Anlass des 1000. Todesjahres der Kaiserin Theophanu. *Kongressakten des 4. Symposions des Mediävistenverbandes*, 4. Sigmaringen 1993, 389–416.

**88** M. OUERFELLI, Le sucre production, commercialisation et usages dans la Méditerranée médiévale. *The medieval Mediterranean*, 71. Leiden / Boston, Mass. 2008.

horse medicine, called the *Hippiatrica*.<sup>89</sup> Unquestionably, therefore, the Byzantines took advantage of some of the new discoveries and inserted them into hippiatric writings and, more specifically, into their Byzantine recensions. There were some improvements in the latter, but these were very patchy compared to the progress made by the Arabs and Westerners. It should be noted that this opening, at least for the specific example of sugar as a pharmacological ingredient, took place at a time when Byzantine science was undergoing an unprecedented expansion and a certain openness towards other cultures. Indeed, the recipe belongs to recension B of the *Hippiatrica*, whose earliest testimonial, *Berlin, Staatsbibliothek zu Berlin-Preußischer Kulturbesitz, Phillipps* 1538 (*olim gr.* 134), dates from the tenth century and is related to the imperial scriptorium of Constantine VII (r. 913-959).<sup>90</sup> This is a period marked by a scientific-cultural revival under the influence of the Macedonian dynasty, which could explain, at least in part, this open-mindedness towards discovering other cultures.<sup>91</sup>

However, one must wait for the thirteenth century to be able to speak of a genuine Mediterranean scientific *métissage*. From then on, in the West, the two-way relationship model (Arabic-Greek, Greek-Latin, etc.) was abandoned. Instead, there was a proliferation of Mediterranean hippiatric knowledge as a whole, which meant that a real craze for hippiatry was revived. This can be seen in the systematic copying of manuscripts, marginal commentaries, new translations and new treatises, some of which have been listed above. The centre of gravity of this new intellectual peak in hippiatry was now concentrated mainly in southern Italy and Sicily. Indeed, Sicily and Southern Italy had become ideal places for making Greek learning available to the Latin Middle Ages. First, they had numerous Greek works kept for the most part in Basilian monasteries. Some of these works might have been there since late antiquity, or they were acquired through trade with the Byzantine Empire.<sup>92</sup> Second and most importantly, one must never forget the constant presence in Sicily and Southern Italy

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**89** BOURAS-VALLIANATOS, Cross-cultural (as footnote 82 above). For the text, see ODER / HOPPE, *Corpus hippiatricorum Graecorum* (t. 1), 386 (*Hippiatrica Berolinensia*, CXXIX, 8). See also ODER / HOPPE, *Corpus hippiatricorum Graecorum* (t. 2), 273 (*Excerpta Lugdunensia*, 5).

**90** On this manuscript, see LAZARIS, *Art et science* (as footnote 17 above), 32–33, 39–40, 133.

**91** In addition to references cited, see P. LEMERLE, *Le premier humanisme byzantin: notes et remarques sur enseignement et culture à Byzance des origines au Xe siècle*. *Bibliothèque byzantine – Etudes*. Paris 1971; B. FLUSIN / J.-C. CHEYNET (ed.), *Autour du Premier humanisme byzantin & des Cinq études sur le XIe siècle. Quarante ans après Paul Lemerle. Travaux et mémoires*, 21,2. Paris 2017.

**92** In general, on trade in Byzantium, see: A. E. LAIOU, C. BOURAS (ed.), *The economic history of Byzantium: from the seventh through the fifteenth century*. *Dumbarton Oaks studies*, 39. Washington (DC) 2002 (especially, part 4. Exchange, Trade, And Markets); M. M. MANGO (ed.), *Byzantine trade, 4th–12th centuries: the archaeology of local, regional and international exchange*. *Papers of the thirty-eighth spring symposium of Byzantine studies* (St John's College, University of Oxford, march 2004). *Society for the Promotion of Byzantine Studies. Publications*, 14. Farnham / Burlington, Vt. 2009; P. MAGDALINO / N. NECİPOĞLU, *Trade in Byzantium*. *Papers from the Third International Sevgi Gönül Byzantine Studies Symposium*. Istanbul 2016.

of groups of native speakers of Greek. Some have survived to this day in the regions of Reggio di Calabria and in the Terra d'Otranto. In the twelfth and thirteenth centuries, three (if not more) languages and ethnic communities coexisted in the Norman kingdom of Sicily and Southern Italy, which explains why the chancellery used to issue its orders and documents in Latin, Greek and Arabic; as stated above, some people, like Frederick II, were fluent in all three languages.

We can therefore ascertain that these intellectual interactions around hippiatric texts provoked cross-cultural connections, with varying degrees of success from one civilization to another, which prevented an inward-looking attitude and allowed for a deeper and shared knowledge. There was therefore a real *métissage* (on this term, see above, n. 12) and not a cultural hegemony of one culture over all others, through translations and reciprocal influences, and in this sense there was a Mediterranean hippiatric science. The medieval Mediterranean as an area of scientific and cultural contacts, as a space for meetings between scholars, hybridisation of knowledge and cultural convergence between Jews, Christians (Catholic and Orthodox) and Muslims did indeed exist, and hippiatric science, despite certain reservations about Byzantium, is evidence of this phenomenon. We can therefore speak of a Mediterranean perspective on the history of hippiatric medieval science. Through the migration of hippiatric knowledge, its appropriation by one culture from another and the many different readings, translations, commentaries and new works produced as a result of these intellectual processes, we can finally cease to belittle the Mediterranean Middle Ages as a poor, even barren, period and area in terms of scientific achievements.