Ǧābir b. Ḥayyān as a Touchstone of Arabic Sciences in the 8th Century

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Abstract

The beginnings of Arabic science are related closely to the translation movement from Greek into Arabic, which is considered to have commenced in the latter half of the 8th century. The Ǧābirian corpus, however, which is regarded as a repository of the science of those days along with the Greek heritage transmitted to Arabic intellectuals, has not so far been sufficiently explored. What prevents us from investigating it is not only the complexity of its contents but also of the "Arabic Ǧābir problem": whether the alchemist Ǧābir b. Ḥayyān really existed or not, when and by whom the Ǧābirian corpus was composed. The Ǧābir problem was once a subdivision of the "Latin Geber problem," and later became an independent subject, which is a complex problem with the difficulties concerning the reliability of historical sources. If we recognize that Ǧābir lived in the 8th century, we need to presume that alchemical knowledge was transmitted from Greek into Arabic before the Abbasid translation movement; otherwise, the existence of Ǧābir in the proposed time would be unreal. Consequently, the attitude toward the Ǧābir problem can reflect nothing but the estimation of Arabic science in its early stage.

Keywords: Ǧābir b. Ḥayyan, Ǧābirian corpus, Arabic science

1. Introduction

When we talk about the Arabic sciences, we cannot ignore the translation activity from Greek into Arabic.[1] It is well known that a large number of scientific works originally written in Greek were translated into Arabic under the reigns of the Abbasid caliphs al-Manṣūr (r. 754–775), Hārūn al-Rašīd (r. 786–809) and al-Maʾmūn (r. 813–833). This translation movement started in the latter half of the 8th century and continued

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[1] In the expression Arabic sciences as used here "Arabic" does not mean "of the Arabs" but "in the Arabic language," i.e. "developed among those who wrote scientific works mainly in Arabic."

until around the end of the 10th century.[2] Through these translations, the Arabic intellectual world absorbed Greek heritage, which affected Arabic sciences. Indeed not all achievements of Arabic sciences stem from ancient Greek knowledge, but it cannot be denied that Arabic sciences were stimulated by Greek scientific works. Dealing with Arabic sciences thus inevitably requires research into the translation movement from Greek into Arabic. We are sure Arabic sciences were influenced by the knowledge from the non-Arabic world, but not sure exactly when such knowledge began to circulate among Arabic intellectuals. Even before the beginning of the Abbasid caliphate, Greek scientific thought may already have circulated in the area now known as the Middle East through Syriac and Middle Persian. Nothing prevents us from supposing that those who sought fascinating knowledge in foreign languages had channels to obtain it at that time. One such branch of knowledge is alchemical science. The history of alchemy is complicated and not easy to portray because it is filled with questionable traditions from historical points of view.[3] This paper will focus on one of the most famous aspects in the history of alchemy, namely, the Ǧābir problem: whether Ǧābir b. Ḥayyān existed in the 8th century or not, when and by whom the Ǧābirian corpus, a mass of works attributed to Ǧābir, was composed.

A proper reassessment of the questions sketched above represents a necessary condition for understanding whether Ǧābir can be regarded as one of the testimonies to the development of Arabic sciences in the early Abbasid period. For, if Ǧābir lived in the 8th century as a scientist having the knowledge which is encapsulated in the Ǧābirian corpus, his presence presupposes that the sciences of the time when Ǧābir is said to have lived already came up to a certain level. On the other hand, it has seemed pertinent to consider the Ǧābirian corpus to be apocryphal since the appearance of Kraus' studies on Ǧābir, but, even in this case, it is still worth trying to decode this Corpus, because it will

[2] The translation activity is discussed in Franz Rosenthal, *Das Fortleben der Antike im Islam* (Zürich: Artemis, 1965), translated as *The Classical Heritage in Islam* (London, Berkeley: Routledge, University of California Press, 1975); George Saliba, "The Development of Astronomy in Medieval Islamic Society," *Arab Studies Quarterly*, vol. 4, No. 3 (1982): 211–225, reprinted in George Saliba, *A History of Arabic Astronomy* (New York & London, 1994), 51–65; Dimitri Gutas, *Greek Thought and Arabic Culture: The Graeco–Arabic Translation Movement in Baghdad and Early ʿAbbāsid Society (2nd–4th/8th–10th centuries)* (London: Routledge, 1998). See also, as a more recent work, Marco Di Branco, "Un'istituzione sasanide?: Il Bayt al-ḥikma e il movimento di traduzione," *Studia Graeco-arabica*, vol. 2 (2012): 255–263.

[3] Information on Arabic alchemists and alchemical works can be found in Fuat Sezgin, *Geschichte des Arabischen Schrifttums*, vol. 4 (1971), 1–299, and Manfred Ullmann, *Die Natur-und Geheimwisseschaften in Islam* (1972), 145–270. Based on these and other studies, Georges C. Anawati surveys those who engaged in alchemy in Arabic in his "Arabic alchemy," *Encyclopedia of the History of Arabic Science*, vol. 3, ed. Roshdi Rashed (London: Routledge, 1996), 853–885. An example of questionable traditions is the records about Ḫālid b. Yazīd who is said to have worked as an alchemist at the Umayyad court. The legends about alchemy in the Umayyad period were considered spurious by Manfred Ullmann, "Ḫālid ibn Yazīd und der Alchemie : Eine Legende," *Der Islam*, vol. 55 (1978): 181–218. George Saliba, on the other hand, considers the legends to be based on historical facts in his recent article in which he discusses Ḫālid's interest in alchemy: "A New Alchemical Poem Attributed to Khālid b. Yazīd (d. ca. 705)," *Ambix*, vol. 64, No. 3 (2017): 220–233.

tell us the scientific knowledge in around the 9th and the 10th centuries when the Corpus would have been composed. Dealing with the Ǧābir problem, namely, analyzing the Ǧābirian corpus, means exactly to research on the science at that time. Moreover, there are many references to ancient Greek works and even verbatim citations from Greek treatises in the Ǧābirian corpus, as Kraus pointed out. Not all the works of the Ǧābirian corpus, however, have been studied enough. The progress in this study may bring us important information that, when combined with other pieces of evidence, could shed new light on the ongoing debate on the transmission of Greek science to the Arabs. Our understanding of their translation activity, in fact, mainly depends on the availability of primary sources and the study of the manuscripts that preserve them. The Ǧābirian corpus must be certainly counted among these sources. Therefore, we need to read the Ǧābirian corpus and cannot separate the study of the Ǧābir problem from that of translation activities in the Arabic world and of Arabic sciences.

First, we will give an overview of the research on the history of alchemy, especially the Geber problem in the 19th century.[4] We need to look first at the Geber problem to comprehend the transition of the Ǧābir problem because the Arabic Ǧābir problem was at first a part of the Latin Geber problem but gradually became independent of it. Following that, we will consider the Ǧābir problem itself as far as it concerns the influence of the translation movement. Through our examination of the history of the Ǧābir problem, we will realize the importance of the question on the historical existence of Ǧābir in the history of Arabic sciences.

2. Research in the 19th Century of the History of Alchemy

Already in the 18th century, doubts arose concerning the generally accepted Arabic origin of writings ascribed to Geber.[5] Nevertheless, the Latin Geber and the Arabic Ǧābir were widely regarded as an identical entity. In 1832, Karl Christoph Schmieder (1778–1850) published his book, *Geschichte der Alchemie*, which describes the history of alchemy from ancient Egypt through Greek, Arabic and Latin to 1800 A.D. Although this work had such a strong influence that Ruska still felt the need to review it a century after it was published, we should note it was not Ǧābir but Geber which was sketched in Schmieder's work.[6] For, in the chapter named "Arabic Alchemy," he used Latin works attributed to Geber as sources of his information on Ǧābir. In the same way, Ferdinand

[4] In this paper, we distinguish between Ǧābir and Geber, who are related closely but to be examined separately since they are not necessarily identical with each other. The Geber problem treats the authenticity of Latin Geber and his corpus, the Ǧābir problem that of Arabic Ǧābir and his corpus.

[5] Julius Ruska, "The History and Present Status of the Jaber Problem," *Journal of Chemical Education*, vol. 6, (1929): 1266–1276, esp. 1266–1267.

[6] Book review on Schmieder (1832) by Julius Ruska in *Zeitschrift für Angewandte Chemie*, vol. 41 (1928): 934.

Hoefer (1811–1878), whose *Histoire de la chimie* in 1842–43 recounts the history of alchemy and chemistry after the 16th century, also did not distinguish Latin Geber from Arabic Ǧābir. Today, however, we hesitate to identify Geber with Ǧābir. The process of separating Geber from Ǧābir began with a study by the German chemist Hermann Franz Moritz Kopp (1817–1892) who expressed doubts on the authenticity of the *Corpus geberianum*—which consists of *Summa perfectionis*, *De investigatione magisterii*, *De investione perfectionis* and *Liber fornacum*—in the third volume of his *Beiträge zur Geschichte der Chemie* in 1875.[7] Kopp concluded, however, that these texts were Latin translations of Arabic treatises written in the 8th century by Ǧābir b. Ḥayyān although he raised doubts about the genuineness of the *Corpus geberianum*.[8] Kopp could not accept that the *Corpus geberianum* did not originate in the Arabic Ǧābiran corpus despite his having found strong indications that Geber's *Summa* was not a translation from an Arabic original.[9] The next famous researcher in the history of alchemy is the French chemist Pierre Eugène Marcellin Berthelot (1827–1907).[10] His *Histoire des sciences: la chimie au Moyen Âge* published in 1886 is a noted voluminous work written with the help of his collaborators Rubens Duval and Octave Houdas.[11] Berthelot reached the conclusion that there was a discontinuity between the Arabic Ǧābirian corpus and the *Corpus geberianum*.[12] Following Kopp and Berthelot, the next notable researcher in this field is again a chemist, Edmund Oscar von Lippmann (1857–1940). His *Entstehung und*

[7] Hermann Kopp, *Beiträge zur Geschichte der Chemie*, Stück 1, 2 (Braunschweig: Friedrich Vieweg und Sohn, 1869), Stück 3 (1875). The *Testamentum Gebri* was usually associated above four as the *Corpus geberianum*, but the author of *Testamentum* was known later to be different from the author of the other treatises [Ruska (1929), 1266].

[8] Later researchers' views about Kopp's judgement may be found in Julius Ruska, "Hermann Kopp, Historian of Chemistry" (translated by Ralph E. Oesper), *Journal of Chemical Education*, vol. 14 (1937): 3–12, esp. 9, Martin Plessner, "Geber and Jābir ibn Hayyān: an Authentic Sixteenth-Century Quotation from Jābir," *Ambix*, vol. 16, No. 3 (1969): 113–118, esp. 113–114, and William R. Newmann, *The Summa Perfectionis of Pseudo-Geber: A Critical Edition*, *Translation and Study* (Leiden: Brill, 1991), 59–60.

[9] Newman demonstrated that the author of the *Summa perfectionis* was Paul of Taranto in his book published in 1991.

[10] The influence of Berthelot on chemistry is described in Vangelis Antzoulatos, "Berthelot's Pathway from Synthesis to Thermochemistry," *Ambix*, vol. 66, No. 1 (2019): 51–71.

[11] Marcellin Berthelot, *Histoire des sciences: la chimie au Moyen Âge*, I-*Essai sur la transmission de la science antique au moyen âge*; II-*L'alchimie syriaque*, in collaboration with R. Duval; III-*L'alchimie arabe*, texts and translations in collaboration with O. Houdas (Osnabrück: O. Zeller, 1967), reprint of (Paris: Imprimerie nationale, 1893). Ruska questions Berthelot's attitude toward his precursors, that is, whether there was "any occasion for his [Berthelot's] coolly disavowing his indebtedness to the work of Kopp and Hoefer," while he says "no one will deny that Berthelot's works are still an indispensable basis for researches in the history of alchemy " and "with the death of Berthelot all research in the field of alchemical history seemed also to have perished" until E. O. von Lippmann appeared [Ruska (1937), 12]. Plessner even says that it was not Berthelot but Kopp who first noted the discontinuity between the *Corpus geberianum* and the Arabic Ǧābirian corpus [Martin Plessner, "Ǧābir ibn Ḥayyān und die Zeit der Entstehung der Ǧābir-Schriften," *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, vol. 115 (1965): 23–35, esp. 25].

[12] We should remember, on the other hand, that Berthelot considered *Liber de septuaginta* to be authentic, that is, that it was a Latin translation of *the Book of Seventy (Kitāb al-sabʿīn)* attributed to Ǧābir [Berthelot (1893), 320–321].

Ausbreitung der Alchemie is particularly important due to its being a complement to the study of Berthelot.[13] As Sarton notes, however, Lippmann did not read the texts in the original languages when he wrote its fourth part, "Alchemy in the East." For his information on the Oriental sources, Lippmann depended on the translations by Orientalists such as Ruska.[14]

3. Difficulties of Both Historians and Chemists

In the 20th century, the Orientalists began to lead in the study of the history of alchemy instead of chemists. In an article published in 1923, Eric John Holmyard (1891–1959) praises the historical researches of Berthelot as a chemist, while pointing out at the same time the deficiencies of Berthelot's study.[15] For Holmyard, the fact that Berthelot was a chemist is a cause of both praise and criticism.

Holmyard thinks it requires adequate knowledge of chemistry to research the history of chemistry/alchemy.[16] Berthelot was qualified for dealing with the history of chemistry because he was an eminent chemist. But he did not have an acquaintance with Arabic. For that reason, he needed a cooperator, O. Houdas, who was an excellent Arabic scholar but did not possess knowledge of chemistry.[17] Holmyard says "even the best Arabic scholar would not produce a satisfactory translation of such a work" as alchemical one "unless he was familiar with many others of the same genre."[18] Indicating some representative mistranslations which are crucial in the alchemical works, Holmyard concludes Houdas' translations are untrustworthy and inaccurate from a technical point of view. Moreover, he criticizes the region of Berthelot's research. The problems which Berthelot wished to solve were the following: (1) what was the relation between the alchemy of the Greeks and that of the early Muslims, and (2) whether certain of the Latin works of the early Middle Ages were really translations from the Arabic. Berthelot examined, therefore, only the earliest and latest periods in the history of chemistry in Islam, whereas Holmyard considers the intervening period of three or four centuries as the period in which alchemy flourished among the Muslims. As regards the Geber problem, Berthelot proved the Latin *Corpus geberianum* could not have been translated

[13] Edmund O. von Lippmann, *Entstehung und Ausbreitung der Alchemie* (Berlin: Verlag von Julius Springer, 1919).

[14] Book review on Lippmann (1919) by George Sarton, *Isis*, vol. 3, No. 2 (1920): 302–305, esp. 304.

[15] Eric J. Holmyard, "A Critical Examination of Berthelot's Work upon Arabic Chemistry," *Journal of the Society of Chemical Industry*, vol. 42 (1923): part I: 958–963, part II: 976–980, esp. 980.

[16] "It will, I think, be generally agreed that the historian of chemistry must primarily be a chemist, for otherwise he is fatally handicapped from the start" [Holmyard (1923), 959]. Here we have no difference between chemistry and alchemy because Berthelot and Holmyard, as far as he talked about Berthelot, seem to have used "chemistry" for both chemical and alchemical knowledge.

[17] Houdas is famed for his translation of Buḫārī's *Traditions of the Prophet*. Octave Houdas & William Marçais (tr.), *Les traditions islamiques: el-Bokhâri*, t. 4 (Paris: Imprimerie nationale, 1903–14).

[18] Holmyard (1923), 959.

from the Arabic Ǧābirian corpus which he published in cooperation with Houdas, but he did not prove, Holmyard emphasizes, the Latin *Corpus geberianum* was not based on Arabic originals which Berthelot did not explore. As if to respond to Berthelot's conclusions, Holmyard proceeded to study the Geber problem and insisted that Geber was Ǧābir and that the *Corpus geberianum* stems from the Ǧābirian corpus. In addition to that, he focused on the problem of who Ǧābir was and provided a detailed description of this legendary person.

4. Historical Figure of Ǧābir

Holmyard proposed a historical description of Ǧābir, which, though provisional, is still the generally accepted view of Ǧābir today.[19] It may be summarized as follows: Ǧābir was born in around 721 A.D., closely associated with the Barmak family, who were politically important under the reign of the Abbasid Hārūn al-Rašīd, and lived till the reign of al-Maʾmūn. His father was Ḥayyān al-ʿAṭṭār (lit. perfume-maker, apothecary), a pharmacist and a Shiite missionary who worked for the Abbasid. This father-son relation of Ḥayyān al-ʿAṭṭār and Ǧābir b. Ḥayyān explains why Ǧābir took up alchemy; he was no doubt inspired by his father's pharmaceutical knowledge. It also explains why Ǧābir was favored by the followers of Ǧaʿfar al-Ṣādiq, since his father had dedicated himself to a Shiite mission.

According to *Kitāb al-aḫbār al-ṭiwāl* of al-Dīnawarī, Ḥayyān al-ʿAṭṭār was a Shiite missionary from Kūfa, and was executed by the Umayyads in Ḫurāsān. If Ǧābir's father was from Kūfa and died in Ṭūs in Ḫurāsān, that would explain why Ǧābir is called Kūfī as well as Ṭūsī. Moreover, since Ḥayyān seemed to have been executed soon after he arrived in Ḫurāsān, if Ǧābir was born there, we have a limited period of time in which Ǧābir must have been born. In addition, if this Ḥayyān was Ǧābir's father, it would be natural that there is a work dedicated to ʿAlī b. Yaqṭīn in the Ǧābirian corpus, i.e. that Ǧābir would be acquainted with ʿAlī b. Yaqṭīn, since ʿAlī's father Yaqṭīn b. Mūsā is mentioned as a Shiite missionary like Ḥayyān al-ʿAṭṭār in Dīnawarī's *Kitāb al-aḫbār al-ṭiwāl*. Holmyard supposed Ḥayyān and Yaqṭīn were acquainted and likewise their sons knew each other. Furthermore, it is likely that Ǧābir was a disciple of the 6th Imam Ǧaʿfar al-Ṣādiq because the name Ǧaʿfar is mentioned frequently in the Ǧābirian corpus. The connection between Ǧābir and Ǧaʿfar al-Ṣādiq can be explained on the basis of the relationships between Yaqṭīn b. Mūsā and Ḥayyān al-ʿAṭṭār, their sons ʿAlī b. Yaqṭīn and Ǧābir b. Ḥayyān, and Ǧaʿfar al-Ṣādiq and ʿAlī b. Yaqṭīn. Such considerations make it

[19] The survey of Ǧābir's life is summed up in Fric J. Holmyard, *Alchemy* (Harmondsworth: Penguin, 1957), 68–73, which is mainly based on his previous researches; Holmyard, "Jābir ibn Ḥayyān," *Proceedings of the Royal Society of Medicine*, vol. 16 (1923): 46–57; Holmyard, "The Present Position of the Geber Problem," *Science Progress*, vol. 19 (1925): 415–426; Holmyard, "An Essay on Jābir ibn Ḥayyān," *Studien zur Geschichte der Chemie: Festgabe Edmund O. v. Lippmann*, ed. Julius Ruska (Berlin: Springer, 1927), 28–37.

quite plausible that what is written about Ǧābir in the historical sources is true, and that Ḥayyān al-ʿAṭṭār was the father of this Ǧābir.

Although this view is a mere conjecture as Holmyard himself acknowledges, it has been accepted as a historical fact of Ǧābir, owing to the absence of other persuasive explanations.[20] After Holmyard established his hypothesis on Ǧābir, Paul Kraus (1904–1944) began to publish his research on Ǧābir in the 1930s, and in his last years wrote his monumental works which are still fundamental for the study of Ǧābir.

5. Ǧābir Problem

Before turning to Kraus, we will shift our attention to Julius Ruska (1867–1949), who seems to have been the first to clearly separate the Ǧābir problem from that of Geber.[21] Although the problems about Ǧābir had already been discussed before, it was secondary to the Geber problem. In 1924, Ruska published the works about the Umayyad prince Ḫālid b. Yazīd and the 6th Imam Ǧaʿfar al-Ṣādiq, who were deemed to be legendary and symbolic alchemists before Ǧābir.[22] Ǧaʿfar al-Ṣādiq is relatively important for us here from the perspective of his alleged acquaintance with Ǧābir.[23] Some Arabic alchemical works are ascribed to Ǧaʿfar al-Ṣādiq, but such ascriptions are considered in all cases to be spurious, Ruska concludes, saying that Ǧaʿfar al-Ṣādiq did not practice alchemy. For, "while the study of alchemy was practiced at Damascus, Baghdad and Alexandria," according to Holmyard who summarized the study of Ruska, "we can scarcely imagine it to have been countenanced in the very city of the Prophet, Medina, where Jaʿfar lived. It is, he [Ruska] says, absurd to imagine Jaʿfar—a pillar of the Shiʿa community—busying himself with cucurbite, alembic and aludel, and with mercury and sulphur, or teaching the art of the transmutation of the metals to a pupil like Jābir."[24] Based on this denial of the connection between Ǧaʿfar al-Ṣādiq and alchemy, Ruska insists that, among the Ǧābirian corpus, the works in which Ǧaʿfar al-Ṣādiq is named as Ǧābir's master are falsifications of a later period.[25] The problem discussed in this place is

[20] Holmyard says the father-son relationship between the permachist Ḥayyān and Ǧābir is "the tentative suggestion" [Holmyard, (1927), 32].

[21] On the Ǧābir problem, "This coinage seems to be due to J. Ruska writing in the 1920's and later" [Syed Nomanul Haq, *Names*, *Natures and Things: The Alchemist Jābir ibn Ḥayyān and his Kitāb al-Aḥjār (Book of Stones)*, (Dordrecht: Kluwer, 1994), 33, n. 2].

[22] Julius Ruska, *Arabische Alchemisten I*, *Chālid Ibn Jazīd Ibn Muʿāwija* (Heidelberg: Carl Winters Universitätsbuchhandlung, 1924); Julius Ruska, *Arabische Alchemisten II. Ǧaʿfar al Ṣādiq* (Heidelberg: Carl Winters Universitätsbuchhandlung, 1924).

[23] According to Ibn al-Nadīm, "they [the Shīʿah] claimed that he [Ǧābir] was a companion of Jaʿfar al-Ṣādiq" [Gustav Flügel (ed.), Ibn al-Nadīm, *Kitāb al-Fihrist* (Leipzig: F.C.W. Vogel, 1872), 355, and Bayard Dodge (tr.), *The Fihrist of al-Nadīm: A Tenth-century Survey of Muslim Culture* (New York: Columbia University Press, 1970), 853].

[24] Eric J. Holmyard, "The Present Position of the Geber Problem," *Science Progress*, vol. 19 (1925): 415–426, esp. 421.

[25] Holmyard declares he could not agree with all the points Ruska suggested. Holmyard says "even if

the authenticity of the Ǧābirian corpus, not of the *Corpus geberianum*. Thus, around the time when Ruska discussed the Ǧābir problem, the Ǧābirian corpus began to be examined in itself, not just as the sources of the *Corpus geberianum*.

6. Authenticity of Ǧābirian Corpus

Kraus demonstrated that the greater part of the Ǧābirian corpus would be apocryphal if Ǧābir was the man Holmyard described. Two of the major questions of the Ǧābir problem for Kraus are whether the enormous number of Arabic works should really be attributed to Ǧābir, and when they were composed. Regarding these points, Kraus provides the hitherto most widely accepted argument, according to which the extant Ǧābirian corpus emerged gradually between the second half of the 9th century and the beginning of the 10th century and was revised in the period down to the second half of the 10th century.[26] The Corpus must have been continued to be composed at least until the 10th century because it includes Ismaili thought which was propagated in that period. The *terminus post quem* is provided by the fact that the Corpus mentions ancient Greek writings which were translated into Arabic on a massive scale from the middle of the 9th century by the al-Kindī circle and a group led by Ḥunayn b. Isḥāq. Ancient Greek thoughts in the Ǧābirian corpus is so abundant that we cannot assume it was composed before the second half of the 9th century when the Arabic intellectuals enjoyed the knowledge from translations of Greek works. Hence Kraus concludes that the Ǧābirian corpus was composed by Ǧābir's disciples or those who held Ǧābir in reverence in later years in the century or so beginning in the second half of the 9th century. This dating of the Ǧābirian corpus was persuasive and its apocryphal feature is generally accepted today although there have been arguments both for and against Kraus' suggestion for a long time.

7. Arguments on Composition Date of Ǧābirian Corpus

The late dating of the Ǧābirian corpus was rejected by Sezgin, whom Plessner, in turn, strongly criticized, defending Kraus' views.[27] In contrast, Haq has supported Sezgin, although the evidence on which Haq depended in dating the translation activity earlier

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Jaʿfar was not a practicing alchemist, there is no valid reason for denying the connection between him and Jābir, or for assuming that Jaʿfar was unacquainted with the terms and aims of the alchemists" [Holmyard (1925), 422].

[26] Paul Kraus, *Jābir ibn Ḥayyān: contribution à l'histoire des idées scientifiques dans l'Islam*, 2 vols. (Hildesheim: G. Olms, 1989). Reprint of (Caire: Imprimerie de l'Institut français d'archéologie orientale, v. 1, 1943; v. 2, 1942), esp. v. 2, LXV.

[27] Fuat Sezgin, "Das Problem des Ǧābir ibn Ḥayyān im Lichte neuer gefundener Handschriften," *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, vol. 114 (1964): 255–268; Martin Plessner, "Ǧābir ibn Ḥayyān und die Zeit der Entstehung der Ǧābir-Schriften," *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, vol. 115 (1965): 23–35.

than is normally accepted has been questioned by Gannagé.[28] Against Kraus, Sezgin believes in the authenticity of the Ǧābirian corpus, i.e. that they could have been written in the 8th century, based on the fact we cannot reject the possibility that Greek works were translated into Arabic before the reign of al-Manṣūr (r. 754–775). Haq agrees with Sezgin and emphasizes that the translation activity could have been flourishing in the 7th and 8th centuries. It should be noted, however, that opinions on the Ǧābir problem are not simply divided into two camps. As Plessner says, what was questioned by Kraus was not whether the person named Ǧābir lived in the 8th century, but whether the Arabic texts which have come down to us were written in the 8th century or not, whatever the author's real name was.[29] It means that Ǧābir's historicity was not a prime concern for Kraus. Actually, Kraus acknowledges that we cannot refute the ingenious life story of Ǧābir as described by Holmyard.[30] In the first place, to say that the Ǧābirian corpus is a "forgery," we would have to assume that Ǧābir lived in the 8th century. After the appearance of Kraus' study, Holmyard gradually changed his belief in the authenticity of the Ǧābirian corpus and accepted the results of Kraus' investigations,[31] while he presents the historical figure of Ǧābir in the 8th century as a "probably authentic" account "in the main."[32]

It is difficult to prove the historicity of Ǧābir owing to the limitations of the sources. Instead, the question as to when the Ǧābirian corpus was composed has become the main point of the Ǧābir problem. Kraus says if we accept the authenticity of the Ǧābirian corpus as well as Ǧābir's existence in the 8th century, it is not al-Ḫwārizmī who introduced the Indian method of calculation into the Arabic world and not the school of Ḥunayn which established the scientific terminology in Arabic.[33] Among the examples for which Sezgin criticized Kraus, there was the problem of the dating of the work on Hermetic magic, *Kitāb sirr al-ḫalīqa* attributed to Apollonius of Tyana, who is known as Balīnās in Arabic. The words of Balīnās are frequently quoted in the Ǧābirian corpus in connection with the science of balance,[34] and the *Kitāb sirr al-ḫalīqa* has had a major influence on the Corpus as Kraus affirmed.[35] Kraus concludes that Pseudo-Apollonius of Tyana's *Kitāb sirr al-ḫalīqa* is not a work composed in Greek but a forgery originally written in Arabic under the reign of Maʾmūn. Contrary to Kraus, Sezgin claims that *Kitāb*

[28] Haq (1994); Emma Gannagé, *Le commentaire d'Alexandre d'Aphrodise In de generatione et corruptione perdu en grec, retrouvé en arabe dans Ǧābir ibn Ḥayyān, Kitāb al-Taṣrīf*, PhD diss., (Université Paris 1 Panthéon-Sorbonne, 1998).

[29] Plessner (1965), 29–30.

[30] Kraus (1943), XLVI.

[31] Eric J. Holmyard, *Alchemy* (Harmondsworth: Penguin, 1957), 73–74. The attitude of Holmyard to Kraus' view is sketched in Plessner (1965), 26, and Haq (1994), 38, n. 52.

[32] Holmyard (1957), 68.

[33] Kraus (1943), XLVIII.

[34] The science of balance is one of the characteristic knowledge of Ǧābirian alchemical thought. The details are reported in Kraus (1942), 187–303.

[35] Kraus (1942), 282.

sirr al-ẖalīqa is an Arabic translation of a Greek work written in the 6th century. Weisser agrees with Sezgin, while Zimmermann supports the view that *Kitāb sirr al-ẖalīqa* originated in Arabic.[36] The date of composition of *Kitāb sirr al-ẖalīqa* is still uncertain, but it is one of the pieces of the puzzle which may help us determine the *terminus post quem* of the Ǧābirian corpus.

8. Possibility of Intellectual Interaction in the Umayyad Period

Besides the aforementioned views, Lory, who was convinced of the apocryphal nature of the Ǧābirian corpus but did not definitively deny the historical existence of Ǧābir in the 8th century, thinks that the true history of alchemy could not be perceived by those who were close to the center of the government.[37] He supposes that the alchemical works in Greek, Coptic and Syriac might have been translated into Arabic before the translation movement which began under the auspices of the Abbasid court, indicating there are references not only in the work of the alchemist al-Ǧaldakī (d. 1342) but also of the philosopher Suhrawardī (1154–1191) that the scientific and philosophical works connected with alchemy were translated into Arabic in the Umayyad period.[38] In other words, at least one person who was outside of the alchemical circles provides testimony that the translation activity had begun before the Abbasid period. We will return to this point later.

As the basis of his view, Lory mentions Grignaschi, who argues that the knowledge including that of alchemy was imported into Arabic from foreign languages in the

[36] Book review on Ursula Weisser, *Das „Buch über das Geheimnis der Schöpfung" von Pseudo-Apollonios von Tyana* (Berlin: 1980) by Zimmermann, *Medical History*, vol. 25, No. 4 (1981): 439–440. As for when *Kitāb sirr al-ẖalīqa* was composed, it seems to be crucial when *Kitāb al-istamāṭīs*, on which *Kitāb sirr al-ẖalīqa* depends, was written. No one refutes *Kitāb sirr al-ẖalīqa* stems from *Kitāb al-istamāṭīs*. Weisser is distinguished for insisting *Kitāb sirr al-ẖalīqa* imported *Kitāb al-istamāṭīs* before being translated into Arabic from others who consider that Arabic *Kitāb al-istamāṭīs* influenced on *Kitāb sirr al-ẖalīqa* originated in Arabic. Further information of *Kitāb al-istamāṭīs* is in Charles Burnett, "Hermann of Carinthia and the *Kitāb al-Isṭamāṭīs*: Further Evidence for the Transmission of Hermetic Magic," *Journal of the Warburg and Courtauld Institutes*, vol. 44 (1981): 167–169.

[37] Lory accepts the hypothesis that Ǧābir lived in the 8th century and makes the following supposition: in the pre-Islamic era, there was a group of people who were familiar with Gnostic, magical and eclectic knowledge which formed part of the shared religious culture of the Near East, away from the control of the Church. Those who belonged to this group had maintained and cultivated alchemical knowledge. Later, these intellectuals were Arabized and Islamized, while the Arab Muslims too became interested in such knowledge. In this way, alchemy was transmitted. There could, therefore, have been sufficient intellectual basis for the existence of the alchemist Ǧābir in the 8th century. Regarding the Ǧābirian corpus, Lory thinks a certain Shiite alchemical school which appeared around Ǧābir in Iraq and Iran began to compose the corpus attributed to Ǧābir based on their philosophy in the latter half of the 8th century. In the 9th century, this school absorbed Greek philosophical and scientific ideas which were conveyed through works translated into Arabic and incorporated these new ideas into the Corpus. The Corpus was then revised and placed under the authority of Imām Ǧaʿfar at the beginning of the 10th century [Pierre Lory, *Alchimie et mystique en terre d'Islam* (Lagrasse: Verdier, 1989), 20–21].

[38] Henry Corbin & Pierre Lory, *L'Alchimie comme art hiératique* (Paris: L'Herne, 1986), 70–71.

Umayyad period. Based on his examination of the Arabic "Letters of Aristotle to Alexander," Grignaschi suggested the existence of an Arabic group in Syriac[39] which was already interested in the Greek and Iranian civilizations under the reign of the Umayyads, namely, that the Arabic intellectuals had begun to assimilate the heritage of ancient cultures and incorporate it into their own civilization in the Umayyad period.[40] With respect to the history of alchemy, after examining the two letters in ms. Vatican Syriac 209, whose author tends to combine the theory of alchemy with the principles of classic physics, Grignaschi says we may assume that the Arabs of the Umayyad period were interested in such occult sciences and that their language had already acquired the capacity of rendering all the concepts of Greek science and philosophy.[41]

In his recent article, Lory says that Kraus' view seems to be solid despite Sezgin and Haq's attempt to defend the view that Ǧābir could have lived in the 8th century and the beginning of the 9th century and he could be truly the author of the corpus attributed to Ǧābir.[42] Nonetheless, considering that Lory did not deny his previous view as mentioned above, he does not seem to renounce the possibility that the Arabic scholars had come into contact with the earlier intellectual stream in Syria and Iran in the Umayyad period.

9. Latest Study of Ǧābir

At the end of the 20th century, around the same time when Lory, Haq and Gannegé published their articles on Ǧābir, the research on the history of alchemy resumed among scientists. Newman made steady progress in the interpretation of the Latin alchemical texts and Principe tried to elucidate the technique of alchemy with modern chemical knowledge.[43] Recently, some articles related to the history of alchemy were published which cast a new light on the history of Arabic alchemy.[44]

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[39] The Arabic "Letters of Aristotle to Alexander" is one of the Arabic texts written in Syriac script.

[40] Mario Grignaschi, "Les «Rasāʾil ʾAristāṭālīsa ʿilā-l-Iskandar» de Sālim Abūl-ʿAlāʾ et l'activité culturelle à l'époque Umayyade," *Bulletin d'études orientales*, vol. 19 (1965−1966): 7−83, esp. 9.

[41] Gringaschi (1965−66), 50−51.

[42] Pierre Lory, "Ésotérisme shi'ite et alchimie. Quelques remarques sur la doctrine de l'initiation dans le Corpus Jābirian," *L'ésotérisme shi'ite*, ed. Amir-Moezzi et al. (2016), 411−422, esp. 412, n. 4.

[43] Some of their publications are William R. Newman, "New Light on the Identity of *Geber*," *Sudhoffs Archiv für die Geschichte der Medizin und der Naturwissenschaften*, vol. 69, No. 1 (1985): 76−90; William R. Newmann, *The Summa Perfectionis of Pseudo-Geber: A Critical Edition, Translation and Study* (Leiden: Brill, 1991); William R. Newman & Lawrence M. Principe, "Alchemy vs. Chemistry: The Etymological Origins of a Historiographic Mistake," *Early Science and Medicine*, vol. 3 (1998): 32−65; Lawrence M. Principe, *The secrets of alchemy* (Chicago; London: University of Chicago Press, 2013).

[44] Sébastien Moureau, "Some Considerations Concerning the Alchemy of the *De anima in arte alchemiae* of Pseudo-Avicenna," *Ambix*, vol. 56, No. 1 (2009): 49−56; Marion Dapsens, "De la Risālat Maryānus au De Compositione alchemiae: Quelques réflexions sur la tradition d'un traité d'alchimie," *Studia Graeco−arabica*, vol. 6 (2016): 121−140; George Saliba (2017). In addition, an interesting article will appear in the near future: Sébastien Moureau, "Alchemy and Medicine in the Texts Attributed to Jābir ibn Ḥayyān and their Transmission to the Latin World," in Jennifer Rampling and Peter M. Jones (eds.), *Alchemy and Medicine from Antiquity to the Enlightenment*, Farnham, Ashgate, forthcoming.

Among the recent authors, Delva accepts Kraus' conclusion about the late dating of the Ǧābirian corpus and casts doubt on the suggestion of Holmyard.[45] Although he admits the hypotheses of Holmyard are compelling, he rejects the notion that Ǧābir's father was Ḥayyān al-ʿAṭṭār, who was a Shiite missionary, by reexamining the contents of Dīnawarī's *Kitāb al-aḫbār al-ṭiwāl*, the only source which Holmyard used when he deduced this father-son relation, and by adding two sources which had been little studied until today, *Ansāb al-ašrāf* by Balāḏurī (d. 892) and *Aḫbār al-ʿAbbās wa-wuldihi*, an anonymous late 9th century text. Based on these new sources, he argues as follows: Ḥayyān al-ʿAṭṭār might not have been martyred for the Shiite cause. Far from that, he might not even have gone to Ḫurāsān. Additionally, Ḥayyān al-ʿAṭṭār is said in the sources to have been a member of the Nuḫaʿ tribe, which implies he could not be the father of Ǧābir who is called Azdī. Furthermore, Delva comes to reject the hypothesis that Ǧābir lived in the 8th century on the ground that the existence of Ǧābir was doubted from an early stage, that very few historical sources mention Ǧābir, and above all that Ǧābir does not appear in any Riǧāl works which document the important people for the Shiites.[46]

While Delva's main aim is to cast doubt on the hypothesis that Ḥayyān al-ʿAṭṭār is Ǧābir's father, in the course of doing so, he points out the problem concerning the reliability of the historical sources. He contends that al-Dīnawarī's *Kitāb al-aḫbār al-ṭiwāl*, on which Holmyard depended as only one single source, is lacking in reliability,[47] and also does not accept the references to Ǧābir by the 14th century alchemist al-Ǧaldakī, which are the other sources Holmyard used, on the ground that al-Ǧaldakī was "gathering the scattered information on Jābir and using this to construct a convincing biography for him."[48] On the other hand, he esteems highly the value of Balāḏurī's *Ansāb al-ašrāf* and the anonymous *Aḫbār al-ʿAbbās wa-wuldihi* although he recognizes that we must pay attention to their pro-Abbasid tendencies, considering both works were written by those who were close to the Abbasid court.

In the last part of his article, Delva expresses his wish that scholars will focus on the Ǧābirian corpus. Most parts of the Ǧābirian corpus remain untouched although it might be a repository of Arabic sciences and history. As we have seen, it is necessary to clarify the exact nature of the translation movement from Greek into Arabic in order to comprehend the Arabic sciences. The Ǧābirian corpus is like a node of the science of

[45] Thijs Delva, "The Abbasid Activist Ḥayyān al-ʿAṭṭār as the Father of Jābir b. Ḥayyān: An Influential Hypothesis Revisited," *Journal of Abbasid Studies*, vol. 4 (2017): 35–61.

[46] Kraus also emphasized that Ǧābir never appeared in the vast biographies of the Shiite Imams. [Kraus (1943), XLVI]. Delva denied the historicity of Ǧābir as described in the historical sources, but he did not deny the existence of Ǧābir himself. He supposed that Ǧābir must have lived in the first half of the 9th century if the Ǧābirian corpus was written by his immediate disciples and later followers [Delva (2017), 53, n. 87].

[47] Delva (2017), 43.

[48] Delva (2017), 52.

those times and the history of translation. In fact, excerpts from Greek works have been found in the Ǧābirian corpus. For instance, a part of the commentary by Alexander of Aphrodisias on Aristotle's *Generation and Corruption* is found in the *Book of Morphology (Kitāb al-taṣrīf)*, and a part of the translation of Aristotle's *Categories* in the *Book of Stones (Kitāb al-aḥǧār)*.[49] Besides these works, there is a prospect of finding new excerpts of the Greek works translated into Arabic in the *Book of Research (Kitāb al-baḥṯ)*, which abounds in references to Greek scientific and philosophical works but remains unedited.[50] It is hoped that all of the Ǧābirian corpus will be edited and translated to enable scholars to engage in further study of the Ǧābir problem and the history of alchemy.

10. Necessity of Both Internal and External Sources

It may be useful to draw a distinction here between the "internal" and "external" sources, whereby by "internal" sources are meant the books written by those who dedicated themselves to alchemy, and "external" the works by those who had no relation to alchemy. By introducing external sources which had not been examined earlier, Delva provided a new vision that helped to resolve the standstill in the study of the Ǧābir problem. External sources should be analyzed further because they may bring us new information and interpretation. As Lory supposed, however, we can never throw away the possibility that there can be an incident which does not appear in any external source. The known fact that the Abbasid court inspired the translation movement may warrant the connection between the center of politics and the development of sciences. Indeed the court supported scientists and this no doubt contributed to a rise in the level of sciences, but not all sciences were under the control of the administrators.[51] If some sciences could develop silently below the surface, their records may not appear in the external books whose authors were generally concerned only with the center stage of politics. We cannot eliminate the possibility that there were traditions of the sciences transmitted only among those who were engaged in those very sciences.

Certainly, the testimonies given by people far removed from alchemy should be valued due to their objectivity, but we should not simply ignore the testimonies provided

[49] The *Kitāb al-taṣrīf* is edited and translated in Emma Gannagé (1998), and the *Kitāb al-aḥǧār* is in Haq (1994).

[50] As the latest editorial work of the Ǧābirian corpus, Liana Saif is currently working on a critical edition and English translation of *Kitāb al-baḥṯ* within the framework of the ERC project "The origin and early development of philosophy in tenth-century al-Andalus: the impact of ill-defined materials and channels of transmission" led by Godefroid de Callataÿ in Louvain-la-Neuve.

[51] For example, it is recognized that the science of weights unique to the Arabic science developed among those who had commercial dealings without relation to the governors [Mohammed Abattouy, Jürgen Renn & Paul Weining, "Transmission as Transformation: The Translation Movements in the Medieval East and West in a Comparative Perspective," *Science in Context*, vol. 14 (2001): 1–12, esp. 4–5].

by those who were themselves engaged in alchemy. Even if such testimonies appear to be apocryphal at first, they should be examined as a historical source as long as it is an extant source. Only small portions of the works of al-Ǧaldakī, who wrote a history of alchemy have so far been edited or translated.[52] Al-Ǧaldakī's references to Ǧābir are actually doubtful owing to his reverence for Ǧābir and we need to take into account the possibility that he might have fabricated the stories on Ǧābir. It is not proper, however, to reject them before investigating them closely, for doing so would be as superficial as accepting the information without questioning.

11. Various External Sources

In considering whether Ǧābir as a historical figure really lived in the 8th century, it seems reasonable to examine the chronicles and historical and political records, seeking for historical clues concerning the person of Ǧābir. Clues, on the other hand, for the second pillar of the Ǧābir problem, that is, when and by whom the Ǧābirian corpus was composed, can be found in other external sources, which may not refer directly to Ǧābir but give us information on the Ǧābir problem for the reason that they have contents similar to those found in the Ǧābirian corpus. One group of such external sources is the Arabic works attributed to Alexander of Aphrodisias and the writings which discuss the science of weight. I am focusing, as an internal source, on the *Kitāb al-baḥṯ*, which has citations from Alexander's treatises on hylomorphism and descriptions of the hydrostatic balance as an apparatus for the science of balance. If we can determine the approximate date when Alexander's treatises cited in the *Kitāb al-baḥṯ* were translated into Arabic, it will help us limit the time period when the *Kitāb al-baḥṯ* could have been composed. My plan is to identify the original Greek work used as the source of the citations and to utilize the outcome of research on the Arabic versions of Alexander of Aphrodisias in determining when the Greek original was translated into Arabic. In addition, I will try to locate the *Kitāb al-baḥṯ* within the history of the science of weight by reconsidering Kraus' explanation that the concept of the specific weight was not essential for the balance system of Ǧābir. Such considerations should help us determine the date of composition of the *Kitāb al-baḥṯ*.

No matter how long we continue to struggle with internal and external sources, the Ǧābir problem might not be solved at all. Nevertheless, we cannot avoid tackling the Ǧābir problem if we are to study the Ǧābirian corpus. It is for that reason that I have overviewed the history of the Ǧābir problem in this paper by retracing the paths trodden by earlier scholars.

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[52] Holmyard already noted the importance of al-Ǧaldakī's works about eighty years ago [Eric J. Holmyard, "Aidamir Al-Jildakī," *IRAQ*, vol. 4 (1937): 47–53, esp. 52].

12. Historical Meaning of Ǧābir

We would like to conclude this paper by considering the significance of the Ǧābir problem. To accept the existence of a historical Ǧābir in the 8th century will require the premise that scientific activity was already relatively developed around that time. For it is unlikely that Ǧābir who is famous as an alchemist suddenly appeared without a background where there was sufficient accumulation of knowledge. As far as the possible existence of Ǧābir in the 8th century survives, we cannot be certain that the scientific knowledge in the Corpus does not come from the same period as that of the supposed Ǧābir or before, even if it is confirmed that the Ǧābirian corpus as we have it today is apocryphal. Although the claims by Sezgin and Haq against Kraus' late dating of the Ǧābirian corpus were denied, yet one cannot exclude the possibility of finding clues which will prove that translation activity had already begun before the time of the Abbasid translation movement, as long as we do not thoroughly read all works of the Ǧābirian corpus. Granting that we cannot find such a clue concerning the translation activity, we can nevertheless elucidate the reality of the Arabic sciences by analyzing each piece of the Corpus which is extant but not examined closely since it is a solid fact that the Corpus is full of the scientific knowledge of the period. For instance, the Ǧābirian corpus presents us the science of balance, which is considered by Kraus as an attempt of natural sciences in the Middle Ages to reduce all the given human knowledge to quantity and measure.[53] If we study the science of balance by taking into account the fact that it is not a mere past form of modern science (which is based on quantification), paying attention to its philosophical and magical knowledge, we will discover important features of Arabic sciences. Furthermore, as Kraus said, the balance varies according to the writings of the Corpus and to the objects to which it applies. Examining what the balance is in each work is equal to study Arabic science, and analyzing the science of balance starts with reading the Ǧābirian corpus, namely, touching the Ǧābir problem.

Those who investigate the history of Arabic sciences will express how they interpret the beginning of Arabic sciences by confronting the Ǧābir problem. The answer to it depends on the valuation of the level of sciences in the 8th century in and around the Arabic world. The existence of Ǧābir remains a touchstone for the evaluation of the history of sciences, especially the history before the translation activity in the Abbasid period.

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[53] Kraus (1942), IX.