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Sonja Brentjes (Ed.), *Routledge Handbook on the Sciences in Islamicate Societies: Practices from the 2nd/8th to the 13th/19th Centuries*, London, UK: Routledge, 2023, 876 pp., ISBN: 9781138047594.

The richly documented *Routledge Handbook on the Sciences in Islamicate Societies* makes an invaluable contribution to the study of the evolution of sciences, covering a huge historiographical gap in the history of science. The handbook examines an array of present approaches to the study of Islamicate theoretical and practical sciences by way of establishing rigorous perspectives on institutional novelties, source criticism, technical edge, and knowledge production, as well as socio-political shifts. It is arranged into various research fields with introductory texts penned by a group of junior, mid-career, and senior expert scholars, who follow chronological and geographical considerations via an overview of in-depth surveys in often-neglected linguistic contexts that existed beyond the hegemony of classical Arabic in Islamic scholarship. While acknowledging the significance of particular scholarly practices, the handbook looks for universalizing frameworks for the study of disciplines and problems in each field, by emphasizing regionalization and historical specification as its main historiographical contribution. The handbook also consists of specific studies about geometrical, arithmetical, astronomical, medical, and other scientific fields, and each case study is accompanied by central historiographical questions related to formal social and institutional structures that governed scientific organizations and geographies of knowledge in the region.

More importantly, the handbook is a rigorous encyclopedic compendium that questions the *idée fixes* of the "decline paradigm" often associated with the notion of the "Arab Golden Age." Such an approach also accentuates shifts and changes in geographies, epistemologies, political hierarchies, and cross- and inter-communal interactions and confessions, along with analyses based on cultural contact, materiality, practical procedures, and experimentation—aspects often left out in previous such studies. Two of the great regional focal points included are al-Andalus and the Maghrib, yet the narrative also extends to other underemphasized fringes of the Islamicate world, such as the Balkans, West Africa, and South and East Asia.

One significant novelty of the handbook is to bring new conceptualizations and uses of terminology in describing methods, trends, and institutions. The earlier conceptualization of the translation movement's exclusive focus on Greek to Arabic, whether via Syriac or not, has now been regarded as an overstatement since, in fact,

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only a few Abbasid caliphs and courtiers were major patrons of the movement. The scholars of this volume particularly abstain from the use of "translation movement" as a way of labeling the efforts of scientific production in the early Islamic world. In her chapter "Translation as an Enduring and Widespread Cultural Practice," Sonja Brentjes, a distinguished historian of mathematics and cartography and the chief editor of the current volume, suggests that the early translation of scientific texts has often been reduced to the primary category of the diffusion of Greek source texts, a view which strictly ignores translations among a kaleidoscope of linguistic contexts (present and later to come), including the vantage points in Persian, Ottoman Turkish, Urdu, Latin, Sanskritic, Hindi, Tamil, and other Indian languages, as well as those that are in interaction, such as Portuguese, French, Italian, and English (p. 16).

Expert scholars from previous generations, such as Abdelhamid Ibrahim Sabra, saw the early Abbasid translations as no sideline affair, but a wider movement of searching for Greek manuscripts and loci of Hellenistic cultural contact. Yet, many of the Islamicate empires and contexts were multi-confessional, multilingual, and multi-ethnic constituents, going beyond the hegemony of Hellenistic culture. As Brentjes suggests, the narrative of the "translation movement" often blurred and marginalized whole classes of Arabic and other languages and, due to the lack of extant sources especially in Middle Persian, the movement itself was historiographically set as a period of Hellenism's extensive diffusion into Abbasid society through Syriac intermediaries. In previous such handbooks, the main actors (that is, translators, patrons, copyists, and those who took part in production networks) were not often clear, and many were one-faceted attempts directed to one particular cultural diffusion and contextualization. Once the actors are set, it should be acknowledged that there existed separate modes of knowledge production and assemblage that did not particularly concern translation, but also the production of commentaries, glosses, and original compositions (pp. 19–21).

Another novelty of the handbook is that it challenges previous paradigms accepted in secondary literature. A highly popular essentialist paradigm of the 20th century, "science versus religion"—a dichotomy that reduces the output of Islamicate sciences to a clash of religious beliefs and secularizing tendencies—has been one of the most salient labels attached to knowledge production in Islamic scholarship. Many scientific debates in early Islamic societies have been seen as a product of these clashes without acknowledging the hybridity and diversity of scientific expertise in Islamicate contexts.

As a way to bridge this gap, the handbook follows the rubric of methodological pluralism that corroborates on historiographical trends, interpretative tools and trajectories, and the study of primary sources in terms of content and production. The volume turns away from previous generic designations, such as *Arabic science*, *medieval science*, and *sciences of Islam*. All of these terms tend not to underpin the nuances of knowledge production in other linguistic contexts, shifts in territorial and cultural zones, and the medium of microhistory by way of the study of specific localities, that is, the analyses of networks, society, and institutions (p. 2). The volume explains how the term Arabic science overlooks the multitude of Islamicate

influences, whereas the designation situates the contributions of the Islamicate world in a period that is both before and inferior to Western historiography based on a Renaissance-centered reading. In this context, it could be observed that certain prejudices were formed against the study of early conceptualizations of Arabic science in the history of science, as the European historiography did not see the Islamic world as part of their scientific legacy.

Prior uses of *Arabic science* as an explanatory category have contributed to a distorted scholarly image of the (scientific) results produced in the Islamicate societies. On the one hand, it had a reduced role in the genealogy of the Western Enlightenment paradigm, an epoch of so-called continued progress at a time when the late antiquity/early medieval Islamic world was perceived as a period "dominated by superstition and darkness."[1] On the other hand, the early interest in Arabic science did not take this phenomenon as an independent site of excavation, as early historians of science showed little interest in such investigation. Conversely, they saw it as a repository of Hellenic science or a belated stage of Hellenic science, projecting long-standing historiographical biases; for example, science as theory was attributed only to the Greek sources and, likewise, the experimental tradition was identified only with 17th-century Europe—neglecting the legacy of Arabic science in the greater Islamicate world.[2]

Furthermore, *sciences of Islam* has the problem of reducing the production of knowledge to a religious paradigm. Unless the three terms discussed here are taken in the context of Shahab Ahmed's Islam as a locus of "inherent contradiction," all of their designations overlook the fact that the Islamic world did not belong to one dynasty or cultural geography.[3] On a larger scale, the practice of sciences in the Islamicate world encompassed a group of scholars with divergent opinions and camps in the intellectual climate, along with a diverse group of institutions and actors, who were a product of complex networks of relations based on multiple causalities. Hence, scholarly translation was an enduring and widespread phenomenon that cannot only be limited to the direct linguistic translation of scientific texts in the early Abbasid period. It was much further reaching, encompassing multiple sources and practices. It was a multifaceted process of cultural transfer and modification of ideas, which, in fact, involved diffusion, assimilation, re-adaption, original synthesis, and composition.

The volume also contributes to the discussions about the nuanced shades of meaning involved in the Arabic term *ʿilm/ʿulūm*, vis-à-vis its early modern and modern uses in different analogous linguistic contexts (Persian, Urdu, and Turkish). Franz Rosenthal's monograph *Knowledge Triumphant* was one of the early key works, which set and established *ʿilm* as the premium unit of epistemological abstraction embracing

1 Rashed (1996, p. i).

2 George Sarton was one of the early scholars to point out the Orientalists' early obsession for setting origins to *Arabic science* as a derivative tradition, especially in connection to Greek and Sanskrit sources. He argues that the study of Arabic-Islamic culture, a highly heterogeneous and rich subject in itself, rather "constituted the main link between the Near East and the West, as well as between the Near East and Buddhist Asia." Sarton (1966, pp. 84, 89–90).

3 Identifying Islam's "coherent dynamic of inherent contradiction" is a common thread in Ahmed (2016).

all knowledge.[4] Yet, over the course of centuries, *'ilm* had other specific designations beyond the label of *epistēmē*, indicating the emergence of the notion of a specific scientific/scholarly discipline of learning with various other subdesignations. Rosenthal acknowledged the term's limitations and its multiplicity of meaning and usage in the Arabic milieu; however, extending its usage to other linguistic contexts also enables us to observe its appropriation in other (tangential) semantic fields, especially in connection to practice. For instance, *fann* and *ṣinā 'a/ṣan'a* in Arabic originally mean art, technology, craft, and handicraft, yet none of these meanings are set: They only point to *one* disjunction in meaning, but there is no necessity involved such that they can easily produce alternative meanings depending on the socio-linguistic context. *Fann* especially seems to have acquired different and, ironically, contradicting connotations in Turkish, such that *fann* means both a unique field of knowledge and a scientific branch in early modern Ottoman scholarly texts. Its plural form, *fünūn*, is often associated with "*beaux-arts*/fine arts," and its singular form *fen* in modern Turkish denotes natural sciences, including physics, biology, and chemistry—a case similar to the Turkish *bilim*, *bilgi*, *enformasyon*, or *veri*, terms associated with modern science and information technologies.

That being said, the handbook also aims to encourage the study of often ignored aspects in secondary literature, such as the modes of technical production vis-à-vis the plurality of material practices. These aspects not only include literary forms and genres as modes of production, but also sociopolitical forms of exchanging knowledge, perceptions of scholarly rivalry, technical edge, academic collaborations, and collegiality.

Brentjes's handbook is often in conversation with a precursor work, *The Encyclopedia of the History of Arabic Science* edited by the distinguished scholar Roshi Rashed, by way of amending and adding onto its framework and reception. Rashed's encyclopedia was one of the first comprehensive volumes devoted to the study of specific aspects of sciences, including Arabic astronomy and mathematics. The work contributed to a genuine understanding of Islamic history of classical sciences from the 9th to the 17th century, which also paved the way to the knowledge of shared scientific culture itself, by mostly providing a background for Arabic-oriented scholarship. As mentioned above, *Arabic science* as a category was often omitted in historiographical works about the rise of Western sciences, and Rashed's compendium stands as one of the first works to show the bridge between the historiography of Greek sciences and those of the Latin medieval tradition and Enlightenment.[5] On the one hand, as a precursor to the current handbook, Rashed's encyclopedia filled an important gap in historiography, highlighting the significance of classical Arabic as the missing link or bridge to the Western historiography. On the other hand, the volume's Arabic-centered approach overlooked the contributions of post-Abbasid sciences in

4 Rosenthal (1970).

5 To justify his approach, Rashed (1996, p. xi) suggests that "a good knowledge of Arabic science will not detract from the innovations of Kepler in astronomy, of Galileo in kinematics or of Fermat in number theory," but enables experts to locate their breakthroughs more exactly, by providing a context for scientific developments and transfers across cultures and scholarly traditions.

other Islamicate languages.[6] Rashed's preface may briefly acknowledge the roots of *Arabic science* in Indian, Persian, and Chinese, but, contrary to Brentjes's handbook, the encyclopedia does not directly engage in specific studies on these languages' influence on the Abbasid transfer of knowledge for the earlier Islamic context.[7]

Brentjes's handbook also evaluates socio-political shifts in a new light. For instance, Françoise Micheau's chapter in Rashed's encyclopedia introduces the "decline paradigm" for the case of the post-Abbasid world, arguing that with the arrival of the Seljūq Turks, the orthodox and religious policies of the new dynasty closed the door on personal reflection in law, and contracted the boundaries of the intellectual field, reducing the role of scholars to applying and transmitting the received tradition.[8] As Micheau's narrative suggests, independent institutions at the disposal of scholars, such as the *Bayt al-ḥikma*, were in decline, and a new network of madrasas were set up, changing the nature of public intellectual spaces that, in effect, ended up adjoining pious establishments. She concludes that exact sciences only slightly benefited from the evolution of the urban landscape and institutions, which lowered their transmission in the post-Abbasid world—a theory that has now been abandoned.[9]

It would be difficult to do justice in such a short review to the complexity of the handbook's points of analysis, as it pays special attention to the differences between different genres and discourses, as well as to the particular manners on which these discourses were based. The current handbook's multiple insights and points of contention not only mark a departure from any other such compendium, but it also creates a fruitful ground for developing past perceptions and suggestions by previous scholars of *Arabic science*. At the core of today's studies in Arabic history of science, there lie certain key, modern, bio-bibliographical studies by scholars like Carl Brockelmann, George Sarton, and Fuat Sezgin. Such early works were foundational in paving the way for source criticism, manuscript analysis, and narrative building as exemplified in Rashed's 1996 encyclopedia, and now Brentjes's handbook represents the culmination of such efforts.

Historicism means understanding all science as relative to something else, which may pertain to a particular time, society, language, or people, yet this should not also lead us into thinking that historicism can be proven through historical evidence or precision. Historicism is a tool to see the past *as is*, not a system of relations that could precisely shed light on the modern context.[10] As the current handbook suggests, the history of science today has to engage in the study of earlier science(s), not merely

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6 For an early assessment of an Arab(ic)-centered understanding of science in Islamic societies, see Mieli (1939). On the other hand, Adıvar's *La Science chez les Turcs Ottomans*, "very wisely … refrains from discussing the racial origins of the great scientists of medieval Islam," albeit confining itself to the contributions of the Turkish peoples: Lewis (1940, p. 486). For Mieli's and Adıvar's personal connection and divergent views, see Günergun (2006, pp. 18–21).

7 Rashed (1996, p. ix).

8 Micheau (1996, p. 995).

9 Micheau (1996, pp. 995–996, 1005).

10 One of the risks involved in the earlier interest in the study of *Arabic science*, as Mohsen Mahdi (1996, pp. 1027, 1039) notes, is related to "the perception that modern science must be acquired if the third world is to modernize itself," such that the study of the past also enables the acquisition of modern science possible.

to learn something, but to clarify and understand the foundation of ever-evolving perspectives and historicities. The only risk involved in such historicist attitudes is the fallacy of bestowing a belief in progress and of projecting past historical perspectives and premises as "scientific" without qualifying them in their own contexts—a hindsight that Brentjes's handbook bridges. The prolonged interest in *Arabic science*, which can now be extended to the whole Islamicate world thanks to the current handbook, is neither simply a result of antiquarianism nor an effort for its own sake, but contributes to the means of understanding knowledge production, socio-cultural contexts, and linguistic communities through a comparative lens.

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