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Scott L. Montgomery. *Science in Translation: Movements of Knowledge through Cultures and Time*. Chicago: University of Chicago Press, 2000. pp. \$35.00 (cloth), ISBN 978-0-226-53480-0.

Reviewed by Johann W. Tempelhoff (School of Basic Sciences, Potchefstroom University for CHE)

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Exploring the transmission of science across

Exploring the transmission of science across cultures

The transmission of scientific knowledge is a complex process and more than often the result of a multi-cultural construction of impressions of thought. Scientists today often construct their ideas on theories that were formulated many centuries ago. They seldom think of the origins of those ideas. Moreover, they seldom consider the fact that what they have made their own in terms of their discipline are by no means the original languages in which the thoughts were formulated. Translation, the act “of rendering the words of one language into those of another, hopefully with little or no spillage of meaning” (p. 3), has been an important component in the transmission of knowledge - itself a highly mobile form of culture. This is one of the provocative thoughts that linger, long after one has read Scott L. Montgomery’s, *Science in Translation: Movements of Knowledge through Cultures and Time*.

The author’s project is immense. His quest for creating an awareness of the technique of translation with the ordinary reader is praiseworthy. In order to convey the significance of translation and its role in the sciences, he goes to great length in selecting interesting examples. As a historian of science, Montgomery, an experienced translator and qualified geologist, shares interesting thoughts on how ideas of the West flowed East and how the East responded and acted as a resource center for ideas that had been lost. Montgomery’s objective is to put up for discussion the proposal that “translation be allowed its crucial role in the history of scientific

knowledge—ancient, medieval and modern—as a subject worthy of diverse inquiry” (p. ix). He also has the objective of explaining, with the aid of a number of interesting examples, the power that translation has commanded in the development of Western science.

The author is in a good position to make these claims. For more than a decade he worked as translator of texts in physical chemistry, geology and medical technology. He explains:

Translation is a restive subject. It involves a larger array of working parts than is commonly brought to bear upon the study of other semantic activities. It calls directly on—indeed, cannot honestly be dealt with in historical terms without—such concepts as authorship, cultural displacements, originality, textual transmission, literacy and orality (p. x).

He goes on to explain that translation “presents a wealth of opportunity to combine the insights of literacy, historical and cultural studies of science” (p. x).

In his consideration of the Western tradition of philosophy, the reader is told that Aristotle probably never existed as an author. Rather, “the words placed under his name were, at the earliest stage of their history, compilations of notes, recordings, collections of facts, and other fragments, mainly from his lectures at the Lyceum, which were assembled, amended, and very often written by his students. They were, in short, communal creations” (pp. 7-8).

The Roman authors in turn relied to a considerable extent on the works of the Greek masters in their writing. They were more than conscious of their dependence, for example, on Greek literary forms. A term such as “imitatio” was devised as a means of using Greek sources as a basis for creating works in Latin. The introduction of Greek works into Latin enriched the Latin language with “novel words.” New verbs were produced and modifications took place that created new nouns.

The narrative takes on an interesting character once the focus shifts to explain why and how Greek thought was introduced by means of translation in Eastern culture. By the seventh century there was an awareness in the East that Greek textual knowledge of an elevated and practical kind was beneficial, especially in the fields of medicine, astronomy, rhetoric, dialectic and philosophical conception. The contemporary Syriac scholar Severus Sebokht made observations on the development of local knowledge, based on the philosophical writings of Aristotle. Using Aristotle’s point of departure that things are made comprehensible by means of events, thoughts, words and writing, Severus explained that it was due to the fact that human understanding relied on language, that understanding was defined largely in terms of conventions of speech which could even include fictions. Severus also explained that nothing of this knowledge could be transferred between individuals, groups, or entire peoples without movement through the medium of language. As a result, names and terminologies were considered essential in providing the substance of science.

The first four chapters of *Science in Translation* are focused on the broad theme of astronomy and its translation/re-translation into different languages. Montgomery maintains that knowledge of the skies came from four major episodes of translation. The first is the Greek works, which were translated into Latin. This is discussed in considerable detail. The second episode is the transfer of Greek texts into Syriac (a form of Aramaic), on their way into Arabic. “These texts, in considerable numbers, had been gradually transferred eastward during the fifth and sixth centuries A.D., in part by the harassing influence of the orthodox Byzantine Church against Nestorian and, to a lesser extent, Monophysite teachers and intellectuals” (pp. 60-1). Members of these communities were forced to migrate to the fringes of the Byzantine empire. Consequently their information was transferred to Persia (Syria and Iraq). Here, at certain schools, the information was studied, copied, commented upon and eventually translated as texts of Hel-

lenistic knowledge.

By the ninth century the Syriac language became the vehicle for the transmission of knowledge from the Hellenistic tradition into Arabic. Once there is an awareness of the significance and change that took place, it makes sense to draw a distinction between “Greek science” and “science in Greek” (p. 62). The effect of translation of Greek into the Syriac language was that the language was partially affected in respect of vocabulary, syntax, and grammar. This situation worked to the benefit of the Syriac language as texts of theological writing and poetry were later translated into Greek. It placed the Syriac Christian culture in a special position as a nexus for Greek learning.

The transmission of texts by means of translation in the Arabic world took place in three phases. In the first, which started in the late eighth century and ended in the ninth century texts in Indian and Persian were important. They were soon replaced by Syriac texts that contained a number of Greek scientific texts. The second phase was from the mid-ninth to the tenth century when there was a pronounced trend to return to the “original” Greek texts (which themselves had undergone substantial translations). These texts were now treated with greater accuracy and the result was that a generally higher standard of material became available. The third phase started in the eleventh century and lasted up to the thirteenth. It stood out as a period in which selected texts were edited and others were retranslated. These were however only a limited number of texts. Montgomery explains that the first two phases were by far the most important. The result of the activity of translation was that by the ninth and tenth centuries Arabic was no longer merely the language of the Prophet and the Qu’r_n. Arabic had become “something much larger, more worldly, flexible, teeming with new terminologies, densely textual, written with the use of a new diacritical system, grammatically and syntactically evolved. A large part of this evolution was a direct result of the translation episode” (p. 130). Arabic had also moved from the language of a predominantly oral society, to the language of a society in the process of acquiring a wealth of written texts a literate society.

Between the tenth and the twelfth century works, translated from Arabic into Latin, started appearing in Europe in particular the south of France. In Spain Toledo was a great center of Arabic learning. From here information was passed on to the rest of Europe. In this process translation played a crucial role. The first phase in the translation process was between 1100 and 1220 when

in Spain, Italy and Sicily works in Arabic were translated by a number of outstanding scholars. Apart from science and philosophy, works of religion were also translated.

By the middle of the thirteenth century a new trend started manifesting itself when the process of translation was redirected. Instead of Greek texts being translated into Latin from the Arabic texts, there were now translators who worked from the Greek texts. The “*translatio nova*” became an acknowledged standard and in the schools scholars were moving away from texts which had not been translated, directly from their original languages. What had begun was the progressive deleting, Montgomery explains, of the Arabs from their “own” legacy.

For long it was assumed that the decline of the Arabic tradition of learning was the result of the Mongol invasion of Mesopotamia and Persia. The fact of the matter is that the study of Arabic in the scholarly disciplines was simply not considered worthwhile. Roger Bacon was one of a few intellectuals to note this. In 1269 he published a work on the learning of languages in which he explained that the Bible had been translated from Greek and Hebrew, while Ophilosophy’ (including science) had entered the Latin language via Arabic and other languages. For this reason he recommended that Hebrew, Greek, Arabic and even Syriac be studied at the universities of Paris, Oxford and Salamanca. By 1400 the issue in respect of Arabic was no longer relevant. The language was simply not adopted. Arabic was considered as being too difficult, too foreign and too unnecessary.

An important theme that unfortunately receives only brief consideration is the fact that one of the major effects of the Arabic culture on “Greek science” was that it was made silent. The focus was now on reading and writing. Whereas Aristotle’s *De caelo* and Cicero’s translation of *Timaeus* drew on models of oral eloquence, there was no longer a requirement for oral eloquence and rhetoric, and it instead focused on the need for reading and writing.

The history of knowledge communication between the West and the Near East has been well documented. Many of Montgomery’s explanations consequently are part of a familiar reference framework. In his quest to give a more rounded impression of the translator’s role in the scientific knowledge Montgomery bring brings in a lively and interesting discourse on the evolution of modern day Japanese science. In the process he explains how Japanese science evolved from Chinese, the adaptations Japanese underwent at different periods in time, as well as the influences to which Japanese was exposed from

abroad.

Montgomery goes into eloquent detail in his description of how the Japanese language evolved out of Chinese. It was however the West that was to provide Japan with the knowledge and skills necessary for making headway in scientific endeavors. As late as the sixteenth century there existed in Japan a need for trade and commerce. The awareness of its relative isolation from the West made it quintessential for the Japanese to make use of translators from the Dutch language to make sense of the technologies of telescopes, globes and guns. The Dutch at the time were the favored trading partners of the Japanese. Consequently the written word from the West entered Japan from the Netherlands.

Montgomery devotes a whole chapter to the translation of science into Japanese. One of the remarkable figures in scientific translation was Shizuki Tadao who was responsible for the introduction of Newtonian physics in Japanese. His translation of John Keill’s *Introductiones ad veram physicam et veram Astronomiam* (1739), not only paved the way for the introduction of modern physics into Japanese. It provided Japanese scientific language with a subtle, accurate and creative terminology for concepts that in the original English proved to be problematical. His sensitivity to the subject matter and the ideas to be conveyed was most probably the result of a dedicated life as translator of science but perhaps also it was the product, Montgomery seems to suggest, of a neo-Confucian scholar who tried to bring Newtonian principles back to the primal text of the *I-Ching*. In the text there are numerous highly readably semi-biographical sketches of important translators who deserve recognition for the role they played in promoting the transmission of scientific ideas in various parts of the globe.

Science in Translation offers the reader some interesting excursions into the realm of knowledge transmission. It is an avenue few historians of science consciously explore, perhaps because of the apparently insignificant role played by the translator. It is only when one ponders on the impact these “invisible” writers have on the world of learning that it becomes evident how important it is to take cognizance of the way in which “foreign” learning becomes part of a civilization.

The work is one of fairly thick description. A wide spectrum of factual information is spread out for comparative use by the historian interested in finding out more about the way in which languages interact in a realm where the universality of knowledge becomes an important part of a world of many linguistic traditions. Mont-

gomery rightly points out: “[T]he study of knowledge today returns, like a thirsty wanderer, to the flowing well of language studies, for whether one turns towards literature or toward science one encounters complex and multi-layered forms of human speech” (p. 270). Who knows? This trend, with the assistance of new technologies of audio-and visual transmission may in future open up avenues of scientific communication which are not confined to silence and where spoken words of wis-

dom and the skills of rhetoric may once again prevail in the exploration of fields seldom wandered before.

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