Gained in the translation

Scientific knowledge is enriched as it moves between languages.

Scott L. Montgomery

The word is no less central to science than it is to literature, philosophy or religion. Densely textual since its very beginnings, Western science could not exist without language, and resides largely within its domain. It is language, after all, that allows knowledge to find its cast and community, to be recorded, debated, shared and advanced.

Many implications flow from this simple truth. Among the most fertile is that, as with other areas of knowledge, science has been a mobile form of understanding. We say that science advances, but it also moves — across linguistic, cultural and temporal boundaries. And this movement has in turn often been integral to scientific advance, owing to the adaptations and additions made by different peoples at different times. Transfers of science have been critical to the building of societies, those we call modern most of all, because the acquisition of technical knowledge such as Arabic numerals, Newtonian physics or the periodic table, has led to many new powers over material existence. By any measure, therefore, movements of science are a significant historical process.

Translation renders knowledge mobile. The task of the scientific translator, no less than his or her literary relative, has been to create new texts, to multiply sources into new languages, and thereby to produce new 'originals'. Over time, translation itself has built a great scientific library, ever more enriched, accessible. Although we may think of scientific translation as literal, mechanical work, this has never been the case. The reasons for this are complex, but have much to do with the lack of exact one-to-one correspondence among languages. Translating science always involves interpretation, the remaking of an original. If it did not, machine translation would have long ago rendered the scientific translator vestigial or extinct.

Before the last century, no standards for accuracy or methodology existed. Translators went about their work in whatever ways they deemed useful. Decanting scientific works involved both oral and written exchange, at times simultaneously; it was performed by individuals, by teams, even by groups. Its sources included original texts, corrupted and abridged texts, partial or reconstructed texts, even fabricated texts; resulting translations therefore represented material partly or wholly rewritten, beautifully adapted, ideologically reconstituted, or so literally repoured as to be nearly incomprehensible. Works of great importance, such as Ptolemy's *Almagest*, were usually rendered several times into each new language, by different hands, often with numerous additions, deletions, reorganization, interpretive commentary and more, all in the name of furthering their utility.

Ptolemy's great work, in fact, is an excellent example. Its very title, which means 'the greatest', is an Arabic–Latin replacement for the original Greek *Mathematica Syntaxis* (*Mathematical Treatise*), revealing centuries of added reverence. Mathematical astronomy in the West is inconceivable without what is often called "the Greek heritage in science", with the *Almagest* at its helm.

In fact, the *Almagest* did not enter Latin until quite late, as part of a vast translation effort that helped comprise the so-called Twelfth Century Renaissance. Roman society found most Greek science too difficult and abstruse. In early Byzantium, purges of 'pagan learning' forced this knowledge eastward, first in the care of Nestorian Christians, and then into the great commerce of learning of the Near East, where, between the fifth and seventh centuries AD, it gained new versions in Syriac, Pahlavi (ancient Persian) and Sanskrit. Parts of the *Almagest* were adapted by Indian astronomers into the siddhanta tradition, with star positions updated and poetic forms added. All this then came within the great intellectual embrace of Islam, whose Abbassid rulers had the intellectual wealth of the region translated into Arabic. In the capable hands of Hunayn ibn Ishak, Thabit ibn Qurra and Abd al-Rahman al-Sufi, *Almagest* astronomy gained still new corrections, refinements, commentary and a magnificent artistic dimension in drawings of the constellations.

It was this total body of work, then, that Europe chose to adopt and adapt. Between roughly 1120 and 1240 AD, the great library of science in Arabic was transferred into Latin, producing a 'renaissance' at least as epochal as that several centuries later in art and literature. It was no accident, therefore, that the university arose during this same period, for it required just this kind of institutional invention to metabolize the flow of nutrient texts into Europe — the Greco–Syriac–Pahlavi–Hindu–Arabic tradition that included Euclidean geometry; Arabic algebra, optics and medicine; *Almagest* astronomy; Aristotelian thought and much more.

It was this period, after all — this naissance (birth) — of textual possession, that made possible so much that came afterward, including the Scientific Revolution. This was when Western knowledge grew beyond all measure, not merely in the rising shadow of gothic cathedrals, but in every library and classroom and makeshift laboratory in Europe. What entered Latin culture was much larger than 'Greek science'. Like its forebears, Europe adopted an accumulation of contributions, and became all the richer for it. At its historical base, Western science must be seen to stand upon many shoulders.

In the end, the age-old notion of *traduttore, traditore* (to translate, to deceive) seems thin, even irrelevant where the history of science is concerned. In truth, an enormous amount has been gained in the movement of technical knowledge among peoples. Scientists, too, are scholars of the inherited word. We are all enriched by the mobilities that translation has made possible. ■

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The 'greatest': Ptolemy's work has been translated into a host of languages.

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