Lost in translation

Physicists know that Heike Kamerlingh Onnes discovered superconductivity in 1911, that James Chadwick discovered the neutron in 1932, and that Edwin Hubble discovered the expansion of the Universe in 1931 — the Hubble constant describing that expansion being named after him. Hendrik Lorentz discovered the Lorentz transformations, just as Albert Einstein discovered the Einstein equations of general relativity.

But history sometimes plays tricks with names, in part because all of us, having limited time and so relying on the writings of others, repeat what we read (especially when we read it in many places) without consulting the original sources. Lorentz did derive the transformations bearing his name, but it wasn't a solo effort: others including Fitzgerald, Larmor and Heavyside helped along the way. I've written before about Hubble's discovery of the expanding Universe, yet I now learn that he actually came in second.

In all fairness, it seems that the 'Hubble constant' ought to be called the 'Lemaître constant' after Belgian physicist Georges Lemaître, who reported findings akin to Hubble's — and with a deeper theoretical backing — two years earlier. That's the conclusion of several threads of recent historical research (H. Nussbaumer & L. Bieri, arXiv:1107.2281; D. L. Block, arXiv:1106.3928; and S. van den Bergh, arXiv:1106.1195). It's not, these studies suggest, that Hubble didn't do important work and deserve credit; only that Lemaître has been unfairly deprived of his rightful position as the father of modern cosmology.

It was in 1931 that Hubble published the paper that linked his name to the notion of the expanding Universe. Based on his own recently improved data on galactic distances, Hubble reported an empirical relationship of the form $v = KD$, with K giving the ratio between the distance D to a galaxy and its velocity v as inferred from the red shifts of galactic spectra. As Hubble noted in the paper, the data "indicate a linear correlation between distances and velocities, whether the latter are used directly or corrected for solar motion, according to the older solutions." Hubble calculated a value for K (only later renamed the Hubble constant, H_0) of about 500 km s^{-1} Mpc^{-1}, roughly a factor of ten higher that today's value of about 65 km s^{-1} Mpc^{-1}.

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All well and good. But Hubble and most other scientists were apparently unaware that Lemaître, a physicist at the Catholic University of Louvain, had arrived at similar conclusions two years earlier in 1929, publishing them in a somewhat obscure French-language journal, *Annales de la Société scientifique de Bruxelles.* As Nussbaumer and Bieri note, Lemaître originally arrived at his view by a theoretical route, criticizing Willem de Sitter's earlier model of a Universe dominated by a positive cosmological constant. That model, he argued, violated the Copernican Principle, as it treated the observer as special.

Correcting this problem led Lemaître instead to a new set of dynamical solutions to Einstein's fundamental equations. From general relativity, he derived the existence of a linear relationship between galactic velocity and distance: $v = HD$. Lemaître then immediately went further, using Hubble's 1926 galactic distances to derive a numerical value for H between 575 and 625 km s^{-1} Mpc^{-1}, noting that further observations would be needed to improve the data.

Sadly — or possibly, suspiciously — it seems that when the Royal Astronomical Society decided to print an English translation of Lemaître's paper in 1931, the translation completely omitted the section in which Lemaître reported his most important findings. Who was the translator? No one knows. Van den Bergh suggests that the omission doesn't look accidental, as it took care to eliminate all parts of the text that would have pointed tangentially to Lemaître's conclusions: "The English translation of the article", he notes, "did not include the footnotes to the original French version of the article. One of these footnotes explains in detail how using weighted and unweighted radial velocities for galaxies leads to slightly different values for the Hubble parameter. … it appears that the translator of Lemaître's 1927 article deliberately deleted those parts of the paper that dealt with the determination of what is presently referred to as the Hubble parameter."

Suspicious, indeed. But it is still unknown why this omission was made, and who was responsible. In any event, scientists in the English-speaking world — and the public — were left believing that Hubble had been the first to derive H, and more generally to conceive the idea of an expanding universe, which is certainly among the most profound ideas in the history of science.

Both Hubble and Lemaître went on to do further influential work. Hubble — who very possibly never knew about Lemaître's contribution — teamed up with Milton Humason to collect data on galactic red-shifts that eventually formed the foundations of observational cosmology. Lemaître went even further, in 1931 floating in a letter to *Nature* early thoughts on what would eventually become the 'Big Bang' view of the beginning of the Universe. Two years later, in another paper, Lemaître suggested a link between the then still-new ideas of quantum theory — especially as applied to fields — and cosmology. The deeper explanation of the cosmological constant Λ, he suggested, might somehow be linked to quantum vacuum fluctuations.

The profound omission from the translation of Lemaître's 1929 paper, discovered originally by James Peebles in 1984, has been brought back into the light by Nussbaumer and Bieri in the course of historical research for their book *Discovering the Expanding Universe* (Cambridge Univ., 2009). Why it has remained unknown for so long is also somewhat mysterious, although such errors of attribution — intentional or not — probably aren't as unusual in science as we think.

Indeed, other researchers (Helge Kraghe and Robert Smith) have studied the evolution of usage of terms such as 'Hubble's law' and 'Hubble Constant' and shown that they came into common usage somewhat abruptly in the 1950s, 20 years after Hubble's paper. They suggest that the link between actual work and credit is more tenuous than we think. "'Hubble's law' is an example", they suggest, "of what has been called Stigler's law of eponymy, namely, 'No scientific discovery is named after its original discoverer.'" ❐

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Corrected online: 28 October 2011

Correction

In the Thesis article 'Lost in translation' (*Nature Phys.* **7,** 667; 2011), the nationality of Georges Lemaître was given incorrectly as French; Lemaître was in fact Belgian. This error has been rectified in the HTML and PDF versions.