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Abstract. One of the greatest discoveries of modern times is that of the expanding Universe, almost invariably attributed to Hubble (1929). What is not widely known is that the original treatise by Lemaître (1927) contained a rich fusion of both theory and of observation. The French paper was meticulously censored when printed in English— all discussions of radial velocities and distances (and the very first empirical determination of “H”) were omitted. Fascinating insights are gleaned from a letter recently found in the Lemaître archives. An appeal is made for a Lemaître Telescope, to honour the discoverer of the expanding universe.

Lemaître (1927) – a theoretical paper?

The title of the original 1927 paper indicates to the reader that the content will be a fusion of both theory and of observation:

“Un univers homogène de masse constante et de rayon croissant, rendant compte de la vitesse radiale des nébuleuses extra-galactiques” which is translated in the English tongue, thus:

“A homogeneous universe of constant mass and increasing radius accounting for the radial velocity of extra-galactic nebulae”

Lemaître spent the years 1924/5 at the Harvard College Observatory. He had an excellent foundation in observational astronomy, writing about terms such as the effective temperatures of stars, trigonometric parallaxes, moving-cluster parallaxes, absolute bolometric magnitudes, dwarf branch stars, giant branch stars, and the like.

To speak of Lemaître (1927) as a most remarkable and absolutely brilliant theoretical paper only, is a grave injustice to the very title. Not only does Lemaître theoretically derive a linear relationship between the radial velocities of galaxies and their distances in the above paper, but he is eager to determine the rate at which the Universe expands. Lemaître (1927) carefully uses the radial velocities of 42 extragalactic nebulae tabulated in Strömberg (1925), and he converts apparent magnitudes m into distance \[ \log r = 0.2m + 4.04 \] following Hubble (1926). The actual value which Lemaître obtains in 1927 for the rate of expansion of the Universe is 625 km/s/Mpc; 575 km/s/Mpc with different weighting factors (Figure 1).
Jaki (1974) elaborates: “Lemaître’s treatment of the problem could hardly be more impressive with respect to specific results... a formula and a table of values for the red-shift of receding galaxies in fine agreement with the actually observed data...”

When the Royal Astronomical Society decided to print an English translation in 1931 from the journal “Annales de la Société scientifique de Bruxelles”, a most dramatic censorship of the first empirical determination of “H” occurred (Figure 2). A meticulously researched book (with a foreword by the late Allan Sandage) has appeared on this precise theme; the book is entitled “Discovering the Expanding Universe” (Nussbaumer and Bieri, 2009). Professor Nussbaumer graciously sent me a copy of the original French paper in 2009, and the sectors censored out in the English translation appear in Figure 2. Equation (24) holds the key. In an independent study, Sidney van den Bergh (2011) affirms that the suppressions in equation (24) were intentional.

![Figure 1](image1.png)

Figure 1  Left hand panel: The data used by Lemaître (1927) to yield the first empirical value of the rate of expansion of the Universe in which v/r is predicted to be constant (see equation 24 in Figure 2). Lemaître derived values of 625 km/s/Mpc and 575 km/s/Mpc. The solid line at left has a slope of 575 km/s/Mpc and is reconstructed by H. Duerbeck. Right hand panel: The radial velocity–distance diagram published by Hubble, two years later, in 1929, with a “best slope” of 530 km/s/Mpc. Left hand panel: courtesy H. Duerbeck.

It would be historically accurate to say that the testing of a linear velocity-distance relation is due to the meticulous observations by Hubble and Humason in subsequent years, but not the formulation of this relation, as seen in the complete original equation (24).

**The Hubble Eclipse**

And now, some insight into the mindset of Edwin Hubble. He was fiercely territorial, as we see in a letter from Hubble to de Sitter, dated 21 August 1930, wherein Hubble writes:
“I consider the velocity-distance relation, its formulation, testing and confirmation, as a Mount Wilson contribution and I am deeply concerned in its recognition as such.” (emphasis, mine).

Nussbaumer and Bieri (2009) respond as follows:

“... the formulation and its central place in cosmology was first given by Lemaître ... there is no justification to glorify Hubble’s publication of 1929 [as the] original discovery of the linear velocity-distance relationship...” (emphasis, mine).

Figure 2 Sections in red, pertaining to the discussion and use of radial velocities of galaxies and their distances by Lemaître (1927) to provide the first empirical determination of “H” were meticulously and ingeniously censored in the English translation. Equation (24) is absolutely crucial.

Lemaître was eclipsed. Multitudes of textbooks proclaim Hubble as the discoverer of the expanding universe. But herein lies a repeated pattern.
In 1927, Knut Lundmark penned these words, cited by Sandage (2004):

“As to Hubble’s way of acknowledging his predecessors I have no reason to enter upon this question here.”

Is it not strange that Vesto Slipher is not referenced at all in Hubble’s landmark paper of 1929? (The vast majority of radial velocities in that paper are from Slipher). Perhaps an even more glaring example is Figure 3, written to JH Reynolds on a visit to England.

Figure 3 Hubble requests the following from JH Reynolds: “Could you not throw your ideas into the form of a precise classification so we could actually apply it to a large number of nebulae representing the various sizes and degrees of brightness with which we will be dealing?” The letter is believed to have been written in 1919, a year in which Hubble is recorded to have dined in England. This letter was first reproduced in Block and Freeman (2008). The original is in the archives of the Royal Astronomical Society of London.

As elucidated by Block & Freeman (2008), Reynolds rises to the Hubble request. He publishes his results in Reynolds (1920). Hubble very carefully studied this paper and actually pencilled in some handwritten
comments, shown to me by the late Allan Sandage. (For example, next to each of the Reynolds class II, III and IV are the Sa, Sb and Sc notations penciled in by Hubble. Dr Sandage furthermore affirmed to me that the correspondence between Reynolds types and Hubble types is “one-to-one”.) Hubble (1926) appeared in print six years after Reynolds – with no reference to Reynolds (1920). Was Lundmark correct?

An eclipse fell on Lemaître too (Kragh and Smith, 2003). The translator is believed to be Lemaître himself (Lambert, private communication). He did write papers in English. The identity of the censor is, at the time of writing, not clear; it may have been Smart (John Couch Adams Astronomer in Cambridge, 1921-1937) or perhaps Eddington. Both would have known about Hubble’s complex personality, as discussed by Sandage (2004). The influence of Hubble in extragalactic observational astronomy was unparalleled. He dined in England with Astronomer Royals (see Figure 126 in Block and Freeman, 2008). “Some have said that Hubble was the most influential astronomer since Copernicus in changing our view of the outside world” (Sandage, 2004) and we have reason to believe that the censor(s) may have been very sensitive to this (Figure 4).

Figure 4 The alarming “presence of a censor” is seen in this February 1931 letter from WM Smart to G. Lemaître. In extremely polite terms, Lemaître is told by Smart that Hubble’s observational result of 1929 is “something more elegant”. The reason we know that Smart is specifically alluding to Hubble (1929) is as follows: Lemaître is given full freedom to translate his 1927 French paper, from paragraph 1 to paragraph 72 (which at first glance, appears as a symbol “n”, but which is actually the number “72”). Here follows the punch-line: paragraph 73 is Lemaître’s equation 24. Paragraph 73 would have been the empirical determination by Lemaître of his expansion coefficient, published in 1927. Courtesy: Lemaître Archives, Louvain-la-Neuve. My very deepest of gratitude is expressed to Professor D. Lambert and Archivist Mrs Liliane Moens.
CODA - A Lemaître ELT?

One of Galileo’s masterful works was entitled “Sidereus Nuncius” – the starry messenger. I would applaud the appeal of John Farrell after this Conference, that a “Lemaître Telescope” (possibly the next European ELT) be named after the starry messenger and priest from Belgium. The moral of the censorship (Figure 2) is - as Martin Gaskell (private communication) poignantly reminded me - Mark chapter 4, verse 22. I allow Nussbaumer and Bieri (2009) to have the final word here regarding the legendary G. Lemaître: “Even in his influential ‘The Realm of the Nebulae’ published in 1936, he [Hubble] avoided any reference to Lemaître. Was he afraid that a gem might fall from his crown if people became aware of Lemaître’s pioneering fusion of observation and theory two years before Hubble delivered the confirmation?” (italics, mine).

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