History of One Defeat: Reform of the Julian Calendar as Envisioned by Isaac Newton

ARI BELENKIY[1], EDUARDO VILA-ECHAGUE[2]

[1]Mathematics Department, BarðIlan University, Ramat Gan 52900, Israel
Economics Department, College of Judea and Samaria at Ariel
belenka@mail.biu.ac.il
[2]IBM, Chile

At the turn of the 18th century, England was one of many Protestant countries that did not join the calendar reform promulgated by Pope Gregory in 1582. The 10-day difference caused problems in trade with the Continent. In 1700, the difference was expected to increase by a day due to the application of a Gregorian rule that in years divisible by 100, but not by 400, February 29 has to be omitted.

The Royal Society learned that Germany and Denmark were accepting the Gregorian calendar in February 1700, upon receiving a letter from Gottfried Wilhelm Leibniz of Hanover. Leibniz sought the Society's support for a similar reform in England and assistance in correcting the Rudolphine Tables, the basis for the new Ecclesiastical calendar. The Society asked Isaac Newton, then Master of the Mint, who already was known to be working on a new theory of the moon's motion, to reply. It is known that after two months, in April, Newton prepared a short Memorandum, which was forwarded to Leibniz in July. A group of unpublished manuscripts, known after the 1936 Sotheby's auction as Yahuda Ms 24, show that Newton went much further than that.

Newton developed a proposal for the reform of the Julian and Ecclesiastical calendars. His calendar, if implemented, would have become for England a viable alternative to the Gregorian. Despite having a different algorithm, its solar part agrees with the latter until 2400 AD and is more precise in the long run, within a period of 5,000 years. Its lunar (Ecclesiastical) algorithm is simpler than the Gregorian, but remained incomplete. We explain why blank spaces were left and why data were changed in several of the manuscripts; discuss the time frame and the order in which Newton wrote different drafts of Yahuda MS 24; analyze their relation with two manuscripts from the Cambridge collection and a reply to Leibniz' letter; and suggest a reason for Newton's delay and failure to press for the implementation of his calendar. Newton, as can be discerned from his statistical analysis of Hipparchus' observations, can also be credited with a remarkable guess about the ancient Greek observations of the equinoxes.