

Biographical Encyclopedia of Astronomers

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Fleming, Williamina Paton Stevens

Born Dundee, Scotland, 15 May 1857

Died Boston, Massachusetts, USA, 21 May 1911

American data analyst and "computer" Williamina Fleming devised, along with Edward Pickering, the first important system for classifying the spectra of stars (after the very basic one by Angelo Secchi) and classified more than 10,000 stars on that system. She came from a craftsman's family and worked as a pupil-teacher from the age of 14. She married James Orr Fleming in Scotland, and they immigrated to Boston a year later, divorcing after the birth of their first child, whom Mrs. Fleming was left to support. Her first job was as a housekeeper in the home of Pickering, the director of the Harvard College Observatory. He was aware of her history as a student and teacher, so when he allegedly criticized the work of a young man at the observatory by saying that his housekeeper could do better, it was not quite the insult it sounds. In any case, he soon employed Fleming at the observatory, first as a copyist and later as a classifier of spectra. She was eventually appointed curator of astronomical photographs, with responsibility for coordinating the work of a dozen other women, which she was said to have done with considerable firmness. Fleming was elected to honorary membership in the Royal Astronomical Society, continuing the tradition pioneered by Caroline Herschel and Agnes Clerke.

Secchi had found five classes of spectra sufficient for his visual observations, but photographic spectra, even the very low-resolution ones with which the Harvard work began, permitted finer divisions. Initially, Pickering and Fleming assigned their stars to 12 types, A to M (omitting J since the ancient Romans did), from simplest looking to most complex, and relegated small numbers of strays to N, O, P, and Q. As time went on, they added a number of groups of peculiar stars, including class R (now recognized as chemically peculiar), novae, and several types of eclipsing and pulsating variables (then thought to be eclipsers and other sorts of binaries). The first Draper Catalogue (published in 1890 under Pickering's name but with a very large fraction of the work attributable to Fleming) contained 10,498 stars, using all types from A to Q, except N. (None of these, also now known to be chemically peculiar, were bright enough for the eighth magnitude cut-off).

Improved telescopes soon led to spectra with better wavelength resolution and a catalog (published by Pickering and Fleming in 1897) of the stars in seven open clusters. Types C, D, I, and L had disappeared, and Pickering soon merged E with G, and H with K. An important part of that work was the recognition that different clusters are dominated by stars of different types (now understood as an indicator of their ages). The last of Fleming's works, published under her name alone, included her measurements of the apparent brightnesses of another 1,400 stars, as well as their spectral types.

Fleming examined all of the Harvard survey plates as soon as they were acquired. She learned to recognize both novae and Mira-type variables from a single spectrogram, without needing a light curve; discovered 10 novae and more than 300 variable stars, for which she estimated the amplitudes of the light curves; and found what seems to be the first spectrum ever photographed of a meteor in 1897 (published under Pickering's name). The second meteor spectrum appeared as hers in 1909/1910, but the spectral features were not identified until after her death, by Peter Millman in 1932. Most are iron, and a few are chromium, magnesium, and silicon

Even before the first Draper Catalogue was published, Pickering had already identified other women to improve the Fleming-Pickering classification scheme for stellar spectra, and had put Antonia Maury to work on the stars in the Northern Hemisphere and Annie Cannon to work on the southern stars. They, too, held the title of "computer" for much of their careers, as did a total of 47 women under the Pickering directorship, beginning with Nettie Farrar (Fleming's predecessor). Many contributed to the Henry Draper Memorial Catalogue, partially funded by his widow, and many were trained by Fleming.

Katalin Kèri

Translated by: Endre Zsoldos

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