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HENRIETTA SWAN LEAVITT.

By SOLON I. BAILEY.

Henrietta Swan Leavitt was born in Lancaster, Mass., on July 4, 1868, and died in Cambridge, on December 12, 1921. She was fortunate in her ancestry, coming on both sides from old Colonial stock. Her father was the Rev. George Roswell Leavitt, a descendant from Jordan Leavitt, who settled in Hingham in 1640. Miss Leavitt inherited in a somewhat chastened form the stern virtues of her puritan ancestors. She took life seriously. Her sense of duty, justice and loyalty was strong. For light amusements she appeared to care little. She was a devoted member of her intimate family circle, unselfishly considerate in her friendships, steadfastly loyal to her principles, and deeply conscientious and sincere in her attachment to her religion and church. She had the happy faculty of appreciating all that was worthy and lovable in others, and was possessed of a nature so full of sunshine that to her all of life became beautiful and full of meaning.

Miss Leavitt graduated from Radcliffe College in 1892. Later she spent several years as advanced student and volunteer research assistant at the Harvard Observatory, in travel, and in teaching. She became a permanent member of the Observatory staff in 1902, and thereafter was closely associated for the remainder of her life with Prof. Pickering, in the solution of problems especially connected with the determination of the photographic magnitudes of stars. Beginning work as an ordinary assistant in the measurement of variable stars on photographic plates, by her exceptional ability and intense application she soon became the head of the department of photographic stellar photometry.

A determination of the visual magnitudes of the stars had a very large place in the work of the Observatory during the first half of Professor Pickering's directorate. As soon as the need of photographic magnitudes became urgent, the importance of a standard sequence, from which the photographic magnitudes could be derived for stars anywhere in the sky, became evident. A sequence of stars of varying magnitudes had been early selected near the North Pole, and the determination of the magnitudes of the stars involved was assigned to Miss Leavitt. This work was carried out with unusual originality, skill, and patience. The preliminary results were published in Harvard Circular, No. 170, and the more nearly complete results in the

PLATE XVII

HENRIETTA SWAN LEAVITT
At about 30 years of age.

Annals, **71**, No. 3. This Polar sequence has now been measured by other astronomers. Slightly modified by the improvements of later methods, it bids fair to be of great and permanent value. As extended by a study of photographs made at Mount Wilson with the 60-inch telescope, stars are included from about the fourth to the twenty-first magnitude. The sequence thus covers an enormous range in brightness. The light of six million stars of the twenty-first magnitude is required to equal that of one star of the fourth magnitude.

An extension of this research is given in Annals, **71**, No. 4, for which Miss Leavitt determined the photographic magnitudes. This includes lists of sequences for all the forty-eight equal regions into which, for convenience of discussion, Professor Pickering divided the whole sky in 1884.

Another work of a similar nature is found in Annals, **85**, No. 1. In it are given standards of photographic magnitudes for the Astrographic Catalogue. Sequences of 15 to 22 stars were selected and measured over the sky with special reference to the zones assigned to the different observatories taking part in this international catalogue. The above treatise contains the sequences for northern zones. The southern portion was in progress at Miss Leavitt's death.

Much of Miss Leavitt's time in the last few years was devoted to the difficult problems of standard photographic magnitudes for Kapteyn's Selected Areas.

About 1906 a Durchmustering of variable stars was proposed at the Harvard Observatory. Somewhat later this was undertaken on plates included in the Map of the Sky, which shows stars to the tenth magnitude, or fainter. Fifty-five of these plates cover the entire sky, and many sets have been made on different dates. A comparison of the photographs of a number of these regions by Miss Leavitt led to the discovery of several hundred variables and other special objects. Among them were a number of stars of the Algol type. A discussion of ten of these is given in Annals, **60**, No. 5.

One of the most striking accomplishments of Miss Leavitt was the discovery of 1,777 variable stars in the Magellanic Clouds. These results were possible by photographs of long exposure made at Arequipa with the 24-inch Bruce refractor and forwarded to Cambridge. Some of these plates had exposures of from two to four hours and showed very faint stars, among which nearly all the variables are found. A discussion of the elements of all these stars has so far been impossible, but from a study of 25 of them, the important law was derived, that the length of period bears a definite relation to the absolute magnitude.

In addition to these larger labors, Miss Leavitt took part in various minor investigations. She gave considerable time to the discovery of new celestial objects. Altogether, she found 4 new stars, 2400 variable stars, or about one half of the known variables, and various asteroids and other objects.

Miss Leavitt was of an especially quiet and retiring nature, and absorbed in her work to an unusual degree. She had the highest esteem of all her associates at the Harvard Observatory, where her loss is keenly felt.

Cambridge, January, 1922.

SHALL WE ACCEPT RELATIVITY?

By WILLIAM H. PICKERING.

Three years have now elapsed since the Principle of Relativity was first announced to a startled public, as perhaps the greatest scientific discovery since the time of Newton. Little attention had been paid to it before that, outside of the ranks of professional physicists. Now that the glamour has somewhat subsided, it may be a good time to take account of stock, to see what evidence has meanwhile accumulated in its favor, and how far its supporters have increased among scientific men. Regarding the latter, the physicists it is believed support it as before. Among the astronomers its stronghold is undoubtedly in England. In America opinion is divided. Which way the majority vote would be cast it is impossible to say. On the continent of Europe I have found the Latins generally skeptical, while I understand that very few of the Germans take it seriously at the present time. Three years is of course too brief a time for any important discovery to win universal acceptance in science. Perhaps a generation may be taken as a fair interval, sometimes a little less, sometimes a little more. Therefore if its adherents have not increased in the past three years, or have even fallen off, that can hardly be counted very seriously against it.

Let us now see what evidence has accumulated with regard to it in the mean time. The Principle of Relativity is founded, as is well known, upon three statements by Einstein. The first is that "Every law of nature which holds good with respect to one coördinate system must hold good for any other, provided that the two systems are in uniform movement of translation." This is simple enough, and has been recognized for many years. Later, however, Einstein added a second to it, that "We should not be limited in any way in our choice of systems so far as their state of motion is concerned." This addition, or second statement, leads to the three well known astronomical predictions made by Einstein, which we shall deal with in this paper. The third statement is that "The velocity of light is constant with regard to the observer, no matter what his velocity may be, and no matter what the velocity of its source." The first portion of this third statement contradicts our common sense, and is the cause of the most