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1854-1931

BY

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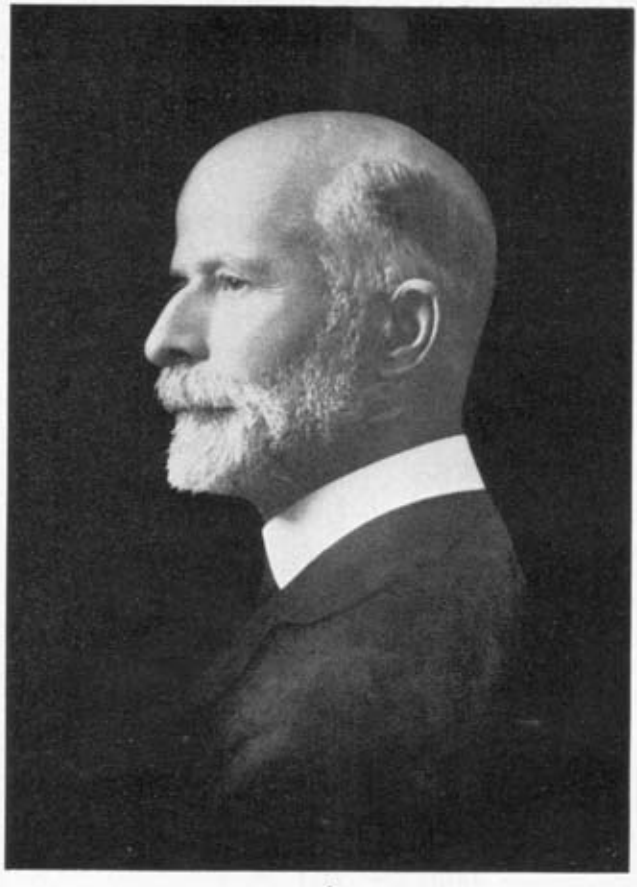

S. I. Bailey

SOLON IRVING BAILEY

1854-1931

BY ANNIE J. CANNON *

Solon I. Bailey, Phillips Professor of Astronomy, Emeritus, in Harvard University, died on June 5, 1931, after an illness of a few days, at his home in Norwell, Massachusetts. He had been connected for forty-four years with the Harvard Observatory, becoming Assistant Professor in 1893, Associate Professor in 1898, and Phillips Professor in 1912. From 1919 to 1921, he was also Acting Director of the Harvard Observatory.

He is survived by his wife, Ruth E. Bailey, and their son, Irving W. Bailey, professor of Plant Anatomy in Harvard University.

Born in Lisbon, New Hampshire, on December 29, 1854, Mr. Bailey, after graduating at Boston University and teaching at Tilton Academy, joined the staff of the Harvard Observatory in 1887 while studying at the University for a Master's degree. He won by his ability and excellent judgment the entire confidence of the Director, Professor E. C. Pickering, and gave him unswerving loyalty and devotion. The two men worked together in complete harmony for more than thirty years over the new projects and undertakings of the Harvard Observatory. To Bailey in 1889 Professor Pickering assigned the task of finding an elevated location suitable for the establishment of the auxiliary station made possible by the will of Uriah Boyden. Attracted by reports of the clear sky and slight rainfall on the high plateau of Peru, where also the whole southern sky is visible, he with Mrs. Bailey and their small son, Irving, sailed for Peru from San Francisco after observing the total solar eclipse at Willows, on January 1, 1889.

The story of this small expedition and their lonely life on "Mount Harvard" is told in Volume 34 of the Harvard Annals.

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* This biography was published by Miss Cannon in the Publications of the Astronomical Society of the Pacific. The bibliography was prepared by Jenka Mohr.—Harlow Shapley.

Clouds prevailed, however, for a long season, and during the second year the station was transferred to Arequipa, the "City of Sunshine." There at Carmen Alto, 8,000 feet high and two miles from the center of the town, the Boyden Station remained for thirty-five years.

With the training in photometric work already acquired in Cambridge, it was natural that Bailey's first southern investigation should be made visually. The result was that observations with the meridian photometer of 7922 stars not visible in Cambridge extended the well-known Harvard photometry to the South Pole.

However, as early as 1893, he was attracted by the accumulating photographs of the southern stars and commenced his classic study of globular clusters by a search for variable stars on excellent photographs taken with the 13-inch telescope. The field of observation was almost untrodden and remained his own for nearly twenty-five years. Fortunately he started with the finest of all globular clusters, Omega Centauri, which proved to be rich in variables. Extending the investigations to other clusters, in a few years he had discovered 509 variable stars, equaling the total number of such objects then already known.

As early as 1901 his discussion of 132 variables in Omega Centauri was published. Hundreds of thousands of measures of these faint flickering stars yielded to his careful study accurate light curves and periods. Later, the variables in the clusters M3, M5, and M15 were discussed in similar monographs. The astonishing facts were revealed that a majority of the cluster variables have periods not far from half of a day and that the median magnitude of all variables in any cluster is uniform, whatever the length of the period.

Later when it became known that the periods of Cepheids are correlated with the magnitude and indicative of the distance, these cluster variables of short period became of increased usefulness and were an important factor in Dr. Shapley's determinations of the parallaxes of globular clusters and his contributions to our knowledge of galactic dimensions.

Professor Bailey's work was characterized by thoroughness

and accuracy. Thus, after twenty years, when Dr. Shapley measured fifty-four of Bailey's variables on photographs taken at Mount Wilson with the 60-inch telescope, he found that Bailey's periods are accurate to one-tenth of a second, and added: "Few, if any, of Bailey's formulae seem to be seriously in error."

Another problem taken up in Peru was the measurement of the light of several asteroids. Eros, at the opposition of 1903, was far south. The period of variation, 0.2196 days, which Bailey derived from his extensive photometric and photographic observations, proved to be the most accurate of that time, and when two ciphers are added it has also been found to represent the light changes of 1931 to a fraction of a second.

Not all of his time in South America could be given to the stars, however, for in the absence of any reliable records a large scheme was planned to establish meteorological stations from sea-level up to an elevation of 19,000 feet. Bailey's lonely and sometimes hazardous journeys, generally on horseback, over many parts of Peru for this purpose might have daunted a less fearless man.

There were adventures such as swinging from peak to peak over a deep valley in a cage suspended by a single cable, or descending rapidly from elevations of 10,000 feet in a hand car with gravitation as the motive power, or passing nights on desolate mountains where perhaps the only sounds were the "ripple of the Rimac far below, and the flapping of a condor's wings." Several of the stations were at such high elevations that the dreaded soroche (mountain sickness) lessened his vitality so that any exertion was almost impossible.

The difficulties and discouragements of establishing a station on top of El Misti, Arequipa's nearly extinct volcano, 19,200 feet high, might have baffled a less determined man. Upon his first attempt to walk up, he became unconscious at the altitude of 16,000 feet and had to be carried down the mountain. Observing that the pack mules reached the top with slight discomfort, it occurred to him that if fatigue could be lessened by riding, this

elevated station might be maintained. Thus the problem was solved by the construction of a mule-path to the summit.

A vivid description of this project is given in Harvard Annals 39, the first volume of the Peruvian Meteorology. After Professor Bailey and his party had passed eight consecutive days and nights at altitudes from 13,000 to 19,000 feet, urging, threatening, rewarding the Indians who shoveled the trail, he thus describes the arrival at the summit: "Panting for breath, stopping to rest at every three or four steps, often struggling on hands and knees, we kept on, hardly believing there could come an end, when, suddenly, we were there. There was no introduction; we did not come to the crater; the crater had come to us. All things conspired to produce surroundings which few have seen and none described. The great altitude, the enormous craters, the sulphurous vapors, the drift clouds, the deep shadows cast by the setting sun, the inexplicable depression of spirits caused by the exhaustion and illness, combined to produce the profoundest sense of awe." El Misti station, the highest in the world, thus established, was maintained for six years, probably sufficiently long in that equable climate.

One of Professor Pickering's fondest astronomical dreams was of a "great international telescope" to be located at the best place on the planet for star study. Professor Bailey went to South Africa in 1908 to see if a better location than Arequipa could be found for this purpose. After making atmospheric tests at Cape Town, Bloemfontein, and Johannesburg, he settled upon Hanover, Cape Colony, for a temporary station and there took his beautiful long exposures of the southern Milky Way, later published in the Annals. No immediate results came from this journey, for Professor Pickering's dream never came true.

Among Bailey's honors may be mentioned that he was a foreign associate of the Royal Astronomical Society, a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the Astronomische Gesellschaft, and of the International Astronomical Union, in which he was, in 1922, President of the Variable Star Commission.

In 1923, in Arequipa, he was made an honorary Doctor of

Science and honorary Professor of Astronomy in the ancient University of St. Augustin.

Wishing, as he said, one more visit to Arequipa, to settle some perplexing points about his cluster variables, Professor Bailey made plans to sail for Peru when relieved of administrative care by the appointment of Dr. Shapley as Director. It was the good fortune of the writer to go in 1922 with Professor and Mrs. Bailey on this their fifth and last expedition. Together with the delightful experiences of actually seeing celestial acquaintances of many years, such as the great star fields of Carina, the Southern Cross, and the brilliant Sagittarius rising over the Andes, was blended the pleasure of visiting the Land of the Incas with such expert guides, and of becoming acquainted with the many friends of Professor and Mrs. Bailey in Lima and Arequipa. A most cordial welcome was given them by such prominent Arequipanians as the Polars, the Romañas, the Llosas, and Mrs. Bates, of the renowned Quinta Bates. A formal reception was given by Dr. Jorge Polar in his beautiful home, and an afternoon party by the Romañas in their charming country home at Savendia, where the Peruvian national dishes were served.

Always commanding the highest respect, Professor Bailey was a great favorite in Arequipa, where he was spoken of as the ideal American gentleman. A certain New England reserve and shyness, sometimes noticeable in his own country, melted away under the tropical Peruvian sky, so that in "simpatica" Arequipa this son of the Granite State seemed to attain the finest flower of his manhood.

Mrs. Bailey was a skillful and charming hostess. Many Arequipa friends as well as American visitors enjoyed the informal teas on the Observatory balcony over the garden, constantly full of luxuriant flowers, with the beautiful view of the rushing Chile River, up to majestic El Misti, framed in the tropical sky.

But nothing in the social line was allowed to interfere with the observing. Every clear night Professor Bailey was busy as soon as darkness set in, making plates of long exposures with his

old friend, the Bruce 24-inch doublet. No matter how whimsical this instrument might be, he could nearly always coax it into good humor. Often following for six hours, during which his post could not be left for more than a minute at a time, he made many beautiful and useful plates, especially of globular clusters, the rich Sagittarius region, the almost barren south galactic pole, and the great nebulae of Carina and Rho Ophiuchi.

By day he was busy making star counts for a proposed study of stellar distribution, or in the examination of his plates for variables and nebulae. Years earlier he had been one of the first to realize the importance of the photographic study of extra-galactic nebulae. Before 1908 he had formulated a classification of "Bright Clusters and Nebulae," and had published catalogues containing nearly two thousand nebulae found on the Harvard photographs.

Modest to the extreme, never given to exploiting his own experiences or travels, unfortunately he wrote little about them except in the formal Annals of the Observatory. From year to year, on his various journeys, he made a valuable collection of Inca pottery, silver, and other historical relics of the early mythical Peruvian dwellers.

That he could write delightfully in a lighter vein is seen in occasional papers like "An Astronomical Interlude," published in the Harvard Alumni Bulletin, and "A New Peruvian Route to the Plain of the Amazon," published in the National Geographic Magazine. Buried in the meteorological volumes of the Harvard Annals are facts concerning the heights and configurations of the Andes, the volcano El Misti, the Desert of Atacama, and the Oroya Valley, which may be found useful in years to come, when, as Bailey pictured, the plain of the Amazon may be "the scene of manifold industries, and the home of millions of prosperous dwellers."

Returning to Cambridge late in 1923, he continued his investigation of cluster variables and stellar distribution, until, at Dr. Shapley's request, he started to prepare a history of the Harvard Observatory. He kept on with undiminished industry, even after his retirement in 1925, so that this useful book and also

the last instalment of Peruvian Meteorology were finished before his fatal illness. The History and Work of the Harvard Observatory, Harvard Monograph No. 4, commences even before the foundation of the Observatory with its historical background in the Massachusetts Bay Colony as early as 1674, and continues in an able and unbiased presentation of the problems and personnel of the Observatory from 1839 to 1927.

Although dignified by nature, Professor Bailey thoroughly enjoyed the human side of life, and was of such a sympathetic nature that he was often consulted on subjects decidedly outside of astronomy. He won the respect of all by his wide sympathy, his justice, his never-failing kindness, and his complete lack of self-seeking.

"His life was gentle." And yet with its gentleness and gentlemanliness, there was a great strength, the strength of faith in God and humanity, and in appreciation of the fundamental eternal truths of science and of life, for which, as he himself wrote, "there is need not only of intelligence, but of imagination."

His name should always be honorably associated with the great development of astronomy which began during the last decade of the nineteenth century, for his pioneer labors in the photography of the southern stars helped to open up the whole sky to modern astronomers, and his early investigations of variable stars in globular clusters provided an important foundation stone for the structure of the new cosmogony.

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