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DOROTHEA KLUMPKE ROBERTS—AN APPRECIATION

By Robert G. Aitken

"Mrs. Dorothea Klumpke Roberts, 81, internationally known astronomer and native San Franciscan, died yesterday in a hospital here."

My heart skipped a beat as I stared at this announcement in the *San Francisco Chronicle* of October 6, 1942. Then I read it again, unbelievingly. Impossible! One cannot associate the idea of *death* with such a warm and living personality. It was true that Mrs. Roberts, born in San Francisco on August 9, 1861, was 81 years old. It was true that she had been more or less an invalid for several years. The lines that pain had etched on face and brow were evident the last time I saw her; but she was vividly alive, gracious as always, keenly interested in the astronomical lecture we were attending and warmly interested in the well-being of her friends.

At a dinner given in her honor in Berkeley, on February 20, 1937, following the Berkeley meeting of the Astronomical Society of the Pacific, Mrs. Roberts, in response to the request of Professor Leuschner, president of the Society, heartily seconded by all those present, gave a modest, informal account of her unusual career. Summarized and supplemented by Dr. Sophia H. Levy, this was printed in our *Publications*[1] for April 1937. It gives us, all too briefly, a glimpse of Mrs. Roberts' family and early life and of the conditions under which she received the training required for admission to the University of Paris.

San Francisco in the 1860's and 1870's was a live and rap-

[1] *Pub. A.S.P.*, **49**, 115–17, 1937.

Dorothea Klumpke Roberts

idly growing city, but the educational advantages it offered beyond the elementary courses could not, in the nature of things, compare with those available in older communities in our own country and still less with those available in Western Europe. The Klumpkes, an able and well-to-do business man and his accomplished wife, wanted the best for their children. Moreover, they held the view, rather unusual at that time and place, that the daughters should be given the same opportunity as the son to develop their special talents. It was therefore decided that Mrs. Klumpke should take the children abroad. She did so, placing them first in schools in Germany and later in France.

This involved repeated trips across continent and ocean, in days long before the advent of streamlined trains and floating palatial hotels—arduous trips. But Mrs. Klumpke had her reward. All her children had distinguished careers: the son as a business man; one daughter as an artist, the pupil and protégée of Rosa Bonheur; another as a physician, who collaborated with her husband, a professor on the Faculty of Medicine at Paris; another as a pianist, the pupil of Marmontel; a fourth as a violinist, a pupil of Isaye; and Dorothea, the mathematician and astronomer, in whom we are here specially interested.

Passing all her examinations with distinction, Dorothea in due time was admitted to the University of Paris where she specialized in mathematics and mathematical astronomy, and became the first woman to receive the degree Docteur-ès-Sciences. Her examiners for the degree were the well-known astronomers Tisserand and Andoyer, and her thesis a mathematical disquisition "L'Étude des Anneaux de Saturne."

She now became an attachée at the Paris Observatory, working specially on the determination of star places on photographic plates under the direction, successively, of G. Bigourdan, Schulhof, and Paul and Prosper Henry. When the International Congress of Astronomers, comprising fifty-six delegates from seventeen nationalities, convened in Paris in April 1887 to consider the proposition, first advanced by Sir David Gill in 1886, of the preparation by international co-operation of a great photographic star chart (the *Carte du Ciel*) and

an accompanying star catalogue, Miss (or rather Dr.) Dorothea Klumpke rendered invaluable service by translating papers that were presented in various languages into French, for the official record.

The proposition was adopted, and the Paris Observatory agreed to photograph in a broad zone across the sky all stars to the 14th magnitude and prepare the corresponding charts for the *Carte du Ciel,* and also to make a catalogue of all stars to the 11th magnitude appearing on the plates. A special Bureau of Measurements was created at the Paris Observatory by the director, Admiral Mouchez, to effect the measurement and reduction of the plates and the preparation of the catalogue, and Dr. Klumpke was placed in charge of it.

The preparation of such a catalogue and set of charts is strictly technical work, involving, in the first place, observing skill of the first order to secure a perfectly homogeneous set of plates. But when these are at hand the work is only begun; they simply provide the material for charts and catalogues. Their measurement and reduction offer a series of problems that only highly trained and capable astronomers can solve, even though the greater part of the routine measurements and computations may be carried out by assistants, and it is a task that requires years to complete. When ninety-six of the Paris charts had been issued, it was estimated that the charts covering the entire sky would make a pile 120 feet high!

The supervision of the work on the Paris section of this great atlas and catalogue absorbed the major part of Dr. Klumpke's time and energy until 1901, but she managed to find time for study in many other lines; and she was active in her support of the French astronomical societies. So highly was her work regarded, indeed, that in 1889 the Société Astronomique de France made to her its first award of the Prix des Dames, and in 1893 the Paris Academy of Sciences elected her Officier d'Académie.

In 1901 she married the British amateur astronomer, Dr. Isaac Roberts, a pioneer in the work of celestial photography. In the 1880's he had erected an observatory at his home in Wales (later removed to Crowborough, Sussex), equipped

with an excellent silver-on-glass mirror of 20 inches aperture and 98 inches focal length, and a star camera with a 5-inch Cooke lens, of 19.22 inches focus. The remarkable photographs taken with the 20-inch reflector gave the first adequate representation obtained in England of the great spiral nebulae, like the Great Nebula in Andromeda, and of many of the planetary and irregular nebulae. This work justly earned for him election as Fellow of the Royal Society and, in 1895, the award of the Gold Medal of the Royal Astronomical Society. A thick quarto volume *Photographs of Stars, Star Clusters and Nebulae,* published in 1893, followed by a second, similar volume in 1895, fully illustrated, gave the details of this valuable pioneering work.

Mrs. Roberts, after their marriage, devoted herself almost entirely to assisting her husband in the observatory and in the study, a task for which her long experience at the Paris Observatory had specially qualified her. Dr. Isaac Roberts died in 1904 but she continued the work, publishing papers from time to time on results obtained. In 1929, in commemoration of the one-hundredth anniversary of his birth, she issued the *Isaac Roberts Atlas of 52 Regions, a Guide to William Herschel's Fields of Nebulosity,* a sumptuous atlas containing, with its supplement, published a little later, enlargements to a uniform scale of 50 plates taken with the 20-inch reflector and similar enlargements of 10 plates taken with the 5-inch Cooke camera, together with all necessary explanatory text, tables, and notes. This atlas has been of special use in identifying these feebly luminous sky areas, and will later, when the regions are again photographed, give valuable information on the proper motions of the stars involved. It is understood that Mrs. Roberts had stored all her plates and instruments safely and had made provision for continuance of the work when conditions permit.

In 1934 came the crowning honor of her career. She was elected Chevalier de la Légion d'Honneur, and received the Cross of the Legion at the hands of the President of the Republic of France. About this time she gave up her active work and returned to her native land (she had never relinquished

her American citizenship) with her sister Anna Klumpke, the artist.

They took up their residence in San Francisco next door to the home of their niece, Mrs. G. E. Austin, and this promptly became one of the rallying points for artists, musicians, scientists, and men and women of distinction in many fields of endeavor, not alone of San Francisco but of the entire Bay area.

Here, surrounded by old friends and new, Mrs. Roberts continued her reading and study and kept up her interest in the progress of astronomy and in the careers of astronomers—especially young astronomers. How many young people she helped in the course of her life we shall never know, but we do know that she was always generous. For years she sent $100 annually to the Director of the Paris Observatory to be given as a prize to some one of the younger members of the staff, and a like sum to the President and Council of the Astronomische Gesellschaft, to be awarded to the writer of the best paper of the year on some subject relating to Herschel's 52 Areas. She was generous, too, in her support of the Société Astronomique de France and re-established its Prix des Dames, which had been discontinued for some years.

On May 21, 1939, the Regents of the University of California accepted from Mrs. Roberts the gift of a sum of money, the interest of which was to be used to establish two prizes of equal value, one in the department of astronomy and one in the department of mathematics, to be known as the Dorothea Klumpke Roberts Prizes, in honor of her father, mother, and husband. They were to be awarded to undergraduate students who had shown special ability. About the same time she contributed the sum of $1,000 to the Lecture Fund of the Astronomical Society of the Pacific. When her will was read, a few days ago, it was found that another $1,000 was to be added to this sum, to constitute the "Klumpke-Roberts Lecture Fund," in honor of her parents and husband. A larger sum, over $3,000, was left to the American Astronomical Society, "to be used in accordance with my wishes which are already known to that institution or as it may deem fit."

And now she has gone from us, this great astronomer, this loyal-hearted, generous woman. But not to die. She will live on for the world at large through her work and her benefactions. In the hearts and memories of those who had the privilege of calling her their friend her rich, warm personality will abide, an everliving presence.

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