

O B I T U A R Y

George Ellery Hale.

By the death of George Ellery Hale on February 22 last, at the age of 69 years, astronomy has lost a great leader and a man of remarkable gifts and great personal charm.

In the early days of astrophysics, about the year 1892, when I had the privilege of meeting him for the first time, at the house of Mr. Ranyard, I was greatly impressed by his enthusiastic interest and sympathy with my amateur efforts in devising apparatus for solar research. He was indeed the friend of the amateur astronomer, and a great advocate of cooperation in research. At that time he had made the notable discovery that the calcium lines H and K were brilliantly reversed, not only in prominences at the Sun's limb but also in the faculæ, and he had already obtained monochromatic photographs of the Sun's disc in K light at his private observatory at Kenwood with a grating spectrograph furnished with moving primary and secondary slits and a stationary solar image. In other words, he had invented the spectroheliograph, which at once revealed the enormous areas of bright calcium emission surrounding sunspots and the intricate réseau of bright and dark markings all over the disc from pole to pole, indicating the turbulence of the gases in the reversing layer.

In later years, about 1908, when photographic plates sensitive to the red rays became available, still more remarkable photographs were obtained with this revealing instrument. Monochromatic images with the hydrogen line α showed strange dark spiral markings around sunspots suggesting to Hale's active mind solar vortices.

The distribution of the markings often resembles on a vast scale the pattern shown by iron filings when coerced by the lines of force in a magnetic field; and so impressed was Hale by this fact that he considered the possibility that negatively charged particles emitted by carbon and other elements at high temperature revolving in the spot vortex might form the conditions necessary for the production of a magnetic field. Inspired by the suggestive markings, and prompted by theoretical considerations, Hale and his enthusiastic associates at Mt. Wilson entered upon a most elaborate and long continued research with polarizing apparatus, resulting in the detection of the Zeeman effect in solar spectra, and the series of brilliant discoveries which prove that magnetic phenomena play a very significant role in sunspots. The question of a general magnetic field in the Sun naturally followed on these results, and the powerful resources of the Mt. Wilson Observatory have been strained to their limits in attempts to detect and measure the minute shifts of the components of the Zeeman doublets. Evidence was obtained in the year 1913, showing that the magnetic field is actually present; Hale, however, always wished to get further confirmation with more powerful apparatus and improved methods of measurement. In recent years he was greatly struck by the resolving power of spectra obtained at Ewhurst with the liquid prism containing ethyl cinnamate as the dispersing agent; this led him to have a prism of large aperture constructed for his private observatory at Pasadena in the hope that he might bring it into use for high-dispersion work on the magnetic field. Unfortunately the many delays and difficulties encountered in the construction of the prism and his failing health prevented its successful use.

In this intense interest in solar work Hale always had in mind the wider interests of astronomy; he wished to study the Sun mainly as an introduction to the stars, and in particular to the process of evolution displayed in the various types. When I visited Mt. Wilson in 1906, the great 60-inch reflector telescope was under construction and already he was scheming for a still larger telescope for stellar research. An 8-foot circle was inscribed on the wall at the end of the corridor used for testing the 60-inch mirror, and this was to be the size of the new mirror!

It seemed colossal, and there were doubts if a large enough disc could be cast. Fortunately for astronomy a fairly successful disc was produced at St. Gobain in France and shipped to America in 1914, just escaping the horrible devastation of the great war.

The work of the two giant telescopes, the 60-inch and the 100-inch, in subsequent years, is a splendid tribute to the energy and foresight of the man who was mainly responsible for the initiation and organization of these great undertakings, and to his success in securing the cooperation of a band of skilled astronomers. Hale was always scheming for further improvements in methods of work and design of instruments. The great light-gathering power of the 100-inch coupled with specially designed spectrographs capable of dealing with the spectra of very faint and distant galaxies has revealed an astounding new fact, perhaps a new law of Nature, the mysterious red shifts in the spectra of the spiral nebulae.

The great success of these telescopes, however, acted only as a spur towards greater efforts. A telescope of four times the light-grasp of the 100-inch is now under way; and Mt. Palomar, which is the site chosen for it, has in store for us new revelations about the constitution of the stars, the age of the Universe, and whether space is infinite or has a radius of curvature. It is sad indeed to think that the moving spirit in this great undertaking is not with us to share in the exciting discoveries of a few years hence.

J. EVERSLED.