

JOSEPH WINLOCK was born Feb. 6, 1826, in Shelby County, Kentucky. Graduating, in 1845, at Shelby College, he afterward held the professorship of Mathematics and Astronomy in that institution until 1852. The remainder of his life was passed chiefly at Cambridge, Mass.; but he spent some months at the U. S. Naval Observatory in Washington, and for more than a year was at the head of the mathematical department of the U. S. Naval Academy at Annapolis. He was twice made Superintendent of the American Ephemeris, finally quitting this office in 1866 to take the post of Phillips Professor of Astronomy at Harvard University, and in that capacity to serve as Director of the Observatory. He held this office at the time of his death, June 11, 1875. His last illness was short, and did not appear dangerous until a few hours before its termination.

Professor Winlock was an excellent mathematician and astronomer, and had a remarkably retentive memory not only for facts relating to his branch of science, but for the sources of information concerning those facts. The originality of his mind, however, was chiefly shown in his suggestions for the improvement of astronomical instruments. These inventions were singularly simple and effective. Four among them deserve special notice in this place.

(1.) The mounting of large meridian circles in such a manner as to allow the piers to be shortened, so that the graduated circles

are wholly above the piers, and the steadiness of the whole instrument is increased. The theoretical advantage of this arrangement cannot here be discussed; it has been tested by five years' experience at Harvard College Observatory with very gratifying results; it has been adopted in other observatories, and will probably come into general use.

(2.) The application of a diagonal eye-piece, moved by a rack and pinion, to any large telescope, in such a manner as to dispense with the customary "finder," and to enable the principal object-glass to be used in finding faint objects which are to be examined with the spectroscope or otherwise. This invention has also been for some years in use at Harvard College Observatory.

(3.) A method of registering spectroscopic observations by marking lines upon a silver plate without requiring the removal of the eye from the spectroscope, or the use of artificial light. Professor Winlock registered in this manner his observations of the solar eclipse of December, 1870, which he observed in Spain.

(4.) The use of a lens of long focus and of a plane mirror in making photographs of the sun. Apparatus of this kind was brought into daily use in July, 1870, at Harvard College Observatory. Priority in this invention is claimed by some other astronomers; but it does not appear that any one actually used the combination of the mirror with the lens of long focus until some years after Professor Winlock. It should also be noticed that in 1869 Professor Winlock first photographed the solar corona without enlarging the image by an eye-piece.

During his connection with the Observatory, Professor Winlock greatly increased its instrumental equipment, and also its pecuniary resources, by the aid of contributions from neighboring friends of science. In particular, the system adopted for furnishing electric signals from one of the clocks at the Observatory to various points in Boston and elsewhere, has been profitable alike to the Observatory and to the public. It illustrates Professor Winlock's practical good sense, that instead of introducing new clocks, controlled by that at the Observatory, at the places where the signals are received, he provided simple telegraphic apparatus for the reception of the signals every two seconds; a method much cheaper than the other, and in practice equally satisfactory.

In private life, Professor Winlock's amiable, though reserved, character greatly endeared him to his friends.

