

ging letter, that "the first application of his meridional instruments should be for the exact determination of his geographical latitude and longitude, and that his observing energies should be given to the large equatorial." With this advice, he directed his attention largely to the remeasurement of Struve's double stars south of the equator. The great astronomer of Pulkova had furnished his full catalogue of these, numbering more than three thousand. Mitchell began his work upon them. He tells in glowing language of the gratification experienced in beholding for the first time—and he, in this, the first observer in this country—the *double stars* brought into view by a powerful instrument.

Airy and Lamont had invited him to make minute observations of the satellites of Saturn, since in the latitude of Cincinnati the planet is observed at a more favorable altitude than at Pulkova, twenty degrees further north. To these, and chiefly "to the physical association of the double, triple, and multiple suns," he gave his close attention. He made interesting discoveries in the course of this review. "Stars which Struve had marked as oblong, were divided and measured; others marked double were found to be triple." He proposed a new method for observing, and new machinery for recording north polar distances or declinations. Professor Peirce reported favorably on this method at the meeting of the American Association in 1851, and Professor Bache, as Superintendent of the Coast Survey, indorsed their approval in his report for that year, presenting also a full account of work done by the new method, in observations made by the enthusiastic astronomer and his patient wife, who assisted him through all. It was claimed that the results rivaled the best work done at Pulkova. Mitchell was the first "to prepare a circuit interrupter with an eight-day clock, and to use it to graduate the running fillet of paper;" and to invent and use the revolving-disk chronograph, for recording the dates of star signals. Professors Bache and Walker had declined to adopt the first of these improvements in astronomical appliances, through an apprehension of injury to the astronomical clock. Mitchell's work proved the apprehension to be groundless. His revolving disk is an invaluable invention. To the perfection of such methods and instruments, together with the routine work of observation, he gave all the energies not of necessity employed in outside labors devolving on him for his support. Unhappily these, at an early date, became almost absorbing.

For the Astronomical Society, having secured their observatory and their director, had failed to secure a basis for his support. This certainly was as much their regret as his. Nor was their astronomer as unfortu-

nately situated as the first Astronomer Royal of England, for whom Charles II. provided an observatory, but "no instruments," for Flamsteed used to say he earned his £100 "by labor harder than threshing:" he had to thresh and to find his own corn. Mitchell relied on his professorship in the Cincinnati College: in two years the college was burned down. He then relied on publications and lectures. He published the *Sidereal Messenger*, a work of three volumes. He delivered lectures of rare power and beauty in the chief cities of the Union. He stirred up an enthusiasm by these lectures, which quickened the movements resulting in the establishment of some of our first observatories of this day. But for his support, unhappily for the observatory, he was compelled to accept the position of chief engineer of the Mississippi and Ohio Railroad from 1848-52; and finally, in 1853, that of director of the magnificent Dudley Observatory at Albany, New York. He did not, however, remove from Cincinnati till 1859. In 1861 his country claimed him from astronomy for her own service. He was not one who could forget the sacred obligations of his training at the Military Academy; but promptly responded as patriot and soldier, and his stirring addresses before entering the field will not soon be forgotten, nor his untimely loss to science.\*

The observatory remained in charge of Mr. Henry Twitchell, of Cincinnati. Mitchell's enthusiasm had gathered around him from time to time young men as learners, among whom were M. Yarnall, then as now a professor in the United States navy; Mr. Twitchell was his chief assistant for twelve years. On his resignation, Mr. William Davis, of Cincinnati, received the use of the building to keep it in repair and make his own amateur observations. For two years he continued a series of observations of moon culminations, such as had been begun in 1856 for the Coast Survey.

On the 1st February, 1869, Mr. Cleveland Abbe, formerly employed at the Pulkova Observatory, and more recently at the United States Naval Observatory at Washington, accepted the place of director.

His first annual report submitted a plan of wide and useful astronomical and magnetic and geodetic investigations. On these he entered vigorously. He first adopted for this country the issuing of daily meteorological bulletins, now so widely known as adopted and used by the United States Signal Service Bureau.

\* General Ormsby McKnight Mitchell's most honorable chronicle reads thus: "Born in Kentucky, 1810; graduated at West Point, 1829; Assistant Professor of Mathematics in the Academy to 1831; Professor in the College of Cincinnati, 1834-44; Director of Cincinnati Observatory, 1844-54; of Dudley Observatory, 1859-61; Brigadier-General U.S.A., 1861; Major-General commanding the Department of the South, 1862. Died in command at Beaufort, South Carolina, 1862."