NEW FORM OF CONSTRUCTION OF OBJECT-GLASSES INTENDED FOR STELLAR PHOTOGRAPHY.

THE interest now generally taken in stellar photography will probably make it desirable that the object-glasses of telescopes ordinarily used for visual purposes should be so constructed as to be readily adapted to photographic use. As now commonly made, the correction for chromatic aberration by means of the flint-glass lens of a refracting telescope is too great to give satisfactory photographic images. The method of adapting such a telescope to photographic purposes which was employed by Mr. Rutherford, and more recently in the case of the great telescope of the Lick Observatory, is to provide an additional convex lens of long focus which may be mounted when photographs are to be taken, and removed when direct observation is desired. The objections to this method are the expense of the additional lens and the introduction of two more surfaces.

Another way of removing the excessive correction for chromatic aberration is to separate the flint- and crown-glass lenses, and to place the flint nearer the eye-piece. But when this is done, while the correction for colour becomes satisfactory, the spherical aberration is only partially corrected, the focal length of the central part of the object-glass being greater than that of the surrounding portions. This difficulty, however, may be surmounted by giving different curves to the two surfaces of the crown-glass lens, and reversing it when the lenses are separated.

In an object-glass of this construction, when used for direct observation, the two lenses are in contact, with the more convex side of the crown lens next the flint. For photographic use, the lenses are separated, and the more convex side of the crown-glass lens is turned outwards. In order to determine whether this principle of construction should be adopted in the case of a large object-glass to be made for experimental work undertaken with the aid of the Boyden Fund, recently transferred to the Observatory of Harvard College, for the purpose of obtaining astronomical observations at elevated stations, a small object-glass was made upon the new plan by Messrs. Alvan Clark and Sons. As this object-glass proved to be well adapted to its purpose, the larger object-glass above mentioned has been similarly constructed by the same makers; its aperture is 13 inches, and its focal length about 180 inches. Upon trial, it is found that the images formed by this object-glass are excellent when the instrument is used for direct observation, and that the photographic images are equally good when the lenses are separated 3 inches and the crown-glass reversed.

The curvature given to the surfaces of such an object-glass will depend upon the quality of the glass employed; in this particular instrument the radius of curvature for the less convex side of the crown-glass is 86 inches; for the more convex side, 77 inches; for the concave side of the flint, 73.8 inches; the side of the flint-glass which is turned towards the eye-piece is convex, and its radius of curvature is 1020 inches.

EDWARD C. PICKERING.

Harvard College Observatory, Cambridge, U.S.,
September 29.

WILLIAM S. SYMONDS.

WE have already announced the death, on September 15, at Cheltenham, of the Rev. William S. Symonds, Rector of Pendock, F.G.S., and a J.P. for the county of Worcestershire. Mr. Symonds, the eldest son of Mr. William Symonds, of Elsdon, Hereford, was born in Hereford in 1818, took his degree at Christ's College, Cam-

bridge, in 1842, and in 1868 was presented to the Rectory of Pendock.

For several years past Mr. Symonds had suffered from heart-disease, and was compelled to withdraw from his parish duties, as well as from participation in those scientific pursuits in which he had long been actively occupied.

The intimate friend of Murchison, Lyell, and of other pioneers in geology, and frequently their companion in their excursions, he enjoyed exceptional opportunities for observing the facts relating to this science, and has contributed numerous papers, chiefly on the rocks and fossils of the west of England, to the scientific periodicals. Yet he sometimes engaged in discussions of a more general character. In the question of the reptiliferous sandstone of Elgin he took much interest. Before the meeting of the British Association at Aberdeen, in 1859, he visited the Elgin area, and, having worked over it with great care, was led to accept the views of Sir C. Lyell in opposition to those of Murchison; and in the discussions at the meeting strongly insisted on the view that the reptiliferous sandstones are of the New Red or Triassic, and not of the Old Red Sandstone age.

Mr. Symonds did not devote as much attention to paleontology as to physical geology, although even in this branch of the science he has left his mark, and has made numerous and valuable contributions from his collections of fossils to several local museums.

During the latter part of his life his interest was much concentrated on the phenomena of the glacial drifts, and the question of the antiquity of prehistoric man. In 1871 he communicated to the *Geological Magazine* (p. 433) a paper on the great Doward Caves, and in his "Severn Straits, or, Notes on Glacial Drifts," he gives his conclusions on this subject.

But it is perhaps chiefly as an earnest and eloquent expounder of the facts and principles of geology and cognate subjects that he will be remembered. He had a remarkable power of infusing his own spirit of research and love of Nature into his writings. Few can read his "Records of the Rocks," "Old Stones," and "Old Bones," or his delightful romances of "Malvern Chase" and "Hornby Castle"—tales of the Wars of the Roses and the Parliament—without recognizing this. In the formation and management of many of the field clubs of the west of England Mr. Symonds's ability was especially conspicuous. He was engaged, with the late Mr. Scobie, of Hereford, in the formation of the Woolhope Field Club, and was elected its President in 1854. He was the frequent companion of the late Sir William Govin in his travels, and took an active part in the management of the Cotteswold Club, of which Sir William was President.

By those who had the privilege of an intimate acquaintance with Mr. Symonds, he will ever be thought of and respected as an earnest and most uncompromising seeker after truth for its own sake. He considered that man is performing a most religious duty when he sits as a humble student at the feet of Nature to learn, as far as may be, the lessons which Nature's Creator would teach him. It was a faith, too, which, throughout the trying and painful complaint that clouded the last days of his life, never failed him, and which enabled him to look forward to, and speak of, the great change which was before him, with cheerful hope.

The number of papers which Mr. Symonds has from time to time contributed to various scientific journals appears to have been over forty.

NOTES.

WE reprint to-day from the *Times* an admirable letter by Mr. Samuel Smith on education in Germany. Mr. Smith gives a clear account of some important elements of the educational system which the Germans are gradually bringing to perfection;