

magnetometer method might be used more than it is at present *under suitable conditions*; I wished to direct attention to its practical limitations.

THE REVIEWER.

Nodules on the Intermediate Bladderwort.

I RECENTLY had an opportunity of examining living specimens of a very rare British plant, the intermediate bladderwort (*Utricularia intermedia*), and found that the leaf-bearing stems ended in a solitary terminal knob or nodule, the largest being the size of a small peppercorn. What are these knobs? Are they autumn plant-buds that will ultimately grow into plants? This seems to me a possible solution; but (my edition of) Bentham does not mention that the plant propagates itself in this way, nor are the knobs figured in the companion volume of illustrations by Fitch and Smith.

HAROLD EVANS.

Llanishen, Cardiff, September 17.

NOTES ON STELLAR CLASSIFICATION.

III.

IN the year 1890 a photographic study of the spectra of stars was commenced by me at the Solar Physics Observatory at Kensington. The object of the investigation was not so much to make a spectroscopic survey of the stars generally as to examine with considerable dispersion the spectra of the brighter individual stars. Up to the end of the year 1900 there had been accumulated a large number of spectra, a catalogue of which was published in the year 1902. This contained 470 of the brighter stars.

In this catalogue the stars were classified according to their spectra after a minute inquiry of the lines due to each of the chemical "elements" involved.

The spectra of 105 of these 470 stars were photographed by Dr. F. McClean at the Cape Observatory.

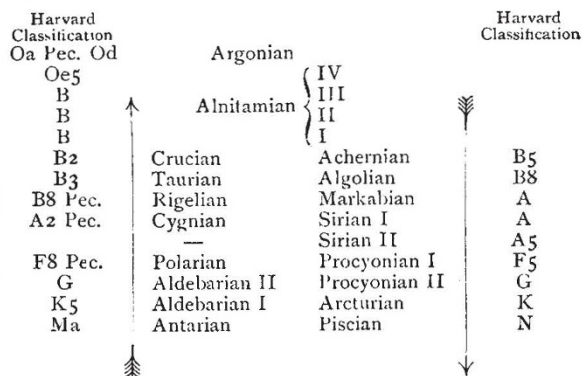
Details of this classification were given in the publication above mentioned, but a brief summary may here be given. The stars were arranged in two main groups, one in which the stars were getting hotter ("hotting"), and the other in which they were cooling. The differentiation of these two groups was based, not only on their chemistry, but on other differences observed on the two arms of a "temperature curve."

On the temperature curve the stars increasing their temperature were located on the left-hand branch or ascending arm of the curve, and the cooling stars on the right or descending arm. The stars of the highest temperature were located at the apex of the curve.

The two main divisions of stars, *i.e.* those getting hotter and those getting colder, were each classified according to their chemistry and placed at their respective levels on each side of the temperature curve. At equal levels on each arm the stars were considered to be of the same temperature, each group being designated by a name derived generally from that of the "type star" which had been selected to represent that group.

Further experience with this method of stellar

classification led to the detection of criteria which have suggested the interpolation of additional groups, and those have now been embodied in the general scheme as given below representing the classification in use at present, and to it has been added the Harvard scheme of classification of the type stars employed by me.



The main routine work at the Hill Observatory at Sidmouth, since the McClean telescope was brought into use in September, 1913, has been a spectroscopic survey of all stars down to the fifth magnitude other than those published in the above-mentioned catalogue; incidentally the spectra of a number of stars fainter than magnitude five have also been photographed.

This programme of work is especially fitting for this observatory, because the same instrument is in use which Dr. Frank McClean employed in his spectroscopic survey of stars equal to or brighter than magnitude 3.5, the telescope having been presented to the observatory by his son, Frank Kennedy McClean.

The McClean instrument consists of an equatorially mounted twin-telescope with apertures of 12 and 10 inches, and focal lengths of 134 and 150 inches respectively. The former is fitted with an objective prism of 12 inches aperture and 20° angle, and is mounted in a metal frame in such a way that it may be moved clear of the objective. In the focal plane is placed a camera fitted with a swing back by Messrs. Hilger. This carries a plate-holder for plates $6\frac{1}{2} \times 4\frac{3}{4}$, but an adapter has been inserted to carry plates $4\frac{1}{4} \times 3\frac{1}{4}$ which are in use. The dispersion on the photographic plate between K and H β is equal to 28 mm. or 927 Angström units.

The telescope, built by Sir Howard Grubb, of Dublin, is driven by means of falling weights, and is fitted with electric control movements regulated by an electric pendulum. The governor is of the heavy ring pattern, and is adjusted by means of a cam. The declination circle is electrically illuminated, and viewed with the aid of one of two reading telescopes from the camera end. In addition to two finders of 4-inch and 2-inch aperture fitted to the 10-inch tube, a 3-inch finder deviated to the angle of the prism has been specially attached to the tube of the 12-inch; this serves the purpose of observing the amount of