

tube on the spectrograph body. The Nernst filament was placed vertically. It was used at such a distance from the slit that at its nearest position to the slit the whole of it was effective in illuminating the plate.

The graduations of the sector opening were compared and corrected with a protractor. The sector wheel ran 120 revolutions per minute, there being two openings in the wheel, the sum of the two being an angular opening equal to that given in the table.

The plates used were half of them Wratten & Wainwright Panchromatic and half Seeds Panchromatic. In one instance a Seeds Process was used with the same results. The plates were given uniform tank development. The exposures were such as to give rather faint images, necessary in order to judge accurately differences in intensity. The exposures were such, however, that with the sector running they were always longer than one minute. A plate would contain a set of exposures for the so-called zero of the experiment, the initial balance distance, and a set of exposures with the sector running, the movable lamp being placed at distances such as to make equivalent sets of exposures. The distances corresponding to the two pairs which matched on such a plate when divided the one by the other gives a quotient which is a figure of the table. With a good setting the two spectral bands balanced throughout if they balanced at all, showing that the proposition is independent of wave length.

As the sector photometer is used for spectrophotometry the two beams fall on a bi-prism in front of the slit with the result that the two beams on the plate are in juxtaposition. Because of the fact that the total reflecting prism used here had been slightly ground on its edges the two bands of the pair in this experiment were .4 mm. apart, which increased somewhat the difficulty of judging equality in blackening. The error in such judgments was probably of the order of 2 per cent. It may have been less than this. The averages for the figures of the table differ as the last two columns show by about a half per cent. from what the figure should be if the diminution in the intensity

of the beam due to the sector is photographically equivalent to the diminution due to a proportionate increase in distance.

That this equality exists is certainly a coincidence. Recently Helmick² has shown that long exposures produce less blackening than short exposures, the total energy being the same (this being when both the short and long exposure are longer than a certain fixed time). In some rough experiments which I first made I found that the total actual intermittent exposure necessary to produce equal blackening through a 72° sector was about of the order of 12 per cent. longer than for a like continuous exposure, *i. e.*, the sector at rest. The evidence herein contained goes to show that when the beam is dimmed by increasing the distance of its source the exposure must likewise be longer by this same amount. In other words, if B_1 , B_2 and B_3 are the blackenings due respectively to a certain beam, to the same beam made intermittent and to a beam of decreased intensity, all of the beams delivering equal total energy through the regulation of the time factor, then B_2 and B_3 are less than B_1 but are equal to each other.

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THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS

THE seventh annual meeting of the American Association of Variable Star Observers was held at the Harvard Observatory, Cambridge, Mass., on November 23, 1918. More than a score of the members were present and the association became formally incorporated under the laws of Massachusetts. The meeting was, without doubt, the most successful and enjoyable that has yet been held. The reports of the several committees indicated the active interest and aims of the members, and a new committee, under the chairmanship of Professor S. I. Bailey, was appointed to gather together a collection of astronomical slides which could be loaned, under proper supervision, to members who might care to lecture in their vicinity, thus tending to arouse a greater interest in astronomy and particularly variable stars.

² P. S. Helmick, *Phys. Rev.*, XI., 5, 1918, 372.

Several prominent authorities on variable stars were elected to honorary membership, including Miss H. S. Leavitt, of the Harvard Observatory; Professor S. A. Mitchell, director of the Leander McCormick Observatory; Professor H. C. Wilson, director of the Goodsell Observatory, and editor of *Popular Astronomy*; Mr. C. L. Brook, director of the Variable Star Section of the British Astronomical Association, England, and Professor A. Bemporad, director of the Observatory, Catania, Italy. Mr. C. E. Barnes, who has been most generous in acting as publisher for the association, was elected as the second Patron.

A pleasant feature of the meeting was the presentation to Professor E. C. Pickering of a solid gold paper knife, set with appropriate jewels, as a token of the esteem in which he is held by the association. President D. B. Pickering most graciously presented the token, in substantially the following language:

Members and friends of the A. A. V. S. O.: It is my very happy task, at this time, to act for you in the performance of a duty of true friendship and appreciation.

At the time our association was formed, seven years ago, its course was decided and its fate determined largely by the influence of one man. Whatever he may have hoped to win for science from our efforts at that time or since, can not be commensurate with the sacrifices that he has made in our behalf.

He has assisted us in everything that we have undertaken and has carefully watched our progress along every step of the way. And the manner of his so doing has been that of the big brother.

For us he has laid aside the cloak of the physicist and master of research, and has given us his hand in fellowship, has taken us into his home, seated us at his board, and been one of us.

Professor Pickering, our attempt to convey to you at this time some feeling of appreciation for the big thing you have done for us, seems very weak and inadequate: but we want you to know that with the little token we are shortly to ask you to accept, there goes to you from each and every one of us the warmest feeling of friendship and goodwill.

There is a precious stone called the alexandrite, that has the rare property of appearing green in the light of day and red under artificial light, and well symbolizes the colors of the stars at their evolutionary extremes. There is also another, called the star-sapphire, wherein nature, in a manner with which we are unfamiliar, has set a star

against a background of azure. Both of these gems are mounted in this little remembrance.

The inscription reads: "Edward Charles Pickering, Director of the Harvard College Observatory, from the American Association of Variable Star Observers, November 23, 1918," and the reverse reads: "This token of appreciation is tendered to him who has done so much to promote the study of variable stars: guiding the amateur with untiring helpfulness along paths of understanding into fields of usefulness and pleasure."

Will you accept it, sir, and with it the gratitude we have tried to express.

Professor Pickering, though taken completely by surprise, responded in his usual characteristic manner and expressed his great appreciation to the association for such an expression of friendship and gratitude, and added that he had felt all along, that he and science were the ones that were being helped by the untiring efforts of the members of this association.

Mr. D. B. Pickering's address as retiring president, was a model of clearness and explicitness and dealt thoroughly with the aims and purposes of the association, what it had accomplished in the past seven years, and what it hoped to do in the future.

The climax of the meeting came at the sumptuous dinner held in the evening, at a private house near the observatory, where in the absence of the newly elected president, Mr. Campbell, acted as presiding officer and toastmaster. The after-dinner speeches, both of an astronomical and non-astronomical nature, were greatly enjoyed by all.

The newly elected officers are: *President*, H. C. Bancroft, Jr., of West Collingwood, N. J.; *Vice-president*, C. Y. McAteer, of Pittsburgh, Pa.; *Council Members for two years*, Miss A. J. Cannon, of Harvard Observatory, and Professor C. E. Furness, of Vassar College Observatory. W. T. Olcott and A. B. Burbeck continue to serve as secretary and treasurer, respectively, and Professor A. S. Young and J. J. Crane have another year to serve on the council.

For the members who could remain in Cambridge until the next day, a visit was made to the Students' Astronomical Observatory at Harvard College, where Dr. Stetson most graciously and thoroughly explained the elaborate devices that are being used there to teach astronomy to the rising generation.

The spring meeting will be held on the first Saturday in May, 1919, in East Orange, N. J., at the invitation of Mr. D. B. Pickering.

L. C.