

ART. XXIV.—*Note on Photographs of the Spectrum of the Comet of June, 1881*; by PROFESSOR HENRY DRAPER, M.D.

THE appearance of a large comet has afforded an opportunity of adding to our knowledge of these bodies by applying to it a new means of research. Owing to the recent progress in photography, it was to be hoped that photographs of the comet and even of its spectrum might be obtained and peculiarities invisible to the eye detected. For such experiments my observatory was prepared, because for many years its resources had been directed to the more delicate branches of celestial photography and spectroscopy, such as photography of stellar spectra and of the nebulæ. More than a hundred photographs of spectra of stars have been taken, and in the nebula of Orion details equal in faintness to stars of the 14.7 magnitude have been photographed.

It was obvious that if the comet could be photographed by less than an hour's exposure, there would be a chance of obtaining a photograph of the spectrum of the coma, especially as it was probable that its ultra-violet region consisted of but few lines. In examining my photographs of the spectrum of the voltaic arc, a strong band or group of lines was found above H, and on the hypothesis that the incandescent vapor of a carbon compound exists in comets this band might be photographed in their spectrum.

Accordingly, at the first attempt, a photograph of the nucleus and part of the envelopes was obtained in seventeen minutes on the night of June 24th, through breaks in the clouds. On succeeding occasions, when an exposure of 162 minutes was given, the tail impressed itself to an extent of nearly ten degrees in length.

I next tried by interposing a direct vision prism between the sensitive plate and object glass to secure a photograph which would show the continuous spectrum of the nucleus and the banded spectrum of the coma. After an exposure of eighty-three minutes, a strong picture of the spectrum of the nucleus, coma and part of the tail was obtained, but the banded spectrum was overpowered by the continuous spectrum.

I then applied the two-prism spectroscope used for stellar spectrum photography, anticipating that although the diminution of light would be serious after passing through the slit, two prisms and two object glasses, yet the advantage of being able to have a juxtaposed comparison spectrum would make the attempt desirable, and moreover, the continuous spectrum being more weakened than the banded by the increased dispersion the latter would become more distinct.

Three photographs of the comet's spectrum have been taken with this arrangement with exposures of 180 minutes, 196 minutes and 228 minutes, and with a comparison spectrum on each. The continuous spectrum of the nucleus was plainly seen while the photography was in progress. It will take some time to reduce and discuss these photographs and prepare the auxiliary photographs which will be necessary for their interpretation. For the present it will suffice to say that the most striking feature is a heavy band above H which is divisible into lines, and in addition two faint bands, one between G and *h* and another between *h* and H. I was very careful to stop these exposures before dawn, fearing that the spectrum of daylight might become superposed on the cometary spectrum.

It would seem that these photographs strengthen the hypothesis of the presence of carbon in comets; but a series of comparisons will be necessary, and it is not improbable that a part of the spectrum may be due to other elements.

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