

NOTE ON THE SPECTRUM OF COMET IKEYA (1963*a*)

Two objective-prism plates of Comet Ikeya (1963*a*) were obtained with the Curtis-Schmidt and the combined 4° and 6° prisms on the night of March 11, 1963; one on 103*a*-O emulsion, the other on 103*a*-E through a Wratten 22 filter. Evening twilight and moonlight combined to produce sky fog of density 3 on both plates, and the spectra could only be studied by contact-printing the negatives on projector slide plates.

In the photographic region, the spectrum appears as might be anticipated from an examination of the slit spectrogram of Spinrad and Faure (1963). On the first positive of the red plate, there are possible faint traces of the two tail emissions observed in the spectrum of Comet Mrkos (1955 III) (Miller 1962). Since this slender evidence suggested red emissions in the spectrum of the tail, a 30-minute direct photograph was taken on the night of March 15, with 103*a*-E emulsion and the Wratten 22 filter. This was the only direct photograph which could be obtained with the Curtis-Schmidt. The sky background is overexposed (density 2.2), but the tail is conspicuous, extending from the nucleus to the edge of the plate, a distance of 2.5. The appearance is comparable to that of the photograph taken on the same night by McClure (1963), but lacking the more delicate streamers and other fine detail.

Interest in this photograph arises from the fact that the tail consists of streamers and filaments characteristic of Type I tails. Such tails are ordinarily weakly exposed or invisible on red-sensitive emulsions. Comet Mrkos (1957 V) is a well-known example (Kearns 1958; Miller 1958), and the spectacular tail of Comet Humason (1961*e*) was also very faint on our red plates.

The writer therefore asked Dr. G. H. Herbig if a slit spectrogram could be taken at the Lick Observatory, and an exposure limited to 20 minutes by the low altitude of the comet was made by Dr. A. E. Whitford on March 19, with the 120-inch telescope, at a dispersion of 93 Å/mm. A paper print and a glass positive were sent to Michigan. In his letter of transmittal Dr. Herbig remarked that a long line at about  $\lambda$  6200 might be the feature which the writer observed in the spectrum of the tail of Comet 1955 III (Miller 1962), and anticipated in the spectrum of Comet 1963*a*.

On the Lick spectrogram, the emission features with greatest extension along the slit are of three kinds. Mercury and neon lines due to city lights run the full length of the slit with uniform intensity. Bands of C<sub>2</sub> and NH<sub>2</sub> drop off rapidly in intensity with increasing distance from the nucleus. The feature near  $\lambda$  6200, on the other hand, brightens very little near the nucleus, and its extension along the slit is asymmetrical; about  $8 \times 10^4$  km on one side of the brightest point in the spectrum of the coma, and two-thirds of this distance on the other. Examination of the positive copies revealed several emission features between  $\lambda\lambda$  6500–6600 which are somewhat fainter than that near  $\lambda$  6200, and have similar distribution of intensity along the slit. In response to a query by the writer, Dr. Herbig wrote that they appear from an examination of the original negative to be real, and that the position angle of greater extension from the nucleus is 25°. On the night when the spectrogram was taken, the position angle of the projection of the radius vector sun-comet was 77°. The direction of greater extension therefore lies in the semicircle opposite that of the sun.

Wavelengths of the feature near  $\lambda$  6200, and of five fainter emissions, were measured on the glass positive. The results are gathered in Table 1. The uncertainty of the measurements is of the order of 1 Å.

The mean wavelength of the three emissions at  $\lambda\lambda$  6542, 6562, and  $\lambda\lambda$  6588–6601 is 6573 Å if double weight is given to the broad feature. This corresponds satisfactorily to the wavelength of the emission observed in the tail of Comet Mrkos (1955 III) (Miller 1962), 6600 Å with an estimated uncertainty of  $\pm 25$  Å. On the objective prism plates the width of the red-tail images is equivalent to approximately 130 Å, and the individual features measured on the Lick spectrogram would not be resolved.