

**No. 68 OBSERVATIONS OF COMET IKEYA-SEKI (1965f)
FROM TUCSON, ARIZONA**

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ABSTRACT

Visual and photographic observations of comet Ikeya-Seki (1965f) were made to determine its positions, size, color, and apparent visual magnitudes. The comet was observed from September 22 to December 4, 1965.

News of the discovery of comet 1965f by K. Ikeya and T. Seki of Japan on September 18.8, 1965 (UT), reached LPL in time for us to take plates on September 22.5. At the time of discovery, the comet was an eighth-magnitude diffuse object with a central condensation, located near α Hya, as reported in *I.A.U. Circular No. 1921*.

To obtain plates for position measurement, the 7-in. f/7 Bailey astrograph of Steward Observatory located near central Tucson on the University of Arizona campus was used. The astrograph has a plate scale of 1° per inch. G. Van Biesbroeck kindly gave permission to quote the positions measured by him from the plates.

D. G. Milon of LPL found the comet on his plate of September 22 without difficulty (Fig. 1a). Only a two-minute exposure was needed to record the comet for position measurement; the bright sky background prevented exposures longer than 15 minutes on 103a-0 spectroscopic plates. The positions on our early plates were used in a preliminary ephemeris by M. McCants (*I.A.U. Circular No. 1926*).

During the period in which the writer was taking plates with the astrograph, Milon observed from a point southeast of Tucson away from the city lights. Milon made observations with 7×35 mm binoculars and used a portable 6-in. reflector to search for a tail. The tail was first seen, 20' long, on September 25 with the 6-in. telescope, and was photographed on September 29 (Fig. 2l.) with the astrograph. However, not until October 3 was the comet itself bright enough to guide on and record the full extent and structure of the tail (Fig. 2c.).

The pre-perihelion observations are summarized in Table 1. Using the binoculars, Milon made visual magnitude estimates by comparing the comet with out-of-focus star images. The comparison-star magnitudes were found in the *Atlas Coeli*, and the comet's magnitude was then interpolated.

Perihelion passage occurred on October 21.2, at which time the nucleus was only 0.0077 AU from the center of the sun (*I.A.U. Circular No. 1944*). It was predicted that if a large tail developed, it could be observed sweeping around the sun. The writer tried to observe this from Kitt Peak, but without

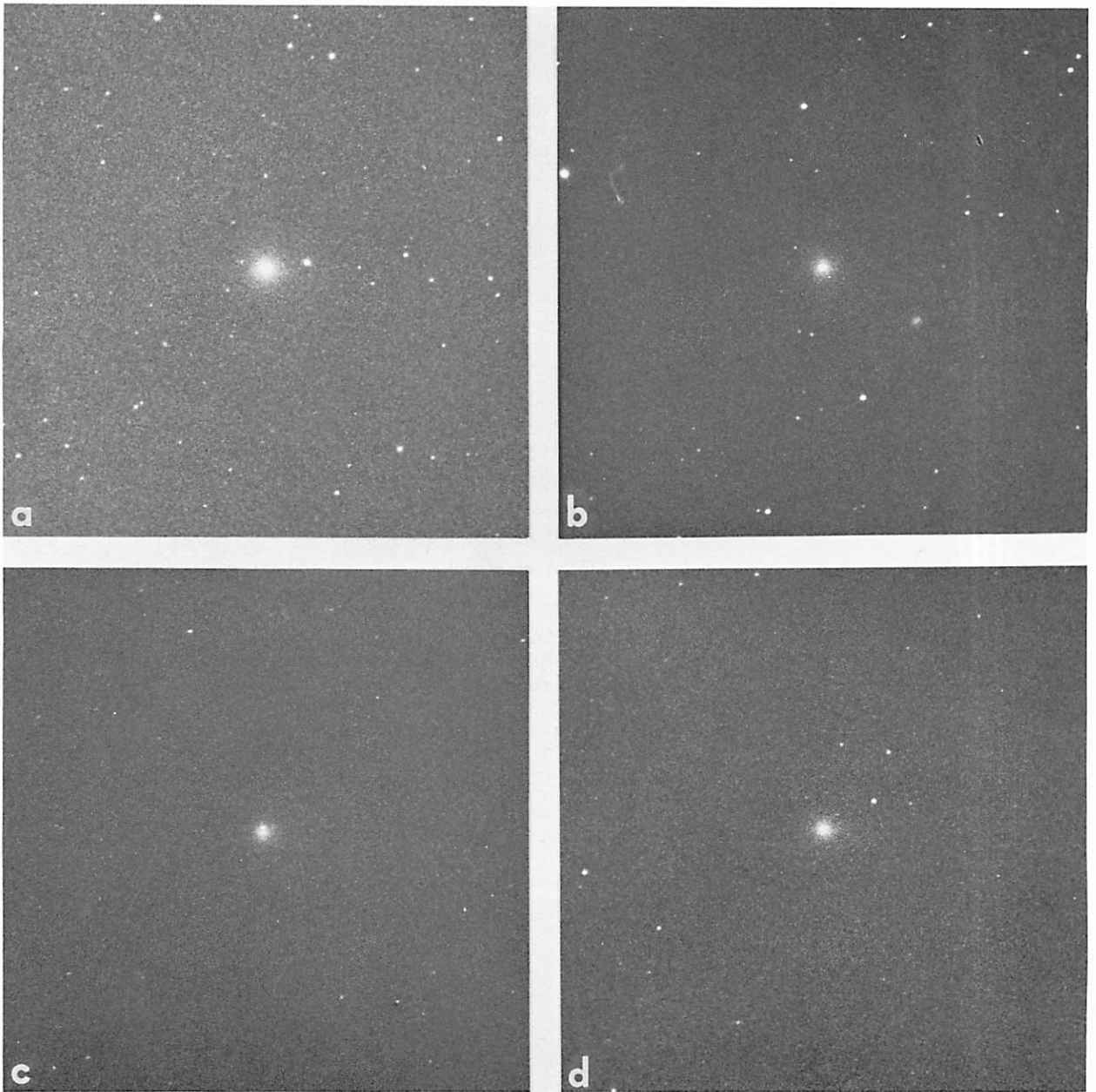


Fig. 1 (a) Sept. 22, 1965, 11^h59^m35^s UT, 10½ min exposure; (b) Sept. 23, 1965, 11^h52^m25^s UT, 11 min exposure; (c) Sept. 25, 1965, 11^h52^m30^s UT, 5 min exposure; (d) Sept. 26, 1965, 12^h13^m30^s UT, 10 min exposure. North is up, and the comet is moving to the left. The bar represents 10 minutes of arc.

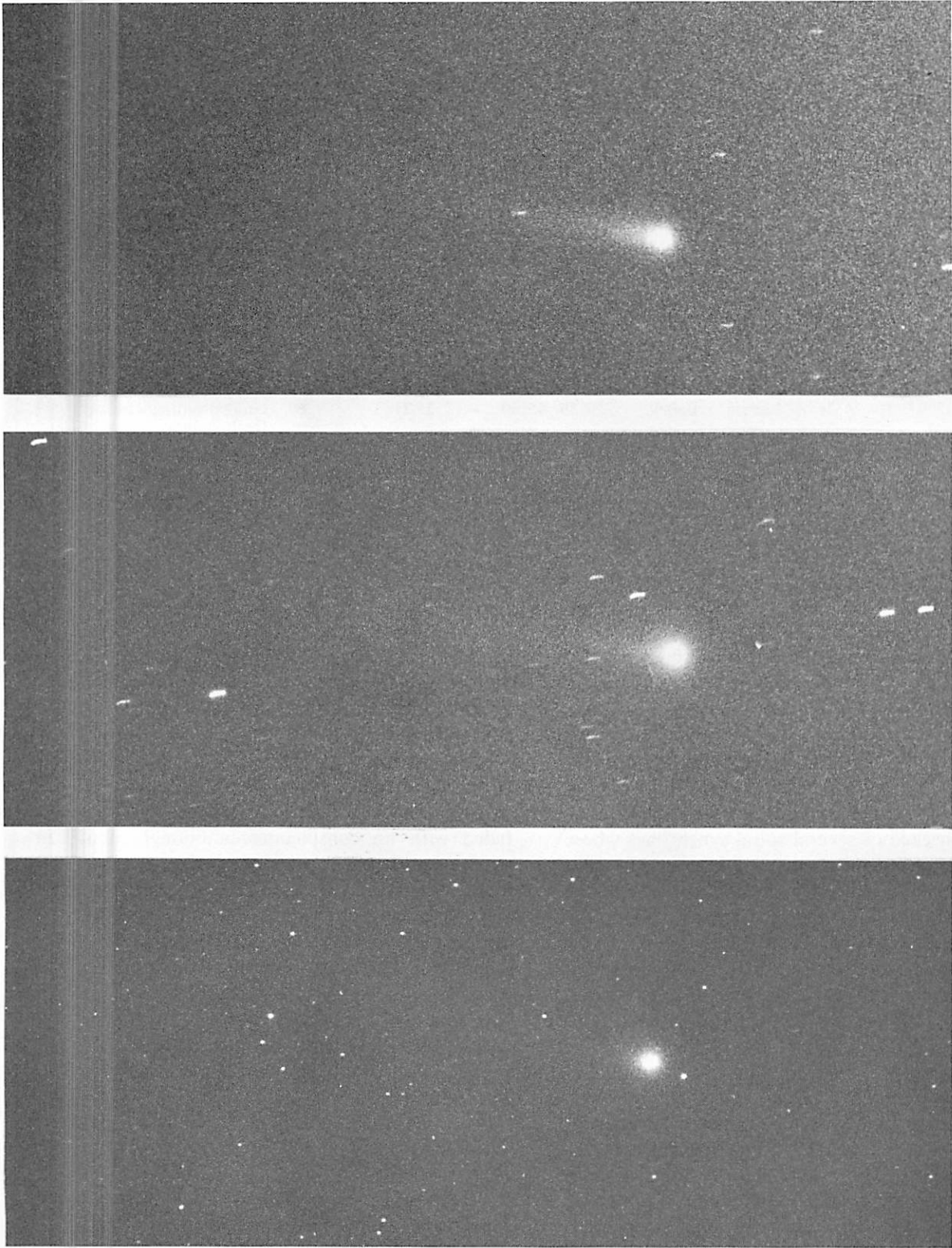


Fig. 2 (Left) Sept. 29, 1965, 12^h00^m10^s UT, 9 min 43 sec exposure; (center) Oct. 3, 1965, 12^h07^m30^s UT, 15 min exposure; (right) Oct. 7, 1965, 12^h07^m30^s UT, 15 min exposure. North is to the left with the comet traveling downward.

TABLE 1
PRE-PERHELION OBSERVATIONS OF COMET IKEYA-SEKI

| DATE (1965) | TIME (UT) | FIG. | OBSERVER | EQUIPMENT* | POSITION (1950.0)† | RA | DEC | APPARENT VISUAL MAG | REMARKS |
|-------------|-----------|------|----------|-------------|--------------------|-------------|-----|---------------------|--|
| 9/22 | 11h59m35s | 1a | Milon | Bailey, B | 8h59m44s76 | —9°31'00".2 | | | |
| 9/23 | 11 52 25 | 1b | Milon | Bailey, B | 9 03 58.64 | —9 45 54.7 | | | |
| 9/24 | 12 | | Milon | B | | | | 6.5 | Five comparison stars. |
| 9/25 | 11 45 | | Milon | 6" refl., B | | | | 6.3 | Obs. SE of Tucson. Tail 20' at 44 X, bright nucleus 2', total coma 4'. |
| | 11 52 30 | 1c | Larson | Bailey | 9 13 08.94 | —10 17 05.9 | | | |
| 9/26 | 12 | | Milon | 6" refl., B | | | | 6.2 | Tail 20', coma 4'–5'. |
| | 12 13 30 | 1d | Larson | Bailey | 9 18 06.12 | —10 33 19.0 | | | |
| 9/29 | 12 00 10 | 2l. | Milon | Bailey | 9 34 07.34 | —11 23 36.9 | | 6 | Tail on photo. |
| 10/2 | 12 20 | | Milon | 6" refl., B | | | | 5± | Strongly bluish in 6" refl. Tail 1:5 on photo with 4" f/6 camera. |
| 10/3 | 12 07 30 | 2c. | Larson | Bailey | 9 59 45.60 | —12 35 21.3 | | | Guided on nucleus for the first time. |
| 10/4 | 11 40 | | Milon | B | | | | 4.9 | Tail 0:75 in binoculars. |
| 10/6 | 11 45 | | Milon | B | | | | 4.6 | Tail 1°. |
| 10/7 | 12 07 30 | 2r. | Larson | Bailey | 10 31 33.71 | —13 43 38.5 | | | Structure different from that on Oct. 3. |
| 10/8 | 12 | | Milon | B | | | | 4.2 | Tail 3° in binoculars. |

*The letter B indicates visual observations with 7 × 35 mm binoculars.
†Measured by G. Van Biesbroeck.

success. Daytime observations in Tucson were also attempted, but the sky conditions were very poor.

Unfavorable conditions prevented further observations until October 26. The post-perihelion observations are summarized in Table 2 and Figures 3–7. On October 26, a long, bright, curved tail was seen shortly before sunrise. On the following morning, the tail consisted of several spiral synchrones whose axes were directed generally toward the sun. In addition, a fainter tail pointing directly away from the sun was recorded in the photographs. With the Bailey astrograph, three plates were needed to show the entire tail with some overlap. Most post-perihelion observations were made from Geology Vista, located at 7000 ft in the Santa Catalina Mountains northeast of Tucson, where the full extent of the tail could be seen. Post-perihelion position measurements were not made because of the bright sky. Three cameras — a 35 mm Miranda, a Voigtländer with 120 roll film, and a 4 × 5 in. Crown Graphic — were employed. They were mounted together on a small portable equatorial mount with a drive that was powered by a car battery through an inverter. Exposures ranged from 1 to 15 minutes on Tri-X panchromatic film and High-Speed Ektachrome color film.

The predominant colors of the comet, as seen in Plate 1, were yellowish in the head, due to bright sodium D-line emission (*I.A.U. Circular No. 1939*), and bluish-green in the tail.

The structure in the tail indicated moderately strong activity near perihelion. As the comet traveled away from the sun, the tail lengthened and gradually faded with no conspicuous additional change in structure. Figure 3 illustrates the apparent tail motion relative to the head. The spiral structure gave way to a tube-like appearance just beyond the nucleus, and the tube was surrounded by a fainter sheath that connected with the synchrones. There was a notable lack of detail around the coma, which appeared to be very small for a comet of this size.

By December 4, comet Ikeya-Seki was so far south in declination and so faint that observations were terminated.

Acknowledgments. The writer wishes to thank Mr. Dennis Milon, who made most of the observations, Dr. G. Van Biesbroeck, who furnished the position measurements, and Mr. R. White of Steward Observatory, who permitted us to use the astrograph.

TABLE 2
POST-PERHELION OBSERVATIONS OF COMET IKEYA-SEKI

| DATE (1965) | TIME (UT) | FIG. | OBSERVER | EQUIPMENT* | REMARKS† |
|-------------|---------------|------------|---------------|--------------------------|--|
| 10/26 | 12h | 5l. | Milon | 6" refl., 35mm, B | Tail blue, strongly curved, about 2-3 mag in brightest section; nucleus yellow, 15"-20". |
| 10/27 | 12h17m-12h49m | 3a, 4l. | Larson | Bailey | Three plates needed to cover tail estimated at 15° in city; no suitable stars for positions. |
| | 11h30m-12h40m | 5r. | Milon | 35mm, B | Tail 15° in photo, 17° visually. |
| 10/28 | 12h03m-12h46m | 3b, 4r. | Larson | Bailey | Three plates needed to cover tail estimated at 17° in city; detail unchanged. No suitable stars for positions. |
| 10/30 | 11h30m-13h | 6, Plate 1 | Milon, Larson | 35mm, B, 120 Voigtländer | Tail 21°, bluish, with south edge much sharper; nucleus yellowish. |
| 11/1 | 12h | | Milon | 35mm | |
| 11/2 | 12h | | Milon | 35mm | |
| | 12h | 7l. | Larson | 35mm | Tail 26°. |
| 11/5 | 12h | | Milon | 35mm | |
| 11/20 | 11h58m | 7r. | Larson | Bailey | Weak tail on plate. Position (1950.0) $\alpha = 11^{\text{h}}05^{\text{m}}30^{\text{s}}.7$, $\delta = -29^{\circ}47'2''.7$. |
| 11/29 | 12h | 8l. | Milon | 35mm, B | Tail 10° visually; mag ~5. On photo tail > 29° long and 3° wide. |
| 12/4 | 12h | 8r. | Milon | 35mm, B | Tail 7° visually; on photo tail ~25° long, 4° wide. |

*35mm refers to Miranda 35mm camera; B indicates visual observations with 7 × 35 mm binoculars.

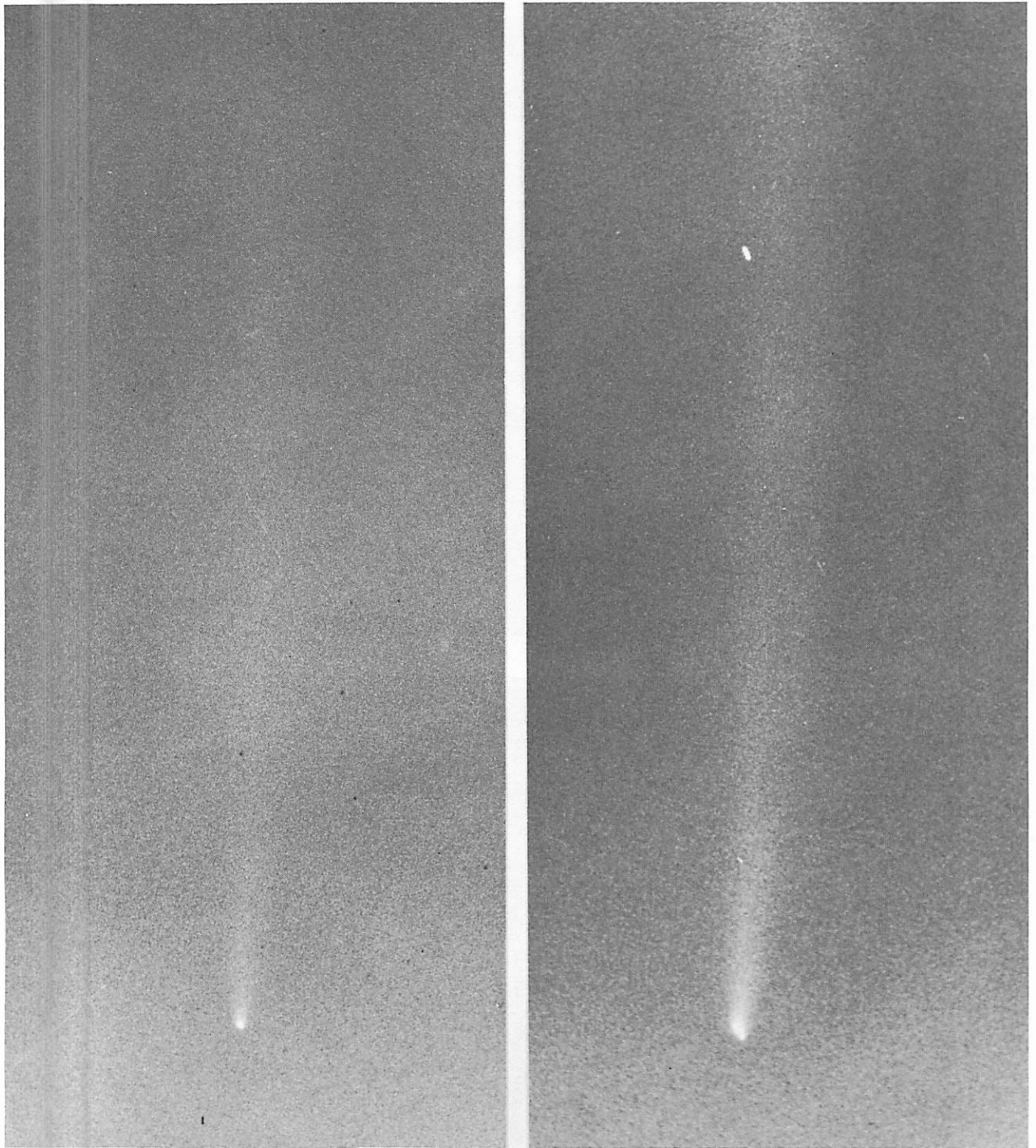
†It should be noted that the observed tail length in the photographs is a function of observing conditions and does not necessarily reflect the intrinsic tail length.

REFERENCES

- Bečvář, A. 1951, *Atlas Coeli, II* (Skalnate Pleso Observatory).
 Hoffleit, D. 1964, *Catalogue of Bright Stars* (New Haven: Yale University Observatory).
I.A.U. Circulars, 1965, Nos. 1921, 1926, 1937, 1939, and 1944 (Cambridge, Mass.: Smithsonian Astrophysical Observatory).



Fig. 3 Tracings made from plates taken with the Bailey astrograph. Each drawing represents a composite of three plates. Contrast has been enhanced. (a) Oct. 27, 1965, 12h35^m UT; (b) Oct. 28, 1965, 12h26^m UT.



10'

Fig. 4 Coma after perihelion. (Left) Oct. 27, 1965, 12^h47^m30^s UT, 1 min exposure; (right) Oct. 28, 1965, 12^h41^m30^s UT, 5 min exposure. Coma trailed due to differential atmospheric refraction. North is to the left with the comet moving toward the upper right.



Fig. 5 (Left) Oct. 26, 1965, 12^h07^m22^s UT, 20 sec exposure; the light on the horizon is from a building; (right) Oct. 27, 1965, 12^h22^m25^s UT, 30 sec exposure.

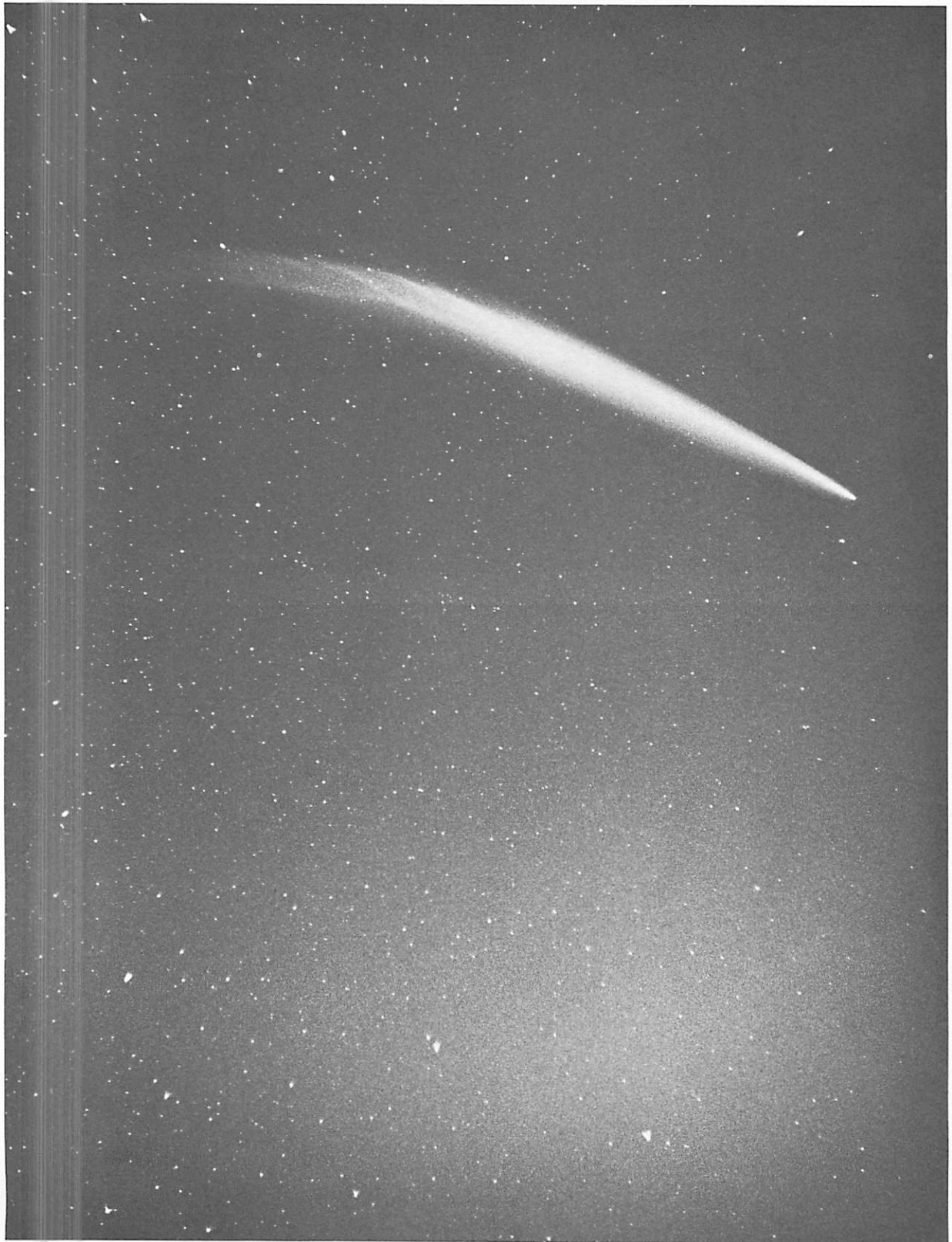


Fig. 6 Comet Ikeya-Seki rising near zodiacal light. October 30, 1965, 12h15m00s-12h15m45s UT, 35 mm Miranda with Tri-X at f/2.8.



10'

Fig. 7 (Left) Nov. 2, 1965, 12h10m UT, 20 sec exposure; (right) Nov. 20, 1965, 11h58m UT, 15 min exposure. North is to the left. Apparent condensation 3 minutes above the coma along the tail was found to be a plate defect and does not show in a second exposure.

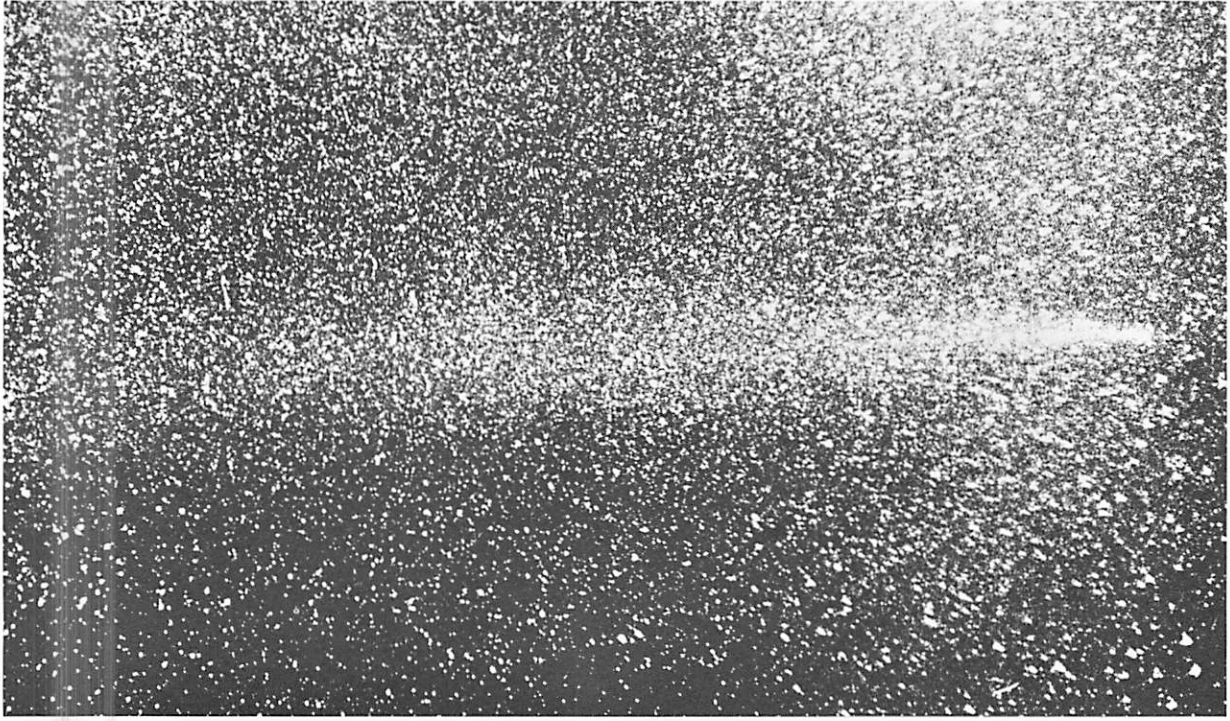
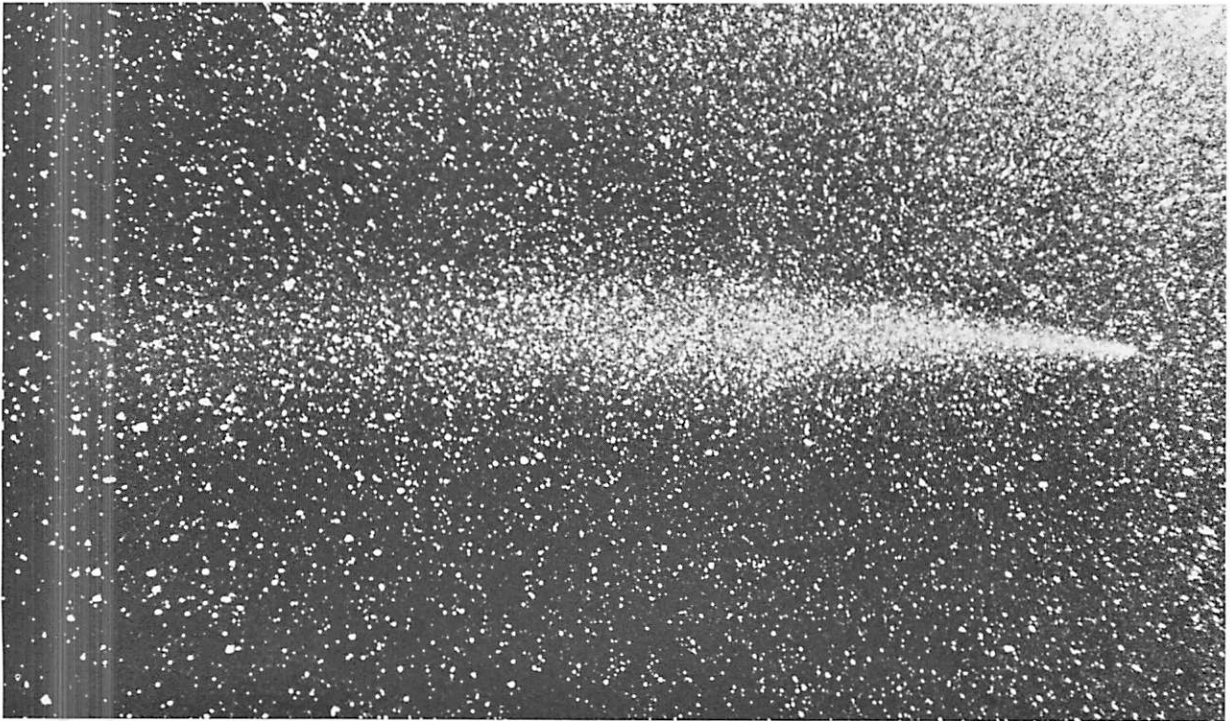


Fig. 8 (Left) Nov. 29, 1965, 11h54m30s UT, 5 min exposure; (right) Dec. 4, 1965, 11h57m30s UT, 5 min exposure.

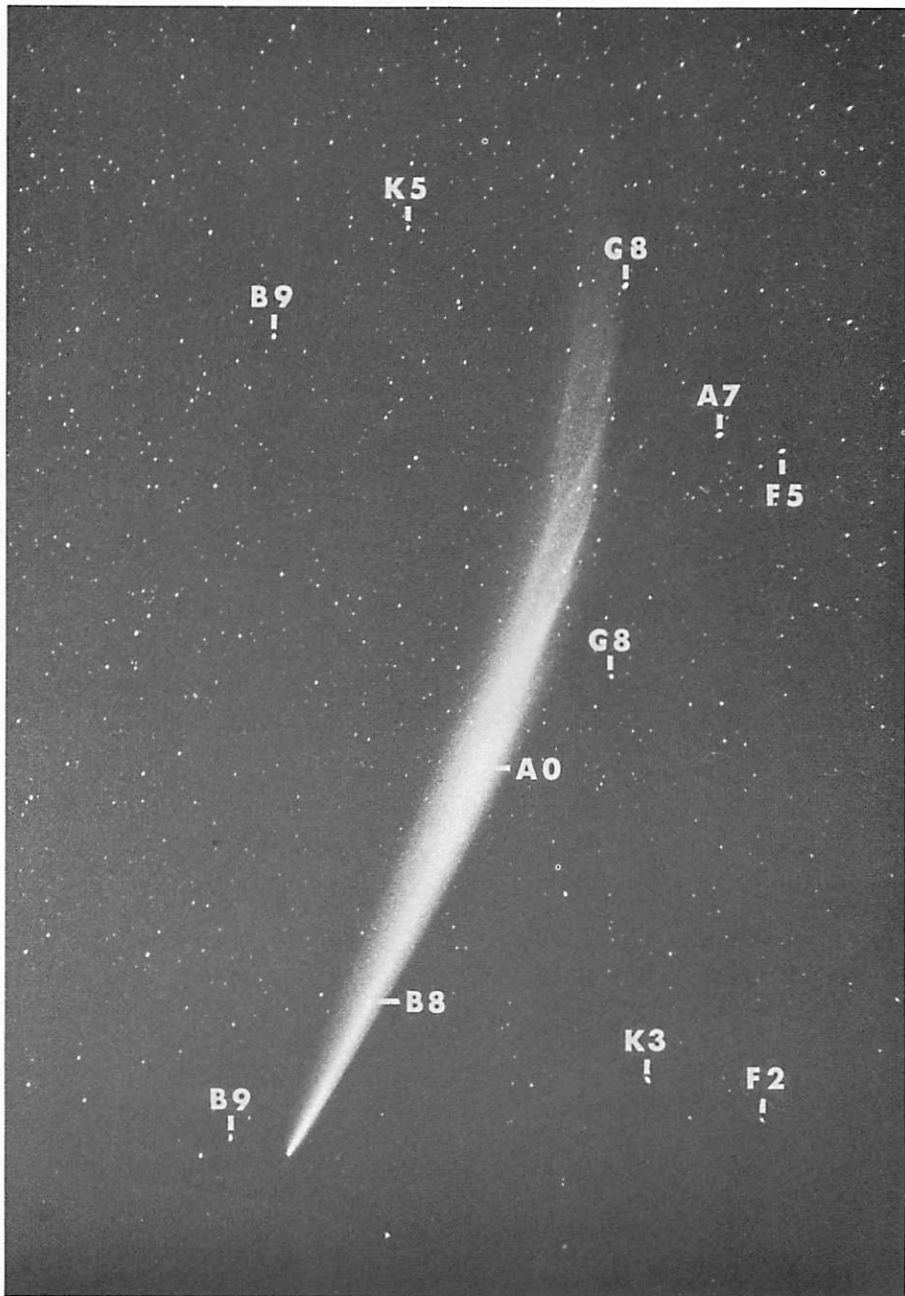


Fig. 9 Same as Fig. 6, with spectral types marked for comparison with the colors in Plate 1.



Plate 1 Oct. 30, 1965, 12^h22^m30^s UT, 15 min exposure on High-Speed Ektachrome at f/4.5. This plate closely matches the visual impression with respect to color and brightness.