

COMET NOTES

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Two new comets were discovered and a periodic comet recovered since the previous edition of the *Comet Notes*, maintaining the recent high level of activity.

The first of the new comets, 1969 g, Tago-Sato-Kosaka, was recognized by Akihiko Tago, Tsuyama, Okayama, on October 10 and reobserved by him on October 12. Independent discoveries were made by Yasuo Sato, Nichinasuno, Tochigi, and by Kozo Kosaka, Akasaka, Okayama, both on October 12. Tago described the comet as diffuse, without condensation, magnitude 10, while Sato and Kosaka estimated the magnitude as 9. The comet was located in the evening sky on the western border of Ophiuchus, but these first approximate positions did not give a clear idea of the daily motion. Accurate measures were soon made by N. Kobayashi and H. Kōsai, Tokyo, at the Perth Observatory, and particularly by T. Seki, Kochi.

Calculations by S. W. Milbourn and by B. G. Marsden showed that the comet at discovery was about 1.6 a.u. from the earth and 2.1 a.u. from the sun, moving in a highly inclined orbit. Although it will be far south when it passes perihelion at 0.5 a.u. from the sun late in December, the comet will move rapidly northward thereafter to become a convenient object in the evening sky of the Northern Hemisphere by the end of January. The greatest brightness, possibly 3rd magnitude, should occur at the beginning of January, when the declination is -55° , but the comet may still be visible with the naked eye at the end of the month.

The second discovery, made by Kiev astronomers, was announced on October 29. K. I. Čurjumov found a new comet near the edge of a plate taken by S. I. Gerasimenko in Gemini on September 11 for P/Comas Solá. The telescope used was the 50-cm meniscus Maksutov camera at the Alma-Ata Observatory. Images of the comet, which received the designation 1969 h, Čurjumov-Gerasi-

menko, also were found on plates taken with the same telescope on September 9 and 21. Measures by the discoverers were reduced at the Institute of Theoretical Astronomy, Leningrad, by M. Ja. Šmakova. The comet, of magnitude 12 or 13, was some two magnitudes brighter than P/Comas Solá and had a tail extending $1'$ in 280° from a central condensation embedded in a coma.

With no recent observations available at the time of the discovery announcement, calculations by M. P. Candy and D. Gans, and by Marsden of preliminary elements and a current ephemeris were particularly important, leading to reobservation of the comet by C. Scovil, Stamford, Connecticut, on October 31. The new comet was still slightly brighter than P/Comas Solá and showed a narrow tail some $10'$ long in 290° . A strongly condensed image of the comet also was found by J. E. Bortle on a plate taken by Scovil for P/Comas Solá on September 14, while B. Milet found an image on a plate taken on September 13. Several exposures of the comet were made by the writer on November 5 with the new 229-cm reflector of the Steward Observatory, located on Kitt Peak. A ten-minute exposure shows a weak trace of tail extending at least $2.5'$ in position angle 290° from a nearly stellar nucleus of magnitude near 17.0. Scovil recorded a $5'$ tail in 300° on plates taken on November 13 and 16, while N. S. Černyh, Crimean Astrophysical Observatory, gave the total magnitude as 14 on November 8.

With the additional positions available by late November, Marsden's calculations of improved elements showed that the orbit was a short-period ellipse, the comet having been at perihelion on September 11 at a distance of 1.3 a.u. from the sun in an orbit inclined only 7° to the ecliptic. The orbital eccentricity was 0.633, and the period about 6.5 years. The comet apparently made a very close approach to Jupiter in 1959, the perihelion distance and period having been significantly larger prior to that event.

Comet Čurjumov-Gerasimenko was fading steadily by late November, but it will remain in a favorable position for a number of months. Opposition comes at the beginning of March 1970, but the brightness of the central condensation is expected to decrease from magnitude 16 or 17 in December to 20th magnitude in May 1970.

P/Slaughter-Burnham, which had received the designation 1969 *f* on the basis of observations in September that later proved

to be of a minor planet, was recognized by the cometary character of its image from among many asteroids on several single search plates taken along the line of variation on November 4 by the writer with the 229-cm Steward reflector. Although the nucleus was only of magnitude 20.0, a trace of tail was unmistakable. Confirmation was obtained on a pair of plates taken the following night. Precise measurement of the positions showed that the correction to the time of perihelion passage calculated by G. Sitarski for this first return of P/Slaughter-Burnham, observed previously for four months in 1958-59, was only -1.1 days. The comet is now past evening quadrature and will be too near the sun for observation for some months around the time of perihelion passage on April 13. By the time the comet can be observed again, in August or September 1970, it will have faded to an inconspicuous object, probably of 19th magnitude.

Many observations of P/Honda-Mrkos-Pajdušáková were obtained during September, when the total brightness reached magnitude 8 or 9, at this most favorable apparition since discovery in 1948. A. Mrkos, T. Seki, B. Milet, and G. Van Biesbroeck all measured accurate positions. Photographs obtained by the writer with the 154-cm reflector of the Catalina Station of the Lunar and Planetary Laboratory on October 11, when the comet was low in the predawn sky, showed a relatively sharp central condensation of magnitude about 15.8 embedded in a trace of symmetrical coma. Seki estimated a total magnitude of 10 on October 10, and 11 on October 12.

Comet Fujikawa, 1969 *d*, reached magnitude 7 at the beginning of October, according to an observation by Seki. Milet, whose telescope has a rather larger *f*-ratio, estimated the magnitude as 9 on October 4. However, he had recorded a sharp coma and a tail more than 20' long on September 22. On very short-exposure photographs taken with the Catalina reflector on October 12, the comet showed a centrally condensed image of magnitude about 13.5. A narrow tail at least 5' long was detected visually. Seki succeeded in following the comet until nearly the end of the month, when it was a very difficult object of total magnitude 9 in the morning twilight.

Additional observations of Comet Kohoutek, 1969 *b*, during August and September have been reported by Seki, Milet, Černyh,

and Van Biesbroeck. Milet described the comet as rather diffuse on September 20 and afterwards. This comet, too, was photographed on October 11 with the Catalina reflector. On short exposures the nearly stellar images of magnitude 16.2 showed only the barest cometary character, while a gently curved structureless tail extending to at least 1.5 southeast from the nucleus was recorded on a 30-minute exposure, which is reproduced in Plate I.

P/Faye, 1969 *a*, was under observation as a relatively easy object during September, October, and November. It reached a total magnitude of 11 or 12 in mid-October, with several observers detecting a very sharp nuclear condensation. A photograph of this comet taken with the 229-cm Steward reflector on November 5 is reproduced in Plate II. A somewhat diffuse tail extends west to at least 5' from the sharply condensed nucleus of magnitude near 15.6.

With the new comet Čurjumov-Gerasimenko discovered nearby, P/Comas Solá received more attention during October than it might otherwise have done. Milet reported the magnitude on October 9 as 15.5, the comet having a nucleus some 10" in diameter and a tail 2' long. On a photograph taken with the Catalina reflector on October 11, a trace of narrow tail extended to 0.1 north of west from a sharply condensed nucleus of magnitude about 16.8.

Comet Ikeya-Seki, 1967 *n*, which was again moving out into the morning sky after conjunction, was photographed with the 229-cm Steward reflector by the writer on November 4. Although the magnitude was only 21.5, the cometary character of the object was evidenced by a trace of tail extending to about 10" northward from the nucleus.

Also moving again into the morning sky is Comet Thomas, 1968 *j*. A continuation of the ephemeris by Marsden shows that the comet may be observable as a faint object of magnitude 19 or 20 during the next several months. The comet is steadily receding from the sun, the heliocentric distance increasing from 4.1 a.u. in October to 5.5 a.u. in May 1970.

Expected to be recovered early in 1970 are the periodic comets Kopff, Pons-Winnecke, d'Arrest, and Ashbrook-Jackson. Each is a well-known comet, observed on repeated returns to perihelion, and recovery of each is expected to be routine, depending only on the



PLATE I

Comet Kohoutek, 1969 *b*, as photographed with the 154-cm reflector of the Catalina Station of the Lunar and Planetary Laboratory on October 11, 1969. The structureless tail extends to at least 1.5 southeastward from the nucleus.



PLATE II

P/Faye, 1969 *a*, from a 30-minute exposure with the 229-cm reflector of the Steward Observatory, Kitt Peak, on November 5, 1969. The tail extends to at least 5' west from the nucleus.

comet reaching reasonable position and sufficient brightness. G. Sitarski finds that P/Kopff should reach perihelion on October 2, 1970. With opposition in April, the return is not particularly favorable, but the comet may be observable for much of 1970. Marsden and K. Aksnes predict perihelion passage for P/Pons-Winnecke on July 21, 1970. The return is a favorable one, with opposition also in April, and the possibility that the total magnitude could reach 12 in July. A revised prediction for P/d'Arrest by Marsden makes allowance for the rather large nongravitational effects that influence the motion of this comet. Perihelion passage occurs on May 18, 1970. A complicating factor may arise from a relatively close approach to Jupiter (0.41 a.u.) in 1968. The comet is fairly close to the sun in the sky near perihelion; opposition occurs near the end of 1970. N. A. Beljaev and M. A. Merslyakova find that perihelion passage of P/Ashbrook-Jackson occurs on March 13, 1971. The perihelion distance is fairly large, however, and the eccentricity small, so that the comet can be reobserved many months before perihelion passage. P/Ashbrook-Jackson crosses the Milky Way in Sagittarius in February and March, but may be recoverable as an 18th or 19th magnitude object near quadrature in April.