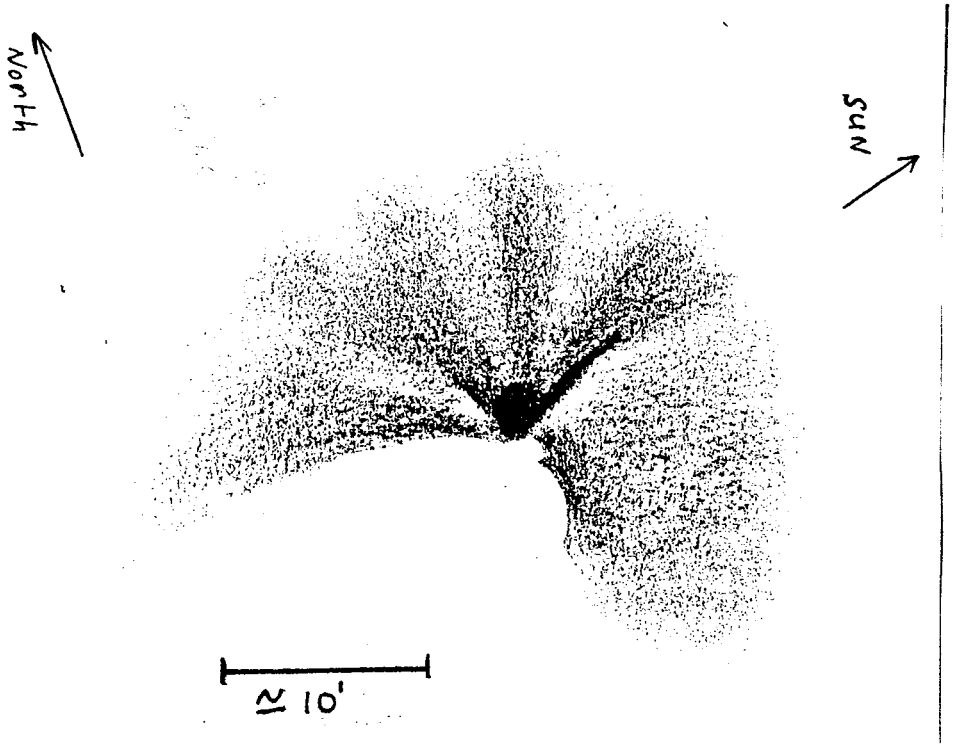
THE INTERNATIONAL COMET QUARTERLY

WHOLE NUMBER 46 APRIL 1983 VOL. 5, No. 2



BRIGHT MAY COMET: COMET IRAS-ARAKI-ALCOCK 1983D

Drawing by J.-C. Merlin, Le Creusot, France (15-cm reflector, 25x-75x), on 1983 May 11 at 22:20 UT. Story on page 31.

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INSIDE THIS ISSUE

THE INTERNATIONAL COMET QUARTERLY (ICQ) is a non-profit journal devoted to news and observation of comets. Issues are published 4 times per year (January, April, July, and October). The ICQ is published by the Department of Physics and Astronomy at Appalachian State University and is mailed from Boone, North Carolina, U.S.A.

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All cometary observations should be sent to C. S. Morris; Prospect Hill Rd.; Harvard, MA 01451, U.S.A. Back issues are available from Dr. T. L. Rokoske, Dept. of Physics and Astronomy; A.S.U.; Boone, NC 28608. U.S.A.

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This issue is No. 46 of the publication originally called THE COMET, founded in March 1973, and is Vol. 5, No. 2, of the ICQ.

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FROM THE EDITOR

Due to a combination of factors, including the hectic past few weeks here at the Central Bureau for Astronomical Telegrams because of 2 close-approaching comets, this issue is being published and mailed from Cambridge. The July issue will be going to press in Boone in a few weeks with photographs and drawings of the recent comets.

Many new subscribers have expressed concern over the late arrival of issues of the ICQ. This is not due to the postal service, but rather to our printing schedule. As the ICQ is a non-profit, volunteer project, we search for ways to cut production costs. Over the past decade, we have managed to retain extremely favorable publication costs through use of the university print shop at Appalachian State University. However, such items as course catalogs have precedence in publication priority over the ICQ, and it sometimes takes up to 2 months to print up an issue once Dr. Tom Rokoske has received the final proofs from me. This was the reason for the January issue appearing in April.

The alternative would be for us to locate a commercial print shop here in the Boston area, but to do so would necessitate the raising of subscription prices — something we'd rather not do. For now, we are arranging more stringent schedules for preparing the final copy here in Cambridge to get the ICQ mailed out closer to, if not in, the cover publication month. We appreciate readers' patience as we work toward our goals.

— Daniel W. E. Green, 1983 June 9

RECENT COMETS IN THE NEWS

by Daniel W. E. Green, Editor

On the evening of May 3, Charles Morris (Prospect Hill Observatory, Harvard, MA) received a phone call from Graham Keitch in England, who was reporting the discovery of a probable new comet by the veteran comet-hunter, George Alcock. Alcock had been hunting from indoors (through glass window!) with 11x80 binoculars. His comet was his fifth discovery, Alcock having discovered his last comet in 1965. Morris, in turn, quickly called your Editor, who is also Assistant Director of the Central Bureau for Astronomical Telegrams, operated by the Smithsonian Institution for the International Astronomical Union.

Confirmation quickly followed, as first Guy Hurst in Wellingborough, England, and then Morris and your Editor in Massachusetts, observed the comet as a diffuse, 6th magnitude object in the northern constellation Draco, about one-third the distance from Vega to Polaris, all within six hours of discovery.

Brian G. Marsden, Director of the Central Bureau, suspected that a rumored discovery of an unknown object in an unknown part of the sky by the Infrared Astronomical Satellite (IRAS) might be the same object as had been discovered by Alcock; this suspicion was based on the knowledge that IRAS can only observe some 90 degrees from the sun, and Alcock's comet was almost exactly 90 degrees in elongation at the time of discovery.

The Central Bureau notified other observers about the discovery during the course of the evening of the 3rd. Jim Gibson had been notified of a discovery of an "object", presumed to be a minor planet, by IRAS, and had taken a plate with the 48-inch Schmidt telescope at Palomar Mountain in California, based on a position supplied by IRAS to individuals at the Jet Propulsion Laboratory in Pasadena. He had not scanned the plate in depth when Marsden reached him that same evening by telephone, and he then noticed a large, fuzzy image on plates taken May 2. IRAS had initially found the object on April 25, and observers in Sweden noted the object on photographs taken April 27 to be a comet; however, the Central Bureau had not been informed (despite a poor recording of a call from Sweden on our phone recording machine), and neither had anyone else in the United States (not even the IRAS group at JPL!), of the cometary nature of the object.

Now that positions on more than one night were available, a telegram was sent out to "List 1" subscribers to the IAU Telegrams, those people interested in receiving news of discoveries of comets brighter than 12th magnitude, as comet Alcock 1983d (for the fourth comet discovered/recovered in 1983). Word then came promptly from Tokyo Observatory in Japan that an amateur from Yuzawa, Niigata, had also independently discovered the object a few hours before Alcock. Following an urgent request by the Central Bureau to England to J. Davies, discoverer of the comet with IRAS, information was received by telex as to positional data. Telegrams went out the next day with the full name, comet IRAS-Araki-Alcock. (Further information on the details surrounding the discovery may be found in the IAU Circulars beginning with No. 3796, and in the article on the comet in the July issue of Sky and Telescope.)

It was soon obvious that the comet was headed toward a close approach with the earth on May 11 of only 0.031 Astronomical Units (AU), this being the closest approach of any comet since 1770 (and likely the 4th closest of any comet in recorded history). The excitement mounted quickly as astronomers and the media learned of the close approach, and the next week became, by far, the busiest such period in the history of the Central Bureau. We granted 4 or 5 interviews to local television stations, and had to turn down 2 or 3 more! Numerous

radio interviews, some live, and many newspaper/magazine interviews were included in the 2-week period following discovery. Professional and amateur astronomers, as well as the average "man on the street", helped to increase the havoc at the Central Bureau — everybody wanted to know where the comet was going to be! Problems with the U.S. Post Office delayed the IAU Circulars by an incredible number of days, a problem we're working on at the Central Bureau. Really serious individuals and groups are encouraged to subscribe to the Telegrams as well as the Circulars to receive telegraphed messages very quickly. (For information, write to the Central Bureau, A-212; Smithsonian Astrophysical Observatory; 60 Garden St.; Cambridge, MA 02138, U.S.A.) It was highly unusual, however, for there to be so little time for astronomers (and the media!) to prepare for such a bright comet.

Thanks to lucky breaks in the clouds, the comet was observable every night but one from Cambridge, from May 4 to May 13, and your Editor was up most or all of those nights, and working by day to answer the telephone, which hardly stopped ringing for some 10 days! One morning, after having observed at the Smithsonian's Oak Ridge Observatory in Harvard, MA, all night, and having then measured plates taken with the 16-inch astrograph for the Arecibo radar-bouncing efforts (Dr. Marsden supplying up-to-the-minute orbital information based upon the latest observations), your Editor had just gone to bed for a much-needed few-hours' sleep. An hour later, a little after 8 a.m., the phone rang, with a producer urgently trying to get a live interview for a radio talk show. So, a little after 8:30, I was laying in bed as I talked with Bill Berg of Chicago's talk station WCFL for 15 minutes!

Another interesting event happened to me, Mike Rudenko, and Steve O'Meara, during one of our mostly-cloudy nights, when we were driving the 30 or 40 miles west from Cambridge to Harvard, in the hopes of some clearing. A small break opened in the clouds when we got to the town of Concord, and we pulled over at the first place we could find away from street lights — a cemetary. Quite spontaneously, we jumped out of the car and headed up the hill into the old cemetary with our binoculars, looking for a peek at the comet near its brightest. A couple of minutes later, three police cars pulled up, lights flashing — and we had an interesting time explaining what we were doing there! We started with the truth, which was met with looks of doubt on their faces. But just as I was wondering what it'd be like explaining how we landed in jail, they accepted our excuses, and we were on our way to Oak Ridge!

Comet 1983d increased in size to some three-and-a-half degrees on May 11, and in magnitude to around 1.5, as the Tabulation of Observations elsewhere in this issue show. A thin tail was seen, difficultly visually, pointing away from the sun, but sunward extensions and a fan, similar to that of periodic comet Encke, was seen by many observers. A tiny, bright, central condensation of about 10th or 9th magnitude (apparent) was seen by more than half a dozen observers to fluctuate on a timescale of some 20 to 30 seconds. Interestingly, the nuclear condensation was a magnitude or more fainter immediately after closest approach than it had been before, perhaps indicated a more-dense coma on one side than the other.

Dr. M. F. Walker, observing from Lick Observatory in California on May 11.245 UT, used a "Sky Brightness Photometer" and a 68' aperture to find the following magnitudes: V = 3.39, B = 3.97. The radar-bouncing attempt at Arecibo, Puerto Rico, was successful in obtaining a sharp spike in the CW band (2380 MHz), and it seems likely that a reliable diameter and rotation period for the nucleus will come out of the data. Deep "holes" were evidently seen. Observations elsewhere

RECENT COMETS IN THE NEWS

also provided interested information. For example, the first apparent siting of diatomic sulphur in a comet was found with the International Ultraviolet Explorer satellite.

In the midst of all this excitement, yet another close-approaching comet was discovered on May 8 by three Japanese amateurs. Comet Sugano-Saigusa-Fujikawa 1983e is making its closest approach to the earth as this is being written, about twice further away than comet 1983d had come. While much fainter than comet IRAS-Araki-Alcock, comet 1983e has generated much interest in the astronomical community since discovery — and therefore has made the Central Bureau again quite busy. Successful radar bouncing with the Arecibo telescope on at least two days has been reported, and the nucleus appears to be some 10 times

(Cont. on next page)

ELEMENTS AND EPHEMERIS FOR COMET SUGANO-SAIGUSA-FUJIKAWA 1983e

by Brian G. Marsden, Harvard-Smithsonian Center for Astrophysics

T = 1983 May 1.32829 ET
O = 82.16585
B = 82.34257 } 1950.0
i = 96.62187

e = 1.0000000

q = 0.4710829 AU

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1983	04 06	02 39.88	+18 34.7	1.481	0.765	28.3	11.2
1983	04 16	02 28.92	+26 10.0				
1983	04 26	02 09.80	+33 21.3	1.288	0.490	20.2	8.9
1983	05 06	01 41.99	+38 32.3				
1983	05 16	01 14.12	+40 46.9	0.812	0.593	35.9	8.8
1983	05 26	00 48.26	+41 06.5				
1983	06 05	23 59.77	+39 21.2	0.239	0.928	62.4	8.1
1983	06 05	23 59.77	+39 21.2	0.239	0.928	62.4	8.1
1983	06 06	23 49.15	+38 44.7				
1983	06 07	23 35.64	+37 51.9	0.183	0.964	68.8	7.6
1983	06 08	23 17.93	+36 31.5				
1983	06 09	22 53.94	+34 21.6	0.129	0.999	79.3	7.0
1983	06 10	22 20.45	+30 37.2				
1983	06 11	21 33.00	+23 46.9	0.082	1.035	101.3	6.2
1983	06 12	20 27.94	+11 32.5				
1983	06 13	19 09.30	-05 47.7	0.063	1.070	148.6	5.8
1983	06 14	17 52.67	-21 13.1				
1983	06 15	16 51.67	-30 25.2	0.091	1.105	169.0	6.7
1983	06 16	16 07.90	-35 11.2				
1983	06 17	15 37.11	-37 42.0	0.140	1.140	150.6	7.8
1983	06 18	15 15.08	-39 06.5				
1983	06 19	14 58.86	-39 57.0	0.195	1.175	141.3	8.7
1983	06 20	14 46.58	-40 29.0				
1983	06 20	14 46.58	-40 29.0	0.224	1.192	138.1	9.0
1983	06 25	14 14.35	-41 28.7				
1983	06 30	14 01.85	-41 44.3	0.519	1.363	121.8	11.4
1983	07 05	13 56.51	-41 52.2				
1983	07 10	13 54.67	-41 59.2	0.819	1.529	112.4	12.9

RECENT COMETS IN THE NEWS

smaller than that of comet 1983d (perhaps on the order of 100-300 m for the fainter comet). Comet 1983e apparently experienced an outburst of 1-2 magnitudes at outburst, for it settled down to a consistent brightness pattern some 1-2 magnitudes fainter than initially "predicted" for most of May and early June. This comet has been extremely difficult for observers to see. Its nucleus was reported by E. Barker, using the 107-inch reflector at McDonald Observatory in Texas, to be no brighter than 18th magnitude, and indeed observers had difficulty for the 3 weeks before closest approach of finding any condensation on photographs to measure; the orbital elements were thus not as well-determined as one might have wished. It was tremendously curious, too, that two very close-approaching comets should pass the earth only a month apart!

By June 9. comet 1983e had grown to 20′-25′ size, as seen in binculars, and was around 7th magnitude. An observation by Morris with 12x50 binoculars on June 12 placed the large, very diffuse comet at magnitude 6.0, but not even a brightening of the star background could be seen in a 10-inch reflector! An ephemeris for this comet is provided below. Our southern hemisphere observers will hopefully be able to follow comet 1983e for awhile until the moon begins to interfere. The elements are by Marsden, from 37 observations from May 9 to June 11; the osculating elements are for epoch 1983 June 12.0 (from IAUC 3826).

IRAS discovered another comet on May 13, although comet 1983f was much fainter, around mag 17 and having passed perihelion in January (cf. IAUC 3814. 3815).

Two recoveries of periodic comets have recently been reported, both objects being quite faint: P/du Toit-Neujmin-Delporte 1983g (IAUC 3816) and P/Johnson 1983h (IAUC 3824), by Jim Gibson at Palomar and A. C. Gilmore and P. M. Kilmartin at Mount John in New Zealand, respectively.

Three other comets have been observable in binoculars in recent weeks, all brighter than 10th magnitude: P/Tempel 1 (1982j), P/Kopff (1982k), and, more recently, P/Tempel 2 (1982d). P/Tempel 2 is quite close to the sun in the morning sky, and is a difficult object because twilight has been setting in before the comet gets very high in altitude. P/Kopff has been near 10′ in diameter and almost 8th magnitude recently.

— Daniel W. E. Green, 6/13/83

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THE 1981-82 APPARITION OF P/COMET SWIFT-GEHRELS

Charles S. Morris
Prospect Hill Observatory, Harvard, Massachusetts

Lost for over 80 years after its discovery by Lewis Swift in 1889. periodic comet Swift-Gehrels was rediscovered by Tom Gehrels on Schmidt camera plates taken at Palomar Observatory in February 1973. However, the comet would not be observed visually until October 1981 during its third recorded apparition.

The 1981-2 apparition of P/Swift-Gehrels began when it was recovered on July 31, 1981, by C.-Y. Shao and G. Schwartz with the 1.5-m telescope at Oak Ridge Observatory (formerly Harvard's Agassiz Station). The perihelion date for this apparition was 1981 November 27.3 UT, less than 3 days to the date of perihelion during the 1889 apparition. Thus, the observing conditions in 1981-82, with the comet well-placed in the evening sky, were almost identical to those during the

THE 1981-82 APPARITION OF P/COMET SWIFT-GEHRELS

discovery apparition.

P/Swift-Gehrels 1981 XIX was picked up visually by John E. Bortle (BOR, U.S.A.) on October 1, 1981, as a diffuse, 13th-magnitude object of diameter 1.1' (~ 29,000 km). The comet steadily increased in brightness well past perihelion, even though the comet was also receding from the Earth. In December, the comet became bright enough to be glimpsed in binoculars by several observers. There was a corresponding increase in the comet's size during this period with some reports, suggesting the comet was 10' in diameter (~ 300,000 km). P/Swift-Gehrels developed a small central condensation, and the coma became slightly more condensed.

After the first of the year, comet 1981 XIX began to fade, and it became increasingly diffuse. The last reported visual observations were made on February 21 by E. P. Bus (BUS01) and Georg Comello (COM), both observing from The Netherlands. At that time, the comet was fainter than 12th magnitude, but still 2' in diameter (~ 120,000 km).

To evaluate the light curve of P/Swift-Gehrels 1981 XIX, a total of 79 observations by 9 observers were selected from the observations submitted to the ICQ. The observers and their totals are given below:

John E. Bortle (BOR)	23
Reinder J. Bouma (BOU)	11
E. P. Bus (BUS01)	11
Marco Cavagna (CAV)	1
Georg Comello (COM)	1
M. Fulle (FUL)	2
Charles S. Morris (MOR)	21
Warren C. Morrison (MOR03)	1
C. E. Spratt (SPR)	8

The observations were aperture-corrected with the method recommended by Morris (1973). As the comet's light curve is clearly asymmetric with respect to perihelion, it was decided that the best approach would be to analyze the comet's heliocentric brightness versus time, using the equation:

$$H_\Delta = H_t + n_t\,(t - t_o), \qquad (1)$$

where H_Δ is the heliocentric magnitude, H_t is the comet's brightness at perihelion, n_t is a coefficient of brightness variation, and $(t-t_o)$ is the time in days from perihelion. This approach has been used previously for other periodic comets with unusual light curves (e.g., cf. Morris 1983).

For the rising branch of the light curve (1981 October 1 - December 31, or $t-t_o = -57$ to $+34$ days), a total of 55 observations were analyzed, and the following values of H_t and n_t were obtained:

$$H_t = 11.32 \pm 0.03 \text{ (p.e.)}$$
$$n_t = -0.042 \pm 0.001 \text{ (p.e.)}$$
$$r = 1.528 - 1.361 - 1.422 \text{ AU.}$$

Here, p.e. is the probable error, and r is the comet's heliocentric distance in astronomical units. These results indicate that the comet's heliocentric brightness increased one magnitude every 24 days, or about 6 times faster than a typical comet with the same orbital elements. P/Swift-Gehrels' heliocentric brightness continued to increase for about a month after perihelion.

The analysis of the declining branch of the comet's light curve was based on 24 observations covering the period 1982 January 9 - February 21, or $(t-t_o) = 43$ to 86 days. The corresponding regression results are:

$$H_t = 9.76 \pm 0.10 \text{ (p.e.)}$$
$$n_t = 0.015 \pm 0.002 \text{ (p.e.)}$$
$$r = 1.459 - 1.698 \text{ AU.}$$

These results indicate that the comet's heliocentric brightness declined much slower than it rose. A standard power-law solution for the declining branch of the light curve gives a value for n of about 4, near the average.

Figure 1 illustrates the light curve of P/Swift-Gehrels 1981 XIX. The straight lines represent the re-

THE 1981-82 APPARITION OF P/COMET SWIFT-GEHRELS

gression solutions presented above. To obtain a continuous light curve, the declining branch solution was extended back to $(t-t_o) = +28$ days in Figure 1.

A direct comparison of the light curves in 1981-82 and the discovery apparition is difficult. Vsekhsvyatskii (1964) has estimated the brightness of the comet in 1889 from physical descriptions. Based on these data and assuming n = 4 (hence 2.5n = 10) in the standard power-law brightness formula for comets, he found $H_{10} = 10.4$ (with no aperture correction). In the current study, $H_{10} = 9.5$ (aperture-corrected). As the observations in 1889 were made with large-aperture refractors, probably $H_{10} = 9$-10 when aperture effects are taken into account. Thus, it is likely that the comet's intrinsic brightness has not changed dramatically since its discovery apparition.

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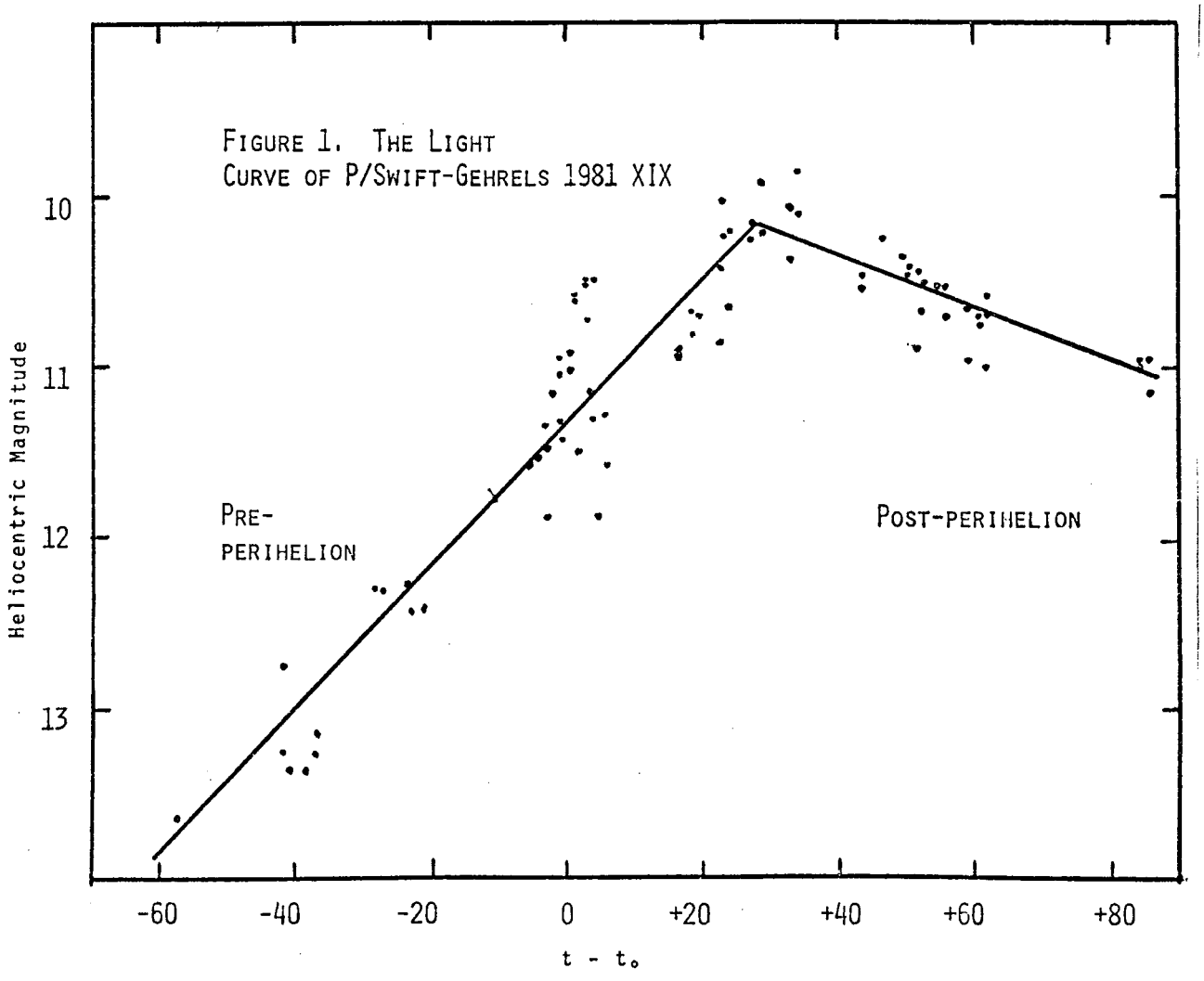

FIGURE 1. THE LIGHT CURVE OF P/SWIFT-GEHRELS 1981 XIX

THE 1981 APPARITION OF P/COMET KEARNS-KWEE

Charles S. Morris
Prospect Hill Observatory, Harvard, Massachusetts

The third apparition of periodic comet Kearns-Kwee was observed visually by only two observers, Graham Keitch (KEI, England) and James A. Morgan (MOR02, U.S.A.). This comet, discovered in August 1963 at Palomar, has a period of almost exactly nine years. Each apparition has been quite favorable, with perihelion occurring near opposition. However, the large perihelion distance of P/Kearns-Kwee (q = 2.2 AU) prevents the comet from becoming much brighter than 12th or 13th magnitude.

The 13 visual observations made during the 1981 apparition span a one-month period from 1981 November 28 to December 30. The five observations by Keitch suggest that the comet was about magnitude 13.6 and 0.5′ to 0.8′ in diameter (corresponding to 30,000 - 40,000 km). In contrast, Morgan's observations were systematically half a magnitude fainter, and his coma-size estimates were correspondingly smaller (0.2′ to 0.3′). As both observers use similar instruments, it must be concluded that Morgan was not observing the whole comet.

For the analysis of the comet's light curve, Morgan's observations were corrected to Keitch's observations by applying a correction factor of −0.5 magnitude. All of the observations were then corrected to a standard aperture of 6.78 cm, using the aperture correction for reflectors (Morris 1973). The resulting absolute magnitude is $H_{10} = 9.05 \pm 0.05$ (p.e.). This result assumes n = 4 because of the short orbital arc covered by the observations.

P/Kearns-Kwee was observed visually by John Bortle (1982) in 1972. Bortle found $H_{10} = 8.3$, or more than half a magnitude brighter than the 1981 apparition. Unfortunately, Mr. Bortle did not observe the comet in 1981. His results suggest, however, that P/Kearns-Kwee was significantly brighter in 1972.

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Bortle, J. E. (1982). ICQ 4, 79.
Morris, C. S. (1973). PASP 85, 470.

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NOTICE TO NEW ICQ READERS

With recent free and paid advertising in such publications as Astronomy and the IHW Newsletter, the ICQ has gained many new readers -- more of in increase in the past 3 months than in any other such period in the 10-year history of this publication. Our new readers therefore will have questions concerning the format of various sections in the ICQ, and we hope to answer some questions here.

Comets are mentioned by two types of designations, preliminary and permanent. When comets are first discovered or recovered, they are given a letter along with the year found. For example, the first comet discovered or recovered in 1984 will be called 'comet 1984a', the second 'comet 1984b', etc. Then, a year or two after the comet has passed perihelion, it is given a more permanent designation using Roman numerals. For example, the first comet to have passed perihelion in 1979 was periodic comet (P/) Shajn-Schaldach 1979 I, and the twentieth comet to do so in 1978 was P/Haneda-Campos 1978 XX.

ALL dates and times published in the ICQ are in 'Universal Time' (UT), unless otherwise noted. This is the standard 24-hour time used in astronomy, and is based on the Greenwich meridian (0^{0} longitude). In North American, for example, add the following numbers to hours to convert

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to UT: EST, 5; CST, 6; MST, 7; PST, 8 (in summer, most locations change to Daylight Savings Time, so that one should add instead 4, 5, 6, and 7 hours, respectively). The 'Ephemeris Time' (ET) used with ephemerides and orbital elements can be considered equal to 0^h UT on the given date.

Ephemerides are simply tabular listings of the predicted positions of celestial objects, so that observers can locate the objects against the stellar background with the aid of a star atlas. The year, month, and date are given in the first columns, followed by the comet's position in right ascension (α) and declination (δ), for equinox 1950.0. The ICQ usually publishes 4 additional columns, as follows: the object's distance from the earth in astronomical units (AU; 1 AU is approximately the mean distance between the earth and sun), 'Delta' or Δ; the object's distance from the sun in AU, r; the object's apparent angular elongation in the sky from the sun (to a maximum of 180°, at opposition); and the predicted (usually very approximate) total visual magnitude of the comet.

For ephemerides, 6 quantities, known as orbital elements, are required to represent the orbit of a comet around the sun. These elements are often published with the ephemeris so that observers may, if they wish, calculate positions for a given comet at times other than those published in the ICQ. The orbital elements are: time of perihelion, or time when the comet is closest to the sun (T); three angles: the argument of perihelion (ω), the longitude of the ascending node (Ω), and the orbital inclination relative to the earth's, i; the perihelion distance, q, in AU; and the eccentricity, e, of the orbit. The period, P, is often given in the case of a 'short-period' comet (one with an orbital period of less than 200 years, thus called 'periodic'). If the orbital elements are well-known, then elements are computed from the known gravitational perturbing effects by the major planets, and an 'epoch of osculation' will be given to designate the time for which the orbit is 'correct'. (As an object moves around the sun, it is constantly being perturbed by all of the other objects in the solar system. Therefore, the orbital elements are constantly changing from one moment to the next.) Nonetheless, the published ephemerides and elements are usually quite sufficient for locating a comet during the period listed. However, when a comet is first discovered, or when an old periodic comet has not been seen well at many apparitions, the predicted ephemeris figures could be off a fair bit from the real position of the object.

Further information about these topics can be found an astronomy textbooks and references.

The other major source of confusion for the new reader will undoubtedly be the Tabulation of Comet Observations. The ICQ is the world's only comprehensive source of tabulated physical observations of comets. The tables list such characteristic of comets, as observed by amateur and professional astronomers, as total magnitude or brightness (column headed 'MAG.') at a given UT (times in the first columns are given to hundredths of a day in decimal form). Two important qualifications which support the magnitude estimates are the method for making the brightness estimate with respect to nearby stars of known brightness, and the catalogs or references used ('RF') to obtain values for comparison star data. The magnitude methods ('MM') used by most observers are Sidgwick or In-Out (S), Bobrovnikoff or Out-Out (B), and Morris or Equal-Out (M). Recent past issues of the ICQ have listed the keys to these and other keys pertinent to the Tabulation in the ICQ (a special updated copy is available at any time for $2.00 postpaid from the Editor).

These keys include the Observer's Key; a three-letter, two-number code appearing in the last five 'digits' of the listings ('OBS.') gives the ob-

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server of the data on that line. The aperture size of the instrument (which was used by the observer to obtain ALL of the observational data on that one line of data) is given in centimeters ("AP."); the focal ratio is given for the same instrument ("F/"); and the type ("T") of instrument used is listed (L for reflector, R for refractor, C for Cassegrain, B for binoculars, E for naked eye, etc.; with its corresponding magnification or power ("PWR") also given. Observers who report the diameter of the cometary "atmosphere" ("COMA") have this value published in minutes of arc; the degree of condensation ("DC") gives the observer's estimated appearance of the coma overall (0 = totally diffuse, 9 = totally stellar; a slash (/) after a number means half-way between that and the next-higher digit).

The tail's length, if seen and measured, is given in degrees (to hundredths of a degree) under the column labelled "TAIL", and the orientation of the tail is given in degrees, measured from 0° north, 90° east, etc., under "PA" (position angle). Note that all data on a single line are assumed to be made with ONE instrument (if the tail length is estimated using a different instrument than is used for the magnitude estimate, we publish the data on 2 separate lines, for example).

Further questions should be directed to the Editor. -D.W.E.G.

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TABULATION OF COMET OBSERVATIONS

A complete Key to all of the coded columns is available from the Editor for $2.00 postpaid. Thanks are due Angela M. Chiarappa, who helped put many of this issue's observations in machine-readable form.

Comet IRAS-Araki-Alcock (1983d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 04.20	M	5.9	AA	24.0	R	7	112	15	4			MOR
1983 05 04.22	M	6.0	AA	24.0	R	7	112					MOR
1983 05 04.22	M	6.0	AA	8.0	B		20					GRE
1983 05 04.22	S	6.0	AA	8.0	B		20	&18	0			GRE
1983 05 04.86	B	6.3	S	5.0	B		7					MER
1983 05 04.87				15.0	L	5	25	14	2	0.25	100	MER
1983 05 05.01	M	6.1	AA	8.0	B		20	&18	0			GRE
1983 05 05.11	S	6.1	MP	5.0	B		10	19	2			BOR
1983 05 05.20	S	6.0	AA	24.0	R	7	112	15	2			MOR
1983 05 05.85	B	5.9	S	5.0	B		7					MER
1983 05 06.15	S	5.4	MP	5.0	B		10	16	4			BOR
1983 05 06.23	S	5.8	A	8.0	B		11	20	3	0.5	35	SPR
1983 05 06.23	S	5.9	A	15	L	4	22	20	1			SPR
1983 05 06.27	I	5.6	AA	0.0	E		1					GRE
1983 05 06.27	M	5.8	AA	24.0	R	7	112	16	4			MOR
1983 05 06.33	S	5.8	AA	8.0	B		20	&20	4			GRE
1983 05 06.33	S	5.7	AA	5.0	B		10					GRE
1983 05 06.36	B	5.6	S	8.0	B		20	18	3			MAC
1983 05 06.92	S	5.2	AT	8.0	B		20	7	5			BAR
1983 05 07.08	S	5.2	MP	0.0	E		1	42	2			BOR
1983 05 07.08	S	5.3	MP	5.0	R		5	43	4			BOR
1983 05 07.12	M	5.0	AA	24.0	R	7	112	18				MOR

Comet IRAS-Araki-Alcock (1983d) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 07.13	S	4.8	AA	21.5	B	7	1 6	24				MOR
1983 05 07.15	I	4.8	AA	0.0	E		1					GRE
1983 05 07.16	S	5.0	AA	5.0	B		7	20	3	0.42	115	DEY
1983 05 07.24	I	4.7	AA	0.0	E		1					GRE
1983 05 07.25	I	4.6	AA	0.0	E		1					GRE
1983 05 07.28	M	4.9	AA	24.0	R	7	112					MOR
1983 05 07.28	S	4.7	AA	20.0	E	7	1 1					MOR
1983 05 07.58				8.0	B		20	&31				GRE
1983 05 07.88				15.0	L	5	25		2	0.83	115	MER
1983 05 07.88	B	4.8	S	5.0	B		7	58				MER
1983 05 08.07	S	4.8	AA	5.0	B		7	28	2	0.50	98	DEY
1983 05 08.20	S	4.6	MP	0.0	E		1	86	1			BOR
1983 05 08.20	S	4.6	MP	5.0	R		5	68	4			BOR
1983 05 08.20	S	5.4	A	8.0	B		11	21	2			SPR
1983 05 08.22				8.0	B		20	&40	3/			GRE
1983 05 08.22	I	4.4	AA	0.0	E		1					GRE
1983 05 08.31	B	5.2	A	8.0	B		20	21	5			MAC
1983 05 08.34	M	4.7:	AA	24.0	R	7	112	&20				MOR
1983 05 08.88	S	4.2	AT	8.0	B		20	30	6			BAR
1983 05 08.90	B	3.9	S	5.0	B		7	60	2	0.83	290	MER
1983 05 08.97	S	3.6	A	5.0	B	4	10	36				KRA01
1983 05 09.02	S	3.0	A	0.0	E		1					KRA01
1983 05 09.16	O	5.1	SP	5.0	B		7	20	1			SIM
1983 05 09.16	O	5.0	SP	5.0	B		7	23				SIM01
1983 05 09.21				20	L	10	81	30	8	0.5	90	SPR
1983 05 09.21	S	4.2	A	8.0	B		11	90	5			SPR
1983 05 09.37	B	3.8	A	0.0	E		1	40	2			MAC
1983 05 09.37	B	4.4	A	8.0	B		20	33	5			MAC
1983 05 09.85	S	1.9	AT	0.0	E		1	90	8			BAR
1983 05 09.87	B	2.8	S	5.0	B		7	70	2/	0.67	52	MER
1983 05 09.90	S	2.5	A	0.0	E		1					KRA01
1983 05 10.04	S	3.6	S	25.0	L	6	20	&22.5	4			KRA01
1983 05 10.08				0.0	E		1	120	2			BOR
1983 05 10.08	S	2.9	AT	5.0	R		5	98	4			BOR
1983 05 10.08	S	3.9	AA	5.0	B		7	40	3	1	258	DEY
1983 05 10.11				8.0	B		20	&65	4			GRE
1983 05 10.11	I	3.1	AA	0.0	E		1					GRE
1983 05 10.13	O	4.5	SP	5.0	B		7	25	3			SIM01
1983 05 10.13	O	4.6	SP	5.0	B		7	25	2/			SIM
1983 05 10.17	B	2.9	AA	20.0	E	7	1 1	129				MOR
1983 05 10.17	S	2.9	AA	24.0	R	7	112					MOR
1983 05 10.20	S	3.6	A	8.0	B		11	90	4			SPR
1983 05 10.22	S	2.7	AA	0.0	E		1	120	3			GRE
1983 05 10.25	S	3.0	S	25.0	L	6	20	30	6			WAR
1983 05 10.29	B	2.8	AA	20.0	E	7	1 1	142				MOR
1983 05 10.37	B	2.6	A	0.0	E		1	156	2			MAC
1983 05 10.86	B	2.2	S	5.0	B		7	105	2	1.00	286	MER
1983 05 10.93	S	3.3	A	0.0	E		1					KRA01
1983 05 11.07	O	4.4	SP	0.0	E		1					SIM
1983 05 11.07	O	4.8	SP	5.0	B		7	30	3			SIM01
1983 05 11.07	O	5.1	SP	5.0	B		7	22	2			SIM
1983 05 11.10	S	3.6	AA	5.0	B		7	90	1	2	240	DEY
1983 05 11.16	S	2.4	AA	0.0	E		1	180	7/			GRE

Comet IRAS-Araki-Alcock (1983d) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 11.18	M	2.3	AA	20.0	E	7	1 1	193	2			MOR
1983 05 11.22				20	L	10	81	15	8	0.25	270	SPR
1983 05 11.22	S	2.5	S	25.0	L	6	20	108	7			WAR
1983 05 11.22	S	3.2	A	8.0	B		11	60	6			SPR
1983 05 11.88	B	2.4	S	5.0	B		7	120	2			MER
1983 05 11.92				7.0	B		10	42				DEA
1983 05 11.92	G	2.6	S	0.0	E		1					DEA
1983 05 12.06				5.0	B		7	32	3			SIM
1983 05 12.06	O	2.5	RA	0.0	E		1					SIM
1983 05 12.06	O	2.7	RA	0.0	E		1					SIM01
1983 05 12.08				5.0	B		7			3.0	230	BOR
1983 05 12.08				0.0	E		1	120				BOR
1983 05 12.08				5.0	B		7			2.5	250	BOR
1983 05 12.08	M	1.7	AA	20.0	E	7	1 1	180				MOR
1983 05 12.08	S	1.7	AT	5.0	R		5	120	4			BOR
1983 05 12.09		3.0	AA	5.0	B		7	78	3			DEY
1983 05 12.10	S	1.7	AA	0.0	E		1	210				GRE
1983 05 12.15	S	2.5	S	25.0	L	6	20					WAR
1983 05 12.22	B	2.3	A	0.0	E		1	144	4			MAC
1983 05 12.23	S	3.5	A	8.0	B		11	60	7			SPR
1983 05 12.94				7.0	B		10	42				DEA
1983 05 12.94	G	3.8	S	0.0	E		1					DEA
1983 05 13.07	S	3.1	AT	5.0	R		5	60	0			BOR
1983 05 13.07	S	3.1	AT	0.0	E		1	60				BOR
1983 05 13.07	S	4.0:	AA	8.0	B		20	&60	1			GRE
1983 05 13.10	O	5.2	SP	5.0	B		7					SIM
1983 05 13.98				7.0	B		10	31.5				DEA
1983 05 13.98	G	5.2	S	0.0	E		1					DEA
1983 05 14.07	O	6.2	SP	5.0	B		7					SIM
1983 05 14.07	O	6.3	SP	5.0	B		7					SIM01
1983 05 15.06	O	6.0	SP	5.0	B		7					SIM
1983 05 15.98				7.0	B		10	18				DEA
1983 05 15.98		5.4	S	0.0	E		1					DEA
1983 05 17.02				7.0	B		10	12			323	DEA
1983 05 17.02	S	5.4	S	9.6	L		30					DEA
1983 05 17.97				7.0	B		10	13			320	DEA
1983 05 18.94				7.0	B		10	7.2				DEA
1983 05 18.94	B	7.5	S	9.6	L							DEA

Comet Sugano-Saigusa-Fujikawa (1983e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 10.31	S	8.7:	S	8.0	B		20					GRE
1983 05 10.34	S	8.1	S	32	L		55	1.5	8			BOR
1983 05 10.49	B	7.8	S	25.0	L	4	36	1.7	7			MAC
1983 05 12.32	S	6.8:	AA	8.0	B		20	& 1	3/			GRE
1983 05 14.32	B	8.3	A	32	L		55					BOR
1983 05 14.32	S	7.9	A	5.0	B		10	4				BOR
1983 05 14.32	S	8.2	A	32	L		55	2.0	7	0.3	310	BOR
1983 05 14.48	B	7.7	S	25.0	L	4	36	2.8	7			MAC
1983 05 15.48	B	8.0	A	25.0	L	4	36	2.5	5	0.05	290	MAC

Comet Sugano-Saigusa-Fujikawa (1983e) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 17.48	B	8.2	A	25.0	L	4	36	2.2	5			MAC
1983 05 18.31	S	7.7	AA	8.0	B		20					GRE
1983 05 18.32	S	8.4	A	32	L		55	2.0	5	0.2	295	BOR
1983 05 18.33	B	8.0	AA	8.0	B		20	& 1	9	&0.25	320	GRE
1983 05 19.30	M	8.2	AA	25.0	L	7	68	2.1	7			MOR
1983 05 19.31	M	8.0	AA	8.0	B		20	6	7			MOR
1983 05 19.32	S	7.8	AA	4.0	R		12					MOR
1983 05 20.46	B	8.3	S	25.0	L	4	36	4	6			MAC
1983 06 09.22	S	7.4	AA	8.0	B		20	&18	0/			GRE

Periodic Comet Tempel 1 (1982j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 03 04.15	S	12.6	A	50.0	L		96	0.5	3			BOR
1983 03 06.17	S	12.6	A	50.0	L		96	0.5	4			BOR
1983 03 06.23	S	13.1:	AC	25.0	L	7	103	& 1	3/			MOR
1983 03 16.14	S	12.0	A	32.0	L		88	0.8	6			BOR
1983 03 16.14	S	12.3	A	50.0	L		96	0.6	6			BOR
1983 03 21.11	S	11.8	A	50.0	L		96	0.8	5			BOR
1983 03 21.11	S	11.7	A	32.0	L		110	0.8	3			BOR
1983 03 21.16	S	11.9	AC	25.0	L	7	103	1.6	4/			MOR
1983 03 29.80	S	11.3	AC	26.0	L	6	130	& 2	2			MER
1983 04 02.10	S	11.2	A	32.0	L		68	1.4	5			BOR
1983 04 02.14	M	11.7	AC	25.0	L	7	103	2.3	5			MOR
1983 04 03.94	S	11.1	AC	26.0	L	6	63	& 2.5	2	?	280	MER
1983 04 04.25	S	10.1	A	20	L	10	81	0.75	7			SPR
1983 04 04.86	S	11.1	AC	26.0	L	6	63	& 2.5	2			MER
1983 04 05.20	M	10.9	AC	25.0	L	7	103	1.9	4/			MOR
1983 04 05.24	S	10.0	A	32	L	7	71	1.00	6			SPR
1983 04 06.11	S	10.8	A	32.0	L		68	1.7	5			BOR
1983 04 06.24	S	10.2	A	20	L	10	81	0.75	5			SPR
1983 04 07.14	M	10.7	AC	25.0	L	7	103	2.1	6			MOR
1983 04 10.06	M	10.8	AC	25.0	L	7	103	2.0	5/			MOR
1983 04 10.27	S	10.1	A	20	L	10	81	1.0	5			SPR
1983 04 12.22	S	10.3	A	20	L	10	81	0.75	6			SPR
1983 04 13.23	S	10.0	A	32	L	7	71	1.0	5			SPR
1983 04 13.31	S	10.5	A	32.0	L		68	1.8	7	?	205	BOR
1983 04 13.83	S	10.8	AC	26.0	L	6	39	3.1	2	0.04	200	MER
1983 04 13.86	S	10.5	AC	9.0	L	9	28					MER
1983 04 15.21	S	9.9	A	20	L	10	81	1.0	6			SPR
1983 04 15.82	S	10.6	AC	26.0	L	6	39	& 3	2		171	MER
1983 04 15.83	S	10.3	AC	9.0	L	9	28					MER
1983 04 16.21	S	10.0	A	20	L	10	81	1.0	6			SPR
1983 04 17.20	S	9.9	A	20	L	10	81	1.0	4			SPR
1983 04 18.10	S	10.1	A	32.0	L		68	2.1	6			BOR
1983 04 18.20	S	9.9	A	20.0	L	10	125	1.0	4			SPR
1983 04 18.22	M	10.4	AC	25.0	L	7	103	1.9	5			MOR
1983 04 19.21	S	10.3	A	20.0	L	10	81	0.75	4			SPR
1983 04 19.83	S	10.3	AC	26.0	L	6	63	3.0	2		200	MER
1983 04 29.05	S	9.9	AC	25.0	L	7	103	2.3	4			MOR
1983 04 29.21	S	10.1	A	20.0	L	10	81	1.0	4			SPR
1983 04 29.84	S	10.1	AC	26.0	L	6	39	1.6	2	0.03	195	MER
1983 04 29.85	S	9.9	AC	9.0	L	9	28					MER

Periodic Comet Tempel 1 (1982j) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 04 30.21	S	10.0	A	20.0	L	10	81	1.25	5			SPR
1983 05 01.23	S	10.0	A	20.0	L	10	81	1.15	5			SPR
1983 05 04.91	S	10.1	AC	15.0	L	5	25	2.9	3	0.08	176	MER
1983 05 05.09	S	9.5	A	8.0	B		20	3				BOR
1983 05 05.09	S	9.6	A	32.0	L		68	2.2	5	0.1	205	BOR
1983 05 05.10	M	9.8	AC	25.0	L	7	68	2.1	5			MOR
1983 05 06.10	S	9.8	A	32	L		68	2.6	6	?	205	BOR
1983 05 06.22	M	9.9	AC	25.0	L	7	68	2.5	4			MOR
1983 05 07.09	M	9.8	AC	25.0	L	7	68	3.2	3/			MOR
1983 05 07.10	S	9.8	AC	8.0	B		20					MOR
1983 05 07.11	S	9.5	A	8.0	B		20	3				BOR
1983 05 07.11	S	9.7	A	32	L		68	2.6	6	?	210	BOR
1983 05 07.19	M	9.9	AC	20.3	L	6	47					GRE
1983 05 07.19	M	10.1	AC	20.3	L	6	72					GRE
1983 05 07.19	S	9.8	AC	20.3	L	6	47	& 4	2/			GRE
1983 05 07.94	S	9.9	AC	15.0	L	5	25	5.0	2	0.10	221	MER
1983 05 08.32	S	9.6	S	25.0	L	4	36	3	6			MAC
1983 05 10.11	S	10.0	A	32	L		68	2.7	5			BOR
1983 05 10.16	M	9.8	AA	8.0	B		20	& 2.7	0/			GRE
1983 05 10.38	S	9.3	S	25.0	L	4	36	3	5			MAC
1983 05 11.17	S	10.1	AA	8.0	B		20	& 9	2			GRE
1983 05 11.90	S	10.1	AC	15.0	L	5	25	3.6	2			MER
1983 05 12.14	S	9.8	A	32	L		68	2.4	5	?	220	BOR
1983 05 12.28	S	9.3	S	25.0	L	4	36	3.5	5			MAC
1983 05 13.09	S	9.8	A	32	L		68	2.9	6			BOR
1983 05 15.09	S	10.0	AC	25.0	L	7	68	3.0	2			MOR
1983 05 16.22	S	9.8	A	20	C	10	81	1.5	5			SPR
1983 05 18.13	S	9.7	A	32	L		68	2.8	5			BOR
1983 05 20.41	S	9.0	S	25.0	L	4	36	4	4			MAC
1983 05 29.07	M	9.6	AC	25.0	L	7	68	3.5	3/			MOR
1983 05 29.24	S	9.8	A	20	C	10	81	1.5	5			SPR
1983 05 30.25	S	9.9	A	20	C	10	102	1.0	5			SPR
1983 06 09.15	S	9.4	AA	8.0	B		20	& 4	2			GRE

Periodic Comet Tempel 2 (1982d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 14.34	S	10.4	A	32	L		68	1.7	1			BOR
1983 05 18.34	S	10.3	A	32	L		68	2.9	0			BOR
1983 05 20.47	S	11.2	S	25.0	L	4	36	7	2			MAC

Periodic Comet Kopff (1982k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 03 16.35	S	11.9	A	50	L		96	1.4	0			BOR
1983 04 05.25	S	11.0:	AC	25.0	L	7	103	& 2	0			MOR
1983 04 13.31	S	11.0	A	32	L		68	1.7	2			BOR
1983 04 15.95	S	11.2	AC	26.0	L	6	63	2.3	1			MER
1983 04 18.20	S	10.6	A	32	L		68	2.2	1			BOR
1983 04 18.26	S	10.9	AC	25.0	L	7	103	1.7	2			MOR

Periodic Comet Kopff (1982k) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 05.15	S	9.8	A	8.0	B		20	2.5				BOR
1983 05 05.15	S	10.1	A	32	L		68	2.3	9			BOR
1983 05 05.18	M	10.9	AC	25.0	L	7	103	0.8	9			MOR
1983 05 06.13	S	9.3	A	32	L		68	2.7	7			BOR
1983 05 06.24	M	10.2	AC	25.0	L	7	68	2.5	4			MOR
1983 05 06.28	S	9.9	AA	8.0	B		20					MOR
1983 05 07.06	S	9.0	S	7.0	B		10	3.0				DEA
1983 05 07.13	S	8.7	A	8.0	B		20	5				BOR
1983 05 07.13	S	9.2	A	32	L		68	3.0	6			BOR
1983 05 07.22	S	9.3	AA	20.3	L	6	47	& 8	4			GRE
1983 05 07.25	M	9.3	AA	25.0	L	7	68	2.9	3/			MOR
1983 05 07.25	S	9.1	AA	8.0	B		20					MOR
1983 05 07.32	M	9.1	AA	8.0	B		20					GRE
1983 05 07.32	S	9.1	AA	8.0	B		20					GRE
1983 05 08.06	S	9.0	S	7.0	B		10	3.0				DEA
1983 05 08.23	S	9.0	AA	8.0	B		20	& 8	2			GRE
1983 05 08.33	S	9.3	S	25.0	L	4	36	4	2			MAC
1983 05 09.06	S	9.0	S	7.0	B		10	3.0				DEA
1983 05 10.13	S	9.2	A	32	L		68	2.7	2			BOR
1983 05 10.24	M	9.6	AA	8.0	B		20	& 4	0/			GRE
1983 05 10.24	S	9.1	AA	8.0	B		20	4	2			MOR
1983 05 10.38	S	9.4	S	25.0	L	4	36	4	4			MAC
1983 05 11.97	S	9.5	AC	15.0	L	5	75	9.8	2/		42	MER
1983 05 12.15	S	9.3	A	32	L		68	3.3	4			BOR
1983 05 12.29	S	9.3	S	25.0	L	4	36	5	4			MAC
1983 05 13.12	S	9.1	A	32	L		68	2.7	4			BOR
1983 05 13.13	M	9.8	AA	25.0	L	7	68	3.0	2/			MOR
1983 05 16.23	S	10.0	A	20	C	10	81	1.0	4	0.02	355	SPR
1983 05 18.13	S	9.1	A	32	L		68	3.1	6			BOR
1983 05 18.31	M	9.1	AA	25.0	L	7	68	4	7			MOR
1983 05 18.31	S	8.7	AA	8.0	B		20	4	5			MOR
1983 05 20.40	S	8.9	S	25.0	L	4	36	6	5			MAC
1983 05 29.08	M	9.1	AA	25.0	L	7	68	3.5	4			MOR
1983 05 29.25	S	9.5	A	20	C	10	81	2.5	4			SPR
1983 05 30.25	S	9.6	A	20	C	10	102	2.5	4			SPR
1983 06 09.17	M	8.2	AA	8.0	B		20	&14	4			GRE

Periodic Comet Churyumov-Gerasimenko (1982f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 19.33	S	12.7	A	31.7	L	6	68	0.5	8			BOR
1982 10 11.22	S	11.8	A	31.7	L	6	68	1.2	7			BOR
1982 10 18.35	B	11.9	A	31.7	L	6	68					BOR
1982 10 18.35	S	11.8	A	31.7	L	6	68	0.8	7/	0.05	260	BOR
1982 10 20.39	B	11.9	A	31.7	L	6	68					BOR
1982 10 20.39	S	11.9	A	31.7	L	6	68	0.9	7			BOR
1982 10 23.39	B	12.0	A	31.7	L	6	68					BOR
1982 10 23.39	S	11.8	A	31.7	L	6	68	0.8	7	?		BOR
1982 10 27.39	S	11.7	A	31.7	L	6	68	& 2	7	0.05	270	BOR
1982 10 28.85	S	10.7	A	15.2	L	5	72	0.75	7			PEA
1982 11 10.22	B	10.3	A	31.7	L	6	68	1.1	7	0.05	270	BOR

Periodic Comet Churyumov-Gerasimenko (1982f) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 11 12.82	S	10.2	A	15.2	L	5	30	1.2	6			PEA
1982 11 13.82	S	10.2	A	15.2	L	5	30	1.2	6			PEA
1982 11 15.80	S	10.2	A	15.2	L	5	30	1.2	6			PEA
1982 11 16.40	B	10.7	A	31.7	L	6	68	1.7	6	0.1	255	BOR
1982 11 18.16	B	10.3	A	31.7	L	6	68					BOR
1982 11 18.16	S	10.2	A	31.7	L	6	68	1.0	6/	0.05	270	BOR
1982 11 20.17	B	10.3	A	31.7	L	6	68	1.7	6/	0.05	270	BOR
1982 11 22.13	S	10.3	AC	8.0	B		20	2.0	3			CAV
1982 12 08.10	B	9.9	A	31.7	L	6	68					BOR
1982 12 08.10	B	10.0	A	50.0	L	5	78	1.1	7	0.1	265	BOR
1982 12 08.10	S	9.7	A	8.0	B		20	& 2.5				BOR
1982 12 08.10	S	10.0	A	31.7	L	6	68	1.7	6/	0.1	265	BOR
1982 12 09.10	B	9.9	A	31.7	L	6	68	1.7	6/	0.05	265	BOR
1982 12 11.71	S	9.8	A	25	L	9	70	2	5			CLA
1982 12 12.79	S	9.9	A	25	L	9	70	2	5	0.05	250	CLA
1982 12 14.18	B	9.6	A	31.7	L	6	68	2.0	7	?	270	BOR
1982 12 14.74	S	9.9	A	25	L	9	70	2	5	0.05	250	CLA
1982 12 14.76	S	9.7	A	15.2	L	5	30	3	5			PEA
1982 12 15.75	S	9.7	A	15.2	L	5	30	3.2	5			PEA
1982 12 15.81	S	10.0	A	25	L	9	70	2	5	0.05	250	CLA
1982 12 16.75	S	9.8	A	15.2	L	5	30	3.2	5			PEA
1982 12 19.76	S	9.7	A	15.2	L	5	30	3	5	?		PEA
1982 12 20.75	S	9.7	A	15.2	L	5	30	2.9	5	0.04	255	PEA
1982 12 21.76	S	9.7	A	15.2	L	5	30	3	5	0.05	257	PEA
1982 12 23.12	B	9.9	A	31.7	L	6	68	1.5	6/			BOR
1982 12 23.12	S	9.4	A	8.0	B		20	& 4.5	3			BOR
1983 01 02.01	B	10.2	A	31.7	L	6	68	1.7	6/	?	270	BOR
1983 01 02.01	M	10.1	A	31.7	L	6	68					BOR
1983 01 02.01	S	9.9	A	8.0	B		20	& 3.5	5			BOR
1983 01 04.09	B	10.0	A	31.7	L	6	68	2.0	6/	0.3	265	BOR
1983 01 04.09	S	9.7	A	8.0	B		20	3	4			BOR
1983 01 09.73	S	10.2	A	25	L	9	110	2.5	5	0.03	210	CLA
1983 01 09.76	S	10.3	A	15.2	L	5	30	0.8	4			PEA
1983 01 09.99	B	10.3	A	31.7	L	6	68	2.1	6/	?	260	BOR
1983 01 10.71	S	10.3	A	15.2	L	5	30	0.9	4			PEA
1983 01 11.76	S	10.4	A	15.2	L	5	30	0.8	3			PEA
1983 01 12.77	S	10.4	A	15.2	L	5	30	1	3			PEA
1983 01 13.21	S	10.5	A	25.0	L	5	101	0.50	3			SPR
1983 01 14.10	S	10.2	A	31.7	L	6	68	2.1	6	0.1	255	BOR
1983 01 15.16	S	10.6	A	32.0	L	7	71	0.75	3			SPR
1983 01 15.66	S	10.0	A	15	L	9	77	1.5	4			CLA
1983 01 16.20	S	10.5	A	20.0	L	10	81	0.75	2			SPR
1983 01 16.69	S	10.3	A	25	L	9	110	2.5	4	0.03	200	CLA
1983 01 16.81	S	10.6	AC	8.0	B		20	2.3	3/			CAV
1983 01 18.68	B	10.4	A	25	L	9	70	2.25	4			CLA
1983 01 18.68	S	10.2	A	25	L	9	70	2.25	4			CLA
1983 01 18.69	S	10.3	A	25	L	9	70	2.25	4			CLA
1983 01 20.03	S	10.2	A	31.7	L	6	68	1.8	5			BOR
1983 01 20.17	S	10.8	A	20.0	L	10	125	0.75	2			SPR
1983 01 20.69	B	10.6	A	25	L	9	110	2	5	0.07	200	CLA
1983 01 20.69	S	10.4	A	25	L	9	110	2	5	0.07	200	CLA
1983 01 22.04	S	10.3	A	31.7	L	6	68	1.8	4			BOR
1983 01 22.16	S	10.6	A	20.0	L	10	81	1.0	2			SPR

Periodic Comet Churyumov-Gerasimenko (1982f) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 01 22.68	B	10.8	A	25	L	9	110	2.25	4			CLA
1983 01 22.68	S	10.5	A	25	L	9	110	2.25	4			CLA
1983 02 01.15	S	10.8	A	32.0	L	7	71	1.0	2			SPR
1983 02 01.81	S	10.4	AC	26.0	L	6	39	3.2	1	0.07	220	MER
1983 02 02.20	S	10.7	A	20.0	L	10	125	1.0	2			SPR
1983 02 02.85	S	10.5	AC	26.0	L	6	39	3.3	1	0.05	220	MER
1983 02 03.16	S	10.8	A	20.0	L	10	125	1.0	1			SPR
1983 02 04.14	S	10.9	A	20.0	L	10	125	0.75	1			SPR
1983 02 04.83	S	10.6	AC	26.0	L	6	63	& 2.5	1	0.04	219	MER
1983 02 05.15	S	11.1	A	20.0	L	10	102	0.75	1			SPR
1983 02 06.01	S	11.2	AC	25.0	L	7	103	2.0	2/			MOR
1983 02 06.18	S	10.9	A	20.0	L	10	81	0.75	1			SPR
1983 02 07.60	S	11.2	A	25	L	9	70	1.5	6			CLA
1983 02 10.06	S	11.0	AC	25.0	L	7	103	2.0	3			MOR
1983 02 10.10	S	10.4	A	31.7	L	6	68	1.8	4	?	180	BOR
1983 02 11.03	S	10.9	AC	25.0	L	7	103	2.0	2			MOR
1983 02 11.04	S	10.6	A	31.7	L	6	68	1.6	3	?	225	BOR
1983 02 13.10	S	11.3	AC	25.0	L	7	103	1.8	2			MOR
1983 02 15.19	S	11.0	A	31.7	L	6	68	1.9	3			BOR
1983 02 15.63	S	11.8	A	25	L	9	110	1	4			CLA
1983 02 15.84	S	11.7	AC	26.0	L	6	63	& 2.5	1			MER
1983 02 16.81	S	11.7	AC	26.0	L	6	63	& 2.0	1			MER
1983 02 17.60	S	11.9	A	25	L	9	110	1	4			CLA
1983 02 17.83	S	11.8	AC	26.0	L	6	63	2.3	1	0.04	76	MER
1983 02 19.03	S	12.1	AC	26.0	L	6	63	& 1.5	0/			MER
1983 02 19.96	S	12.4	AC	26.0	L	6	63	1.3	0			MER
1983 03 04.04	S	12.0	AC	25.0	L	7	103	2.0	0			MOR
1983 11 22.13	S	10.4	AC	25.4	L	4	79	2.0	6/			CAV

Periodic Comet Schwassmann-Wachmann 1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 03 20.06	S[	12.9	AC	26.0	L	6	130					MER
1983 04 16.00	P[	13.0	UP	26.0	L	6						MER
1983 04 29.88	S	11.7	AC	26.0	L	6	130	1.5	4		239	MER

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NEW OBSERVING REPORT FORM

On the following page is a new, revised report form for observers making observations of comets to be published in the ICQ. As the format for putting observations in machine-readable form into the computer has changed over the past 5 years, to better facilitate the compilation of observations, it is of great help if the observations are reported to us in the same format as is "punched" into the computer. We ask all observers to begin using this form over previous ones. For the references (Ref.) and magnitude methods (M.M.), as well as instrument type, we ask that observers use the official ICQ codes (see NOTICE TO NEW ICQ READERS in this issue, and articles in previous issues).

COMET OBSERVING REPORT FORM. Send completed sheets to INTERNATIONAL COMET QUARTERLY, c/o C. S. Morris, Prospect Hill Road, Harvard, MA 01451, U.S.A.: or c/o D. W. E. Green, Smithsonian Astrophysical Observatory, 60 Garden Street, Cambridge, MA 02138, U.S.A. Please convert observing times to decimals of a day in Universal Time (e.g., Aug. 3, 18:00 UT = Aug. 3.75 UT). *Xerox or photocopy this sheet for more copies. (This form supercedes all previous forms. 1983 May 31.)*

PLEASE PRINT OR TYPE ONLY. Use only one sheet per comet.

Name and designation of comet: COMET_____ 19_____.

Observer_____ Address_____

*Date (U.T.)**	*M.** *M.*	*Total** *Magn.*	*Ref.**	*Instr.** *Aperture*	*Instr.** *Type*	*f/**	*Power**	*Coma Dia.*	*D. C.*	*Tail Length*	*P. A.*	*Remarks*

NOTE: *Drawings and additional comments or remarks should be included on separate sheets of paper. To be eligible for publication in the ICQ, columns marked with an asterisk (*) must be filled in.*

EXTENSION OF EPHEMERIS OF PERIODIC COMET KOPFF (1982k); see last issue, p. 26.

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1983	07 30	15 56.13	-16 46.3				
1983	08 04	16 04.81	-17 43.7	0.886	1.578	112.0	10.2
1983	08 09	16 14.34	-18 40.2				
1983	08 14	16 24.67	-19 34.9	0.943	1.577	107.4	10.3
1983	08 19	16 35.72	-20 27.0				
1983	08 24	16 47.43	-21 15.7	1.006	1.582	103.3	10.5
1983	08 29	16 59.71	-22 00.4				
1983	09 03	17 12.49	-22 40.4	1.078	1.594	99.6	10.7
1983	09 08	17 25.71	-23 15.3				
1983	09 13	17 39.30	-23 44.6	1.158	1.612	96.1	10.9
1983	09 18	17 53.18	-24 08.0				
1983	09 23	18 07.27	-24 25.3	1.246	1.636	92.7	11.1
1983	09 28	18 21.50	-24 36.5				
1983	10 03	18 35.80	-24 41.4	1.342	1.665	89.4	11.4
1983	10 08	18 50.13	-24 40.1				
1983	10 13	19 04.42	-24 32.9	1.447	1.700	86.0	11.6
1983	10 18	19 18.62	-24 19.9				
1983	10 23	19 32.68	-24 01.4	1.560	1.738	82.5	11.9
1983	10 28	19 46.57	-23 37.8				
1983	11 02	20 00.26	-23 09.3	1.681	1.781	78.9	12.1
1983	11 07	20 13.74	-22 36.3				
1983	11 12	20 26.98	-21 59.2	1.809	1.827	75.2	12.4
1983	11 17	20 39.96	-21 18.4				

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