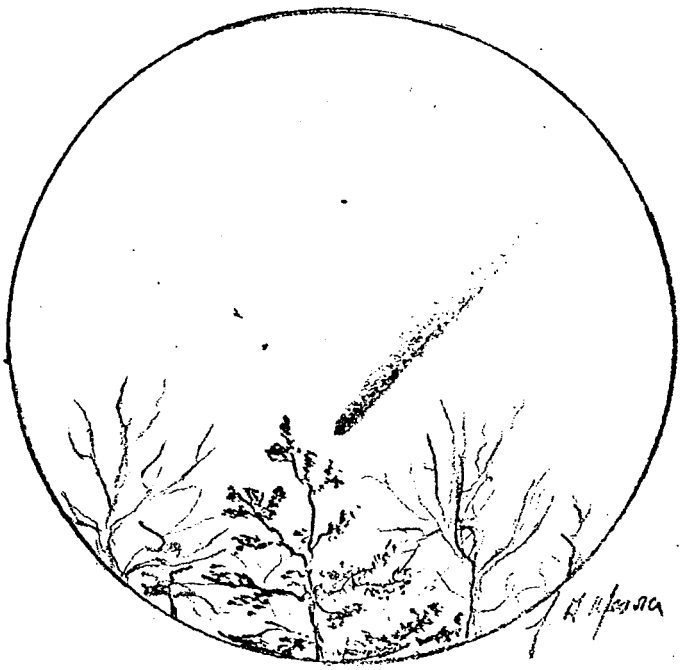
THE INTERNATIONAL COMET QUARTERLY

JANUARY 1981 VOL. 3, NO. 1



COMET BRADFIELD 1980t

At left is a drawing of the comet as it appeared to Stephen O'Meara on 1981 January 5 at 22:30 UT in 10x50 binoculars. O'Meara, observing from Cambridge, MA, observed a naked-eye tail of 2° on the same evening. The view at left is typical, as the comet was low in the southwest in twilight for northern hemisphere observers. More drawings of Comet 1980t by O'Meara are on page 32.

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INSIDE THIS ISSUE

THE INTERNATIONAL COMET QUARTERLY is a non-profit journal devoted to news and observation of comets. Issues are published four times per year (January, April, July, and October). The ICQ is published usually by the Physics Department of Appalachian State University and is mailed from Boone, North Carolina; occasional issues are published at the Smithsonian Astrophysical Observatory and mailed from Cambridge, Massachusetts. Subscription rates are $8.00 per year worldwide; subscribers who do not wish to be billed, and who will keep record of their own expiration dates, may subscribe at the rate of $5.00 per year. Make checks payable in U.S. funds to THE INTERNATIONAL COMET QUARTERLY and send to the Editor at P-329, S.A.O.; 60 Garden St.; Cambridge, MA 02138, U.S.A. Group rates available upon request. Manuscripts will be reviewed for publication; they should be typewritten and double-spaced, and should be sent to the Editor. 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, Physics Dept.; A.S.U.; Boone, NC 28608, U.S.A.

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This issue is No. 37 of the publication originally called THE COMET, founded in March 1973, and is Vol. 3, No. 1, of the ICQ.

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FROM THE EDITOR

This issue of the ICQ is by far the largest that has been compiled thus far in our expanding program. The use of the VAX computer at the Harvard-Smithsonian Center for Astrophysics has greatly increased our efficiency in not only working with the tabulated observations of comets, but also with the text itself. During the last year or so, we have been using a "Spin-Writer" to present very readable text and numbers in the ICQ's final form. The support from our many readers, both professional and amateur astronomers, is expanding tremendously, and we thank everyone for this support.

When subscribers are renewing, we ask that the account number be stated at the time, as this greatly expedites the accounting process; the account number is the first set of digits (before the first hyphen) at the top of the address label.

Special notes are given in this issue concerning the use of ICQ comet observations in reductions, on p. 8. We are also beginning a periodical "Request From the Editors", as described on the same page.

Special recognition is also due at this time to David Herald of Kambah, Australia, for the invaluable work which he performed to get observations of Comet Bradfield 1980t in December while it was only 8° above his horizon, using only a small amateur reflector. Herald's astrometric positions provided the only means for computing an orbit of this bright comet, by which a fairly reliable ephemeris could be published. Only one other astrometric observation made after Herald's has been received as of this writing, that being one by Dr. Edward Bowell at Lowell Observatory! More amateur work in this area is definitely needed. See also Herald's letter on page 8 of this issue.

--Daniel W. E. Green
Cambridge, MA, 1981 January 18

A REVIEW OF VISUAL COMET OBSERVING TECHNIQUES -- II

by Charles S. Morris

ABSTRACT. In the second part of this three-part paper, techniques for making visual observations of coma diameter, degree of condensation, and tail are surveyed.

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COMA DIAMETER ESTIMATES

Estimating the coma diameter of a comet visually is important because photographic estimates generally underestimate the comet's size. This is particularly true of large, diffuse comets. In addition, many photographs of comets are taken for astrometric purposes and are therefore of short exposure in order to more easily measure the comet nucleus position by minimizing the coma.

There are three frequently-used methods for visually estimating a comet's coma diameter. The first method requires that the telescope drive, if any, be shut off so that the stars and comet will "drift" across the field of the eyepiece. Using an eyepiece with crosshairs, one of which is oriented north-south, the comet is allowed to drift across the field. The length of time in seconds, T, between the comet's first and last contact with the crosshair is measured. After several measurements have been taken and averaged, the following expression is used to obtain the comet's coma diameter (in minutes of arc):

$$\text{COMA SIZE} = 0.25\ T \cos \delta ,$$

where δ is the comet's declination. Note that as δ approaches $\pm 90^\circ$, the "drift" time required for a comet of a given size increases ($\cos \delta$ approaches zero). As a result, the "drift method" should not be applied in the polar regions ($\delta < -70^\circ$ and $\delta > +70^\circ$). The drift method tends to work best for small-to-moderate-size comets (coma size 0-5').

Another popular way of estimating a comet's coma diameter utilizes known separations between field stars. Using a large-scale atlas, such as Atlas Eclipticalis, the observer measures the separation between pairs of stars in the comet's vicinity. At the telescope, the observer compares the apparent diameter of the comet to the separation of the stars, and thus obtains an estimate of the coma diameter. This method works best for medium to large comets (coma size > 3').

For those observers who have either a reticle-equipped eyepiece or filar micrometer, the comet's coma diameter can be obtained directly. Use of this type of equipment is to be preferred, as it eliminates many of the uncertainties of the drift and star-pair methods.

Like magnitude estimates, coma diameter estimates suffer from an "aperture effect." A comet will appear smaller in larger instruments. An extreme example of this effect was documented by this author during the apparition of Comet Bradfield 19791. On 1980 February 4.0 UT, the following coma diameter estimates were made:

INSTRUMENT	COMA DIAMETER
6x15 binoculars	18'
12x50 binoculars	15
20x80 binoculars	12
25-cm f/7 reflector, 70x	7

Coma diameter estimates should be made in a small instrument, such as binoculars, whenever possible. It is very desirable to make both the magnitude and coma diameter estimates using the same instrument.

DEGREE OF CONDENSATION ESTIMATES

The combination of the coma diameter and the degree of condensa-

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A REVIEW OF VISUAL COMET OBSERVING TECHNIQUES -- II

(Continued from previous page)
tion (DC) gives the professional astronomer a good idea of the comet's physical appearance. For instance, was the comet small and condensed, or large and diffuse?

The DC scale ranges from 0 to 9 with a totally diffuse comet being rated DC = 0 and a totally condensed comet assigned DC = 9. A DC-0 comet would appear as a glow with little or no increase in surface brightness toward the center of the coma. The DC rating of a comet increases as the brightness increase toward the coma's center becomes more pronounced. When this concept is extrapolated to the extreme, a comet with DC = 9 would appear stellar (e.g., Comet Bradfield 1974b). However, there are cases when a comet's coma looks like a planetary disk (e.g., Comet West 1975n in the daytime, and Comet Bradfield 1980t using low power). In this case, the comet is neither diffuse not stellar. How does one rate DC in such a case? Most experienced observers would still consider such a comet to be totally condensed, with DC = 9.

It should be noted that a condensed comet does not necessarily have an observable central condensation. A central condensation is a "disk" superimposed on the coma. Thus, there will be a discontinuity in the comet's surface brightness when a central condensation is present. This discontinuity makes a DC estimate (and a magnitude estimate) more difficult. This is particularly true when the comet has a sharp central condensation surrounded by a diffuse coma (e.g., P/Stephan-Oterma 1980g). If one considers the central condensation alone, one might get DC = 9. However, the DC-value for the diffuse coma would be very small. The solution to the problem is to determine an "average" DC-value. Unfortunately, this task can be very difficult to do in practice.

Like most visual observations of comets, a DC estimate is instrument-dependent to some degree. However, there is no clear-cut trend to the instrument dependence. For example, a bright comet (e.g., Comet Bradfield 1980t) may have a DC-9 rating in binoculars but appear somewhat less-condensed in a larger telescope. On the other hand, a comet like P/Stephan-Oterma 1980g appears significantly larger, and thus more diffuse in binoculars. It is probably best for the observer to estimate DC in the same instrument which is used to make the magnitude and coma diameter estimates.

TAIL OBSERVATIONS

Of all the observations which a visual observer can make, the tail observations are usually of the smallest value (particularly in the case of bright comets). This is because the two parameters usually estimated visually, tail length and position angle (PA), are more accurately determined photographically. However, there is still a reason for estimating the tail parameters. Many relatively-faint comets, which often are infrequently photographed, produce faint tails. The amateur's record of these tails may be the only record available.

A comet's tail length can often be measured directly using known star pair separations or in terms of an eyepiece or binocular field. For long tails ($> 10^\circ$) which occur with very bright comets, it is necessary to calculate the tail length using the following formula:

$$\cos d = \sin D \sin \delta + \cos D \cos \delta (\alpha - A),$$

where d is the tail length in degrees, α is the comet's right ascension, δ is the comet's declination, A is the right ascension of the end of the tail, and D is the declination of the end of the tail.

The best procedure for estimating the tail's PA is to plot the

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A REVIEW OF VISUAL COMET OBSERVING TECHNIQUES -- II

(Continued from previous page)
comet's position on an atlas and to then plot the tail's position relative to field stars. A protractor is then used to measure the PA. A PA of 90° means that the tail is pointing east, 0° = north, etc.

Visual tail observations are extremely sensitive to sky brightness. Thus, observations made from the city or with moonlight are basically useless. Because sky brightness is an important factor, faint tails are sometimes more easily seen in a larger instrument.

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(PART III OF THIS ARTICLE WILL BE PUBLISHED IN THE NEXT ISSUE.)

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ROMAN NUMERAL DESIGNATIONS OF COMETS IN 1978 AND 1979 (from MPC 5067-8, 5660)

Comet	T		Name	Year/letter
1978 I	Jan.	6.8	P/Schuster	1977o
1978 II	Jan.	11.0	P/Tempel 1	1977i
1978 III	Feb.	2.5	P/Arend-Rigaux	1977k
1978 IV	Feb.	14.9	P/Chernykh	1977l
1978 V	Feb.	20.7	P/Tempel 2	1977d
1978 VI	Mar.	15.9	P/Wolf-Harrington	1977j
1978 VII	Mar.	17.7	Bradfield	1978c
1978 VIII	Mar.	27.6	P/Whipple	1977h
1978 IX	May	7.4	P/Tsuchinshan 1	1978e
1978 X	May	24.7	P/Kojima	1977r
1978 XI	June	15.9	P/Wild 2	1978b
1978 XII	July	8.4	P/Daniel	1979b
1978 XIII	Aug.	13.6	Machholz	1978l
1978 XIV	Aug.	19.9	P/Ashbrook-Jackson	1977g
1978 XV	Sept.	14.8	Seargent	1978m
1978 XVI	Sept.	21.0	P/Tsuchinshan 2	1978p
1978 XVII	Sept.	24.2	P/Comas Sola	1977n
1978 XVIII	Sept.	29.1	Bradfield	1978o
1978 XIX	Oct.	2.0	P/Denning-Fujikawa	1978n
1978 XX	Oct.	9.5	P/Haneda-Campos	1978j
1978 XXI	Nov.	11.4	Meier	1978f
1978 XXII	Nov.	21.3	P/Giclas	1978k
1978 XXIII	Nov.	26.3	P/Clark	1978q
1978 XXIV	Dec.	3.0	P/van Beisbroeck	1977s
1978 XXV	Dec.	25.8	P/Tuttle-Giacobini-Kresak	1978r
1978 XXVI	Dec.	26.2	P/Jackson-Neujmin	1978q
1979 I	Jan.	9.0	P/Shajn-Schaldach	1978i
1979 II	Jan.	13.7	P/Kowal 2	1979a
1979 III	Feb.	12.8	P/Giacobini-Zinner	1978h
1979 IV	Feb.	22.7	P/Holmes	1979f
1979 V	May	27.0	P/Russell 1	1979d
1979 VI	July	15.4	Torres	1979e
1979 VII	July	23.3	Bradfield	1979c
1979 VIII	Sept.	2.8	P/Schwassmann-Wachmann 3	1979g
1979 IX	Oct.	17.4	Meier	1979i
1979 X	Dec.	21.6	Bradfield	1979l

PHOTOMETRIC PARAMETERS OF COMETS

by Charles S. Morris, Prospect Hill Observatory

P/COMET STEPHAN-OTERMA 1980g

P/Stephan-Oterma 1980g remains well within the reach of amateur telescopes. To date this comet has followed rather well the magnitude predictions given in the ICQ, Vol. 2, p. 41. In early December, 1980g attained magnitude 8.4 (in 20x80 binoculars), and it is now fading. It appears that the value of n is smaller than that used in the predictions, and that the absolute magnitude is therefore fainter. An analysis of 18 of the author's pre-perihelion observations (corrected to 6.78 cm) gives:

H_o = 3.12 ± 0.24 (p.e.)
n = 12.50 ± 0.44 (p.e.)
r = 1.862 - 1.574 AU

An unusual flare in brightness was observed by Daniel Green and the author at Prospect Hill Observatory on 1980 November 13 (UT). In 20x80 binoculars, the comet appeared about one magnitude brighter than when observed on November 9. In addition, the comet's size had doubled from 7' to 14'. Curiously, there was no evidence of this "flare" in the author's 25-cm reflector. Although no official magnitude estimate was made, the comet appeared to be about magnitude 9.0 in the larger instrument, consistent with the November 9 observation using the 25-cm reflector. This then was a "binocular flare" since it was only visible in binoculars. When observed on November 15, the comet had returned to its pre-flare state. Did anyone else detect this flare?

A complete report on P/Stephan-Oterma's apparition will appear in the next issue of the ICQ.

P/COMET TUTTLE 1980h

P/Tuttle is now a southern hemisphere object and fading. Recent observations by David A. J. Seargent (The Entrance, Australia) made at the close of 1980 indicate that this comet had faded to about 8th magnitude. The author's observations (October 9-December 6) indicate that in the range r = 1.42 - 1.14 AU, H_o = 7.1 and n = 9.4. However, the comet's rapid increase in brightness apparently came to an abrupt halt at r = 1.14. In the range r = 1.14 - 1.02 AU, H_o = 8.4 and n = 0.

Observers, particularly those in the southern hemisphere, are urged to report their observations to the ICQ. A complete report of P/Tuttle's apparition will be presented in the next ICQ.

COMET PANTHER 1980u

This new comet will be a circumpolar object in the northern sky in the coming weeks, and will pass very near the North Celestial Pole in March (see the ephemeris on page 14). Since the comet will be between 8th and 9th magnitude, it will make a perfect object for conducting an investigation of aperture correction and evaluating different magnitude estimation techniques (see ICQ, Vol. 2, pp. 69ff). In addition, short-term fluctuations in the comet's brightness can be searched for. Observers are urged to estimate Comet Panther's brightness using as many instruments as possible, and to report these to the ICQ. Be sure to indicate the method(s) used to estimate the comet's brightness. It is suggested for uniformness that all observers use the North Polar Sequence for comparison stars. To encourage this, we are publishing a copy of the NPS on the following page, courtesy of the American Association of Variable Star Observers.

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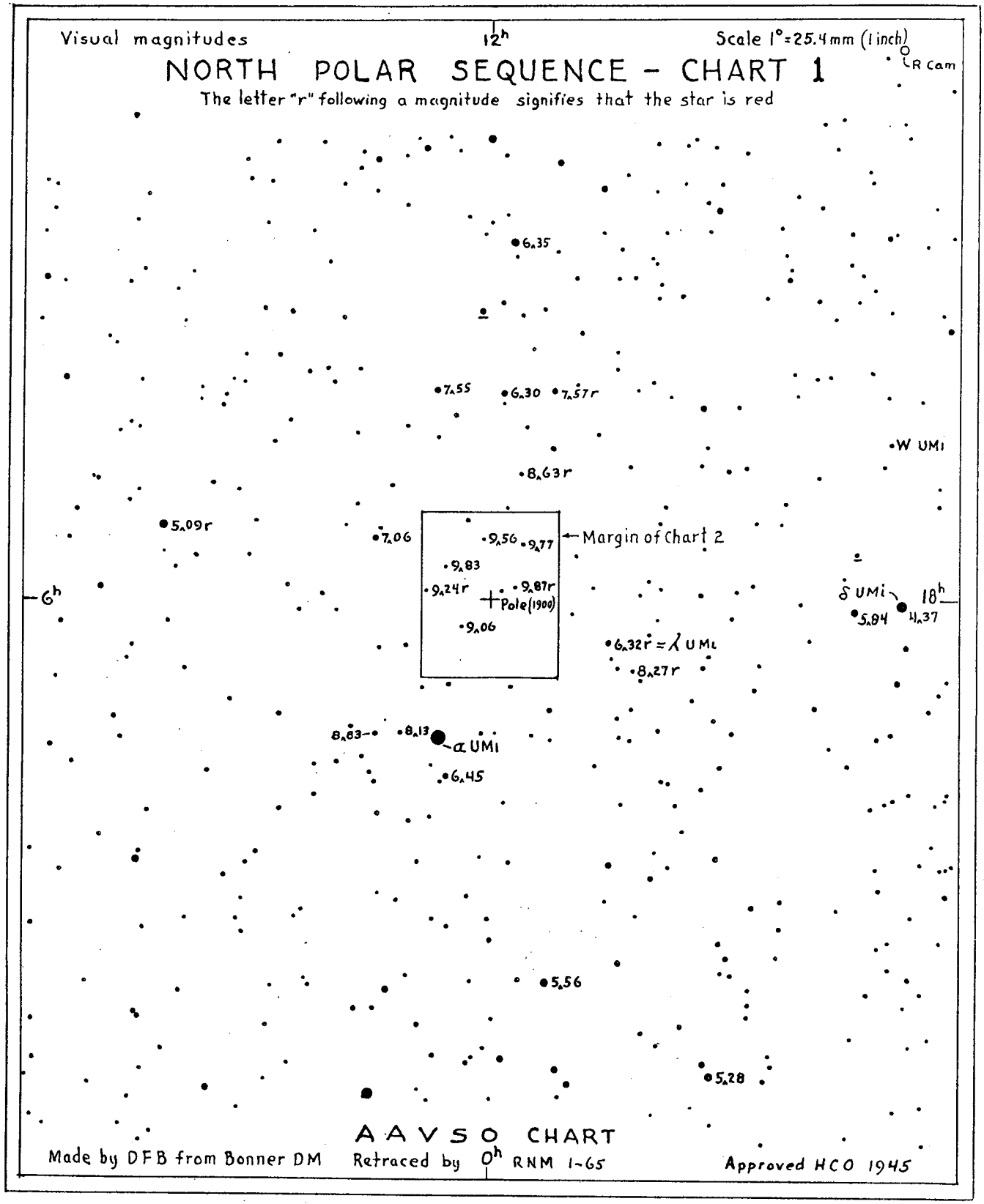
Readers are reminded that photometric parameters derived by individuals or groups will be considered for publication in this column.


Visual magnitudes
12h
Scale 1°=25.4mm (1 inch)
NORTH POLAR SEQUENCE - CHART 1
The letter "r" following a magnitude signifies that the star is red
R cam
6.35
7.55
6.30
7.57r
W UMi
8.63r
5.09r
7.06
9.56
9.77
Margin of Chart 2
9.83
9.24r
9.87r
Pole(1900)
9.06
6h
δ UMi
18h
5.84
4.37
6.32r = λ UMi
8.27r
8.83
8.13
α UMi
6.45
5.56
5.28
AAVSO CHART
Made by DFB from Bonner DM
Retraced by 0h RNM 1-65
Approved HCO 1945

REQUEST FROM THE EDITORS

In order to publish observations of past comets in a more orderly fashion, we are instituting the policy of requesting observations of specific comets in advance. These observations will then be published as soon as possible after they are received. The Editors realize that not all groups or individuals will be able to meet our "deadlines" for submitting observations, but we trust that many will be able to do so. Those who submit observations AFTER the deadline will still be published in a later issue of the ICQ. However, our new policy is designed to "concentrate" observations of past comets so that they are more readily accessible.

Our first request is for observations of Comet West 1976 VI (1975n). Readers are requested to send their observations to the ICQ before August 1981 for inclusion in an upcoming issue. --C.S.M., D.W.E.G. (1/18/81)

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LETTER TO THE EDITOR

Dear Sir:

Being located in the southern hemisphere, I have found that my most valuable contribution as an amateur observer of comets is in the determination of accurate positions of comets, and consequently, I have tended not to spend much time on observing physical aspects of comets, save for the occasional total magnitude estimates. What has always disturbed me in making these estimates is the shear difficulty of obtaining an accurate measure, and I have noted from estimates published in the IAU Circulars that my estimates often differ systematically from other observers by up to a whole magnitude or more, almost always being fainter. I would certainly like to see published in the ICQ articles dealing with the estimation of total magnitudes, and perhaps the ICQ would be the best organ for determining and eliminating causes for systematic errors.

David Herald (Woden, A. C. T., Australia; 1979 March 3)

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SUGGESTIONS ON THE USE OF ICQ OBSERVATIONS

In the past, the Editors have made a specific effort to publish all valid magnitude observations submitted. Many times these included several observations by a single observer on a given night. The reason for inclusion of these multiple observations is to provide data for the study of instrumental effects on comet magnitude observations. With this issue, we have inaugurated the policy of publishing the magnitude estimation method used by the observer, so that studies of these different techniques can be undertaken. We anticipate further sets of multiple observations from experienced observers as a result of this policy change. It is a concern of the Editors that users of ICQ data realize the reasons for the inclusion of these multiple observations.

For magnitude analyses, the Editors strongly believe that only one observation per observer per night should be utilized, unless an unusual event is occurring (e.g., a brightness flare). Otherwise, observations of certain observers would be given greater weight than others. --C.S.M., D.W.E.G.

RECENT NEWS CONCERNING COMETS

The year 1980 was truly an interesting one concerning comets. No less than 21 recoveries or new discoveries of comets were reported to the International Astronomical Union Central Bureau for Astronomical Telegrams, one of those proving to be a ghost image, which were assigned provisional letter designations.

Comets P/Stephan-Oterma 1980g, P/Tuttle 1980h, P/Encke, and Meier 1980q were followed by amateurs to the end of the year. Comets 1980g, and 1980h are discussed briefly on page 6 of this issue, and P/Encke is discussed on page 10. Comet Meier 1980q remained fairly constant in brightness, as can be noted in the tabulation of observations toward the end of this issue.

Miklos Lovas discovered a diffuse object with condensation of total magnitude 17, moving retrograde near the Lynx-Cancer-Leo Minor borders. Comet Lovas was given the designation Comet 1980s.

William Bradfield of Dernancourt (near Adelaide), Australia, discovered his eleventh comet on 1980 December 17 UT as a 6th-magnitude object in twilight. Comet Bradfield 1980t was then moving rapidly toward perihelion with the sun, at a distance of 0.26 AU on December 29. Five observations obtained by David Herald in mid-December with the comet only 8 degrees above the horizon were the only astrometric positions available of this comet until January 9 (see pp. 2 and 8 of this issue). Since then, only 2 accurate positions have been reported, one of them being a prediscovery observation found through efforts by D. A. Pickup (Royal Observatory, Edinburgh, Scotland) and K. S. Russell (U. K. Schmidt Telescope Unit, Australia); an exposure made by J. Barrow and R. J. Smyth with the 120-cm U. K. Schmidt telescope at Coonabarabran on 1980 July 18 UT revealed a 16th-magnitude image of the comet! (IAUC 3564)

Observations were made from the southern hemisphere of Comet 1980t by visual observers until almost the end of December (see the tabulation of observations in this issue). A few independent discoveries were made by northern hemisphere observers in early January who had not heard of the comet's discovery, as the bright object moved northward after perihelion. The comet was generally observed as slowly fading from magnitude 4 to 5.5 from January 5-13 UT, but sometime on January 13 UT, the comet experienced a significant outburst of 1 to 1.5 magnitudes in brightness, to magnitude 4.5. The tail was observed up to 5 degrees in length visually, and up to 7 degrees photographically, during this same period of 8 to 10 days.

Unfortunately, Comet Bradfield 1980t will remain close to the sun in terms of elongation for earth-based observers during the coming weeks, but observations of this interesting object should still be possible for amateurs for perhaps a month or two (see the ephemeris on page 13). A more-detailed report on this comet will be published on the April issue.

Roy W. Panther of Walgrave (near Northampton), England, discovered a 10th-magnitude comet moving direct in Lyra on 1980 December 25 UT. Comet Panther 1980u will move away from the sun during the next few months and move northward as a 8th-9th magnitude object, passing very near the North Celestial Pole in March (see ephemeris on page 14). This should provide interesting comparisons of magnitude methods and discussions of aperture effect, as described by Charles Morris on p. 6 of this issue.

P/Comets Borrelly and Schwassmann-Wachmann 2 may also be visible in large amateur instruments in the coming weeks, and we provide ephemerides for these comets, as well.

(continued on page 32)

THE 1980 APPARITION OF PERIODIC COMET ENCKE

by Daniel W. E. Green and Charles S. Morris

ABSTRACT. The 1980 apparition of P/Encke 1786 I is discussed, centering chiefly on visual observations. Magnitude analysis reveals an absolute magnitude of 9.8 and confirms that the brightness of this comet varies with heliocentric distance, r, according to the formula suggested by Sekanina: $r^{1.8} - 1$.

Periodic Comet Encke offered visual observers a good view as it approached perihelion on 1980 December 6 for its 52nd observed apparition. Passing very close to the earth, less than 0.3 AU in late October, visual observers followed this quickly-moving object as it became brighter than total magnitude 7 (see observations on p. 82, ICQ Vol. 2, and on p. 23 in this issue).

The history of this comet, which was originally discovered in 1786 by Pierre Mechain in Paris, is well-documented by Bortle (1980) and Vsekhsvyatskii (1964). P/Encke has a period of 3.3 years, the shortest on record for any comet, and its heliocentric distance varies from 2.2 to 0.3 AU.

John Bortle was apparently the first to detect P/Encke visually at this apparition, finding it at magnitude 12.7 in a 32-cm reflector on September 19. It quickly brightened to magnitude 8 by mid-October, and to magnitude 7 by late October. Reports of multiple tails were reported extensively in late October and early November (before the comet became immersed in morning twilight), with length estimates ranging from a few minutes to well over half a degree in length. These tails included a straight, narrow gas tail, typically extending toward the northwest, and the sunward fan which is characteristic of P/Encke. The tail length may have been as much as 150,000-300,000 km on November 9, according to visual observations.

The comet's rapid increase in brightness was accompanied by a dramatic increase in the coma's diameter over a period of a week or two, in October. This rapid increase was in part due to the observational selection effect; the comet's surface brightness rapidly increased above the background sky brightness, causing more of the coma to be visible to observers. The maximum coma diameter observed was around 13' to 15', indicating a maximum true diameter of about 1.75×10^5 km at about 1.2 AU. As the comet moved closer to the sun, and thus into twilight, its diameter decreased markedly.

P/Encke appeared moderately condensed throughout most of its apparition. The shape of the coma was characteristically parabolic, positioned in an "antisolar" direction. No nucleus or central condenstion was reported. However, Steve O'Meara, using a 23-cm refractor, did report a mottled inner coma during the apparition.

MAGNITUDE REDUCTION

A total of 40 magnitude estimates by four observers have been analyzed by the authors. The observers, with their number of observations in parentheses, include:

John Bortle (BOR)	17
Daniel Green (GRE)	2
James Morgan (MOR02)	7
Charles Morris (MOR)	14

The observations span the period 1980 September 19 to 1980 November 26, corresponding to a variation in the comet's heliocentric distance (r) of 1.529 to 0.433 AU. All observations are pre-perihelion. Post-perihelion observations were not possible during this apparition due to the comet's proximity to the sun.

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THE 1980 APPARITION OF PERIODIC COMET ENCKE

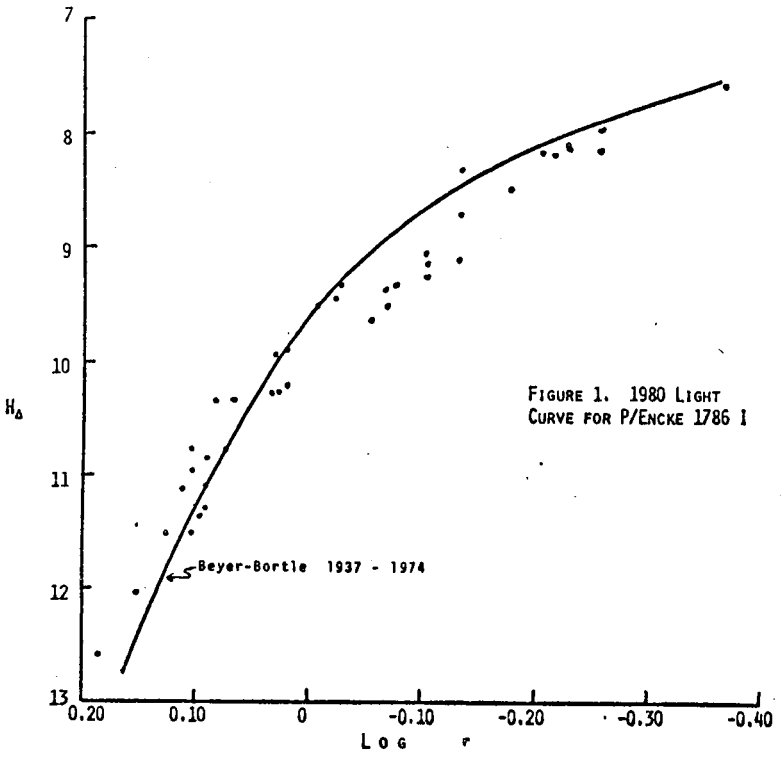

FIGURE 1. 1980 LIGHT CURVE FOR P/ENCKE 1786 I

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Figure 1 shows the standard graph of heliocentric brightness (H_Δ) versus log r for the observations of P/Encke. As is expected for this comet, Figure 1 indicates that there is a non-linear relationship between H_Δ and log r. Thus, the standard power-law formula

$$H_\Delta = H_o + 2.5\ n \log r,$$

which is the equation for a straight line in Figure 1, is not appropriate because P/Encke does not have a constant value of n.

Sekanina (1979) has proposed the following relationship to represent P/Encke's brightness variation:

$$H_\Delta = H_o + n'(r^{1.8} - 1). \qquad (1)$$

The observations have been fitted to this formula. As shown in Figure 2, equation (1) represents the observations extremely well. A least squares regression gives the following values for H_c and n':

$$H_c = 9.79 \pm 0.03 \text{ (p.e.)}$$
$$n' = 2.54 \pm 0.05 \text{ (p.e.)}$$

The absolute magnitude of 9.79 is similar to that obtained for other recent apparitions of this comet. For example, Bortle (1974) has shown that observations by Beyer and himself for the 1937, 1947, 1951, 1961, 1967, 1970, and 1974 apparitions can be represented by a single curve. This curve estimated from the 1937-1974 observations has been superimposed on Figure 1. Clearly, there is good agreement between the Beyer-Bortle curve and the observations of the current apparition. The Beyer-Bortle curve suggests an absolute magnitude of about 9.6. Note that the 0.2-magnitude difference in absolute magnitude between the current apparition and the Beyer-Bortle curve occurs primarily because of a "dip" in the brightness observations between 0.89 and 0.71 AU (log r =

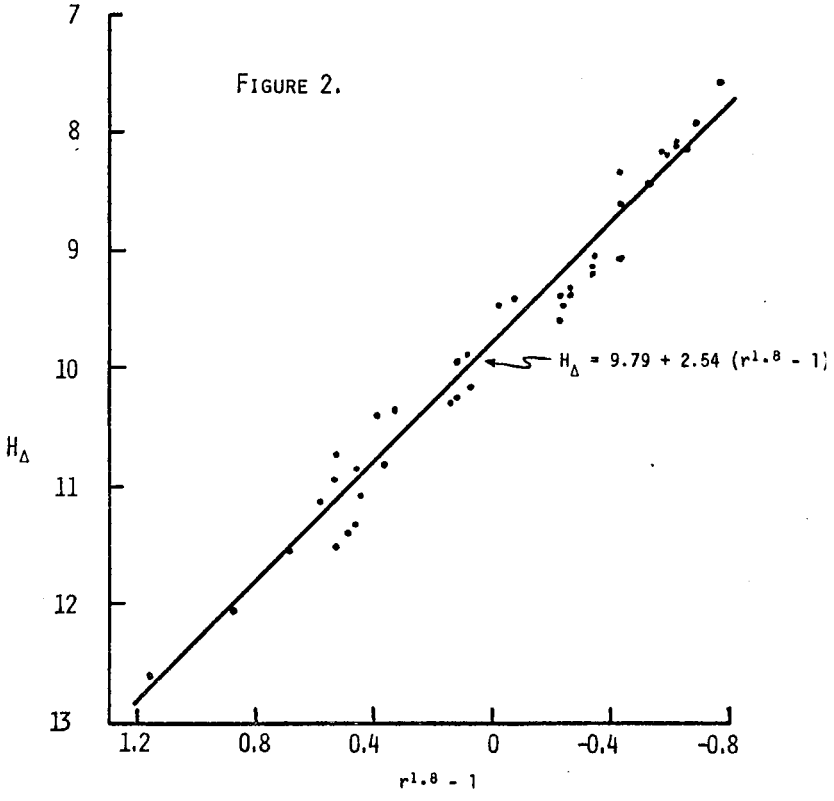

FIGURE 2.

THE 1980 APPARITION OF PERIODIC COMET ENCKE

(continued from previous page) -0.05 to -0.15). This "dip" appears to be real. Prior to this "dip", the magnitude estimates of the current apparition indicate an absolute magnitude close to 9.6. Thus, there does not appear to be any significant decay of the comet since 1937, using absolute magnitude as a basis.

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EPHEMERIDES OF CURRENTLY BRIGHT COMETS

Following are ephemerides for Comets P/Borrelly 1980i, P/Schwassmann-Wachmann 2, Meier 1980q, Bradfield 1980t, and Panther 1980u, which should help observers find these objects while they are within the range of amateur instruments. The elements for P/Borrelly are from a differential correction by Brian G. Marsden, Harvard-Smithsonian Center for Astrophysics, using elements by D. K. Yeomans, Jet Propulsion Laboratory (MPC 5126). The elements for P/Schwassmann-Wachmann 2 are also by Marsden (B.A.A. Handbook 1980). The elements for Comets Meier, Bradfield, and Panther are by Daniel Green, Center for Astrophysics, as are all five of the ephemerides.

COMET P/BORRELLY 1980i

Elements:

T	(time of perihelion)	=	1981 Feb. 20.0115 ET
ω	(argument of perihelion)	=	352.°7716
Ω	(ascending node)	=	75.0577 (equinox 1950.0)
i	(inclination)	=	30.2008
q	(perihelion distance)	=	1.319246 AU
e	(eccentricity)	=	0.631488

Date ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1981 01 31	01 03.39	-04 45.8	1.468	1.340	62.6	12.9
1981 02 05	01 15.21	-01 28.5				
1981 02 10	01 27.36	+01 48.0	1.498	1.325	60.4	12.9
1981 02 15	01 39.83	+05 02.5				
1981 02 20	01 52.65	+08 14.0	1.536	1.319	58.3	12.9
1981 02 25	02 05.85	+11 21.2				
1981 03 02	02 19.45	+14 23.2	1.583	1.325	56.5	13.0
1981 03 07	02 33.50	+17 19.1				
1981 03 12	02 48.00	+20 07.7	1.639	1.340	54.8	13.1
1981 03 17	03 02.98	+22 48.3				
1981 03 22	03 18.46	+25 20.0	1.704	1.366	53.3	13.3
1981 03 27	03 34.45	+27 42.0				
1981 04 01	03 50.96	+29 53.6	1.776	1.401	51.9	13.5
1981 04 06	04 07.97	+31 54.4				
1981 04 11	04 25.47	+33 43.7	1.856	1.444	50.5	13.7
1981 04 16	04 43.41	+35 21.3				

P/COMET SCHWASSMANN-WACHMANN 2 (1979k)

Elements: T = 1981 March 17.0828 ET
q = 2.135029
e = 0.386707
ω = 357°.4624
Ω = 125.9399 (equinox 1950.0)
i = 3.7300

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1981 01	31	05 56.81	+21 26.5	1.320	2.160	138.6	13.4
1981 02	05	05 56.78	+21 40.5				
1981 02	10	05 57.65	+21 54.2	1.391	2.150	128.7	13.5
1981 02	15	05 59.40	+22 07.4				
1981 02	20	06 02.01	+22 20.0	1.474	2.143	119.6	13.7
1981 02	25	06 05.44	+22 31.8				
1981 03	02	06 09.64	+22 42.4	1.568	2.138	111.3	13.8
1981 03	07	06 14.56	+22 51.9				
1981 03	12	06 20.17	+22 59.8	1.669	2.135	103.7	13.9
1981 03	17	06 26.40	+23 06.0				
1981 03	22	06 33.18	+23 10.2	1.775	2.135	96.8	14.0
1981 03	27	06 40.48	+23 12.4				

COMET MEIER 1980q

Elements: T = 1980 Dec. 9.51225 ET
q = 1.5220851
e = 1.0000000
ω = 87°.90693
Ω = 24.79029 (equinox 1950.0)
i = 101.02813
(based on 34 observations from 1980 Nov. 6 to 1981 Jan. 8)

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1981 01	31	17 46.37	+21 06.5	1.952	1.686	59.7	9.6
1981 02	05	17 43.67	+21 05.0				
1981 02	10	17 40.24	+21 08.5	1.874	1.748	67.3	9.7
1981 02	15	17 35.95	+21 16.8				
1981 02	20	17 30.65	+21 29.3	1.779	1.818	76.2	9.7
1981 02	25	17 24.20	+21 45.6				
1981 03	02	17 16.39	+22 04.8	1.673	1.894	86.6	9.8
1981 03	07	17 07.06	+22 25.9				
1981 03	12	16 56.01	+22 47.2	1.566	1.974	98.4	9.8
1981 03	17	16 43.09	+23 06.5				
1981 03	22	16 28.22	+23 21.1	1.473	2.059	111.5	9.9
1981 03	27	16 11.42	+23 27.8				
1981 04	01	15 52.85	+23 23.1	1.408	2.147	125.4	10.0
1981 04	06	15 32.83	+23 03.9				
1981 04	11	15 11.92	+22 27.7	1.388	2.238	138.3	10.1
1981 04	16	14 50.78	+21 33.9				
1981 04	21	14 30.10	+20 23.7	1.425	2.331	146.7	10.3
1981 04	26	14 10.53	+18 59.9				
1981 05	01	13 52.52	+17 26.6	1.522	2.426	146.4	10.7
1981 05	06	13 36.39	+15 47.6				
1981 05	11	13 22.25	+14 06.6	1.673	2.522	138.7	11.0
1981 05	16	13 10.10	+12 26.5				
1981 05	21	12 59.81	+10 49.1	1.869	2.618	128.2	11.4
1981 05	26	12 51.22	+09 15.7				
1981 05	31	12 44.17	+07 46.8	2.096	2.716	117.4	11.8
1981 06	05	12 38.46	+06 22.5				
1981 06	10	12 33.94	+05 02.7	2.344	2.814	107.0	12.2
1981 06	15	12 30.46	+03 47.0				
1981 06	20	12 27.86	+02 35.2	2.605	2.912	97.2	12.6

COMET BRADFIELD 1980t

Elements: T = 1980 Dec. 29.54270 ET ω = 358°.29498
q = 0.2597887 AU Ω = 114.65866 (equinox 1950.0)
e = 1.0000000 i = 138.59026
(based on 11 observations from 1980 Dec. 18 to 1981 Jan. 7)

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1981	01 31	21 37.61	+06 07.6	1.704	0.928	26.2	8.3
1981	02 05	21 45.61	+06 43.3				
1981	02 10	21 52.50	+07 14.2	1.984	1.136	22.4	9.5
1981	02 15	21 58.59	+07 42.6				
1981	02 20	22 04.05	+08 09.6	2.221	1.330	19.4	10.5
1981	02 25	22 08.99	+08 36.0				
1981	03 02	22 13.50	+09 02.3	2.419	1.515	18.8	11.2
1981	03 07	22 17.62	+09 28.6				
1981	03 12	22 21.38	+09 55.1	2.579	1.690	21.1	11.8
1981	03 17	22 24.80	+10 21.7				
1981	03 22	22 27.88	+10 48.6	2.704	1.859	25.9	12.4
1981	03 27	22 30.64	+11 15.5				
1981	04 01	22 33.07	+11 42.6	2.797	2.022	32.2	12.8
1981	04 06	22 35.16	+12 09.6				

COMET PANTHER 1980u

Elements: T = 1981 Jan. 26.89613 ET ω = 105°.15518
q = 1.6646310 AU Ω = 331.31193 (equinox 1950.0)
e = 1.0000000 i = 82.73597
(based on 12 observations from 1980 Dec. 27 to 1981 Jan. 8)

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1981	01 31	19 09.65	+53 30.8	1.633	1.666	74.4	8.8
1981	02 05	19 13.57	+56 47.0				
1981	02 10	19 17.71	+60 25.9	1.541	1.675	79.7	8.7
1981	02 15	19 22.10	+64 28.3				
1981	02 20	19 26.88	+68 54.3	1.464	1.695	85.1	8.6
1981	02 25	19 32.3	+73 42.8				
1981	03 02	19 39.4	+78 51.6	1.414	1.725	89.9	8.6
1981	03 07	19 52.3	+84 16.7				
1981	03 12	00 52	+89 32.7	1.404	1.764	93.2	8.7
1981	03 17	07 24.9	+84 22.8				
1981	03 22	07 38.4	+78 43.7	1.442	1.812	94.2	8.9
1981	03 27	07 45.8	+73 12.3				
1981	04 01	07 51.74	+67 54.3	1.530	1.867	92.7	9.1
1981	04 06	07 57.12	+62 53.6				
1981	04 11	08 02.25	+58 12.5	1.663	1.929	89.2	9.5
1981	04 16	08 07.24	+53 52.2				
1981	04 21	08 12.15	+49 52.4	1.830	1.997	84.2	9.8
1981	04 26	08 17.01	+46 12.2				
1981	05 01	08 21.84	+42 50.4	2.022	2.069	78.4	10.2
1981	05 06	08 26.65	+39 45.1				
1981	05 11	08 31.45	+36 55.0	2.230	2.146	72.1	10.6
1981	05 16	08 36.23	+34 18.2				
1981	05 21	08 41.00	+31 53.2	2.445	2.226	65.6	10.9
1981	05 26	08 45.75	+29 38.7				
1981	05 31	08 50.48	+27 33.3	2.663	2.309	58.9	11.3
1981	06 05	08 55.20	+25 35.9				

TABULATION OF COMET OBSERVATIONS

The A.L.P.O. observations of Comet Kobayashi-Berger-Milon 1975 IX listed in this issue complete that organization's file on this comet; the remainding observations were published in Vol. 2 of the ICQ. In addition, all of the A.L.P.O. observations of Comet Suzuki-Saigusa-Mori 1975 X are tabulated in this issue. Most of the remainder of the observations in the following pages were those contributed by individuals directly to the ICQ.

NOTE: With this issue, we are adding a new item to our files, namely the method used for the magnitude estimate (cf. "A Review of Visual Comet Observing Techniques -- I," by C. S. Morris, 1980, ICQ Vol. 2, pp. 69ff). A letter is designated for the various methods, placed in a column after "R" (the reference used for the estimate): B = Bobrovnikoff; E = Beyer; M = Morris; S = Sidgwick or In-Out. In addition, we have added the letter "O" to indicate that the observer mentioned that he used an extrafocal or "out-of-focus" method; however, we do urge that observers be more specific and indicate the method from those 4 listed above. Thus, with the initiation of this new column in our tabulations, we also urge that observers indicate on their observing forms which method they use for each observation.

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NEW ADDITIONS TO THE OBSERVER KEY:

ARM		J. ARMSTRONG, GA, U.S.A.
FUL		M. FULLE, ITALY
HIL01	10	R. HILLEBRECHT, WEST GERMANY
WEL		G. WELCH, NEW ZEALAND
WIS	10	L. WISOTZKI, WEST GERMANY

NEW ADDITIONS TO THE REFERENCE KEY:

G = Groombridge
Q = Falkauer Atlas
U = McCormick Photovisual Sequence

Comet Kobayashi-Berger-Milon (1975 IX = 1975h)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 01.06	4.6	Y	B	3.5	B		7	25	3			SMI
1975 08 01.06	4.6	Y	S	3.5	B		7	25	3			SMI
1975 08 01.07	3.8	X		5.0	B		10	&30	9	0.25	90	MAT02
1975 08 01.08				15.2	L	7	28	& 7	5	&0.05	90	MCC01
1975 08 01.08	4.8	Z		2.5	R		6	&13	5/			ADA
1975 08 01.11	6	:		1.0	B		7	15	6			HUL
1975 08 01.13	4.6	X		3.5	B		7		1			STE02
1975 08 01.17	4.3	:S		5.0	B		7	18	3	0.18		ROB
1975 08 01.21		P								0.50	90	MIN
1975 08 01.21	4.7	S		5.0	B		7	10	1/	0.17	90	MIN
1975 08 01.24	4.6	K	B	3.5	B		7	6.8	4	&0.27	95	WAL
1975 08 01.51 *				25.0	R	15			5			BOR
1975 08 01.51 *	4.7	O	E	5.0	B		10	14		2.33	90	BOR
1975 08 01.59	4.7	X	S	4.0	B		8		0			DES
1975 08 01.89	4.5	Y	O	7.0	B		20	20	5			LUK
1975 08 02.06	4.0	X		5.0	B		10	20	9	&0.33	85	MAT02

Comet Kobayashi-Berger-Milon (1975 IX = 1975h) Cont.

DATE (UT)		MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 02.06		4.6	Y	B	3.5	B		7	&25	3			SMI
1975 08 02.06		4.6	Y	S	3.5	B		7	&25	3			SMI
1975 08 02.08		5.3	Z		2.5	R		6	7	5/	0.36	333	ADA
1975 08 02.08		4.8	S		3.5	B		7					OME
1975 08 02.09					15.2	L	7	56	& 6	4			MCC01
1975 08 02.13		4.9	X	O	5.0	B		7					KOH
1975 08 02.19		4.7	Y	O	5.0	B		7					MIN
1975 08 02.19			P		12.7	C	10		7	2/	0.37	85	MIN
1975 08 02.2		5.1	X		5.0	B		7	9	4/	2	95	WEI
1975 08 02.22		4.5	K	B	3.5	B		7					WAL
1975 08 02.52	*	4.8	O	E	5.0	B		10	15	6	1.75	90	BOR
1975 08 02.88		4.6	Y		7.0	B		20	18	4			LUK
1975 08 02.9					8.0	B		11	8		&0.26	80	MUH
1975 08 02.9		4.8	K	B	3.5	B		8					MUH
1975 08 03.07		3.8	X		5.0	B		10	25	9	0.33	80	MAT02
1975 08 03.07		4.9	X		3.5	B		7		1			STE02
1975 08 03.11		5.0	X	O	5.0	B		7		&1		90	KOH
1975 08 03.15		4.7	Y	B	3.5	B		7	&25	3			SMI
1975 08 03.15		4.6	Y	S	3.5	B		7					SMI
1975 08 03.16		4.9	K		3.5	B		6		7			SIM
1975 08 03.20			P		12.7	C			7	2/	0.13	80	MIN
1975 08 03.20		4.5:	Y		5.0	B		7					MIN
1975 08 03.55	*	4.9	O	E	5.0	B		10	10	6	2.33	80	BOR
1975 08 03.59		4.4:	X	S	4.0	B		8		0			DES
1975 08 03.88		4.8	K	B	4.0	B		8	6		0.25	83	MUH
1975 08 03.90		4.5	Y	O	7.0	B		20	22	4	0.25	245	LUK
1975 08 04.12		4.7	K		5.0	B		7					SIM
1975 08 04.2		4.0	K			E							WAL
1975 08 04.2					3.5	B		7			2	81	WAL
1975 08 04.2					11.0	L	10	40	11.8	4/	1.67	81	WAL
1975 08 04.20		4.5:	Y		5.0	B		7					MIN
1975 08 04.20			P		12.7	C	10		5.5	3/	0.50	77	MIN
1975 08 04.89		4.5	Y	O	7.0	B		20	20	4			LUK
1975 08 05.13					3.5	B		7		5	1	45	STE01
1975 08 05.22		5.4	E		15.0	L	17						MIN
1975 08 05.22		5.1	X		5.0	B		7					MIN
1975 08 05.22			P		12.7	C	10		5	4/			MIN
1975 08 05.89		4.6	Y	O	7.0	B		20	25	3	0.67	240	LUK
1975 08 06.05		5.0	K		5.0	B		7					SIM
1975 08 06.06		4.5	Y	B	3.5	B		7	18				SMI
1975 08 06.06					15.2	L	8	28	23	4	&0.18	70	SMI
1975 08 06.06		4.5	Y	S	3.5	B		7					SMI
1975 08 06.10		4.8	Z		3.5	B		7					MIL
1975 08 06.19		5.0	E		15.0		17						MIN
1975 08 06.19			P		12.7	C	10		6	5	0.63	68	MIN
1975 08 06.19		4.8	Y		5.0	B		7					MIN
1975 08 06.86		4.5	Y		7.0	B		20	25	5	1	220	LUK
1975 08 07.15		4.2	Z		3.5	B		7			&0.5		WES
1975 08 07.17		4.9:	X	O	5.0	B		7			&2	80	KOH
1975 08 07.19		4.7	X		3.5	B		7			1.5		MIL
1975 08 07.2			P		12.7	C			6.0	4	0.63	70	MIN

Comet Kobayashi-Berger-Milon (1975 IX = 1975h) Cont.

DATE (UT)		MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 07.2		5.7	X		5.0	B		7					MIN
1975 08 07.2		5.0	X	O	5.0	B		7	9	3/	4.5	80	WEI
1975 08 07.2		5.7	E		15.2	L	17						MIN
1975 08 07.58		4.5:	X	S	4.0	B		8		0			DES
1975 08 08.17		4.8	X		5.0	B		7					MIN
1975 08 08.17			P		12.7	C			6	4	0.63	65	MIN
1975 08 08.2		5.2	X	O	5.0	B		7	10	3/	4	80	WEI
1975 08 08.88		3.9	Y		7.0	B		20	20	5	0.67	260	LUK
1975 08 09.06		3.5	X		5.0	B		20	25	9	0.50	65	MAT02
1975 08 09.07		4.6	O			E							MAL02
1975 08 09.07		4.8	K	O	5.0	B		7					MCC01
1975 08 09.07					15.2	L	7	56	& 6	6	0.42	75	MCC01
1975 08 09.07	*	4.7	O	E	5.0	B		10	9		4.25	70	BOR
1975 08 09.07	*				25.0	L				5/			BOR
1975 08 09.07		5.3	A	O	2.5	R		6		3			ADA
1975 08 09.09		5.2	K		5.0	R				0			COS
1975 08 09.10		4.5:			20.3	C			23	9	0.67	100	ARP
1975 08 09.10		4.9	X	O	5.0	B		7			&2.75	80	KOH
1975 08 09.11		4.6	L	B	15.2	R	15	36	10.6	3/	0.50	85	PAT
1975 08 09.88		4.7	K	B	4.0	B		8	&13		0.42	60	MUH
1975 08 10.06		4.9	A	O	2.5	R		6	4.5	6			ADA
1975 08 10.06		3.4	X		5.0	B		20	25	9	0.50	65	MAT02
1975 08 10.07		4.9	X	O	5.0	B		7	& 7	6	0.17	70	MCC01
1975 08 10.07		4.7	Y	S	3.5	B							SMI
1975 08 10.07		4.8	Y	B	3.5	B		7	&15	4			SMI
1975 08 10.08	*	4.8	O	E	5.0	B		10	9		4.75	67	BOR
1975 08 10.08	*				32.0	L				6			BOR
1975 08 10.08					20.3	C			23	9	4	100	ARP
1975 08 10.10		4.8	L	B	6.0	R	15	36	7	3/	0.33	65	PAT
1975 08 10.18		4.7	X		3.5	B		7			1		MIL
1975 08 10.87		3.7	Y		7.0	B		20	25	6	1.33	270	LUK
1975 08 11.06					10.8	L	15		9	8	1.5	105	SIM
1975 08 11.06		5.1	K		5.0	B		7					SIM
1975 08 11.16		4.7:	S		5.0	B		7	15	4	0.33		ROB
1975 08 12.06		5.1	K		5.0	B		7					SIM
1975 08 12.08		4.7	X	O	5.0	B		7			&1	80	KOH
1975 08 13.05		4.8	Y	B	3.5	B		7	&15	4			SMI
1975 08 13.06		5.1	K		5.0	B		7					SIM
1975 08 14.18		5.0:	S		5.0	B		7	17	6	0.45		ROB
1975 08 15.05		4.8	Y	B	3.5	B		7	&18	4	&0.25	65	SMI
1975 08 15.05		4.8	Y	S	3.5	B		7	&18	4	&0.25	65	SMI
1975 08 15.08		4.6	S		3.5	B		7					OME
1975 08 15.17		4.6:	S		5.0	B		7	18	6	0.58		ROB
1975 08 15.20		4.8:	S		5.0	B		7	15	5	0.55		ROB
1975 08 16.16		4.8	K		3.5	B		7					OHA
1975 08 16.16					6.1	R	15	35	&10	7			OHA
1975 08 16.84		4.6	K	B	3.5	B		8					MUH
1975 08 16.84					8.0	B		11	& 5		0.50		MUH
1975 08 17.2		4.7	K	O	31.2	L	6		&10	7	0.42	30	OHA
1975 08 18.16		4.7	K	O	3.5	B		7	&10	6			OHA
1975 08 19.03		5.0			3.5	B		7					MIL
1975 08 19.04		4.7	Y	S	3.5	B		7					SMI

Comet Kobayashi-Berger-Milon (1975 IX = 1975h) Cont.

DATE (UT)		MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 19.04		4.7	Y	B	3.5	B		7	&14	5/	0.50	45	SMI
1975 08 19.07	*	4.7	O	E	5.0	B		10			2.00	46	BOR
1975 08 19.07	*				32.0	L	6		2.4	6/			BOR
1975 08 19.08		4.4	S		3.5	B		7					OME
1975 08 19.2		4.6	K	O	3.5	B		7		8			OHA
1975 08 20.05					10.0	R	15			4	&1		POR
1975 08 20.05		4.8	K		3.5	B		7					POR
1975 08 20.09	*	4.7	O	E	5.0	B		10	& 5	7	&1	48	BOR
1975 08 21.04					22.9	R		150		6			OME
1975 08 21.04		4.5	S		3.5	B		7					OME
1975 08 21.05		4.9	K		3.5	B		7					POR
1975 08 21.08		4.4	S		3.5	B		7					OME
1975 08 23.03					5.0	B		20	25	9	0.50	40	MAT02
1975 08 23.04		4.2	S		3.5	B		7					OME
1975 08 23.06	*				32.0	L	6		1.7	6/			BOR
1975 08 23.06	*	4.7	O	E	5.0	B		10	2.2		1.25	38	BOR
1975 08 23.07		4.6	Y	B	3.5	B		7	15	5		40	SMI
1975 08 24.08		4.5	Y	B	3.5	B		7	15	5			SMI
1975 08 24.12		4.6	K	B	3.5	B		7	& 2	7/		30	WAL
1975 08 25.06		4.8:	X		5.0	B		7			&2	45	KOH
1975 08 25.15		4.5	K	B	3.5	B		7	& 2	7/	0.50	25	WAL
1975 08 26.13		4.8	Y		5.0	B		7	3	6			MIN
1975 08 26.13		4.7	E		15.2		17						MIN
1975 08 27.13		4.9	X	O	5.0	B		7	4	4	5.5	55	WEI
1975 08 28.04	*				32.0	L	6		2.4	6/			BOR
1975 08 28.04	*				8.0	B		15	2.4				BOR
1975 08 28.04	*	4.7	O	E	5.0	B		10	2.7		7.50	28	BOR
1975 08 28.05					15.2	L	7		& 2.5	8	&0.29	10	MCC01
1975 08 28.06					12.7	R	5	17		7	&5.75	31	SAB
1975 08 28.06		6.3	S		3.5	B		7		3	0.75	12	POR
1975 08 29.06					12.7	R	5	17		7	&4.75	24	SAB
1975 09 04.02	*	4.8	O	S	5.0	B		10					BOR
1975 09 04.02	*				8.0	B		15	& 1	7			BOR
1975 09 11.40	*	4.9	O	S	8.0	B		15	& 2				BOR
1975 09 13.40	*	4.9	O	S	5.0	B		10	& 2	7	&0.17	340	BOR
1975 09 14.40	*	5.1	O	S	5.0	B		10	1.5	7			BOR
1975 09 14.40	*				12.0	B		20	1.0	7	1	320	BOR
1975 09 14.42		5.6	Y	B	5.0	B		12	& 7.5	5	0.33	328	GRE
1975 09 15.39	*	5.0	O	S	5.0	B		10					BOR
1975 09 15.39	*				8.0	B		15	1.3	7	1	320	BOR
1975 09 29.40	*				8.0	B		15	2.0				BOR
1975 09 29.40	*	6.4	O	S	5.0	B		10					BOR
1975 10 03.41	*	7.1	O		8.0	B		15	1.5	5			BOR
1975 10 04.40	*	6.9	O	S	5.0	B		10					BOR
1975 10 04.40	*				15.0	L	4			5/			BOR
1975 10 04.40	*				8.0	B		15	2.0				BOR
1975 10 05.40		7.1	S		3.5	B		7					MIL
1975 10 07.40	*	7.1	O	S	5.0	B		10					BOR
1975 10 08.41	*	6.9	O	S	5.0	B		10	1.8				BOR
1975 10 13.43					20.3	L	6		& 8	3/	0.33	355	GRE
1975 10 13.43		7.0	A	B	5.0	B		12					GRE
1975 10 14.42		7.4	A	B	5.0	B		12		3/			GRE

Comet Suzuki-Saigusa-Mori (1975 X = 1975k)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 10 07.41	8.5	A	S	15.0	L	4	24	2.7	4			MOR
1975 10 08.34				32.0	L	6		3.0	4	&0.25	270	BOR
1975 10 08.34	8.2	U	S	5.0	B		10	3.0				BOR
1975 10 11.43	8.2	A	S	15.0	L	4	24					MOR
1975 10 11.43	8.3	A	B	15.0	L	4	24					MOR
1975 10 11.43	8.1	A	B	5.2	R		8					MOR
1975 10 11.43	8.1	A	S	5.2	R		8	4.5	6			MOR
1975 10 12.40	7.8	O	S	5.0	B		10	5.3				BOR
1975 10 12.43	8.3	A	S	15.0	L	4	24	5.2	6			MOR
1975 10 12.43	8.2	A	B	5.2	R		8					MOR
1975 10 12.43	8.3	A	B	15.0	L	4	24					MOR
1975 10 12.43	8.2	A	S	5.2	R		8					MOR
1975 10 14.39	7.5	A	B	5.0	B		12					GRE
1975 10 14.39				20.3	L	6	43	9	1/	0.08	310	GRE
1975 10 15.46	8.2			25.4	L	8	50	3				TRU
1975 10 21.37	6.5	X		5.0	B		20	& 5.5	7			MAT02
1975 10 21.40				32.0	L	6	55	& 3	3/			BOR
1975 10 21.40	7.0	O	S	5.0	B		10	& 9				BOR
1975 10 22.39				8.0	B		15	7				BOR
1975 10 22.39				32.0	L	6		& 4	3			BOR
1975 10 22.39	6.8	O	S	5.0	B		10	& 7.5				BOR
1975 10 23.38	7.2	S		15.0	L	8			0			POR
1975 10 23.39	6.8	O	S	5.0	B		10	8				BOR
1975 10 23.39				12.0	B		20	& 7.5				BOR
1975 10 23.39				32.0	L	6	55	5	3			BOR
1975 10 23.45	7.0	G		11.0	L	10	40	6	0			WAL
1975 10 24.40	6.5	S		15.0	L	8	45		0/	1.3	334	POR
1975 10 24.52	6.8			5.0	B		10					TRU
1975 10 26.47	5.9	K	B	3.5	B		7	& 8				WAL
1975 10 26.47				11.0	L	10	40	6	0			WAL
1975 10 27.48	5.8	K	B	3.5	B		7	10	0			WAL
1975 10 28.41	5.5	O	S	5.0	B		10	12				BOR
1975 10 28.41				12.0	B		20	10	4	&0.75		BOR
1975 10 28.49	5.9	K		3.5	B		7	&11				WAL
1975 10 28.49				11.0	L	10	40	7				WAL
1975 10 28.53	8.0:			25.0	L		43	& 3		&0.1	90	COM01
1975 10 29.51	5.5	K		3.5	B		7	&11				WAL
1975 11 04.44	6.5			8.0	B		14	14				BOE
1975 11 06.47	5.9:	S		20.3	L			10				BOE
1975 11 08.45	6.2	S		8.0	B		14	11				BOE
1975 11 09.49				20.3	L			7				BOE
1975 11 21.44	8.8	S		20.3	L			6				BOE
1975 11 22.45	8.8	S		20.3	L			6				BOE

Comet Kohler (1977 XIV = 1977m)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1977 09 20.14	8.9	S		7.5	R		45		3			MOR02
1977 09 25.14	8.6	S		7.5	R		45		4			MOR02
1977 10 01.08	8.5	S		7.5	R		35			0.07	350	MOR02
1977 10 09.10	8.4	S		7.5	R		35		5			MOR02
1977 10 16.05	8.0	B		7.5	R		35	17	5			MOR02

Comet Kohler (1977 XIV = 1977m) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1977 10 25.14	7.4	B		5.0	B		7		4			MOR02
1977 10 29.07	7.2	B		5.0	B		7					MOR02
1977 11 01.70	7.3			22	L		51			0.15		ANA
1977 11 01.74	8.0:			5.0	B		7					NIG
1977 11 02.70	8.0:			5.0	B		7					NIG
1977 11 02.98				32	L	6	65			0.30	0	BOR
1977 11 02.98				32	L	6	65	4.4	6	0.60	60	BOR
1977 11 02.98	6.9			5.0	B		10	6.6	6			BOR
1977 11 03.72	7.3			23	L		51					ANA
1977 11 03.76	6.9	V		15	L		67	6	7	0.13	60	SHA02
1977 11 03.76	6.5			8.0	B		15	6	3			PAN
1977 11 03.76	6.9			12	R		70	6	7			RID
1977 11 03.77	6.5			8.0	B		24					TAY
1977 11 03.79	6.4			15	L	4	24	4	5/			KEI
1977 11 03.79	6.2			5.0	B		10	9.5	5/			KEI
1977 11 03.81	6.3			5.0	B		10	20	8			HUR
1977 11 03.83	6.7:			5.0	B		10 &	4	4/			DOH
1977 11 04.06	6.9	B		5.0	B		7	10				MOR02
1977 11 05.71	7.3			22	L		51		7/			ANA
1977 11 06.40	6.9			4.0	R							JON
1977 11 06.72	8	:		5.0	B		7		5			NIG
1977 11 06.75	7	:		16	L		50	3.0	5			LEM
1977 11 06.76	6.8			5.0	B		7	5	5			FRY
1977 11 06.76	7.2			7.0	R		68	5	5			FRY
1977 11 06.77	7.3			5.0	B		7 &	7	6	0.25	50	SHA02
1977 11 06.77	6.4			5.0	B		10					HUR
1977 11 06.78	7.0			12	R		70	6	5			RID
1977 11 06.81	7.1			5.0	B		10 &	5	3			KEI
1977 11 06.82	6.7			8.0	B		11	3.0	5			PAN
1977 11 07.71	7.3			22	L		51					ANA
1977 11 07.76	6.5			5	B		10	6.0	6	0.75	265	DOH
1977 11 07.77	7.8	S		22	L		60	4.0	7			STU
1977 11 08.74	8.2:			5.0	B		7 &	2.5		0.01		NIG
1977 11 08.77	7	:		16	L		50	2.7	6			LEM
1977 11 08.77	7.4	S		22	L		60	4.5	6			STU
1977 11 09.39	7.4	S		4.0	R				6			JON
1977 11 09.77	7.0			16	L		50	2.5	7			LEM
1977 11 09.79	8.2:			5.0	B		7					NIG
1977 11 11.97				32	L	6	55			0.30	45	BOR
1977 11 11.97	6.7	O		5.0	B		10	7.9	7			BOR
1977 11 11.97				32	L	6	55	5.3	6	0.60	340	BOR
1977 11 12.00	6.7	B		5.0	B		7	10				MOR02
1977 11 12.74	7.0	S		12	R		70	5	7			RID
1977 11 12.74	6	:		8.0	B		15	6	3			KEI
1977 11 12.75	6.5	S		5.0	B		10	12		0.80	50	HUR
1977 11 12.76	8.2:			5.0	B		7					NIG
1977 11 12.76	6.9			8.0	B		11	5	7			PAN
1977 11 12.77	6.6	S		6.0	B		13	8	7			HEN
1977 11 13.74	8.2:			5.0	B		7					NIG
1977 11 14.41	7.1	S		4.0	R				6			JON
1977 11 14.75	7.2	S		5.0	B		7	7	5			SHA02
1977 11 14.78	7.2	S		12	R		70	5	7			RID

Comet Kohler (1977 XIV = 1977m) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1977 11 14.97				32	L	6	65			0.40	45	BOR
1977 11 14.97	6.9	O		5.0	B		10	6.0	6			BOR
1977 11 14.97				32	L	6	65	4.0	6	0.75	355	BOR
1977 11 15.76	6.3			5.0	B		10		3/			KEI
1977 11 16.41	7.3	S		4.0	R							JON
1977 11 16.73	8.2:			5.0	B		7					NIG
1977 11 16.78	7.0			8.0	B		15	4	5			PAN
1977 11 17.74	7.8:			5.0	B		7					NIG
1977 11 17.79	7.1			8.0	B		15	5	3			PAN
1977 11 18.00	6.8	B		5.0	B		7		4			MOR02
1977 11 18.71	7.8			22	L		51		2			ANA
1977 11 20.00	6.8	B		5.0	B		7	9	5	0.50	55	MOR02
1977 11 29.00	7.0	B		5.0	B		7		4			MOR02
1977 12 06.00	7.1	B		5.0	B		7	5	5			MOR02
1977 12 08.00	6.8	B		5.0	B		7	6	5			MOR02

Comet Bradfield (1978 VII = 1978c)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 02 04.76	8 :											BRA01
1978 02 05.75	7 :											TRE
1978 02 11.57	7.9	S		20.0	L	7	50	3				NIK
1978 02 20.63	7.1			30.0	L	7	36	4		0.33	218	COO
1978 02 20.66	6.9	S		30.0	L	7	96	3		0.33	224	MUN
1978 02 21.71	6.6			6.0	B		8	3				WEL
1978 02 21.71				40.7	L	9	144			0.13	240	WEL
1978 02 25.66	6.6	S		11.5	L		36	3		0.33	225	MUN
1978 03 04.66	5.9	S		5.0	B		50	4		0.42	235	COO
1978 03 04.69	6.0	S		30.0	L	7	96	4		0.42	235	MUN
1978 03 04.71	5.0			40.7	L	9	144	& 2.5		0.13	240	WEL

Comet Seargent (1978 XV = 1978m)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 12 01.50	10.0:	S		20.3	L			5		?		BOE
1978 12 03.52				20.3	L			7				BOE
1978 12 05.60				20.3	L			& 6				BOE
1978 12 06.48	11.0			20.3	L							BOE
1978 12 22.52	12.5:			20.3	L							BOE
1978 12 26.51	13.0			20.3	L							BOE

Comet Bradfield (1979 VII = 1979c)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1979 06 27.28	8.8	S		20.0	L			& 4.5				NIK

Comet Černis-Petrauskis (1980k)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 08 31.19	12.6			25.0	L	4	36	1.5	3			MAC
1980 09 05.06	12	:P						1.0				BEL01
1980 09 07.20	12.9			25.0	L	4	36	1.5	3			MAC

Comet Meier (1980q)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 06.11	10.5:			40.6	L	5	56	& 2.5				MEI
1980 11 07.14	10.6	S		15.0	L		75	2	2			MAC
1980 11 08.00	9.6	A		32.0	L	6	55	3.4	2			BOR
1980 11 08.98	9.6	A		32.0	L	6	55	2.8	2/			BOR
1980 11 09.14	10.6	S		15.0	L		75	2	2			MAC
1980 11 09.37	10.3			12.0	L		33	2				SAK
1980 11 09.40	10 :			12.0	L		50	3	2			SAK
1980 11 10.41	10.2			12.0	L		33	2				SAK
1980 11 11.40	10.5			12.0	L		33	3	3			SAK
1980 11 13.42	10.5			12.0	L		50	3	3			SAK
1980 11 14.44	10.5			12.0	L		33	2				SAK
1980 11 15.02	9.8	B		7.5	R		45					MOR02
1980 11 15.38	9.7			12.0	L		33	3	2			SAK
1980 11 16.02	9.9	B		7.5	R		45					MOR02
1980 11 16.98	9.6	A	S	25.0	L	7	70	3	2			MOR
1980 11 17.44	9.8			12.0	L		33	2	3			SAK
1980 11 18.01	9.8	S		7.5	R		45		3			MOR02
1980 11 18.43	10 :			12.0	L		33	2				SAK
1980 11 19.42	10.7			12.0	L		33	2				SAK
1980 11 21.07	10.0	S		7.5	R		56		3			MOR02
1980 11 26.40	9.9			12.0	L		50	3	3			SAK
1980 11 27.03	9.6	A		32.0	L	6	55	2.6	0/			BOR
1980 11 29.35	10.2			12.0	L		50	3	2			SAK
1980 11 30.98	9.5	A	S	25.0	L	7	70	2.5	4			MOR
1980 12 01.37	10.5			12.0	L		33	2				SAK
1980 12 04.38	10.4			12.0	L		50	3	3			SAK
1980 12 04.74	9.7	A		25.4	L	4	79	2.8	3			CAV
1980 12 06.74	9.6	Q		7.0	R		36	3	1			FUL
1980 12 07.75	9.6	Q		7.0	R		36	5	1			FUL
1980 12 08.72	9.4	Q		7.0	R		36	3	2			FUL

Comet Bradfield (1980t)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 19.72	5.6	S		8.0	B		15	& 1	8	&0.16	255	SEA
1980 12 24.73	4.6	S		8.0	B		15					SEA
1980 12 25.74	3.7	S		8.0	B		15					SEA
1980 12 26.75	3.7	S		8.0	B		15					SEA
1981 01 04.97	3.5			7.0	B		10			0.75	45	ARM
1981 01 05.71	4.0			8.0	B		20			0.3	45	SHE
1981 01 05.93	4.4	Y	B	8.0	B		20		9	&1	40	GRE
1981 01 05.93	4 :			22.9	R		120	4	9	&1		OME
1981 01 05.94					E					&2		OME
1981 01 05.94	4.2			8.0	B		11			&1		COL
1981 01 05.95	3.9	O		5.0	B		10	1.5	8	3.50	35	BOR
1981 01 05.95	4.1	Y	B	8.0	B		20		9	3.50		MOR
1981 01 08.01	4.1			5.0	B		10			3.7	80	SHE
1981 01 08.94	5.2		O	5.0	B		10		7	1.33	29	MEN
1981 01 08.95	4.7	A	B	8.0	B		20		9	&1.75	30	GRE
1981 01 08.95	4.5	A	B	5.0	B		12		9	4.00	35	MOR
1981 01 08.95	4.6	A	B	8.0	B		20	& 2.5	9	3.50		MOR
1981 01 08.95	4.3	O		5.0	B		10	3.5	8	5.00	32	BOR
1981 01 10.93	5.8		O	5.0	B		10		9	1.00	24	MEN
1981 01 10.95	5.3	A	B	8.0	B		20			&0.67	20	GRE

Comet Bradfield (1980t) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 10.95	5.4	A	B	8.0	B		20	& 3.0	9	1.00	20	MOR
1981 01 10.96	5.2	O		5.0	B		10	2.9	7	3.10	35	BOR
1981 01 11.95	5.5	A	B	8.0	B		20	& 3	9	&3.7	33	GRE
1981 01 11.95	5.5	A	B	8.0	B		20		9	3.50	33	MOR
1981 01 11.96	5.1:			5.0	B		10			4	33	OME
1981 01 11.96	5.3	A	B	5.0	B		12		9	4.00	33	MOR
1981 01 12.95				20.3	L	6	48		7		25	GRE
1981 01 12.96	5.6:	A	B	8.0	B		20		9	&3.5	25	GRE
1981 01 12.96	5.6	A	B	8.0	B		20	& 2.5	9	4.20	30	MOR
1981 01 12.96	5.4	A	B	5.0	B		12		9	4.20	30	MOR
1981 01 12.96	5.1:			5.0	B		10			4	30	OME
1981 01 13.95	4.7	K		8.0	B		11	& 2.75				COL
1981 01 13.95	4.6	A	B	8.0	B		20	& 2	9	&3	38	GRE
1981 01 13.95	4.8:			5.0	B		10					OME
1981 01 13.96	4.4	A	B	8.0	B		20	& 2.5	9	3.00	35	MOR
1981 01 14.06				13.0	R						45	MAL
1981 01 14.06	5.0			3.5	B		7			3.5		MAL
1981 01 15.03	5.2			3.5	B		7			2.8		MAL
1981 01 15.03				13.0	R			2.4			42	MAL
1981 01 19.96	6.2	A	B	8.0	B		20		7	&0.5	35	GRE
1981 01 20.95	6.3	A	B	8.0	B		20		7	&1.5	35	GRE
1981 01 21.96	6.5	A	B	8.0	B		20		5	&1	35	GRE

Comet Panther (1980u)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 02.96	9.3			22.9	R			& 2.5				OME
1981 01 04.96	9.6:			22.9	R							OME
1981 01 05.98	9.3			22.9	R			2.5		&0.17	0	OME
1981 01 08.98	9.3	A		32.0	L	6	55	2.4	5			BOR
1980 12 27.98	9.7:	A	S	25.0	L	7	70	2.5	3			MOR
1980 12 30.96	9.3	A	M	25.0	L	7	70	3	6			MOR
1981 01 08.98	9.0	S	S	25.0	L	7	70	& 3.5	3			MOR

Periodic Comet Encke

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 10 07.47	9.4	S		25.0	L	4	36	8	0			MAC
1980 10 08.47	9.2	S		25.0	L	4	36	8	0			MAC
1980 10 10.89	11.2											HIL
1980 10 18.34	8.8	S		25.0	L	4	36	10	1			MAC
1980 10 19.15	8.9	Q		7.0	R		22	8	0			FUL
1980 10 20.17	8.5	Q		7.0	R		22	12	1	0.07	130	FUL
1980 10 21.15	8.5	Q		7.0	R		22	12	0	0.67	330	FUL
1980 10 22.15	8.5			15.0	L			7				FIL01
1980 10 22.17				7.0	R		22			0.05	155	FUL
1980 10 22.17	8.3	Q		7.0	R		22	10	1	0.10	10	FUL
1980 10 27.15	8.5:	S		8.0	B		20	& 2	1			GLI
1980 10 27.16	7.8	Q		7.0	R		22	5	1			FUL
1980 10 27.75	8.1			15.0	L			3				FIL01
1980 10 29.11	8.0	S		8.0	B		20	6	1/			GLI
1980 11 01.19	7.5	S		8.0	B		20	6	2/			GLI
1980 11 02.19	7.6	S		8.0	B		20	8	3			GLI

Periodic Comet Encke (Cont.)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 03.21	6.9	S		8.0	B		20	7	2/			GLI
1980 11 03.39				32.0	L	6	55		4	0.50	260	BOR
1980 11 03.39	6.6	O		5.0	B		10	11				BOR
1980 11 06.41	6.6	O		5.0	B		10	10				BOR
1980 11 09.39	6.8	O		5.0	B		10	5.5	4			BOR
1980 11 09.55	7.0	S	S	25.0	L	4	36	8	6			MAC
1980 11 09.55	7.4		B	25.0	L	4	36					MAC
1980 11 09.55	7.1		M	25.0	L	4	36					MAC
1980 11 10.21	7.0:	S		8.0	B		20	& 5	4			GLI
1980 11 10.55	7.0	S		25.0	L	4	36	8	6			MAC
1980 11 13.42	6.5	O		5.0	B		10	7				BOR
1980 11 14.20	6.8	Q		7.0	R		22	10	2	0.5	270	FUL
1980 11 14.20				7.0	R		22		2	320		FUL
1980 11 15.42	6.6:	A	S	8.0	B		20	& 4	7/			MOR
1980 11 16.42	6.7	A	S	8.0	B		20	& 3	8			MOR
1980 11 17.42	6.5	O		5.0	B		10	3.4	5			BOR
1980 11 17.43	6.7:	A	S	8.0	B		20		8/			MOR
1980 11 19.22	7.0	S		8.0	B		20	2	6			GLI
1980 11 19.22	7.0	Q		7.0	R		22	2	4			FUL
1980 11 19.43	6.7	O		5.0	B		10	2.6	5			BOR
1980 11 19.43	6.7	S	S	8.0	B		20					MOR
1980 11 20.20	6.8	S		8.0	B		20	3.5	6	0.23	320	CAV
1980 11 26.44	6.7	S		5.0	B		10	1.7	6/			BOR

Periodic Comet Schwassmann-Wachmann 3 (1979 VIII = 1979g)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1979 09 25.33	12.6	V		31.7	L							JON

Periodic Comet Schwassmann-Wachmann 2 (1979k)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 11.13	12.1	A		32.0	L	6	68	0.8	4			BOR

Periodic Comet Wild 2 (1978 XI = 1978b)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 04 01.53	12.5			20.3	L							BOE
1978 04 03.55	12.5			20.3	L			& 3.5				BOE
1978 04 05.54	12.3			20.3	L							BOE
1978 04 21.07	11.0	S		32.0	L		70		4			MOR02
1978 04 23.07	10.9	S		32.0	L		70				35	MOR02
1978 04 26.51	12.0			20.3	L			2				BOE
1978 04 27.51	12.0			20.3	L			2				BOE
1978 04 28.53	12.0			20.3	L			2				BOE
1978 04 29.49	11.8			20.3	L			2				BOE
1978 04 30.06	11.0	S		32.0	L		70	2.5	4		40	MOR02
1978 05 01.54	11.7			20.3	L			3				BOE
1978 05 02.50	11.7			20.3	L			3				BOE
1978 05 03.50	11.7			20.3	L			3				BOE
1978 05 04.50	11.7			20.3	L			3				BOE
1978 05 05.11	10.9	S		32.0	L		70					MOR02

Periodic Comet Wild 2 (1978 XI = 1978b) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 05 07.49				20.3	L			3				BOE
1978 05 09.57	11.6			20.3	L			& 3.5				BOE
1978 05 11.50	11.5			20.3	L							BOE
1978 05 16.10	10.8	S		32.0	L		70	1.5	4			MOR02
1978 05 17.11	10.7	S		32.0	L		56	1.4	3			MOR02
1978 05 30.11	10.5	S		32.0	L		56	1.4	3			MOR02
1978 06 02.10	10.5	S		32.0	L		56	1.0				MOR02
1978 06 04.12	10.4	B		32.0	L		56					MOR02
1978 06 29.52				20.3	L			3				BOE

Periodic Comet Denning-Fujikawa (1978 XIX = 1978n)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 10 30.41	[13.0			32.0	L	6	110					BOR

Periodic Comet Tuttle (1980h)

1980 10 07.48	10.5	S		25.0	L	4	36	3	2			MAC
1980 10 08.48	10.6	S		25.0	L	4	36	4	2			MAC
1980 10 18.46	8.9	S		25.0	L	4	36	3.5	3			MAC
1980 10 20.43	9.2	S		25.0	L	4	36	3	3			MAC
1980 10 22.19	9.0	Q		7.0	R		22	3	7			FUL
1980 11 03.40	8.3	A		8.0	B		20	5.5	4			BOR
1980 11 03.40	8.4	A		5.0	B		10					BOR
1980 11 06.42	8.1	A		5.0	B		10	6.8				BOR
1980 11 09.41	7.8	A		5.0	B		10	6.6				BOR
1980 11 09.45	8.4	S	S	25.0	L	4	36	5	3			MAC
1980 11 09.45	8.5		M	25.0	L	4	36					MAC
1980 11 09.45	8.5		B	25.0	L	4	36					MAC
1980 11 10.16	7.7	Q		7.0	R		22	10	4			FUL
1980 11 10.17	8.5	S		8.0	B		20	7	1/			GLI
1980 11 10.43	8.2	S		25.0	L	4	36	5	3			MAC
1980 11 13.41	7.7	A		5.0	B		10	7.4	3/			BOR
1980 11 14.10	8.0	Q		7.0	R		22	8	3			FUL
1980 11 15.39	7.4	A	S	8.0	B		20	9	6/			MOR
1980 11 16.40	7.3	A	S	8.0	B		20	8	6/			MOR
1980 11 17.39	7.5	A		5.0	B		10	7.8	4/			BOR
1980 11 17.41	7.3	A	S	8.0	B		20	8	6/			MOR
1980 11 18.73	8.2	S		8.0	B		15					SEA
1980 11 19.17	7.5	Q		7.0	R		22	12	3			FUL
1980 11 19.20	7.8	S		8.0	B		20	9	3			GLI
1980 11 19.39	7.2	A		5.0	B		10	9.8	4			BOR
1980 11 19.41	7.2	A	S	5.0	B		12					MOR
1980 11 19.41	7.3	A	S	8.0	B		20	8	6/			MOR
1980 11 19.47	7.8		B	25.0	L	4	36					MAC
1980 11 19.47	7.6		M	25.0	L	4	36					MAC
1980 11 19.47	7.6	S	S	25.0	L	4	36	7	5			MAC
1980 11 20.18	7.0	Q		7.0	R		22	12	3			FUL
1980 11 20.18	7.9	S		8.0	B		20	8	2			CAV
1980 11 20.41	7.1	A		5.0	B		10	8.8				BOR
1980 11 27.23	7.4:	S		8.0	B		20	& 4	2/			GLI
1980 11 30.43	6.9	O		5.0	B		10	7.2	4			BOR

Periodic Comet Tuttle (1980h) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 01.14	7.5			20.0	C							WIS
1980 12 02.20	7.0	Q		7.0	R		22	6	3	0.2	245	FUL
1980 12 03.43	7.0	O		5.0	B		10	6.5				BOR
1980 12 04.22	6.7	Q		7.0	R		22	10	2	0.2	270	FUL
1980 12 04.35	6.8:	A	S	5.0	B		12	&10	6			MOR
1980 12 04.43	6.8	O		5.0	B		10	6.0	4			BOR
1980 12 05.22	6.8	Q		7.0	R		22	8	1	0.2	290	FUL
1980 12 05.40	7.0	A	M	8.0	B		20	6	7			MOR
1980 12 05.40	6.9	A	S	5.0	B		12	8	6			MOR
1980 12 05.42	6.9	O		5.0	B		10	7.7	4			BOR
1980 12 05.42				32.0	L	6	55	4.3		0.10	280	BOR
1980 12 06.39	6.9	A	M	8.0	B		20	7	7			MOR
1980 12 06.45	7.7	S	B	25.0	L	4	36					MAC
1980 12 06.45	7.4	S	M	25.0	L	4	36					MAC
1980 12 06.45	7.3	S	S	25.0	L	4	36	8	4			MAC
1980 12 06.64	6.5	S		8.0	B		15					SEA
1980 12 07.20	6.4	Q		7.0	R		22	12	1			FUL
1980 12 07.43	6.9	O		5.0	B		10	8.8	4			BOR
1980 12 08.20	6.5	Q		7.0	R		22	8	3			FUL
1980 12 08.51	7.1	S		25.0	L	4	36	8	5			MAC
1980 12 08.64	6.3	S		2.5	B		2					SEA
1980 12 09.22	6.4	Q		7.0	R		22	7	2			FUL
1980 12 09.64	6.4	S		2.5	B		2					SEA
1980 12 10.64	6.5	S		2.5	B		2					SEA
1980 12 11.44	6.7	S		5.0	B		10	7.6	5			BOR
1980 12 11.67	6.5	S		2.5	B		2					SEA
1980 12 12.52	7.2	S		25.0	L	4	36	7	4			MAC
1980 12 12.69	6.7	S		2.5	B		2					SEA
1980 12 15.53	7.4	S		25.0	L	4	36	7	5			MAC
1980 12 24.48	7.4	S		8.0	B		15					SEA
1980 12 25.46	7.6	S		8.0	B		15					SEA
1980 12 26.46	7.8	S		8.0	B		15					SEA
1980 12 31.48	7.7	S		8.0	B		15					SEA

Periodic Comet Schwassmann-Wachmann 1 (1974 II)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1978 04 10.06	[13.0			32.0	L	6						BOR
1978 04 26.06	[12.0			32.0	L	6						BOR
1978 05 01.07	[12.5			32.0	L	6						BOR
1978 05 03.07	[12.0			32.0	L	6						BOR

Periodic Comet Stephan-Oterma (1980g)

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 10 07.46	10.3	S		25.0	L	4	36	4	4			MAC
1980 10 08.47	10.3	S		25.0	L	4	36	3	6			MAC
1980 10 18.39	9.7	S		25.0	L	4	36	4	6			MAC
1980 10 30.55	9.9	S		8.0	B		15					SEA
1980 10 31.55	10.1	S		8.0	B		15					SEA
1980 11 03.41	9.5	A		32.0	L	6	65	3.8			205	BOR
1980 11 07.81	9.6			15.0	L			4				SPR

Periodic Comet Stephan-Oterma (1980g) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 11 09.15	9.2	A		32.0	L	6	55	3.3	6			BOR
1980 11 09.15	9.1	A		8.0	B		20	3.7				BOR
1980 11 09.36	9.0	S	S	25.0	L	4	36	4	6			MAC
1980 11 09.36	9.2		M	25.0	L	4	36					MAC
1980 11 09.36	9.3		B	25.0	L	4	36					MAC
1980 11 10.42	9.2		M	25.0	L	4	36					MAC
1980 11 10.42	9.1	S	S	25.0	L	4	36	4.5	7			MAC
1980 11 10.42	9.3		B	25.0	L	4	36					MAC
1980 11 10.99	9.2	S		8.0	B		20	5	1			GLI
1980 11 11.55	9.7	S		8.0	B		15					SEA
1980 11 12.55	9.7	S		8.0	B		15					SEA
1980 11 13.75	9.5			15.0	L			5				SPR
1980 11 14.89	9.0	A		25.4	L	4	79	1.7	7		200	CAV
1980 11 15.39	8.5:	A	S	8.0	B		20	8	6			MOR
1980 11 15.40	8.8		M	25.0	L	4	36					MAC
1980 11 15.40	8.9		B	25.0	L	4	36					MAC
1980 11 15.40	8.7	S	S	25.0	L	4	36	3.5	7			MAC
1980 11 16.38	8.6	A	S	8.0	B		20	7	5			MOR
1980 11 17.39	8.8	A		8.0	B		20	2.3				BOR
1980 11 17.40	8.6	A	S	8.0	B		20	8	5			MOR
1980 11 19.18	8.8	S		8.0	B		20	6	3			GLI
1980 11 19.40	8.5	A		8.0	B		20	6.0				BOR
1980 11 19.40	8.6	A	S	8.0	B		20	6	5			MOR
1980 11 19.47	9.0		B	25.0	L	4	36					MAC
1980 11 19.47	8.8	S	S	25.0	L	4	36	3	7			MAC
1980 11 19.47	8.8		M	25.0	L	4	36					MAC
1980 11 20.16	8.8	A		8.0	B		20	4	5			CAV
1980 11 27.06				32.0	L	6	55	2.6	6	0.16	250	BOR
1980 11 27.58	9.4	S		8.0	B		15					SEA
1980 11 30.95	9.0			20.0	C							WIS
1980 12 02.05	8.8:			8.0	B		20 &	5	3			GLI
1980 12 02.21	8.3:	A	S	8.0	B		20 &	7	5			MOR
1980 12 03.93	8.6	A		25.4	L	4	79	3				CAV
1980 12 04.11	8.4	A		8.0	B		20	4.7	6			BOR
1980 12 05.09	8.4	A	S	8.0	B		20	7	5			MOR
1980 12 05.15	8.4	A		8.0	B		20	4.7				BOR
1980 12 05.51	8.9	S		8.0	B		15					SEA
1980 12 06.10	8.7	A	M	25.0	L	7	70	2	7	0.13	240	MOR
1980 12 06.15	8.4	A		8.0	B		20	4.7	7			BOR
1980 12 06.39	8.4	S	S	25.0	L	4	36	5	5			MAC
1980 12 06.39	8.7	S	B	25.0	L	4	36					MAC
1980 12 06.39	8.5	S	M	25.0	L	4	36					MAC
1980 12 06.56	8.8	A		8.0	B		15					SEA
1980 12 07.33	8.7	S	S	25.0	L	4	36	4	6			MAC
1980 12 07.33	8.8	S	B	25.0	L	4	36					MAC
1980 12 07.33	8.8	S	M	25.0	L	4	36					MAC
1980 12 11.55	8.9	A		8.0	B		15					SEA
1980 12 11.99	8.8	A	M	25.0	L	7	70	2	7			MOR
1980 12 12.42	8.6	S	S	25.0	L	4	36	5	6			MAC
1980 12 12.42	8.8	S	M	25.0	L	4	36					MAC
1980 12 12.42	9.0	S	B	25.0	L	4	36					MAC
1980 12 13.42	8.8	A	M	25.0	L	7	70	2	6/			MOR

Periodic Comet Stephan-Oterma (1980g) Cont.

DATE (UT)	MAG.	R	MM	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 14.16	8.4	A		8.0	B		20	4.0	6	0.10	225	BOR
1980 12 14.36	8.8	A	M	25.0	L	7	70	2	6/	0.05	220	MOR
1980 12 15.20	8.4	A	S	8.0	B		20	4	5			MOR
1980 12 15.22	8.5	A	M	25.0	L	7	70	& 3.5	7	0.05	230	MOR
1980 12 15.44	8.7	S	M	25.0	L	4	36					MAC
1980 12 15.44	8.4	S	S	25.0	L	4	36					MAC
1980 12 15.44	8.9	S	B	25.0	L	4	36	5	7			MAC
1980 12 26.06	8.7	A	S	8.0	B		20					MOR
1980 12 26.07	8.9	A	M	25.0	L	7	70	2	7	0.16	165	MOR
1980 12 28.00	8.9	A	M	25.0	L	7	70	2	5	0.03	180	MOR
1980 12 30.99	9.1	A	M	25.0	L	7	70	2.3	4/			MOR
1981 01 01.27	9.0	A	M	25.0	L	7	70	2.0	5			MOR
1981 01 01.89	9.6	A		25.0	L	4	79	2.8	9			CAV
1981 01 04.23	9.3	A	S	25.0	L	7	70	1.5	4			MOR
1981 01 06.11	9.2	A	M	25.0	L	7	70	2	4			MOR
1981 01 09.07	9.2	A	M	25.0	L	7	70	1.3	4/			MOR
1981 01 11.14	9.5	A		8.0	B		20	3.4	6		135	BOR

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LUNAR PHASES 1980 - 1981

The following dates and times for the lunar phases are presented here as a convenience both for those who are reducing cometary data and for those who are observing comets. Data is from the American Ephemeris and Nautical Almanac (1980) and the Astronomical Almanac (1981). All times are UT.

1980	NEW MOON	FULL MOON	1981	NEW MOON	FULL MOON
		Jan. 2.38		Jan. 6.31	Jan. 20.32
	Jan. 17.89	Feb. 1.10		Feb. 4.93	Feb. 18.96
	Feb. 16.37	Mar. 1.88		Mar. 6.44	Mar. 20.64
	Mar. 16.79	Mar. 31.64		Apr. 4.85	Apr. 19.33
	Apr. 15.16	Apr. 30.32		May 4.18	May 19.00
	May 14.50	May 29.90		June 2.48	June 17.63
	June 12.86	June 28.38		July 1.80	July 17.19
	July 12.28	July 27.79		July 31.16	Aug. 15.69
	Aug. 10.80	Aug. 26.15		Aug. 29.61	Sept. 14.13
	Sept. 9.42	Sept. 24.51		Sept. 28.17	Oct. 13.53
	Oct. 9.12	Oct. 23.87		Oct. 27.84	Nov. 11.93
	Nov. 7.86	Nov. 22.28		Nov. 26.61	Dec. 11.36
	Dec. 7.61	Dec. 21.76		Dec. 26.42	

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NOTICE CONCERNING DRAWINGS AND PHOTOGRAPHS OF COMETS

Drawings of comets, particularly those showing coma and tail detail, are solicited for possible publication in the ICQ. Drawings must be in black, however, so that the camera can pick up details in the photo-offset printing process. We therefore suggest the use of either black ink or charcoal-type pencils. We are also now seeking good photographs of (any) comets for publication in a large, special issue of the ICQ planned for later this year.

INDEX TO THE INTERNATIONAL COMET QUARTERLY: VOLUME 2 (1980)

Following is an index to the 4 issues published in 1980 as Volume 2. Indices are published in the October issue for each volume. References listed below indicate issue number and page; for example, (1:5) indicates [Vol. 2] No. 1, page 5. --D.W.E.G.

LIST OF MAJOR ARTICLES, BY TITLE:

LIST OF MAJOR ARTICLES, BY AUTHOR:

LIST OF OTHER COLUMNS, NOTES, AND SHORT ARTICLES, BY TITLE:

TABULATED OBSERVATIONS AND NEWS OF INDIVIDUAL COMETS (by designation):

(Continued on next page)

INDEX TO THE INTERNATIONAL COMET QUARTERLY: VOLUME 2 (1980)
(Continued from previous page)

TABULATED OBSERVATIONS AND NEWS OF INDIVIDUAL COMETS (by name):

(Continued on next page)

INDEX TO THE INTERNATIONAL COMET QUARTERLY: VOLUME 2 (1980)
(Continued from previous page)

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UNIVERSAL TIME (UT): This time based on the Greenwich meridian is used throughout the ICQ; it is 24-hour time, from midnight to midnight. In North America, add the following numbers to standard times to convert to UT: EST, 5; CST, 6; MST, 7; PST, 8. For daylight savings time, add 4, 5, 6, and 7 hours, respectively.

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RECENT NEWS CONCERNING COMETS

continued from page 9) The first comet discovery/recovery in 1981 as that of P/Longmore, which was recovered by T. Seki (Geisei Station, apan) on exposures made 1981 January 2 and 3. Comet 1981a was then at otal magnitude 18, and diffuse with condensation. (cf. IAUC 3561)

Below are a few drawings of Comet Bradfield 1980t by Stephen 'Meara of Cambridge, Massachusetts, continuing that published on page 1.

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To the right are two drawings made by Stephen O'Meara from visual observations made at Harvard, MA, with 10x50 binoculars. The one at right was made 1981 Jan. 11.96 UT, and the one at far right was made Jan. 12.96. Below is a drawing from an observation made Jan. 5.94 UT with the 23-cm refractor at Harvard College Observatory, Cambridge, MA, also by O'Meara. Drawings of the inner coma made by the same observer will appear in the April ICQ.

The observed visual tail lengths for the two views at right were 4 degrees.