THE INTERNATIONAL COMET QUARTERLY

WHOLE NUMBER 52 OCTOBER 1984 Vol. 6, No. 4

Stephen J. O'Meara

23-cm Clark Refractor
Harvard College Observatory

Comet Austin 1984i
9/6/84 9 hrs. U.T.

5' of arc

Stephen James O'Meara

23-cm Clark Refractor
Harvard College Observatory

Comet Austin 1984i
9/8/84 9 hr U.T.

5'

Drawings of comet Austin 1984i by Stephen J. O'Meara on Sept. 6 and 8, showing the prominent anti-tail (towards upper right), made using the 9-inch Clark refractor of Harvard College Observatory. See also page 80.

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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 in Boone, North Carolina, U.S.A.

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Cometary observations also should be sent to the Editor at the above address. Back issues are available from Dr. T. Rokoske; Dept. of Physics and Astronomy; A.S.U.; Boone, NC 28608, USA.

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This issue is No. 52 of the publication originally called THE COMET, founded in March 1973, and is Vol. 6, No. 4, of the ICQ.

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NEW ADDRESS FOR ASSOCIATE EDITOR

Charles S. Morris has a new address which should be noted for all correspondance: 7635 Memory Drive, Tujunga, CA 91042, U.S.A.

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DRAWINGS OF RECENTLY-OBSERVED COMETS

On the following pages are drawings of several comets submitted to the ICQ by Jean-Claude Merlin of Le Creusot, France, and by Stephen J. O'Meara of Cambridge, Massachusetts. The cover also features two drawings by O'Meara of comet Austin 1984i; he usually observes with the 9-inch Clark refractor on the roof of Harvard College Observatory in Cambridge. Merlin observes with different telescopes, sometimes with the 60-cm f/3.5 reflecting telescope at Pic du Midi Observatory; he states the telescope aperture and magnification with each individual drawing. Merlin also uses 26-cm and 15-cm reflectors for some of his observing. On page 81 are shown Merlin's 8 drawings of P/Kopff, spanning 1983 May 17 to July 13. On page 82 are 2 drawings of P/Tempel 2 (1982d) in 1983 July (top), by Merlin; his 15 drawings of P/Crommelin (1983n) in 1984 February and March span pages 82-83. Page 83 also has 6 of Merlin's drawings of P/Tempel 1 1982j, spanning 1983 April to June. Page 84 includes 8 drawings in 1983 Jan. and Feb. of P/Churyumov-Gerasimenko 1982f, 2 in 1983 Sept. and Oct. of comet Černis 19831, and 2 in 1983 Dec. of P/Hartley-IRAS 1983v, all by Merlin. Page 85 has 5 drawings by O'Meara, the top 3 of P/Encke in March 1984 and the bottom two of comet Austin 1984i in 1984 September. Page 86 shows a view of P/Hartley-IRAS on 1984 March 2 and two views of P/Crommelin in March 1984, also by O'Meara.

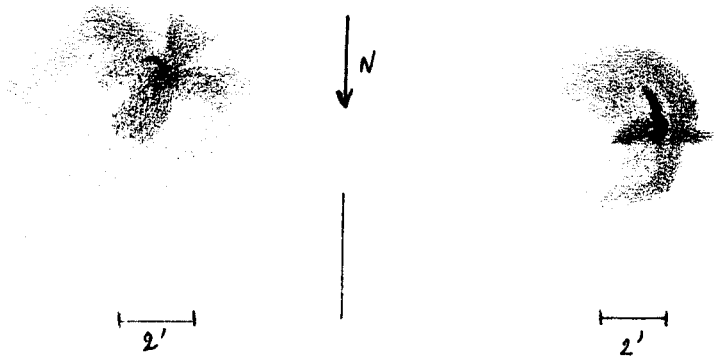
P/Kopff - 1982 K.

17 Mai 1983 . T260 - 63x - 130x.
21h30 TU.

02 Juin 1983 - T260 - 130x - 22h30 TU

03 Juin 1983 - T260 - 130x -
21h35 TU

04 Juin 1983
22h25 TU

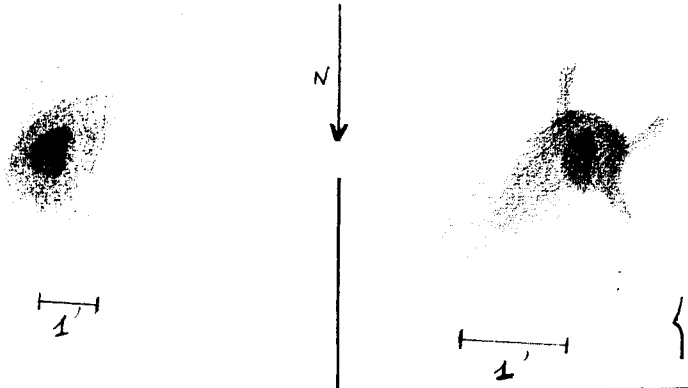


P/Kopff - 1982 K

Télescope 600 mm - F/3.5 - Pic du Midi.

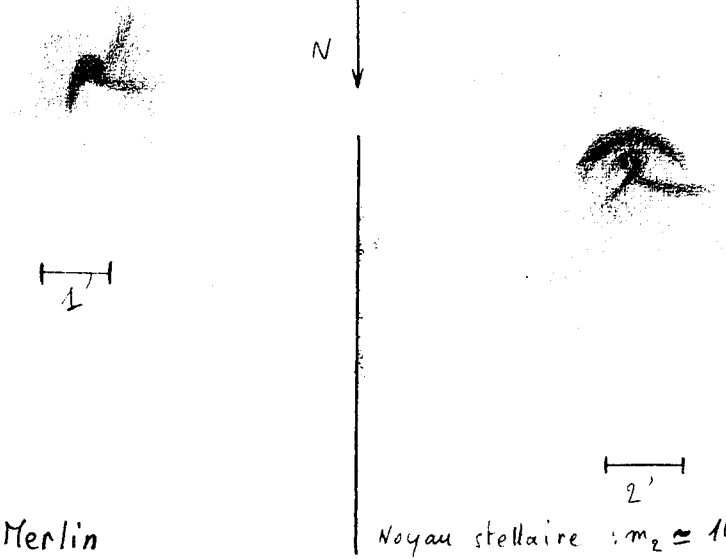
10 Juillet 1983
T600 - 420x - 22h30 TU

12 Juillet 1983
T600. 420x - 0h10 TU



12 Juillet 1983
T600 - 420x - 22h20 TU

13 Juillet 1983
T600 - 84x - 23h30 TU



J.C. Merlin

Noyau stellaire : $m_2 \simeq 14.5$

P/Tempel 2 - 1982 d

Télescope de 600 mm - Pic du Midi

10 Juillet 1983

T600 - 84 x - 2h 20 TU

13 Juillet 1983

T600 - 84 x - 2h 45 TU

P/Crommelin - 1983 n

08 Février 1984

T150 - 75 x - 18h45 TU

09 Février 1984 - T260

39x - 18h20 TU 130x - 18h30 TU

10 Février 1984

T260 - 130x - 18h45 TU

P/Crommelin - 1983 n

12 Février 1984 - 18h30 TU - T260 - 130x

13 Février 1984 - 18h35 TU - T260 . 63x - 130x

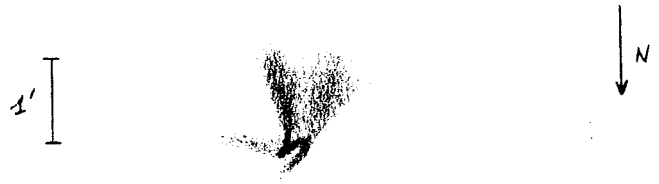
14 Février 1984 - 18h50 TU - T260 - 130x

CORRIGENDA

* In the Oct. 1982 issue (ICQ 4, 99-100), the 4th column in the "Photometric Parameters" table should read H_{10} instead of H .
* In the July 1984 issue, top of p. 66, delete the word "Cont." in the heading for comet Austin.
* In the Jan. 1983 issue (ICQ 5, 7), the observation by POI of comet Bowell 1980b on 1982 May 21.09 should have 10.0 (instead of 10.A) for the magnitude.

P/Crommelin - 1983 n

17 Février 1984 - 18h30 TU - T260 - 130x



18 Février 1984 - 18h40 TU - T260 - 130x

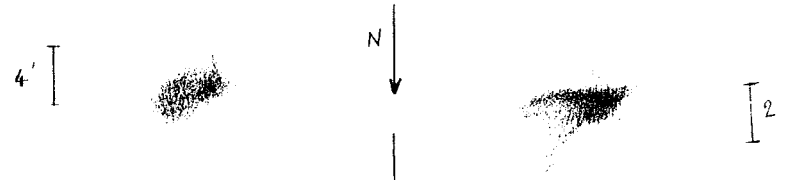
19 Février 1984 - 18h50 TU - T260 - 130x

P/Crommelin - 1983 n

23 Février 1984 - 18h55 TU - T260 - 130x

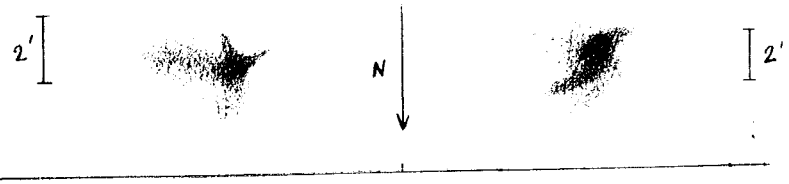
04 Mars 1984 - 19h50 TU
T150 - 75x

05 Mars 1984 - 19h10 TU
T260 - 130x



06 Mars 1984 - 19h TU
T260 - 130x

08 Mars 1984 - 19h TU
T260 - 130x

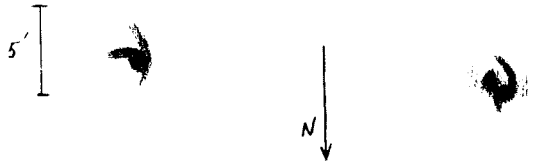


P/Tempel 1 - 1982 j

13 Avril 1983 · T260 - 130x
20h25 TU

15/16 Avril 1983 T260 - 130x

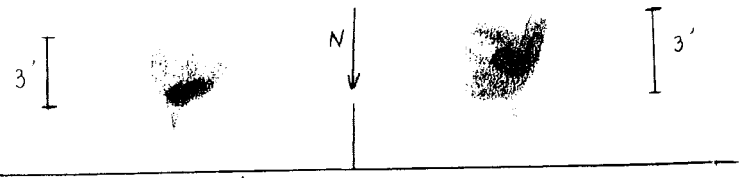
15 Avril - 20h25 TU 16 Avril - 0h TU.



P/Tempel 1 - 1982 j

02 Juin 1983 - 22h TU
T260 - 130x

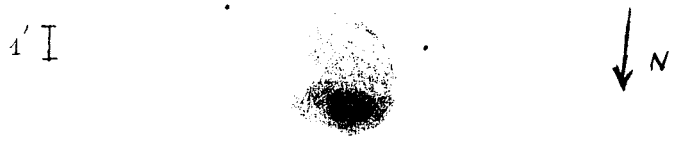
03 Juin 1983 - 22h35 TU
T260 - 130x



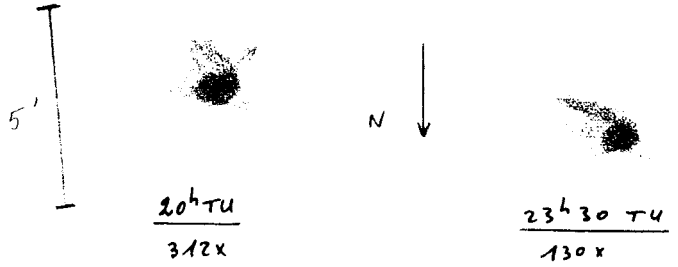
04 Juin 1983 - 23h TU
T260 - 130x

comète P/churyumov-Gerasimenko - 1982f.

06 Janvier 1983 - T 150 - 75x 22h20 TU

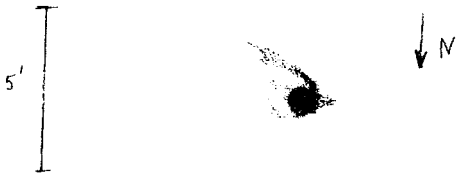


07 - Janvier 1983 - T260 -



08 Janvier 1983 - T150 - 75x - 23h15 TU

09 Janvier 1983 - T260-130x - 21h30 TU



01 Février 1983 -
19h30 TU -T260-39x

P/churyumov-Gerasimenko
1982f.

02 Février 1983 - 20h35 TU - T260 -130x.

17 Février 1983 - 20h15 TU. T260-63x

Černis - 1983l

07 Septembre 1983

T260-130x. 22h45 TU

12 Octobre 1983

T260-130x. 22h10 TU

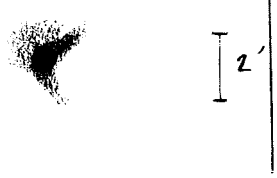
P/Hartley-IRAS - 1983 v.

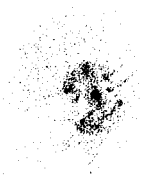
28 Décembre 1983

T260 -130x - 18h TU

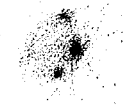
29 Décembre 1983

T260-130x - 18h TU





Comet Encke 3/13/84 0hrs U.T.



Comet Encke 3/15/84 0hrs U.T.

Comet Encke 3/16/84 0hrs U.T.

Comet Austin 1984c
9/13/84 1hrs. U.T.

5' of arc

Comet Austin 1984c
9/13/84 1hrs. U.T.

5' of arc

Comet Hartley - IRAS
23 cm Clark

3/2/84
10:15 U.T.

Stephen P. O'Meara
Harvard College Observatory

Comet Crommelin
23cm Clark

3/3-4/84
23-2 hrs U.T.

Stephen P. O'Meara
Harvard, Mass.

Comet Crommelin
23cm Clark

3/13/84
1 hr U.T.

Stephen P. O'Meara
Harvard Observatory
Cambridge

ERRATA: SOME THOUGHTS ON THE LIGHT CURVE OF PERIODIC COMET CROMMELIN

In the July issue, p. 58, the Editor inadvertently left out a Figure to Charles Morris' article. The Figure which was published should have been Figure 2, and Figure 1 is from IHW Newsletter No. 3. Both Figures are re-published here to avoid ambiguity. Also, two places in the text need to be corrected to agree with the two figures, both on page 60: (1) line 4 from the bottom, Figure 1 should read Figure 2; and (2) line 14 from the bottom, Figure 1 reveals should read Figure 2 reveals. Both of these text corrections refer to Morris' Figure 2, not Marcus' Figure 2.

The Editor also accidentally ignored a postscript to the Morris article, which mentioned some important errors in the Marcus (1984) paper:

(1) The Morris observation of Feb. 24.16 should read 8.1 not 8.6 for the magnitude.
(2) In Marcus' Figure 1, the post-perihelion observation labelled "1956, BAA" should read "1956, Van Biesbroeck".

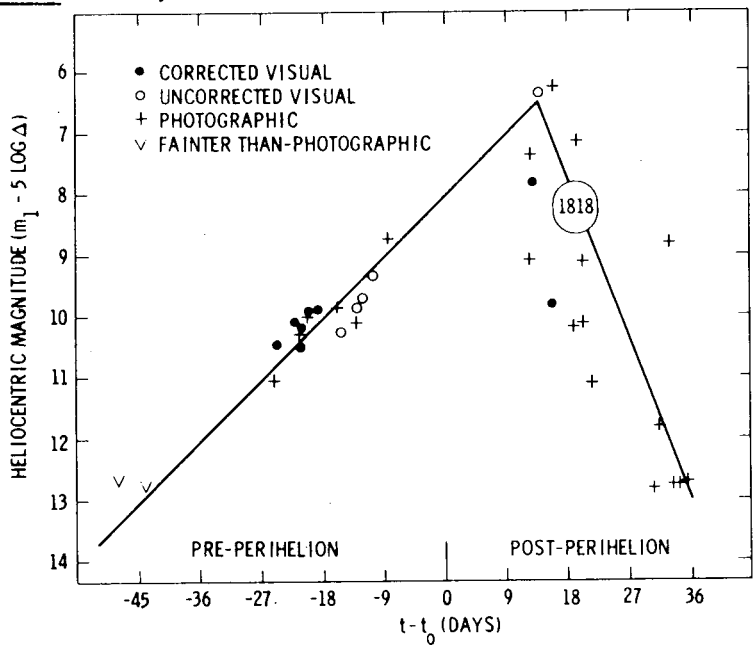
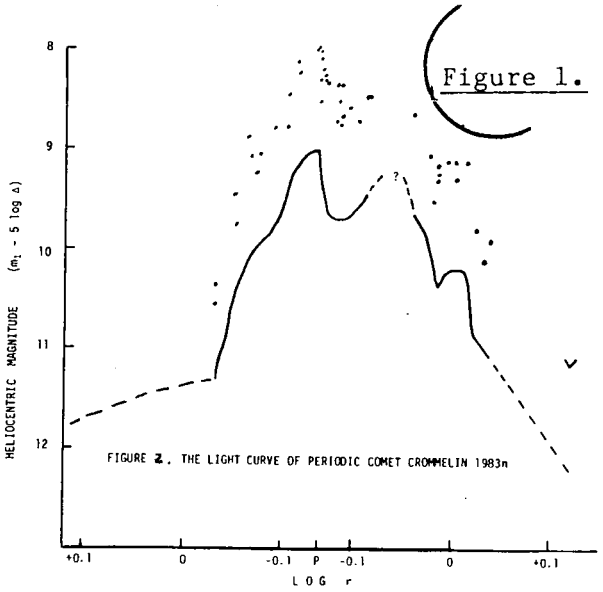


Figure 1. The light curve of periodic Comet Crommelin.



ASTEROIDS AND THEIR POSSIBLE RELATIONSHIP TO COMETS

BOOK REVIEW: ASTEROIDS

Asteroids, edited by Tom Gehrels (1979), second printing 1982, University of Arizona Press (1615 E. Speedway Blvd., Tucson, AZ 85719, U.S.A.), 1181 pages, $35.00 postpaid.

The past couple of years has seen the discovery of some minor planets having highly unusual orbits. Indeed, several of these asteroids appear to be moving in comet-like orbits. At the "top" of this list is 1983 TB (cf. ICQ 5, 88 and 6, 27), which is travelling within the orbital boundaries of the Geminid meteor stream, and may well have been the parent body (or one of the parent bodies) of these meteors; no "progenitor" had been previously found for the Geminids. Before the discovery of 1983 TB, only active comets had been identified as the probable parent bodies for other meteor streams. Several observers, however, are planning to try to observe 1983 TB when the object is as close to the Sun as possible, thereby attempting to determine if there might be some slight signs of cometary activity left while it is near perihelion. (Perihelion for 1983 TB will occur on 1985 Feb. 5 at a distance of 0.14 AU, and we are coming upon a rather favorable observing period for this object; it will be brighter than magnitude 15 in early December 1984.)

Can we assume, then, that some asteroids are actually "defunct" nuclei of comets? Orbital studies indicate "perhaps". This most interesting topic must be discussed in any discourse concerning the evolution of comets. The best single, printed volume devoted to minor planets has been recently reprinted: the first edition of Asteroids (1979) was in such demand that it was quickly out-of-print. This bargain-priced, mammoth-length book is a very worthy companion to Comets (reviewed in ICQ 6, 8), since these two University of Arizona Press books follow similar structures, and since the topics of the two books are inevitably intertwined.

Asteroids is a detailed successor to Physical Studies of Minor Planets (1971); indeed, no other book can qualify as covering more ground concerning the study of minor planets. The last decade has had a dramatic increase in asteroid studies, producing (for example) the Tucson Revised Index of Asteroid Data (TRIAD). The complete TRIAD file is published in Asteroids, in Part VII of the book. Tabulations include orbital elements for the first 2118 numbered asteroids, lightcurve parameters, and discovery circumstances (date and observer). A listing by E. Bowell, Gehrels, and B. Zellner includes absolute magnitude, classification (by spectrophotometrically-observed composition), and diameter (where "known") for each minor planet.

Many of the chapters in Asteroids are essentially detailed elaborations of the various TRIAD listings; methods for obtaining the data are described in a number of chapters. The first chapter by Gehrels contains a very readable review of the history of asteroid studies, and is an appropriate introduction to the book. Gehrels alludes to the dearth of comets with large perihelion distances, noting that these distant objects are important to understanding the transition from active comets to extinct nuclei. A similar type of review, a short chapter by Brian G. Marsden, describes the Minor Planet Center, which is responsible for collecting and publishing astrometric observations of minor planets and comets, and for cataloguing, computing, organizing, and publishing the orbital elements, where possible, for these objects.

Many of the chapters in Asteroids include topics with parallel ideas in cometary studies; papers on future exploration (notably space missions), radar and radio observations, families of asteroids, orbital encounters with Jupiter, rotations and shapes of asteroids, collisions and fragmentation, impact cratering, and orgins of the minor planets all have some relation to various aspects in the study of comets. Laurel Wilkening discusses meteorites chiefly from the possibility of their origin from, and relation to, the asteroids in

the early accretion/formation stages of the solar system.

ICQ readers will likely find Part III of Asteroids ("Interrelation") to be of highest interest. Eugene Shoemaker and his Caltech colleagues begin this section with a chapter on Earth-crossing asteroids, which the authors classify as belonging to one of 3 groups: the Aten-type (semi-major axis, a, < 1.0 AU; aphelion distance, Q, ≥ 0.983 AU), the Apollo-type (a ≥ 1.0 AU; perihelion distance, q, ≤ 1.017 AU), and the Amor-type (1.017 AU < q ≤ 1.3 AU) objects. Note that these definition values, based on the Earth's orbital eccentricity (which varies), are not accepted by all astronomers. These asteroids are quite different in orbital nature from the routine, stable, main-belt minor planets. As several minor planets in the solar system which lie in unusual orbits are suspected to be possibly of cometary origin, these Earth-approaching objects are likewise interesting. Shoemaker et al. discuss extinct short-period comets as possible suppliers for some of the Earth-crossing asteroids, citing P/Encke as a potential candidate. There are now about 45 known Apollo-type objects and 5 known Aten-type asteroids (Shoemaker et al. state that there were 23 known Apollos in 1979).

Edgar Everhart continues the discussion of "Chaotic Orbits in the Solar System", including both minor planets and comets. This leads to the key article by Ľubor Kresák, entitled "Dynamical Interrelations Among Comets and Asteroids", in which the author discusses key cometary types and individual candidates for soon becoming asteroidal objects. Specific examples include P/Neujmin 1 and P/Arend-Rigaux (cf. ICQ 6, 49), which exhibit very little activity. Minor planets (944) Hidalgo and (2060) Chiron spend much or all of their time in orbits beyond the orbit of Jupiter, and they are possible candidates for "extinct" comet nuclei (Chiron would probably not be extinct -- it probably just never had a chance to be active due to its very large heliocentric distance, with q = 8.4 AU). Hidalgo actually crosses Jupiter's orbit (q = 2.01 AU, Q = 9.71 AU), and since Kresák wrote his article, we can now add the following recently-discovered asteroids to the bizarre list of Jupiter-crossers: 1982 YA (q = 1.1, Q = 6.3, e = 0.70), 1983 SA (Q = 7.25, q = 1.21, e = 0.715), and 1984 BC (q = 1.55, Q = 5.27, e = 0.546). 1983 XF also has a strongly comet-like orbit (e = 0.535, Q = 4.78). Only comets were known to have such orbits besides Hidalgo!

Apollo-type objects such as (1566) Icarus (e = 0.827, q = 0.187), 1983 TB (e = 0.890, q = 0.139), (2212) Hephaistos (e = 0.835, q = 0.356), and 1983 LC (e = 0.709, a = 2.63) have such high eccentricities that they indeed appear to be travelling in orbits more characteristic of comets, even though high values of e are common among such Earth-crossers.

Kresák also describes, in some detail, other "possible ex-comets among the asteroids". Several comets travel in orbits similar to the Hilda group of asteroids, including P/Oterma (prior to 1963), P/Gehrels 3, and P/Smirnova-Chernykh.

In summary, there will undoubtedly be much new observational evidence gathered in the coming years to further link asteroids with dying or extinct cometary nuclei. Asteroids is an essential reference for anyone interested in such study, and it's a book that is not overly technical for the layman or amateur.

-- Daniel W. E. Green

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ICQ PUBLICATION DEADLINES FOR JANUARY 1985 ISSUE

To get on a regular publication schedule, the ICQ Staff is announcing publication deadline dates for contributors of articles, letters, photographs and drawings, and observations. Contributors should send materials for the January 1985 issue according to the following schedule (deadlines given in right column):

Articles, book reviews, letters to the Editor	1984 Nov. 26
Photographs or drawings from observations of comets	Dec. 3
Observational data (for Tabulation of Comet Observations)	Dec. 10
Last minute important observations or news	Dec. 14

LETTER TO THE EDITOR: CONCERNING "A REVIEW OF THE LUMICON SWAN BAND COMET FILTER"

Dear Sir:

In the July 1984 issue of the ICQ, there was a significant typographical error in the article by Charles Morris, "A Review of the Lumicon Swan Band Comet Filter". In the second paragraph, the transmission of the "Comet Hunters Filters" is incorrectly given as 18%. The correct transmission value is 85% for these filters. The readers may be interested in the technical differences between this filter and the Swan Band filter. The "Comet Hunter Filter" is fully blocked in the violet and red regions, making it useful in bright twilight. The Swan Band Filter has a somewhat larger 25-nm bandpass and is unblocked, to allow a higher transmission of about 95%. Unblocked filters are ideal for visual use because the human eye is not sensitive to faint light in the near-ultraviolet and red spectral regions when observing at night. If readers have any further technical questions, they are welcome to call me at (415) 447-9570, or write c/o Lumicon. ICQ readers are eligible for a 10% discount if they mention this fact.

Charles Morris mentioned that the usefulness of the Swan Band Filter to casual observers was difficult to evaluate. Inexperienced observers from suburban (non-dark) locations were able to easily see comets Crommelin 1983n and Kopff 1982k using the Swan Band Filter. These were people who had never before observed any comet, and the filter was thus helpful in getting inexperienced observers started in observing comets.

Jack B. Marling, President
Lumicon
2111 Research Dr.
Livermore, CA 94550

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TABULATION OF COMET OBSERVATIONS

DESCRIPTIVE INFORMATION CONCERNING COMETS (to complement the tabulated data):

Austin (1984i): Peter Williams (WIL02) notes a "stellar" nucleus on July 24.36, July 31.36, and Aug. 3.36; on July 24, he noted the 10′ coma as round and diffuse "with indefinite edges which fade rapidly from the brighter centre -- [like a] classic unresolved globular [cluster]." On July 30, Williams suspected a very faint tail with indefinite edges, some 3′ long in p.a. 150 deg. David Seargent (SEA) noted the comet to have an inner coma of diameter 4′ and a faint outer coma of diameter 10′ on July 20; he also noted a possible tail on July 23. The Australian observers commented on the bright sky in early August, which apparently rendered the tail invisible, as the comet headed for perihelion and conjunction with the Sun in mid-August. T. Lovejoy (LOV) noted the object was "steadily visible to the naked eye using averted vision" in late July; on Aug. 3, he remarked on the "long, ghostly tail" as being "impressive" with an 8x30 refractor (f/6.7).

P/Takamizawa (1984j): Andrew R. Pearce (PEA) noted a prominent central condensation on Aug. 2 and an "irregular (not perfectly circular) outer coma" on Aug. 3; he gave similar remarks with his Aug. 21 observation, and noted "circular, diffuse coma" on Aug. 24.

P/Clark (1983w): Pearce (PEA) noted a "very diffuse outer coma" on July 23.

P/Faye (1984h): Charles Morris (MOR) found the comet elongated east-west.

COMPLETE COPIES OF THE OBSERVER KEY, REFERENCE KEY, INSTRUMENT KEY, ETC., ARE AVAILABLE FROM THE EDITOR FOR $2.00 POSTPAID. THESE INCLUDE EXPLANATIONS TO THE INDIVIDUAL COLUMNS OF DATA PUBLISHED BELOW.

NEW ADDITIONS TO THE OBSERVER KEY (cf. ICQ 6, 64):

CAL	JOSEPH CALI, AUSTRALIA
DUC	RICHARD DUCOTY, CA, U.S.A.
FER	IGNACIO FERRIN, VENEZUELA
LIN02	JUERGEN LINDER, WEST GERMANY
WIL02	PETER F. WILLIAMS, AUSTRALIA

Comet Austin (1984i)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 07 17.34	S	5.6	AA	8.0	B		15		6			SEA
1984 07 17.37	S	5.5	AA	8.0	B		15	15	7			PRI
1984 07 18.35	M	5.8	Y	4.0	B		8					CAL
1984 07 18.35	S	5.6	A	3.0	R	7	8	5.5	6			LOV
1984 07 18.35	S	5.6	AA	8.0	B		15	& 4	6			SEA
1984 07 20.35	S	5.7	AA	8.0	B		15	10	6			SEA
1984 07 20.36				20	L	6	50	& 4.5	6/			LOV
1984 07 20.36	S	5.7	A	3.0	R	7	8					LOV
1984 07 20.38	S	6.0	AA	8.0	B		15	12	7			PRI
1984 07 21.35	S	5.6	A	3.0	R	7	8					LOV
1984 07 21.35				20	L	6	50	4.0	6/			LOV
1984 07 23.35	S	5.5	AA	8.0	B		15		7	?		SEA
1984 07 23.38	S	5.8	SC	5.0	B		10	5	6			WIL02
1984 07 24.36	S	5.8	SC	5.0	B		10	5	6			WIL02
1984 07 27.36		5.2	A	0.7	E		1					LOV
1984 07 27.36				20	L	6	50	3.0	7	0.16		LOV
1984 07 28.36	S	5.4	A	3.0	R	7	8					LOV
1984 07 28.36				20	L	6	50	2.5	7	0.25		LOV
1984 07 29.34	S	5.0	AA	8.0	B		15		8	&2		SEA
1984 07 29.35				20	L	6	50	2.3	7/	0.50		LOV
1984 07 29.35		5.3	A	0.7	E		1					LOV
1984 07 29.39	S	4.2	A	40.6	L	4	60	& 6.5	6/	1.5		PAR01
1984 07 30.34	S	4.8	AA	8.0	B		15		8	1.3	123	SEA
1984 07 30.36	S	4.3	A	40.6	L	4	73	& 6.5	6/	1.75		PAR01
1984 07 30.36				15	L	8	50	5	7	0.05	150	WIL02
1984 07 30.36	B	4.3	A	40.6	L	4	73					PAR01
1984 07 30.36	S	5.3	SC	5.0	B		10	5	7			WIL02
1984 07 30.37		5.1	A	0.7	E		1					LOV
1984 07 30.37				20	L	6	50	2.0	7/	0.66		LOV
1984 07 31.35	B	5.2	A	20	L	8	60					PAR01
1984 07 31.35	S	5.2	A	20	L	8	60	5.66	4/	1.0		PAR01
1984 07 31.36	S	5.1	SC	5.0	B		10	5	8			WIL02
1984 07 31.36				15	L	8	50	5	9			WIL02
1984 07 31.36	S	5.3	A	3.0	R	7	8				130	LOV
1984 07 31.36				20	L	6	50	1.5	8			LOV
1984 08 01.35	S	5.5	AA	8.0	B		15	10	7	1.0		PRI
1984 08 01.36	S	5 :	A	3.0	R	7	8	1.7	8		130	LOV
1984 08 02.35	S	4.5	AA	8.0	B		15		8	&3	130	SEA
1984 08 02.36	S	5.6	AA	8.0	B		15	10	7	2.25		PRI

Comet Austin (1984i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 02.36	S	5.2:	A	3.0	R	7	8					LOV
1984 08 02.36				8.0	B		15			1.2		LOV
1984 08 02.36				20	L	6	50	1.5	8		130	LOV
1984 08 03.35	S	4.4	AA	8.0	B		15		8			SEA
1984 08 03.35	S	5.2	A	3.0	R	7	8					LOV
1984 08 03.35				20	L	6	50		8	1.5	129	LOV
1984 08 03.36	S	5.6	AA	8.0	B		15	10	7	1.75		PRI
1984 08 03.36	S	5.4	SC	5.0	B		10	5	8			WIL02
1984 08 04.36	S	5.8	AA	8.0	B		15	8	6	1.00		PRI
1984 08 05.35	S	5.0	A	3.0	R	7	8					LOV
1984 08 06.35	S	4.9	A	8.0	B		15					LOV
1984 08 07.34				20	L	6	50	0.7	8/			LOV
1984 08 07.34	S	4.8:	A	8.0	B		15					LOV
1984 08 07.35	S	5.6	AA	8.0	B		15	8	6			PRI
1984 08 26.38	S	5.8	S	5.0	B		10	2				BOR
1984 08 27.38	S	6.0	S	8.0	B		20	2	7			BOR
1984 08 27.51	S	5.8	AA	25.4	L	4	32	4	7	0.10	280	MAC
1984 08 28.51				25.6	L	4	45	1.6				MOR
1984 08 28.51	M	5.9	AA	8.0	B		20		9	0.25	310	MOR
1984 08 29.51	M	6.0	AA	25.6	L	4	45	1.3	8/			MOR
1984 08 29.51	S	5.9	AA	25.4	L	4	32	4	6	0.22	310	MAC
1984 08 29.51	M	5.6	AA	8.0	B		20		9	2.0	315	MOR
1984 08 29.51				25.4	L	4	32			0.11	75	MAC
1984 08 30.51				25.6	L	4	45	1.3		0.25	116	MOR
1984 08 30.51	M	5.8	AA	8.0	B		20		9	1.5	306	MOR
1984 08 31.49	M	6.0	AA	8.0	B		20		9	1.25	309	MOR
1984 08 31.51				25.6	L	4	67	1.5	8/	0.33	117	MOR
1984 08 31.51	S	6.1	AA	25.4	L	4	32	4	7	0.71	307	MAC
1984 08 31.51	S	6.5	S	20	T	10	44	2	6/	0.08	75	DUC
1984 08 31.51				25.4	L	4	32			0.20	108	MAC
1984 09 01.37	B	6.7	S	5.0	B		10					BOR
1984 09 01.37				8.0	B		20	4		0.3	300	BOR
1984 09 01.37	S	6.6	S	5.0	B		10	4	6			BOR
1984 09 01.49	M	6.4	AA	8.0	B		20		8/	1.5	306	MOR
1984 09 01.50				25.6	L	4	67	1.7	8	0.33	116	MOR
1984 09 01.51	S	6.7	S	20	T	10	44	2	6/	0.13	310	DUC
1984 09 02.38	S	6.2	AA	8.0	B		20	& 4.5	7			GRE
1984 09 02.49				25.6	L	4	67	1.5	8	0.42	117	MOR
1984 09 02.49	M	6.5	AA	8.0	B		20	3	8	2.0	304	MOR
1984 09 02.51				13.1	R	7	27			0.13	114	MAC
1984 09 02.51	S	6.9	S	20	T	10	44	2	6			DUC
1984 09 02.51	S	6.4	AA	13.1	R	7	27	4	7	0.47	302	MAC
1984 09 03.50	M	6.4	AA	8.0	B		20	3	8	1.33	304	MOR
1984 09 03.50				25.6	L	4	67	1.6		0.33	115	MOR
1984 09 03.51				13.1	R	7	27			0.15	119	MAC
1984 09 03.51	S	6.5	AA	13.1	R	7	27	5	7	0.27	314	MAC
1984 09 04.50	M	6.6	AA	8.0	B		20	3	8	1.0	306	MOR
1984 09 04.50				25.6	L	4	67	1.8		0.42	115	MOR
1984 09 04.51	S	7.4	S	20	T	10	44	2	6			DUC
1984 09 05.49	M	6.8	AA	8.0	B		20		8	0.67	305	MOR
1984 09 06.36	S	6.5	AA	8.0	B		20	& 5	6	&0.42	295	GRE
1984 09 06.38	S	6.9	S	5.0	B		10	5.5	5			BOR
1984 09 06.38				31.7	L	6	55	2.1	7	0.3	120	BOR
1984 09 06.38				31.7	L	6	55			0.2	300	BOR

Comet Austin (1984i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 09 06.49	S	6.9	AA	25.4	L	4	32	5	5	0.48	304	MAC
1984 09 06.49				25.4	L	4	32			0.35	121	MAC
1984 09 06.51	M	7.0	AA	8.0	B		20		8	0.50	301	MOR
1984 09 06.51				25.6	L	4	67	1.6	8	0.33	114	MOR
1984 09 07.36	S	6.8	AA	8.0	B		20	& 4	6			GRE
1984 09 07.36				22.9	R	12	152	& 5	7	&0.20	110	GRE
1984 09 07.36	B	7.2	AA	8.0	B		20					GRE
1984 09 07.36	M	6.8	AA	8.0	B		20					GRE
1984 09 07.38	S	7.0	S	5.0	B		10	4.5	6			BOR
1984 09 07.38				31.7	L	6	55			0.3	297	BOR
1984 09 07.38				31.7	L	6	55	3.3	6/	0.4	117	BOR
1984 09 08.37	B	7.1	NO	5.0	B		10					BOR
1984 09 08.37				31.7	L	6	55			0.15	297	BOR
1984 09 08.37	S	7.1	NO	5.0	B		10	4	6			BOR
1984 09 08.37				31.7	L	6	55	2.7	6	0.35	117	BOR
1984 09 08.38	S	6.9	AA	8.0	B		20					GRE
1984 09 08.38	M	7.0	AA	8.0	B		20	& 4	6/	&0.13	110	GRE
1984 09 08.38	S	6.9	AA	5.0	B		7					GRE
1984 09 08.49				25.6	L	4	45	2.2	7/	0.27	112	MOR
1984 09 08.50	M	7.2	S	8.0	B		20	3.3	8	0.40	306	MOR
1984 09 08.51				25.4	L	4	32			0.18	111	MAC
1984 09 08.51	S	7.0	S	25.4	L	4	32	5	6	0.12	321	MAC
1984 09 09.36	M	7.0	AA	8.0	B		20					GRE
1984 09 09.36	S	6.9	AA	8.0	B		20	& 5	6			GRE
1984 09 09.50	M	7.5	S	25.6	L	4	67		6/	0.20	112	MOR
1984 09 13.38	M	7.2	AA	8.0	B		20					GRE
1984 09 13.38	S	7.1	AA	8.0	B		20	& 5	6/			GRE
1984 09 14.51	M	7.6	S	8.0	B		20	& 5	7			MOR
1984 09 15.50				25.6	L	4	67	2.4	6/	0.33	109	MOR
1984 09 15.51	M	7.5	S	8.0	B		20		7			MOR
1984 09 16.50	M	7.5	S	8.0	B		20		7			MOR
1984 09 17.37	S	7.4	AA	8.0	B		20	& 5	4/			GRE
1984 09 17.37	M	7.5	AA	8.0	B		20					GRE
1984 09 18.38	S	7.4	AA	8.0	B		20	& 5.5	4/			GRE
1984 09 18.38	M	7.4	AA	8.0	B		20					GRE
1984 09 25.52	M	8.1	S	25.6	L	4	67	6.0	4/	0.17	120	MOR
1984 09 25.52	M	7.9	S	8.0	B		20	9	3/			MOR
1984 09 27.50	S	7.9	S	8.0	B		20	7	3			MOR

Comet Meier (1984o)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 09 19.01	S	11.7	AC	20.3	L	6	68	& 1.5	1/			GRE
1984 09 19.01	S	11.7	AC	20.3	L	6	68					OME
1984 09 20.17	S	11.6	AC	20.3	L	6	61		1/			HAL
1984 09 23.17	S	11.4	AC	25.6	L	4	67	1.8	2			MOR
1984 09 27.13	S	11.3	AC	25.6	L	4	67	& 2	2			MOR

Comet Shoemaker (1984f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 06 16.93	P	14.5:	UP	26.0	L	6		1.0	1			MER

Periodic Comet Clark (1983w)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 06 25.79	S	10.7	VN	15.2	L	5	72					PEA
1984 06 25.79	S	10.6	VN	15.2	L	5	30	1.5	5/			PEA
1984 06 26.78	S	10.6	VN	15.2	L	5	30	1.75	5			PEA
1984 06 27.78	S	10.6	VN	15.2	L	5	30	1.5	5			PEA
1984 06 28.77	S	10.5	VN	15.2	L	5	30	2	4/			PEA
1984 06 29.78	S	10.6	VN	15.2	L	5	30	2	5			PEA
1984 07 22.76	S	11.0	VN	15.2	L	5	30	1.25	2/			PEA
1984 07 23.77	S	11.1	VN	15.2	L	5	30	1.5	3			PEA
1984 07 27.76	S	11.1	VN	15.2	L	5	30	1.4	3			PEA
1984 08 04.21	S	11.5	AC	25.6	L	4	67	2.4	0/			MOR
1984 08 25.25	S[	12.0	AC	25.6	L	4	67					MOR

Periodic Comet Wild 2 (1983s)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 01 25.85	P[	14.0	UP	26.0	L	6						MER

Periodic Comet Russell 4 (1984d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 04 21.95	P	15.5:	UP	26.0	L	6		0.4	7			MER

Periodic Comet Takamizawa (1984j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 02.52	S	9.1	AA	8.0	B		15		5			SEA
1984 08 02.65	S	9.4	AA	15.2	L	5	30	1.8	6/			PEA
1984 08 03.44	S	9.1	AA	8.0	B		15		5/			SEA
1984 08 03.64	S	9.4	AA	15.2	L	5	30	1.75	6			PEA
1984 08 04.27	M	9.4	AC	25.6	L	4	45	2.0	7/	0.15	264	MOR
1984 08 04.28	M	9.2	AC	8.0	B		20	6	6			MOR
1984 08 05.19	M	9.5	AC	25.6	L	4	45	& 2	7/	?		MOR
1984 08 05.37	S	9.7	S	25.4	L	4	32	2.0	6	0.66	240	MAC
1984 08 06.42	S	9.2	AA	8.0	B		15					SEA
1984 08 08.43	S	9.8	S	25.4	L	4	32	1.2	4	0.50	240	MAC
1984 08 08.59	S	9.6	A	40.6	L	4	115	& 3.5	3/			PAR01
1984 08 14.40	S	9.9	AA	8.0	B		15					SEA
1984 08 15.40	S	10.1	AA	8.0	B		15					SEA
1984 08 16.40	S	10.1	AA	8.0	B		15					SEA
1984 08 18.26	S	10.2	S	13.1	R	7	27	1.0	2			MAC
1984 08 18.40	S	10.2	AA	8.0	B		15					SEA
1984 08 19.28	S	9.9	S	13.1	R	7	27	1.0	2			MAC
1984 08 19.40	S	10.3	AA	8.0	B		15					SEA
1984 08 20.90	S	10.4	A	25.4	J	6	48	2.5	1/			BOU
1984 08 20.91	S	10.0	A	25.4	J	6	48	3	1/			BUS01
1984 08 21.29	M	10.4	AC	25.6	L	4	67	1.6	6/	0.06	270	MOR
1984 08 21.61	S	9.9	AA	20.3	L	6	38	2	3			PEA
1984 08 23.22	M	10.1	AC	25.6	L	4	67	2.2	4/	?		MOR
1984 08 23.39	S	10.0	S	25.4	L	4	32	1.0	2			MAC
1984 08 23.64	S	10.2	AA	20.3	L	6	38	2	2			PEA
1984 08 24.15	S	10.2	A	31.7	L	6	68	1.8	3/			BOR
1984 08 24.62	S	10.3	AA	20.3	L	6	38	1.8	2/			PEA
1984 08 25.11	S	10.6	A	31.7	L	6	68	1.8	2			BOR
1984 08 25.31	M	10.1	AC	25.6	L	4	67	1.8	6	0.03	270	MOR

Periodic Comet Takamizawa (1984j) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 25.38	S	10.5	AA	8.0	B		15					SEA
1984 08 26.10	S	10.7	A	31.7	L	6	68	2.0	2			BOR
1984 08 27.09	S	10.6	A	31.7	L	6	68	1.6	3			BOR
1984 08 27.37	S	10.4	S	25.4	L	4	32	1.5	2			MAC
1984 08 31.30	M	10.5	AC	25.6	L	4	67	1.7	6/			MOR
1984 09 01.10	S	11.0	A	31.7	L	6	68	1.9	1			BOR
1984 09 19.25	S	11.9	AC	25.6	L	4	156	& 1	1			MOR

Periodic Comet Faye (1984h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 30.49	S	12.5	NP	25.6	L	4	111	0.9	4			MOR

Periodic Comet Wolf-Harrington (1984g)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 28.50	S	12.8	NP	25.6	L	4	111	1.7	4			MOR

Periodic Comet Neujmin 1 (1984c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 25.21	S	13.6	AC	25.6	L	4	156	0.5	8/			MOR
1984 08 31.22	S	13.5	AC	25.6	L	4	156	0.6	7/			MOR
1984 09 23.23	S	13.2	AC	25.6	L	4	156	0.7	6			MOR

Periodic Comet Schwassmann-Wachmann 1 (1974 II)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 06 16.90	P	[14.0	UP	26.0	L	6						MER

Periodic Comet Crommelin (1983n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 02 12.79		8.7	S	20	C		50	1.5	2			LIN02
1984 02 19.79		8.9	S	20	C		50	2.2	5			LIN02
1984 02 29.0	B	8.2	S	11	R	10	29					FER
1984 03 25.18	S	9.0	S	25.4	L	4	32	4	1			MAC
1984 03 26.0	B	8.4	S	11	R	10	29					FER

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RECENT NEWS AND RESEARCH CONCERNING COMETS

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In the period of one week, beginning on September 12, three comet recoveries/discoveries were announced by the IAU's Central Bureau for Astronomical Telegrams, and the pace of such recoveries and discoveries for 1984 has kept nearly even with the record-breaking pace of 1983. P/Schaumasse was recovered by Jim Gibson at Palomar using the 48-inch Schmidt telescope on plates taken Sept. 5 and 6; this confirmed a single observation by E. Roemer made late in Dec. 1976 which was never announced because it had never been confirmed as a recovery at that rather poor apparition. P/Schaumasse 1984m may reach 11th

magnitude in December if it behaves as it did at its favorable perihelic opposition in 1952, when it was just barely a naked-eye object; an ephemeris is provided below.

Comets 1984n and 1984o are both new discoveries, the former by Charles Kowal and Antonin Mrkos, and the latter by Rolf Meier of Ottawa, Canada. Kowal reported images on Palomar Schmidt plates nearly five months after the plates were taken of comet 1984n; Kowal explains that so many plates are taken with the 48-inch Schmidt in the course of surveys at Palomar that they just cannot be looked at efficiently for possible new comets! Images of the comet on only two nights were available from April, but a third night became available when it was realized by Brian Marsden that an object reported as a minor planet (although noted as somewhat diffuse) by Mrkos at Kleť Observatory in Czechoslovakia was actually the same object. It had been published as minor planet 1984 JD; the orbit showed the comet to be of short period, so the new name is periodic comet Kowal-Mrkos 1984n. It has a period of 7.2 years (q = 2.04 AU), and perihelion occurred around May 16, 1984. It has not been seen outside of three nights (Apr. 23 to May 2), and searches are now being undertaken to find the object, which is probably 18th magnitude or fainter.

Comet 1984n is Mrkos's 12th comet discovery, and his first in 25 years! It is also his third short-period comet. The discovery puts Mrkos in a 3-way tie with William Bradfield and Minoru Honda as the leaders among living comet discoverers. Mrkos' discovery was made photographically during the routine search for minor planets at his observatory. The circumstances surrounding the discovery of comet 1984n are amazingly similar to the discovery a year ago of P/Kowal-Vávrová 1983t (cf. ICQ 5, 89). That comet, too, was reported initially by Kowal several months after the plates were exposed, and Zdenka Vávrová (who works at Kleť with Mrkos) had also initially reported her image as being a new minor planet!

As an interesting aside, S. Nakano published earlier this year (in his Nakano wa Kangaeru noda) the identifications of several previously-reported minor planets with comets. In the case of P/Smirnova-Chernykh, discovered in 1975, Nakano found an identification with the asteroid 1967 EU, thereby extending the arc of observation back some 8 years in time. It is obvious that a combination of observing conditions and the lack of a strong coma can fool the astronomer into thinking that a comet is actually an asteroid.

Meier's discovery of comet 1984o, his fourth comet discovery, came only 84 search hours since his previous discovery in 1980. He has hunted for a total of only some 200 hours for all 4 comets since 1978 -- quite different from the average time required by other comet hunters for a comet discovery! He uses a 16-inch f/5 reflector at low power, and only hunts small areas of the evening sky. His method has made Meier the most successful active comet hunter in the Northern Hemisphere for the past 6 years. Comet Meier 1984o was near total visual magnitude 11.5 at discovery, and (at elongation 54°) was moving rapidly into conjunction with the Sun in mid-October (q = 0.86 AU, T = 1984 Oct. 13).

P/Tsuchinshan 1 was recovered by T. Seki (Geisei, Japan) on Sept. 4 and independently by Gibson at Palomar on the following two nights, and this object has been given the provisional designation "comet 1984p". At nuclear magnitude 20.5 upon recovery, the comet may brighten to total visual magnitude 12 or 13 in January, as this is its most favorable apparition since its discovery at Tsuchinshan (Purple Mountain Observatory) in China in 1965. An ephemeris is provided below, as well.

Further to the note in this column of the last issue, concerning the recovery of P/Arend-Rigaux (1984k), Edgar Everhart also independently recovered the comet on Aug. 9 with the 40-cm reflector of Chamberlin Observatory in Colorado. At that time, he noted a faint, round, uniform, soft, diffuse image some 9" in diameter, near magnitude 19.

Comet Austin 1984i has been quite a bit brighter (some 3 magnitudes) than expected during September. It was near-

ly 4th magnitude visually, according to reports from Australia (see Tabulation of Comet Observations elsewhere in this issue), in August before it was lost in the solar glare as the comet approached conjunction. What was doubly-surprising as northern-hemisphere observers picked up comet 1984i in the morning sky, in late August and early September, was a very prominent anti-tail extending some 10′ to 30′ toward the sun. Although the anti-tail was generally much shorter than the main tail, it was much more intense in brightness; in fact, by mid-September, when the anti-tail was still quite visible, the normal tail was very difficult to see. Zdenek Sekanina calculated that the Earth passed through the comet′s plane on Sept. 13.9 UT, at which time the anti-tail should have had its greatest visual intensity. This passing through the comet′s plane caused the dust particles of the anti-tail, which were left behind by the comet (as the comet, in turn, moved rapidly away from the sun), to be highly visible from Earth. It seems that, except for perhaps that of comet Kohoutek in late December 1973 and early January 1974, comet 1984i′s anti-tail is the best such example since that of the famous comet Arend-Roland in 1957. Comet Arend-

Comet Austin (1984i) as photographed by Gary Emerson (E. E. Barnard Observatory, Mt. Thorodin, CO) on Sept. 3 (mid-time of 10-min exposure on IIaF plate was 11:05 UT).

Roland was quite a bit brighter, though, than comet Austin 1984i. The anti-tail was even seen by some observers in binoculars, although its brightness was basically near the threshold of 20x80 binoculars. (See also the page-97 photograph by Gary Emerson.) An extended, revised ephemeris for comet Austin is provided at the end of this article.

Ed Barker observed P/Neujmin 1 on September 18 and 21 with an IDS spectrograph on the 2.7-m McDonald Observatory telescope, finding only a reflected solar spectrum at the center of the central condensation (no emissions). He found a fan extending some 12" to the southeast. CN and C_3 emissions were found in spectra of the fan region (at 7" from the center of condensation) on Sept. 21; he thinks that the strong solar condensation probably masks these emissions in the central-condensation spectra.

P/Takamizawa has faded to fainter than 12th magnitude by late September. Several other comets fainter than total magnitude 12 are being followed by visual observers (see the Tabulation of Observations).

Note that visual observers with reflectors of 20-cm (8-in) or greater are observing many comets which are at total magnitude 12 or 13 -- and many of such short-period comets are "predicted" to be much fainter in ephemerides published in the MPCs or the B.A.A. Handbook. The faint predicted magnitudes are often due to the fact that such comets have never been observed visually, and only very crude magnitude estimates (usually "nuclear" magnitudes) are available from images on photographic plates. It is becoming more and more evident that the total visual magnitudes of many comets are much brighter than the "magnitudes" given by photographic observers of comets fainter than mag 13 or 14. It is therefore important for observers to attempt finding many of these fainter comets, but two or more positive nights of observations and/or motion on a single night should be determined when attempting such observations to assure that the comet has been accurately located and identified; care and quality is of the utmost importance.

Seki is apparently the first amateur astronomer to photograph P/Halley at its current apparition, finding the comet as an object at magnitude 20 or 21 on photographs taken with his 60-cm reflector on Sept. 22 and 26. Observers using the 4-m reflector (with prime-focus CCD) at Kitt Peak report a faint, assymetric coma extending some 6" towards the north from the nucleus; the nucleus was at red magnitude R = 20.3 on Sept. 27.4903 UT. Since its recovery in October 1982, P/Halley has been exhibiting signs of significant variability -- up to 1-2 magnitudes within a few nights. At least four separate papers have been written on the subject in the past year on the subject, with the various authors trying to determine rotation periods for the comet's nucleus from the brightness data. There are no conclusions so far, with periods in the "suggestion box" ranging from a few hours to a few days; the period is, however, quite possibly longer than 1 day. It is also probable that P/Halley has been exhibiting some coma in its reflected light ever since its 1982 recovery, even though the observed images until now have been essentially stellar. Using photometric data from David Jewitt at Palomar and Richard West at La Silla, the author has derived absolute magnitude values for P/Halley which range between 13.3 and 14.8; indeed, this entire range in brightness can be derived solely from data obtained in the single month of 1984 January! If we assume a value of H = 14.0 for the absolute magnitude of P/Halley's nucleus, then with an inverse-square law, one can derive an upper limit to the comet's brightness at aphelion of magnitude 29.4, a value considerably fainter than the anticipated threshold of the Space Telescope.

The European Space Agency is apparently putting together a Giotto 2 spacecraft from spare parts left over from the Giotto probe that will intercept Halley's comet in 1986. Giotto 2 may be used to go to a comet within the next ten years to retrieve a gas/dust sample and return it to Earth. One possibility is a 1989 Dec. 14 launch to send the probe to P/Schwassmann-Wachmann 3, which Giotto 2 would reach

on 1990 May 4; the probe would then return to Earth on Dec. 14 of that year and possibly be taken back to the ground via the Space Shuttle. However, it appears that the right people haven't been consulted: P/Schwassmann-Wachmann 3 has only been observed at 2 apparitions, and it was lost from its discovery apparition in 1930 until 1979 (its orbital period is only 5.4 years). It is due at perihelion on 1985 Jan. 11, but this is an extremely poor apparition due to its apparent proximity to the Sun at very small elongations for months on end. Such a candidate should not be taken too seriously because its orbit is not one of the better-known comet orbits.

The April 1984 issue of The Strolling Astronomer (The Journal of the Association of Lunar and Planetary Observers) includes the announcement that Dennis Milon has stepped down as Recorder of the Comets Section after some 20 years at that post. David H. Levy (Rt. 7, Box 414; Tucson, AZ 85747) has replaced Milon as Recorder, and although the Comets Section has been fairly inactive in recent years, Levy hopes to renew observers' interest in the field; he now edits a newsletter called "Tails and Trails", which serves both the Comets and Meteors Sections of the ALPO.

-- 1984 Sept. 29

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THE LAST 20 COMETS TO RECEIVE PROVISIONAL LETTER DESIGNATIONS

Listed below, for handy reference, are the last 20 comets which have been given letter designations (1985a is the first comet to be discovered or recovered in 1985, 1985b is the second comet..., etc.). Room is given after the first "equal sign" for the Roman numeral designation (usually not yet given for the last 20 comets), which gives the year of perihelion. After the second "equal sign" is given the name, preceded by an asterisk (*) if the comet is a new discovery (as opposed to a recovery from predictions of a previously-known short-period comet). Also given parenthetically are such values as the date of perihelion, T (month/date), and the perihelion distance, q (in AU).

1983o = 1983 = * IRAS (T = 11/20)
1983p = 1983 = * Shoemaker (T = 11/23)
1983q = 1983 = P/Arend (T = 5/22)
1983r = 1983 = P/Harrington-Abell (T = 12/1)
1983s = 1984 = P/Wild 2 (T = 8/20)
1983t = 1983 = * P/Kowal-Vávrová (T = 4/2)
1983u = 1984 = P/Taylor (T = 1/7)
1983v = 1984 = * P/Hartley-IRAS (T = 1/8)
1983w = 1984 = P/Clark (T = 5/29)
1984a = 1983 = * P/Bradfield (T = 12/27, q = 1.4)

1984b does not exist
1984c = 1984 = P/Neujmin 1 (T = 10/8)
1984d = 1984 = * P/Russell 4 (T = 1/6)
1984e = 1985 = P/Giacobini-Zinner (T = 9/5)
1984f = 1985 = * Shoemaker (T = 9/9, q = 2.8)
1984g = 1984 = P/Wolf-Harrington
1984h = 1984 = P/Faye
1984i = 1984 = * Austin (T = 8/12, q = 0.3)
1984j = 1984 = * P/Takamizawa (T = 5/24, q = 1.6)
1984k = 1984 = P/Arend-Rigaux (T = 12/1, q = 1.4)

19841 = 1985 = P/Gehrels 3 (T = 6/3, q = 3.4)
1984m = 1984 = P/Schaumasse (T = 12/6, q = 1.2)
1984n = 1984 = * P/Kowal-Mrkos (T = 5/16, q = 2.0)
1984o = 1984 = * Meier (T = 10/13, q = 0.9)
1984p = 1985 = P/Tsuchinshan 1 (T = 1/2, q = 1.5)

EPHEMERIS FOR COMET AUSTIN (1984i), from elements by B. G. Marsden on IAUC 3990. The magnitudes are based on n = 4 and absolute mag = 7.5.

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1984	10 17	05h18m.48	+49°15'.8	0.820	1.555	117°.4	9.0
1984	10 22	04 20.65	+49 15.7				
1984	10 27	03 24.55	+47 19.1	0.835	1.727	141.4	9.5
1984	11 01	02 36.92	+43 54.0				
1984	11 06	02 00.00	+39 48.3	0.950	1.893	154.2	10.2
1984	11 11	01 32.64	+35 41.8				
1984	11 16	01 12.71	+31 56.7	1.148	2.053	147.7	10.9
1984	11 21	00 58.29	+28 41.6				
1984	11 26	00 47.91	+25 57.0	1.400	2.207	134.6	11.7
1984	12 01	00 40.52	+23 40.5				
1984	12 06	00 35.38	+21 48.2	1.685	2.358	121.8	12.4
1984	12 11	00 31.94	+20 16.3				
1984	12 16	00 29.82	+19 01.5	1.990	2.504	110.1	13.0
1984	12 21	00 28.76	+18 00.8				
1984	12 26	00 28.53	+17 12.0	2.304	2.647	99.3	13.5
1984	12 31	00 28.98	+16 33.3				
1985	01 05	00 29.98	+16 02.9	2.621	2.786	89.2	14.0

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EPHEMERIS FOR P/WOLF-HARRINGTON (1984g), from elements on MPC 8289 (with T corrected to Sept. 22.759 ET). Magnitudes from H = 9.5, n = 4.

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1984	10 17	08h43m.87	+11°15'.6	1.616	1.634	73°.1	12.7
1984	10 22	08 54.44	+09 27.1				
1984	10 27	09 04.48	+07 36.5	1.558	1.651	77.1	12.6
1984	11 01	09 13.97	+05 44.2				
1984	11 06	09 22.90	+03 50.8	1.502	1.674	81.6	12.6
1984	11 11	09 31.24	+01 56.7				
1984	11 16	09 38.97	+00 02.5	1.448	1.702	86.4	12.6
1984	11 21	09 46.06	-01 51.2				
1984	11 26	09 52.47	-03 43.9	1.397	1.734	91.7	12.6
1984	12 01	09 58.18	-05 35.0				
1984	12 06	10 03.14	-07 23.9	1.348	1.771	97.6	12.6
1984	12 11	10 07.32	-09 09.9				
1984	12 16	10 10.69	-10 52.4	1.302	1.812	104.0	12.7
1984	12 21	10 13.20	-12 30.5				
1984	12 26	10 14.80	-14 03.3	1.262	1.856	110.9	12.7
1984	12 31	10 15.50	-15 29.8				
1985	01 05	10 15.28	-16 49.1	1.229	1.903	118.3	12.7
1985	01 10	10 14.15	-18 00.1				
1985	01 15	10 12.14	-19 01.7	1.205	1.952	125.9	12.8
1985	01 20	10 09.33	-19 52.9				
1985	01 25	10 05.79	-20 32.8	1.194	2.004	133.6	12.9
1985	01 30	10 01.68	-21 00.6				
1985	02 04	09 57.15	-21 16.1	1.199	2.057	140.4	13.0
1985	02 09	09 52.39	-21 19.5				
1985	02 14	09 47.58	-21 11.0	1.223	2.112	145.5	13.2
1985	02 19	09 42.91	-20 51.6				
1985	02 24	09 38.57	-20 22.4	1.266	2.168	147.6	13.4
1985	03 01	09 34.71	-19 45.2				
1985	03 06	09 31.45	-19 01.7	1.332	2.225	146.1	13.6

EPHEMERIS FOR P/SCHAUMASSE (1984m), from elements by B. G. Marsden on IAUC 3987. Total visual magnitudes predicted below are after Hendrie and Morris (1982, J. Brit. Astron. Assoc. 93, 1).

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1984	10 17	09h13m.88	+18°44'.5	1.390	1.376	68°.1	13.8
1984	10 22	09 34.37	+17 58.8				
1984	10 27	09 55.14	+17 05.8	1.313	1.321	68.3	12.6
1984	11 01	10 16.11	+16 05.6				
1984	11 06	10 37.17	+14 58.9	1.254	1.276	68.1	11.6
1984	11 11	10 58.20	+13 46.4				
1984	11 16	11 19.11	+12 28.9	1.212	1.242	67.8	10.7
1984	11 21	11 39.77	+11 07.6				
1984	11 26	12 00.09	+09 43.8	1.186	1.220	67.6	10.2
1984	12 01	12 19.96	+08 18.7				
1984	12 06	12 39.31	+06 53.6	1.174	1.213	67.7	10.0
1984	12 11	12 58.09	+05 29.7				
1984	12 16	13 16.25	+04 07.8	1.173	1.219	68.2	9.7
1984	12 21	13 33.73	+02 49.1				
1984	12 26	13 50.50	+01 34.3	1.177	1.239	69.3	9.7
1984	12 31	14 06.53	+00 24.0				
1985	01 05	14 21.81	-00 41.5	1.184	1.272	71.2	9.8
1985	01 10	14 36.31	-01 41.9				
1985	01 15	14 50.04	-02 37.2	1.190	1.316	73.9	9.9
1985	01 20	15 02.96	-03 27.1				
1985	01 25	15 15.05	-04 11.9	1.193	1.370	77.4	9.9
1985	01 30	15 26.29	-04 51.6				
1985	02 04	15 36.67	-05 26.6	1.191	1.433	81.7	10.0
1985	02 09	15 46.16	-05 57.1				
1985	02 14	15 54.75	-06 23.4	1.184	1.501	87.0	10.1
1985	02 19	16 02.38	-06 46.0				
1985	02 24	16 09.04	-07 05.0	1.171	1.574	93.1	10.1
1985	03 01	16 14.67	-07 21.0				
1985	03 06	16 19.26	-07 34.5	1.155	1.651	100.3	10.2
1985	03 11	16 22.77	-07 45.8				
1985	03 16	16 25.17	-07 55.3	1.136	1.731	108.5	10.2
1985	03 21	16 26.44	-08 03.3				
1985	03 26	16 26.56	-08 10.5	1.119	1.813	117.7	10.3
1985	03 31	16 25.53	-08 17.1				
1985	04 05	16 23.40	-08 23.5	1.108	1.896	128.0	10.3
1985	04 10	16 20.23	-08 30.2				
1985	04 15	16 16.10	-08 37.3	1.109	1.980	139.2	10.4
1985	04 20	16 11.11	-08 45.2				
1985	04 25	16 05.45	-08 54.0	1.126	2.064	150.9	10.5
1985	04 30	15 59.29	-09 04.1				
1985	05 05	15 52.85	-09 15.5	1.165	2.148	162.4	10.7
1985	05 10	15 46.33	-09 28.3				
1985	05 15	15 39.92	-09 42.6	1.229	2.232	170.3	10.8
1985	05 20	15 33.82	-09 58.4				
1985	05 25	15 28.17	-10 15.6	1.319	2.315	166.2	11.1
1985	05 30	15 23.11	-10 34.3				
1985	06 04	15 18.72	-10 54.5	1.434	2.398	156.3	11.3
1985	06 09	15 15.04	-11 15.9				
1985	06 14	15 12.10	-11 38.5	1.573	2.480	145.9	11.6
1985	06 19	15 09.90	-12 02.2				
1985	06 24	15 08.43	-12 26.9	1.732	2.562	136.0	11.8

EPHEMERIS FOR P/TSUCHINSHAN 1 (1984p), from elements on MPC 7658. The magnitudes are from n = 6 and absolute mag = 12; this is an object that visual observers should try to observe as much as possible -- its true total magnitude could be 1 to 2 magnitudes brighter than what is listed below.

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1984	10 27	07^{h}36^m.98	+16°37'.0	1.174	1.664	100°.0	15.7
1984	11 01	07 49.21	+16 38.4				
1984	11 06	08 01.43	+16 40.7	1.066	1.624	104.2	15.3
1984	11 11	08 13.62	+16 44.7				
1984	11 16	08 25.74	+16 50.8	0.967	1.588	108.6	14.9
1984	11 21	08 37.75	+16 59.8				
1984	11 26	08 49.58	+17 12.6	0.877	1.559	113.3	14.6
1984	12 01	09 01.19	+17 29.7				
1984	12 06	09 12.52	+17 52.1	0.799	1.535	118.4	14.3
1984	12 11	09 23.51	+18 20.2				
1984	12 16	09 34.07	+18 54.9	0.732	1.519	123.9	14.0
1984	12 21	09 44.09	+19 36.5				
1984	12 26	09 53.48	+20 25.5	0.676	1.510	130.0	13.8
1984	12 31	10 02.14	+21 21.7				
1985	01 05	10 09.97	+22 24.6	0.634	1.508	136.6	13.7
1985	01 10	10 16.89	+23 33.4				
1985	01 15	10 22.80	+24 46.9	0.605	1.514	143.6	13.6
1985	01 20	10 27.62	+26 03.3				
1985	01 25	10 31.34	+27 20.2	0.591	1.527	150.4	13.6
1985	01 30	10 33.99	+28 34.9				
1985	02 04	10 35.63	+29 44.6	0.593	1.547	156.0	13.7
1985	02 09	10 36.41	+30 46.8				
1985	02 14	10 36.46	+31 39.0	0.612	1.573	158.5	13.9
1985	02 19	10 36.00	+32 19.6				
1985	02 24	10 35.26	+32 47.2	0.648	1.606	156.9	14.1
1985	03 01	10 34.49	+33 01.3				
1985	03 06	10 33.89	+33 02.1	0.701	1.644	152.0	14.5
1985	03 11	10 33.64	+32 50.6				
1985	03 16	10 33.83	+32 27.8	0.770	1.687	145.7	14.8
1985	03 21	10 34.58	+31 54.9				
1985	03 26	10 35.92	+31 13.4	0.854	1.735	139.0	15.2
1985	03 31	10 37.88	+30 24.5				
1985	04 05	10 40.43	+29 29.6	0.952	1.786	132.3	15.7

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CORRIGENDUM

In the Jan. 1984 issue (ICQ 6, 29), readers will note that the top 10 lines of the ephemeris for P/Wild 2 are simply a repetition of the last 10 lines on p. 28.

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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.