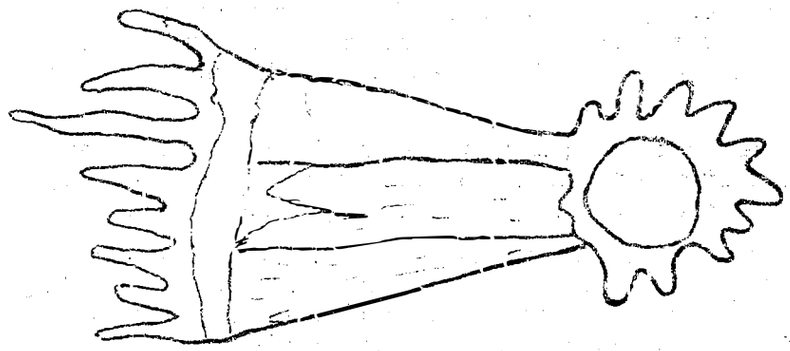
THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



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BULLETIN NO. 18 OCTOBER 1982

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CHANGE IN SECTION OFFICERS

It has been necessary for Paul Doherty to reduce his commitments to astronomy for the time being and he has asked to resign as an assistant to the Director of the Comet Section. While I am sorry that this has been necessary, we shall still have him as an observer and adviser. I would like to thank him for his assistance over the past few years and hope that he will find more time to observe comets in the future.

AUSTRALIAN COMET SECTION & BAA NEW SOUTH WALES BRANCH COMET SECTION

Those associated actively with comet observation will know that observations of comets from southern amateurs are very important and that the observers, while not numerous, are very active and produce many observations (some of us please note).

Communications have been a problem as individual subscriptions to IAU telexes are expensive and the cards (also no longer cheap) now take 10 days to reach us in Europe against only 4 or 5 in the days of steam. To overcome these problems and encourage observers in the south, the Australian Comet Section has been set up under the leadership of the well-known observer and discoverer of comet 1978 VI, David Seargent.

David Seargent, a member of the New South Wales Branch of the BAA, has also undertaken the Directorship of a new Comet Section set up by that branch. We have arranged for this Bulletin to be made available to the NSW Branch, and for an exchange of observations and information. We wish both organisations and David Seargent every success and look forward to years of fruitful co-operation.

ASSOCIATION'S ANNUAL EXHIBITION MEETINGS HELD IN LATE MAY

Each year I make an appeal for material to display at the Exhibition Meeting held each May, but generally the response is poor to very poor, a few members providing the material each year and the usual recourse by the Director and his assistants to digging out old photographs shown many times before.

Now is not too early to start a contribution for next May. With comet Austin and hopefully others, there ought to be something that many of us can do if we start early enough. The show of Section work at the Exhibition Meeting has not reflected the considerable amount of work put in during the year on behalf of the Section by those who seldom if ever exhibit.

Photographs of comets are not the only thing that we can show; there are drawings, pictures of instruments, light curves, historical research, equipment itself, diagrams of methods of observing, etc.

With Halley's comet not far off and our involvement in the IHW, why not start now to show that we are doing something and can produce something to display. The practice will be useful and a good exhibit not only enhances the reputation of the Section and BAA but could increase the number of BAA members. There is an increasing interest in comets just now that is likely to last at least until 1986, so let us make the most of it. I should be pleased to hear of any ideas sooner rather than later.

PROBABLE SUN-GRAZING COMETS

IAUC 3718 and 3719 report two further probable sun-grazing comets revealed from analysis of the Solwind P78-1 satellite data. D.J. Michels of the Naval Research Laboratory reports that the first observed on 1981 January 26-27 yielded 15 observations as the comet approached the Sun, when it brightened from an estimated 0.0 mag at 8 solar radii to -2.5 or brighter at 3 solar radii. The comet was not observed after perihelion and may have hit the Sun.

The second comet was observed on 1981 July 19-20 there being 34 observations in all, the brightness being estimated at -0.8 at 8 solar radii. The paths of both these comets and that reported in Bulletin 17 (Howard-Koomen-Michels 1979 XI) are consistent with their being members of the Kreutz group of Sun-Grazing comets. The discovery of 3 comets travelling in similar paths, all of which were only seen from space when very close to the Sun, and in only 2 years of observation raises the question as to how common these and other comets really are.

DESIGNATIONS OF COMETS DISCOVERED & RECOVERED IN 1982

1982a	P/Grigg-Skjellerup
1982b	P/du Toit-Hartley (=1945 II)
1982c	P/du Toit-Hartley (=1945 II)
1982d	P/Tempel 2
1982e	P/D'Arrest
1982f	P/Churyumov-Gerasimenko
1982g	Austin
1982h	P/Peters-Hartley (=1846 VI)

Comets 1982b and 1982c were the two components of a comet discovered by M. Hartley with the UK Schmidt Telescope at Siding Spring, Australia. At discovery the two components were on the same plate and had a similar motion. They were later identified as being the lost comet P/du Toit 1945 II.

Comet 1982h was another comet discovered by Hartley with the UK Schmidt, which again turned out to be a lost periodic comet, this time comet Peters 1846 VI. This comet was at perihelion in 1982 May and reached about 16 mag.

At the time of writing there is still no news of the Perseid comet, P/Swift-Tuttle 1862 III which has a period of about 120 years and should be at perihelion at any time (see B17 page 5). Harold Ridley will be discussing some long-lost recovered and not yet recovered comets in Bulletin 19.

RECENT COMET BOOKS

"Introduction to Comets" by Brandt & Chapman, Cambridge U. Press, £21.00.

This book was reviewed in the Journal recently and after reading this you might be forgiven for thinking that nothing could be gained by reading it yourself. This is not so. While I do not intend to review the book here I do think that it contains much that is very useful, especially in the

larger middle part of the book, where current ideas on the nucleus and processes in the heads and tails of comets are described. This is not a comet picture book, though it is well illustrated, and not always easy going, but it does contain much that one should be aware of if one is to understand why professional astronomers are making the kinds of observations that they are.

At £21.00 it is very expensive, but I am told by CUP that a softcover edition will be available, presumably at a much more reasonable price. Meanwhile try to borrow one!

"Comets" edited by L.L. Wilkening, UN. of Arizona Press, about £16.00.

This book is better value for money at 700 pages (against 250) being a collection of papers by well-known cometary astronomers who attended the Tucson conference in 1981 March. It covers most aspects of cometary research and will remain a valuable reference work for some years. It can be thoroughly recommended. There will be a review appearing in the BAA Journal in due course.

CATALOGUE OF COMETARY ORBITS - 4th EDITION

The 4th Edition of this catalogue has been published and can be purchased from the Minor Planet Center, Smithsonian Astrophysical Observatory, 60 Garden Street, Cambridge MA 02138, U.S.A. for $10.00 including postage. The BAA office will be acquiring some copies for sale to members and a notice will appear in the Journal.

The latest catalogue includes all comets up to May 1982.

OBJECT IN GEMINI

On 1981 Nov 21.8 UT Maurice Clark observing from Western Australia found what he thought was a comet a few arcminutes south of the star Castor. The object appeared as moderately bright in a 10 inch f/9 Newtonian x110 (probably 10.5 to 11.5 mag) and about 1.5 arcmin across. In the time during which he observed it no motion was detected, but he says that the usual tests of moving the telescope and changing eyepieces did not reveal the object as a ghost. After 48 hours the object was not found, though I understand from David Seargent that attempts were made to find it at Perth Observatory.

If anyone was observing this part of the sky near this date or better, took photographs near Castor would they look to see whether there is any suspicious object and let the Director know the result, either way please.

COMET SECTION MEETING

A full report of the Comet Section Meeting held at the Hawkstone Hall on 1982 April 3 has appeared in the 1982 August (Vol 92, No 5) Journal and will not be repeated here but for the record the list of speakers and their subjects is given below. Forty participants signed the book, but a count of heads by two members made the number greater, perhaps nearer 60 at one time. There was opportunity to talk to visitors and meet a number of observers who were until then only known through their letters. Particularly pleasing was the considerable distances some had travelled to be there, from as far away as The Netherlands (Hank Feijth of the Dutch Comet Section), and the USA for Charles Morris, Joe Marcus, C. Herold, and Paul Maley who came on a day-trip from Houston to attend.

George Alcock, Paul Doherty and Stan Milbourn were all due to speak originally but unfortunately were unable to be present for personal reasons. However, we were very pleased to hear Charles Morris and Joe Marcus speak in their places. Thanks are due to all who made this an enjoyable and interesting day.

Speakers and their subjects were:

Dr. David Hughes - P/Halley and Giotto Probe
Harold Ridley - Comet Photography
Michael Hendrie - (briefly) Astrometry of Comets
Graham Keitch - Visual Observations of Comets
Joe Marcus - Brightness Perception of Comets
Charles Morris - Brightness of P/Halley

COMET P/HALLEY

IAUC 3688 reported attempts to recover P/Halley using the 5.1m telescope (200 inch) with a charge-coupled-device placed at the prime focus. In all 24 exposures were made on 1981 December 18.3 UT of 300 seconds exposure each and another 12 of 100 seconds exposure each. The comet was not found and was presumably fainter than 24.5 mag (probable maximum radius of the nucleus 1.5 km). Further attempts will be made during the winter of 1982/83 when the comet will again be near opposition near the Canis Minor, Gemini, Orion border.

INTERNATIONAL HALLEY WATCH (IHW)

The project to co-ordinate the world-wide observation of comet Halley was reported in earlier Bulletins. Run by the JPL for NASA plans and organisation are proceeding. Discipline specialists to co-ordinate professional observations have been selected and an Amateur Observation Net has been set up. Those attending the Comet Section Meeting last April may have seen the draft IHW Amateur Observer's Handbook that was on display. We have had the opportunity, thanks to the co-ordinator Stephen Edberg of the JPL, to give our views and comments on proposals and help have some amendments made before publication later this year. The Handbook will be available free to observers who require it. When we have the information about its availability a notice will be put in the Bulletin, Journal or Circulars.

The aims and organisation of the IHW are now being made known and we propose to devote more space to it in the next Bulletin.

COMET OBSERVATIONS FROM LIGHT POLLUTED SITES by D.H. Frydman (N. Wembley, London)

If potential comet observers live under light polluted skies and are unable to travel away from lights - I have found that some useful magnitude determinations can be made if one is familiar with deep sky objects such as M1, M78 etc. These resemble comets, and from my observations I surmise that they react to light pollution much as comets do. Stars, however, are less affected by light pollution, and in my opinion reliable estimates may be more difficult using them in light skies, except with, say, 10x binoculars, where the comet appears small.

When trying to judge comet Magnitudes, I estimate that the comet cannot be fainter than mag "b" nor brighter than magnitude "a". Then I take a mid value and put in a likely error value based on my experience. If possible I repeat this using another nearby nebulous object.

It is essential that the nebulous object is at the approximate elevation of the comet or to wait until it is so situated. One must make allowance, based on experience, for any small difference in elevation or position in the sky. It is almost useless attempting magnitude estimates (in London - ed) for elevations much below 45°.

In a series of observations of the brighter comets visible recently, I noted that my magnitude estimates were usually within 1/2 magnitude of results obtained by experienced observers in dark locations, and sometimes 1/4 magnitude, although my estimates were usually a bit fainter than those of experienced observers. If one observes an object over several days near the same apparent position in the sky, one can notice changes in magnitude, although changes in the weather have far more influence than under darker skies. The best time to observe is under transparent skies between rainy spells, when the sky is reasonably dark even in London. I noted the coma diameter estimates were approximately half those at dark sites, but I presume that the deep sky comparison object is similarly affected.

One important point to note is that some deep sky objects have notoriously different magnitudes quoted in different sources. With Planetaries this may amount to up to 4 magnitudes in extreme cases, and some values are clearly wrong, being copied from old publications which may be a hundred years out of date. So one should adopt well catalogued consistent visual

magnitudes. Even M1 is catalogued variously as $+8.4^{v}$ and $+8.7^{v}$. A complete review of accepted visual magnitudes of deep sky objects is long overdue.

With regards to photographs of comets and nebulous objects, one must be very careful. On one night, a recent comet was within a degree of M1, and visually the same size and brightness. Yet photographs showed one object twice as large and much brighter than the other.

With necessary precautions, some experience, and knowing the limitations, I feel that reasonable magnitude determinations can be made if one gets to know a dozen deep sky objects that are situated fairly high in the sky. It is also important that the person reducing the observations should keep a set of fixed accepted visual magnitudes of these standard objects so that different observers results can be compared; and also that he realises that the observer concerned is restricted by a light sky, and that his magnitude estimates are less accurate than those obtained from dark sites. It is of course preferable to observe from a dark location, but for those who cannot, and when a bright enough comet appears, at least some experience of comet observation can be had from the most unlikely locations.

A valuable and necessary additional check is an intimate knowledge of the capabilities of your telescope, especially its limiting magnitude at different elevations for stars, globular clusters, gaseous nebulae, planetaries, galaxies and clusters. The objects most resembling comets are probably certain types of galaxies, but gaseous nebulae and globulars can also be used. One should beware of most planetary nebulae as regards magnitude.

It is also worthwhile checking beforehand, at what date the track of the comet will pass near known nebulous objects so that they can be compared. This is incidentally very useful for photographers, as very nice photos result when comets are near deep sky objects.

Visually, one can find a comet a full magnitude fainter than on a normal sweep, if its position is plotted exactly beforehand. One can find fainter deep sky objects than comets, as their position is known very exactly, and one can wait for exceptionally transparent nights. The faintest comet that I could positively identify from Willesden, London, using my 123 mm telescope, was about magnitude 10.0^{v}, although a slightly fainter comet may be visible near the zenith. The limiting stellar magnitude, however, was 13.1^{v} at 50^{o} elevation.

For twenty years I thought that deep sky objects were almost impossible from London, with possibly a maximum of a hundred visible. Yet in the last few years I have observed about 350 such objects, out of a total of 600 that I now think are within reach of the 123 mm telescope. Similarly, comets are not so difficult to observe from towns as one may at first think. However, one should try, if at all possible, to observe from a dark site, so as to improve the accuracy and value of the observational results.

COMETS : FURTHER NOTES FROM THE LITERATURE 1981-82

Books & Reviews: "Introduction to Comets" by J.C. Brandt and R.D. Chapman (Cambridge Univ. Press, 1981) and Proceedings of the 5th College Park Colloquim on Chemical Evolution, held in 1980, published as "Comets and the Origin of Life", edited by C. Ponnamperuma (Der Reidel, 1981) were reviewed in the Journal (JBAA 92, No 4, p200). In the "Proceedings" there are reviews on ultraviolet spectroscopy (P.D. Feldman, pp31-41), their nature (F.L. Whipple, pp 1-20), and a discussion of the interaction of the solar wind and radiation on a comet as it moves around the sun (D.A. Mendis, pp 71-89). Other reviews are on the chemistry of comets (R. Luest, Topics Curr. Chem. 1981, No 99, pp 73-98) and their study using space probes (H. Fechtig, Naturwiss. Rundsch. 35, No 1, pp 1-5, 1982), and there are several interesting articles in an issue of Icarus devoted to papers presented at the IAU colloqium in Tucson, March 11-14, 1981 (vol 47, No 3, Sept. 1981).

Yeomans (D.K. Yeomans, Icarus 47(3) p 492, 1981) presents a short history on the relation between comet Temple-Tuttle and the Leonid meteors. Newton (1863) demonstrated the nature of the shower and by analysis of historical records deduced a probable heliocentric period and predicted a rich shower for November 13, 1866. Guillaume Temple on Dec 19 1865 and on Jan 5th 1866 Horance Tuttle discovered the comet. When the orbit of the comet was published the identification of the comet with the meteor stream was widely recognised. The comet was not seen on the following two returns. Observations of 1366 and 1699 were used as a constraint on the comet's true period to provide a successful search ephemeris for 1965. On November 17th the following year another impressive meteor shower was observed. While the periodic comet Temple-Tuttle does not appear to have been observed prior to 1366, the associated Leonid meteors can be traced as far back as AD 902 and as the meteoroids are relatively "fresh", as is evident by the displays being significant only within a few years of the comet's return to perihelion, further analysis provided mapping of the particle distribution about the comet to be made. The maximum likelihood of a shower occurs when the Earth runs into particles outside and behind the comet. However, the particle distribution surrounding the comet is far from uniform, thus the likelihood of an unusual shower in 1998 and 1999 is very good but by no means certain. Temple-Tuttle is one of sixteen Earth-orbit approaching comets known to be associated with meteor showers, but there may be many more associated with sporadic meteors (J.D. Drummond, Icarus 47, p 500, 1981). A study on the formation of comets in the outer parts of the original solar nebula, and the effects of Jupiter and nearby stars on comet clouds, was made by J.G. Hills (Astron. J., 86, p 1730, 1981).

Cometary Nuclei:

A review on the rotation and procession of cometary nuclei was presented by Z. Sekanina in Annual Reviews of Earth & Planetary Sciences, vol. 9, 1981 (page no unknown). Houpis and Mendis discuss the effects of rotation of a nucleus (specifically a 1 km-radius water-dominated comet nucleus at 1 AU from the sun) on the dust particles on its surface (H.L.F. Houpis, D.A. Mendis, Astrophys. J., 251, P 409, 1981). At very large (~5 AU) a water-dominated comet has no protection from the solar ultraviolet radiation and wind, as a result the surface becomes electrostatically charged and repulsive forces may lead to ejection of sub-micron particles (D.A. Mendis et al., Astrophys. J. 249, p 787, 1981). The possibility of photographing the nucleus of a comet from spacecraft, in particular that of Comet Halley, was discussed by E.P. Ney (Science 215, p 397, 1982.)

Comet Tails:

Ershkovich writes on the folding phenomena of comet tails (A.I. Ershkovich, Monthly Notices RAS 198, p 279, 1982). Niedner presented a catalogue of 72 disconnection events in cometary tails that covers the period 1892 to 1976 (M.B. Niedner Jr., Astrophys. J., Suppl. Ser., 46 p.141, 1981). The data consists of measurements of the distances of the rejected tails from the cometary head, and deduction of the kinematical properties of them, time of rejection, and a brief description of each event.

Technical Papers:

On the chemistry of or modelling reactions related to the chemistry in comets: on diatomic carbon (K.S. Krishna-Swamy, Astrophys. J. 251 p. 805, 1982), negative ions (O.V. Dobrovol'ski et al., Dokl. Akad. Nauk Tadzh. SSR 24(9), 543, 1981); on the interaction of solar radiation with cometary material (V.A. Dranevich et al., Probl. Kosm. Fis. 1981, p 131); theoretical calculations on the UV and submillimeter emissions of Imidogen (NH)(M.M. Litvak, E.N. Rodriguez-Kuiper, Astrophys. J. 253 p. 622, 1982). A feature at 2972A in the spectrum of Comet Bradfield 1979X has been tentatively identified as a forbidden Oxygen line probably (but not exclusively) arising from the action of solar Ly-α photons on water molecules (M.C. Festou, P.D. Feldman, Astron. Astrophys., 103 p 154, 1981).

Individual Comets:

Encke: radar detection (P.G. Kamoun et al., Science 216, p 293, 1982); photometric investigation of, spectroscopy of, in 1980-1 (R.L. Millis, NASA CR-164580, 1981; H. Spinrad, NASA CR-164866, 1981).

West 1976VI: spectrum of (V.K. Rozenbush, Astrometriya Astrofis., 1981 (4) p 363).

Panther (1980u): spectrum of, late 1980 (C.C. Huang, Astron. Astrophys., Suppl. Ser., 46(3) p 369, 1981).

Kohoutek 1973XII: spectrophotometry of, in November 1973 (H.S. Ishii, et al., Moon & Planets 25(4) p 437, 1981).

Bowell (1980b): D.W.E. Green, B.G. Marsden in Sky & Telesc., 63(4) p.366, 1982; discussion of the possible mechanisms for the production of the extended dust coma observed at the heliocentric distance of 7.17 AU (H.L.F. Houpis, D.A. Mendis, Moon & Planets 25(4) p 397, 1981).

Schwassmann-Wachmann I: spectrophotometry of, during quiescent phase and outburst of 1981 Feb 7 (A.L. Cochran et al., Astrophys. J., 254, p 816, 1982).

Hartley 1982b, c: pair of comets discovered in Virgo, virtually certain were a single object as late as 1976 (IAU Circ. 3663, 3665; Feb. 1982).

Halley: the long-term motion of (D.K. Yeomans, Monthly Notices RAS, 197(2) p 633, 1981). The orbital motion was numerically integrated back to 1404BC beginning with an orbit based on the observations of the 1759, 1682 and 1607 apparitions. The numerical integrations were run back in time with full planetary perturbations and non-gravitational forces taken into account. The latter were assumed to be due to the rocket-effect of an outgassing water-ice nucleus. The dynamic model used to compute the long-term motion of the comet successfully represented ancient Chinese observations over nearly two millenia. This model assumed that non-gravitational forces remained constant from one apparition to the next. Hence it seems likely that Halley's spin axis and ability to outgas has also remained relatively constant with time.

Bradfield 1979X: M.F. A'Hearn et al (Astron. J. 86(10) p 1559, 1981) find, from narrow-band photometry at post-perihelion (0.57 to 1.65 AU from the sun), the comet to have the highest emission to continuum ratio they have measured. The emission arises from excitation of the gaseous material by solar radiation, the continuum from the dust, hence the comet is the most gaseous one observed. All molecular species show a steep variation with helio-centric distance which is inconsistent with simple models of vapourisation equilibrium and suggests that other factors such as insulating material or chemical reactions are important in controlling the gas production in this comet. Ultraviolet observations indicated that the comet was composed principally of water ice (H.A. Weaver et al., Astrophys. J. 251, p 809, 1981).

Observational notes: Sky & Telescope's "Comet Digest", by J.E. Bortle:- Volume 63, Jan-Jun 1982, pp 98, 215 (Bowell 1980b), 315 (Seki-Lines 1962 III), 427 (Grigg-Skjellerup 1982a), 533 (Swift-Gehrels 1981j), 634 (Comet 1861 II).

COMETS IN 1980

1980a=1980VI. P/Forbes. Making its fifth observed return since discovery in 1929, P/Forbes was recovered on 1980 Mar. 12.29 U.T. by H.-E. Schuster (European Southern Observatory). The image was somewhat diffuse, magnitude 19-20. A later observation by H. Kosai (Kiso) showed that the comet had brightened to magnitude 17 on 1980 April 18. This comet is subject to appreciable non-gravitational forces and the prediction in the Handbook 1980 (also MPC 4773) required a correction to T of -0d.58.

1980b. Bowell. On 1980 Mar. 13.28 U.T. E. Bowell (Lowell Observatory) discovered a 16½ magnitude diffuse object moving slowly NW in Leo, close to Jupiter in the sky, using the 0.33m photographic telescope at the Anderson Mesa station. Images were later found on two plates exposed on 1980 Feb. 11. Preliminary orbit calculations showed that the comet was actually situated some 1.7 A.U. beyond Jupiter but would make a close approach to the planet (0.23 A.U.) in 1980 December. With the comet passing inside the orbit of Jupiter to reach perihelion in March 1982 at a distance of 3.36 A.U. perturbations will have the effect of making the orbit strongly hyperbolic causing the comet to eventually leave the Solar System.

In 1981 the comet had brightened to mag. 12.7 in January and 11.6 in April (J.E. Bortle) and at the current opposition magnitudes reported are between 10.3 and 11.2.

The latest elements by Dr. B.G. Marsden are based on 79 observations 1980 Feb - 1982 Apr with a mean residual of 1".6:

T	1982 Mar. 12.31204 E.T.	Epoch	1982 Mar. 12.0 E.T.
Peri.	134°.87910	e	1.0571959
Node	114.06756 1950.0		
Inc.	1.66506	q	3.3638148 A.U.

(MPC 6889)

1980c= 1980I. P/Honda-Mrkos-Pajdusakova. Discovered in 1949, this comet was making its 6th appearance when recovered by T. Seki (Geisei) on 1980 May 1.45 U.T. The comet was also independently recovered by I. Halliday on 1980 May 7.25 U.T. using the 3.6m telescope at Mauna Kea. The comet was diffuse, mag. 14-15, the Mauna Kea plates showing a very faint tail about 40" long in p.a. 70° with two faint streamers 9" long in p.a. 30° and 60°.

The prediction in the Handbook 1980 required a correction to T of -0d.15. The recovery positions were in very close agreement with a prediction by Dr. B.G. Marsden (MPC 5128) which utilised 32 observations 1964-1975 and included the effects of non-gravitational forces:

T	1980 Apr. 11.07297 E.T.	Epoch	1980 May 1.0 E.T.
Peri.	184°.63263	e	0.8086233
Node	232.92857 1950.0	a	3.0338482 A.U.
Inc.	13.11837	n°	0.18651481
q	0.5806079	P	5.28 yrs

1980d=1980VII. P/Wild(3). Paul Wild (Astronomical Institute, Berne University) discovered his third short-period comet on 1980 Apr. 11.08 U.T. using the 0.4m Schmidt telescope at Zimmerwald. The comet, moving WSW near the NE border of Virgo, was diffuse with good central condensation, mag 15.5. Computations by Dr. B.G. Marsden indicate that the comet passed only 0.13 A.U. from Jupiter in 1976 August and before that, the orbit was larger and more circular with e= 0.12 and q = 4.2 A.U. with a period of 10.3 yrs. Although perihelion was not until 1980 October, the comet was receding from the Earth and became no brighter than the discovery magnitude.

The following elements by Dr. B.G. Marsden are based on 36 observations 1980 Apr 11 - 1980 Aug 11 with a mean residual of 1".7:

T	1980 Oct. 5.18036 E.T.	Epoch	1980 Oct. 8.0 E.T.
Peri.	179°.33167	e	0.3680273
Node	72.04793 1950.0	a	3.6196469 A.U.
Inc.	15.46121	n°	0.14312146
q	2.2875181 A.U.	P	6.89 yrs.

(MPC 6518)

1980e=1980II. Torres. Discovered by Carlos Torres (Department of Astronomy, University of Chile) on an exposure obtained at the Cerro El Roble station on 1980 Jun. 13.25 U.T., a confirming plate being taken the next night. The comet

was moving NW in Sagittarius and was diffuse with condensation, magnitude 15. A short tail was also reported. Receding from both Sun and Earth, the comet was followed until 1980 October 6.

The following parabolic elements by Dr. B.G. Marsden are based on 23 observations 1980 Jun. 13 -1980 Oct. 6:

T 1980 Apr. 19.87408 E.T.	Peri.	334°.97750	
	Node	278.82279	1950.0
q 2.5839288 A.U.	Inc.	73.14486	

1980f=1980IX. P/Brooks(2). Originally discovered in 1889, P/Brooks(2) was making its 12th appearance when recovered by H.-E. Schuster (European Southern Observatory) on 1980 Jun. 13.30 U.T. The comet was around 19th magnitude and on Jun. 18, J.H. Bulger and C.-Y. Shao (Harvard College Observatory) reported the image as weak and very nearly stellar. The prediction in the Handbook 1980 required a small correction to T of -0d.02.

1980g=1980X P/Stephan-Oterma. Recovered by H.-E. Schuster (European Southern Observatory) on 1980 Jun. 13.35 U.T. at magnitude 18. Originally discovered in 1867, the comet was missed at the 1904 return but rediscovered as a new comet by Whipple and Oterma in 1942. The 1980 return was favourable and was observed visually from 1980 Sept. to 1981 Feb., the magnitude reaching a maximum of around 8.4 in December. No tail was reported and the coma remained relatively small throughout the apparition, not exceeding 4'.

The prediction in the Handbook required a correction to T of -2d.7 but only of -0d.07 to a prediction by D.K. Yeomans published on IAUC 3488:

T 1980 Dec. 5.2244 E.T.		Epoch 1980 Dec. 7.0 E.T.	
Peri. 358°.1619		e 0.859984	
Node 78.5122	1950.0	a 11.244112	A.U.
Inc. 17.9810		n° 0.0261406	
q 1.574361	A.U.	P 37.704	yrs

1980h=1980XIII. P/Tuttle. Recovered by C.-Y. Shao and G. Schwartz on 1980 Jun. 14.29 U.T. using the 1.5m reflector at Agassiz (now Oak Ridge). The comet was diffuse with slight condensation, magnitude 20. The prediction in the Handbook 1980 required a small correction to T of -0d.03. This comet was discovered in 1790 and was making its 10th appearance. The comet came within 0.5 A.U. of the Earth in 1980 December and was widely observed visually, maximum magnitudes reported being around 7 in late November and early December.

1980i. P/Borrelly. Recovered by H.-E. Schuster on 1980 July 9.31 U.T. The magnitude was 18-18½ but nothing was reported about the appearance of the comet. Discovered in 1904, P/Borrelly was making its 10th observed apparition having been missed between 1932 and 1953. The prediction in the Handbook was very close. The comet was unusually bright during the first few months of 1981 when visual magnitudes between 9.5 and 10.4 were reported.

1980j. P/Kohoutek. Recovered by H.-E. Schuster (European Southern Observatory) on 1980 Aug. 6.27 U.T. The comet was of magnitude 19, nothing being reported about the appearance of the object. Discovered in 1979, this comet was making its first return and the prediction in the Handbook required a correction to T of -0d.68. The comet remained a faint object and no visual observations were reported.

(To be continued)

S.W. Milbourn

COMET OBSERVATIONS - Graham S. Keitch

It is our intention to analyse all observations of comets on a current basis and these notes include reports on the recent apparitions of comets P/Swift-Gehrels 1981j, P/Kearns-Kwee 1981h and P/Grigg-Skjellerup 1982a. None of these three objects became brighter than 9.0 magnitude and coverage was therefore maintained by only a few observers. We would encourage observers to monitor these fainter objects and would also like to stress the desirability of prolonged and consistent coverage. This equally applies, of course, to both faint and bright comets for the purposes of these analyses.

These notes also contain an account of the performance of comet Austin 1982g which is currently (Sept. 25) a bright object in binoculars (around 8.0 mag). The comet is being monitored closely by many members of the Section at the present time and we look forward to receiving more observations over the next month or so as the comet fades away. It should remain visible for the remainder of the year and a full analysis will be prepared for the next Bulletin.

In addition to analysing current comets, we are also attempting to investigate some of the more important comets observed by the Section in recent years. An analysis of comet West 1976 VI by Christopher Clayton is almost complete and the results of this major undertaking will be ready for the next Bulletin. We have completed an analysis of comet Bradfield 1979 X and this is presented below. This particular comet attracted the attention of professional observers and was extensively monitored by the International Ultraviolet Explorer satellite. A considerable amount of narrow band data exists for this object and a preliminary comparison between the comet's visual photometric performance and its photometric behaviour at selected wavelengths has prompted us to look more closely at this aspect of the comet using the Section's observations. We will report on this in due course.

For the photometric analyses which follow, we have fitted the comet's brightness behaviour to the usual formula; $m = H + 5 \log \Delta + 2.5n \log r$. All photometric estimates have been aperture corrected to the standard aperture of D = 6.78 cm according to the formula recommended by Morris [1]. These notes also list most of the Section's active observers. Readers can use these lists to identify the individuals whose observations are referred to in the following reports where initials have been used in place of full names.

Comet Bradfield 1979 I = 1979 X

William Bradfield discovered his tenth comet on 1979 December 24.75 UT. Two days later AFJ described the object as being diffuse with a gradual condensation and a short tail in twilight. Using a 4.5cm finder, the brightness was judged to be $5.^m5$ while observations during the last week of the year by MC and other southern hemisphere observers put the comet around $4.^m6$ to $4.^m8$ with a fairly small coma of about 1.'5 to 2.'0. A tail of at least 2° was seen in PA 250°. Further observations by MC showed a gradual increase in coma size to about 3' (85000 km) as seen in the 25 cm relfector x 55 on 1980 Jan. 9.80 while AFJ judged the $5.^m6$ coma to be a little over 3' with a 30' tail in PA 260° as seen in 11 x 80 binoculars (B) in moonlight on Jan. 12.64 UT. On Jan. 20.47, AFJ was able to glimpse the comet as a misty patch of $4.^m9$ to the naked eye while the 32cm relfector showed the coma as being very large (12') and generally diffuse although well-condensed at the centre, The faint whispy tail was recorded for 30' in PA 250° and this compares with the value of 225° for the position angle of the radius vector at this time.

By the month's end, the comet had moved considerably northward and was located by JEB at $4.^m8$ in 10 x 50 B on Jan. 27.98. The gibbous Moon was now strongly interfering but the binoculars still showed a good 12' of coma (112,000 km). These values were confirmed by CSM a few hours later. Over the next few days JEB, AFJ and CSM all reported a slight fading to about $5.^m5$ as noted in small instruments.

Magnitude estimates by most observers using proper methods were in very good agreement around this time. For Feb. 3, aperture corrected estimates by JEB, GMH, CSM, CSM, HBR, and GSK all agree to within $0.^m1$ when reduced to a common photometric sequence; the magnitude was $5.^m8$ to $5.^m9$ or $6.^m2$ to $6.^m3$, depending on whether photoelectric or SAO magnitude data were used. The agreement is especially good considering the large and diffuse

nature of the 12' coma. On the same night, JEB noted various appendages outto 30' between PA 80° and PA 140° while CSM and GSK also recorded a tail to the east. On Feb. 4.0 both JEB and CSM were able to see numerous tails and streamers between east and south-east of the condensed coma while the former observed the comet as a circular glow about 17' (295,000 km) across at $5.^m6$ with the naked eye. He also used a visual spectroscope on the 32cm reflector to record strong C_2 emission bands but very little continuum.

Poor weather prevented observations from this country over the next week or so but our active observers overseas, JEB, AFJ and CSM were able to maintain coverage. All these observers agreed the comet was $6.^m4$ to $6.^m5$ on Feb. 6 while MG was able to see about 13' of coma from Kenya about this time. The night of Feb. 6 was also the occasion on which a magnificant series of photographs was secured at the Joint Observatory for Cometary Research (JOCR). Three exposures show rapid and dramatic changes in the plasma tail over a time scale of less than half an hour. The plates were reproduced in Sky and Telescope[2] and show how the PA of the tail altered by 10 degrees during this brief interval.

The next good night in the UK was on Feb. 10-11 when numerous observers placed the comet somewhere between $7.^m5$ and $8.^m4$; fainter values being reported by those with hazy skies. On this date, JEB, CSM, RWP and GSK noted appendages to the east while two photographs by MJH with the 10cm camera at Colchester showed a narrow type 1 tail up to 1 degree long in PA 74° and a broader more diffuse span of material between this tail and PA 110° out to a distance of about 10' from the coma. Both RWP and JS reported seeing a nucleus of 11^m to 12^m within the slightly condensed 8' coma. Hazy skies made it difficult for GMH, HBR and GSK to obtain magnitude estimates on the night of Feb 11-12 when values of $8.^m0$ to $8.^m5$ were found for the comet which was now becoming quite diffuse while remaining very extensive. These estimates are probably a little faint because the following day CSM and GSK found values of $7.^m8$ and $8.^m1$ for the 7' (223,000km) coma using 20 x 80 B while JEB could still see 13' (434,000km) of coma in 10 x 50 B and consequently obtained even brighter value of $7.^m3$. Providing observers give full details of their observing conditions and make sensible estimates or measurements of coma diameter, it is quite possible to account for these descrepancies in the magnitude data.

Around midmonth, CSM and GSK recorded tails to the north-east and south-east while the north-east component in PA 46° was photographed by MJH on Feb. 13.83. Over the next few days, most observers agreed that the diffuse coma was fading gradually although JEB and GSK continued to record the faint tail features pointing towards the east. The position angle of the radius vector was 76° on Feb. 15. By February 20, JEB and CSM estimated the slightly condensed comet as being between $8.^m6$ and $8.^m8$. Moonlight then interfered again.

As March began the comet had become very diffuse and ill-defined. With 25-32 cm reflectors, JEB, CSM and GSK reckoned the comet to be somewhere between $9.^m7$ and $10.^m2$ on the night of March 3-4. This agreement is reasonably good considering the difficulties presented by an extensive object of such low surface brightness. During the next week or so the comet was barely brighter than the background sky and it was finally lost from view as an exceedingly difficult object of magnitude $10\frac{1}{2}$ to 11 after the second week of the month. Some observers were surprised to learn of the relatively bright values being reported by JEB, CSM and GSK around this time when the comet was almost at the limit of detection. Those who are still skeptical may wish to expand a magnitude $10\frac{1}{2}$ star to resemble a 4' coma on a dark clear night. The writer is confident that some observers will be surprised at the faintness of the image, assuming that the star is fully expanded to the correct size!

The last positive observation of the comet was made by JEB on March 19.04. Using the 32cm reflector, the coma was found to be totally diffuse, 3.'0 across (257,000km) and $10.^m8$. Further attempts by GSK to locate the comet during April were unsuccessful.

For the photometric analysis, 102 observations were selected. A Sharp MZ-80K microcomputer was programmed to carry out a least-squares regression analysis and to produce a plot of all the data. This shows that the comet's photometric performance altered beyond 1 AU from the Sun.

Consequently, the r less than 1.0 data and the r greater than 1.0 were analysed separately and the following parameter values were found:

r less than 1.0 AU

r = 0.559 to 0.996 AU (16 observations)
H = 8.78 ($\pm$ 0.17)
2.5 = 11.84 ($\pm$ 1.65)

r greater than 1.0 AU

r = 1.013 to 1.795 AU (86 observations)
H = 8.08 ($\pm$ 0.08)
2.5n = 5.85 ($\pm$ 0.06)

These values agree reasonably well with those determined independently by Morris[3].

The r less than 1.0 AU data showed evidence of a possible dip coinciding with delta min (perigee) and Marcus[4] has already attributed this to the delta effect. However, the current analysts also found evidence of a flare following immediately after the dip. Beyond this point, at about 1 AU the comet's photometric performance alters; the rate at which it faded reduced dramatically to an inverse 2.3 function of heliocentric distance. Together with the change in the comet's photometric performance, the flare has also the effect of exaggerating the dip which immediately precedes it and consequently, the writers are not sure that a true effect exists with this particular comet. Nevertheless, the exact coincidence of the dip with perigee is rather striking and Marcus' paper on this comet is certainly most interesting.

The breakdown of observations which contributed to this analysis is given below:

r less than 1 AU results:

JEB (2), AFJ (12), CSM (2)

r greater than 1 AU results

JEB (17), GMH (8), MJH (2), AFJ (7), GSK (18), CSM (20, SWM (1), RWP (7) HBR (5), JS (1).

Selected Aperture Corrected Estimates of Comet Bradfield 1979 X

Date	m_1	I	Obs	Date	m_1	I	Obs
1979							
Dec 26.65	5.7	4.5R	AFJ	Feb 10.79	7.3	8.0B	RWP
1980							
Jan 10.64	5.6	5.0B	AFJ	13.99	7.7	8.0B	CSM
20.47	5.2	2.3B	AFJ	16.82	8.2	8.0B	RWP
27.98	4.9	5.0B	JEB	18.01	8.5	5.0B	JEB
28.43	5.3	2.3B	AFJ	20.04	8.7	5.0B	JEB
30.03	5.2	8.0B	CSM	23.82	8.7	26.0L	GMH
31.02	5.5	8.0B	CSM	Mar 3.80	9.8	29.8L	GSK
Feb 2.79	5.9	5.0B	GSK	4.03	9.9	25.0L	CSM
4.00	5.9	5.0B	JEB	4.82	10.0	29.8L	GSK
5.01	6.1	8.0B	CSM	10.04	9.6	32.0L	JEB
5.39	6.5	5.0B	AFJ	16.04	10.1	32.0L	JEB
10.01	7.1	5.0B	JEB	19.04	10.3	32.0L	JEB

I = instrument aperture (cm) and type (R = refractor, L = reflector, B = binoculars)

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P/Swift-Gehrels 1981j

This periodic comet made a favourable return during the winter of 1981/82 but JS, KMS and GSK were the only UK observers to secure a long series of observations despite the fact that the comet was quite bright and readily visible in larger reflectors for several months. The comet was well monitored by the American observers JEB and CSM as well as by the Dutch Comet Workgroup.

Unfortunately, the data secured by these observers is unusually inconsistent. Although the comet was reasonably bright and condensed, the outer coma during most of the apparition was ill-defined and quite extensive and this can create difficulties when estimating the comet's magnitude. The situation is generally relieved by observing with small instruments at low magnification but the comet was too faint for any prolonged coverage in such instruments although JEB, CSM, GSK and the Dutch were able to see the comet as a diffuse faint patch in 8cm binoculars during 1981 Nov and Dec.

To try to make some sense of the data, estimates contributed by the following were selected for closer examination:

JEB (26), GMH (3), CSM (27), RWP (3), JS (17), and GSK (27).

The estimates were aperture corrected and this brought most of the estimates secured by JS with the 32cm refractor at Cambridge nearer those obtained by the other observers using 25 to 32 cm reflectors. An immediate feature of the data is that JEB, CSM and GSK all reported step jumps in the comet's brightness rather than gradual changes. However the observers do not agree over the timing of the brightness increases which suggests that they were not intrinsic to the comet itself. JEB first located the comet on 1981 Oct. 1.01 when the 1.'1 (29,000km) coma was $13.^{m}0$ in the 32cm reflector. The same observer noted only a gradual increase in brightness up to Oct. 22.02 when a value of $12.^{m}7$ was reported. Near this date, CSM reported a similar value with his 25cm reflector. The next observation by JEB on Oct. 30.14 placed the comet at 1^{m} brighter than it had been previously but this may have been partly due to a small drop in the magnification from x88 to x68. The observations by CSM do not show the jump until Nov. 24.05 when again a drop in magnification from x103 to x68 may have been partly responsible.

From the beginning of November until mid December, GSK employed the same eyepiece and noted only a gradual change in brightness. It seems that the image presented to each observer by the instruments aperture and magnification together with the general observing conditions (which were probably affected by snow cover) were especially critical in the case of this particular comet. The inconsistencies increased during the first week of 1982 Jan when JEB reported a gradual drop in brightness of approx. 1^{m}. Around this time, CSM reported a slight fade yet GSK reckoned the comet to have become somewhat larger and more diffuse with an increased total magnitude! In fact, a couple of weeks later on Jan 20.78, GSK could see the comet more clearly in 20 x 80 B than at any previous time while JEB and CSM both agreed that the comet was fading to near 11^{m} in larger reflectors. Between Jan 26.82 and 29.86 GSK reported a dramatic decrease in coma brightness and size from 10^{m} and3.'0 to $12.^{m}1$ and 1' ! Perhaps a marginal difference in sky condition was responsible for this dramatic effect, in which case, it is hardly surprising that the reports were abnormally inconsistent. Several weeks later on Feb 11.88, GSK suspected the comet at $12.^{m}7$ while the Dutch reported seeing the comet somewhere between $12.^{m}0$ and $12.^{m}6$ during the period Feb 14.78 to Feb 21.87.

The following table of selected aperture corrected estimates should serve as a guide to the comet's performance:

Aperture Corrected Estimates of Comet P/Swift-Gehrels 1981 j

Date		m_1	I	Obs	Date		m_1	I	Obs
1981					1981				
Oct	1.01	12.5	32L	JEB	Dec	20.98	10.0	25L	CSM
	18.04	12.2	32L	JEB		24.16	9.7	8B	CSM
	22.04	12.1	25L	CSM		30.04	9.9	25L	CSM
Nov	1.04	12.1	25L	CSM		31.00	9.4	32L	JEB
					1982				
	4.97	11.4	30L	GSK	Jan	12.98	10.0	25L	CSM
	18.85	11.5	30L	GSK	13	13.76	10.1	30L	GSK
	24.05	10.5	25L	CSM		21.99	10.5	25L	CSM
	26.15	10.4	32L	JEB		25.05	10.7	32L	JEB
Dec	3.00	10.4	25L	CSM		27.86	10.4	30L	GSK
	13.97	10.0	25L	JEB	Feb	11.88	12.3	30L	GSK
	17.04	10.0	25L	CSM					

Throughout the apparition, the comet was generally described by JEB, GMH, CSM, KMS, JS and GSK as being large and diffuse with some condensation. The coma was generally reckoned to be about 2' (50,000 to 100,000km) across and once or twice CSM and GSK suspected a tail towards the east. JEB and GSK also suspected a tail pointing towards the south-west on occasions.

P/Kearns-Kwee 1981h

This very faint object was well-placed during the winter of 1981-82. The first Section visual observation was by GSK using the 30cm reflector at Wrington on 1981 Nov 28.03 when the comet was small, 0.'6 across (35,000km) and very faint being $13.^m6$ at x 89. A few hours earlier the comet had produced a very faint image of approximately 16^m on a photograph taken by AY at the prime focus of his 57cm reflector. A number of further photographs were secured by this observer over the next few weeks while MJH photographed the comet as being 0.'8 diameter at 14^m with the 10cm Cooke lens at West Bergholt, Colchester on Nov 30.97.

Further visual observations by GSK between Nov 29.05 and Dec 9.22 showed the comet to be at a constant brightness of $13.^m6$ to $13.^m7$ with a coma diameter of less than 1'. A tail was observed on PA 273° on Dec 3.13 and this was confirmed by photographs exposed around this time by AY. Attempts by JS and GSK to observe the comet later in the month were unsuccessful although AY continued photographic coverage well on into the New Year of 1982.

P/Grigg-Skjellerup 1982a

In many respects, comet P/Grigg-Skjellerup was very similar to P/Swift-Gehrels. The comet was generally rather large, very diffuse and of similar brightness. It was visible in 20 x 80B as a ninth magnitude object when at maximum brightness but was too faint for prolonged study in small instruments. The comet was monitored between 1982 mid April and mid June by JEB, CSM, JS and GSK. A couple of observations were also submitted by RWP.

The first of these observers to locate the comet was CSM. Using the 25cm reflector at Prospect Hill Observatory, Harvard, USA, he found the comet to be $13.^m0$ and 0.'6 (13,000 km) across on 1982 Apr 20.07. Further observations over the next week or so showed the comet to have brightened by approx. $\frac{1}{2}$ mag. It was $12.^m6$ in the same instrument on Apr 25.05 while the 15cm reflector gave a value of $9.^m7$ on May 15.09, by which time, the coma was seen to be a full 4' across (65,000km).

To begin with, the comet was poorly placed from the UK as the approaching summer evenings lengthened, GSK was unable to locate the comet until May 16.92 when the 30cm reflector showed less than 2' of coma and gave a correspondingly faint magnitude estimate of only $11.^m5$. The following day, however, GSK observed the comet with a 20 x 80B which showed more of the coma and gave a value of $9.^m6$ which was clearly more realistic as CSM judged the comet to be $9.^m5$ in the 15cm reflector two days later. The comet was at maximum brightness around this time.

Using the 32cm reflector on May 15.08, JEB described the comet as being very diffuse and ill-defined with a possible broad tail in PA 225° while GSK reported a diffuse tail in PA 281° on May 25.94. On the nights of May 22 and 23, both JEB and RWP agreed the comet was $9.^m9$ to $10.^m0$ in 32cm and 25cm reflectors while JEB, CSM, RWP and GSK all placed the comet near $9.^m8$ during the last week of May before moonlight obliterated the large, very diffuse and only slightly condensed object.

When the comet was next seen during the second week of June, both JEB and GSK reported that it had faded to $10.^m3$ to $10.^m4$. These values were reported by both observers for June 10 and 13. As the month progressed, the comet became really quite difficult on account of its low surface brightness. GSK judged the coma to be $10.^m9$ and 2.'1 (25,000km) across on June 19.97 when it was possibly fanned towards roughly PA 270°. A few days later, JEB reported virtually identical values and further confirmation was provided by CSM when he reported $11.^m0$ and 2.'5 on June 19.17.

The last observations reported by these observers all show the comet to have been exceedingly faint and diffuse during mid July with a total magnitude of $11.^m2$ to $11.^m3$ and a coma diameter of 2' to 3'.

Selected Aperture Corrected Estimates for comet P/Grigg-Skjellerup 1982a

Date 1982		m_1	I	Obs	Date		m_1	I	Obs
Apr	20.07	12.7	25L	CSM	Jun	14.96	10.2	30L	GSK
	25.05	12.3	25L	CSM		19.97	10.5	30L	GSK
May	11.08	9.4	32L	JEB		27.17	10.5	25L	CSM
	17.93	9.5	8B	GSK	Jul	10.11	10.8	32L	JEB
	23.95	9.7	20L	RWF		15.12	10.9	25L	CSM
	27.08	9.6	15L	CSM		16.00	10.9	30L	GSK
Jun	10.10	9.9	32L	JEB					

For the photometric analysis 37 estimates were selected as detailed below:

JEB (9), CSM (17), RWP (2), JS (2), GSK (7).

The heliocentric variation of 0.989 to 1.298 AU was too small for a proper determination of the n-parameter value. Consequently we assumed that $n = 4$ and determined H_{10} as being 11.96 ± 0.76, for comparison, Bortle gives[5] $H_{10} = 12.5$ for the 1977 apparition. He also comments that the comet behaved unusually in 1977 when it continued to brighten after perihelion. The observations used for this present study show that the comet brightened rapidly during the very brief pre-perihelion interval of r = 1.049 to 0.990 AU although the heliocentric magnitude varied little during the outward journey when the heliocentric distance increased from r = 0.989 AU to 1.298 AU. It will be interesting to investigate further apparitions in the future.

Comet Austin 1982g

This bright comet was discovered by Rodney Austin (New Zealand) on 1982 June 18.667. The object was not accessible from the UK until mid August by which time it was rapidly heading northwards. Prior to that it was only visible from the Southern hemisphere when it was monitored closely by members of the Australian Comet Section. This small but expanding group of observers are to be congratulated for their fine efforts. A preliminary study of their work shows that these observers are using consistent and acceptable methods of observing comets and the quality of their observations appears to be very good. A long series of observations by Pearce and Seargent shows excellent agreement when small allowances are made for differences in instrumentation. Both observers used proper comparison star sequences and in so doing have provided a first class account of the comet's performance during June and July. In the past, observations from the south have often been rather sparse and it is especially pleasing that this situation is now being rectified.

It is also pleasing that observers in this country are now adopting proper procedures for comet photometry and, of the observations received so far, the scatter is well down below $\frac{1}{2}$ magnitude. Often observers using proper methods and comparison stars are agreeing precisely and certainly to within 0.1 to 0.2 mag. The wider use of the AAVSO Atlas by both the Australian and UK observers

can partly account for this.

From the observations of comet Austin received so far it is evident that the comet has received considerable attention from the following observers:

R. Arbour	(RA)	UK	V. Matchett	(VM)	Australia
M. Clark	(MC)	Australia	J. Medway	(JM)	UK
C. Clayton	(CC)	UK	S. Milbourn	(SWM)	UK
L. Entwisle	(LE)	UK	C. Munday	(CM)	UK
K. Grundy	(KG)	UK	R. Newman	(RN)	Australia
M. Hendrie	(MJH)	UK	R. Panther	(RWP)	UK
T. Hickey	(TH)	Australia	C. Parfoot	(CP)	Australia
D. Keedy	(DK)	UK	A. Pearce	(AP)	Australia
G. Keitch	(GSK)	UK	H. Ridley	(HBR)	UK
S. Lawrence	(SL)	Australia	D. Seargent	(DS)	Australia
D.McAdam	(DMcA)	UK	G. Thompson	(GDT)	Australia
G. Marsh	(GDM)	UK	A. Young	(AY)	UK

To digress briefly, and to complete the list of current active members, the following also contribute to the Section regularly although it has not been possible to include their results for comet Austin (we await their reports):

J. Bortle	(JEB)	USA	J. Shanklin	(JS)	UK
D. Frydman	(DF)	UK	K. Sturdy	(KMS)	UK
M. Gainsford	(MG)	UK	M. Taylor	(MDT)	UK
G. Hurst	(GMH)	UK	Dr. R. Waterfield	(RW)	UK
A. Jones	(AFJ)	New Zealand			
R. McKim	(RMcK)	UK			
C. Morris	(CSM)	USA			

(We apologise if anyone has been accidently omitted from these lists.)

A full analysis of all the observations will be undertaken for the next Bulletin when all the report forms have been received. Meanwhile, the following is an account of the comet's performance so far.

The comet was $9.^m6$ on 1982 Jun 21.9 when the coma was 2' in diameter and little condensed according to the Australian team. It was visible in 15 x 80B according to DS while AP noted that the coma was slightly elongated N-S in the 15cm f/5 reflector at x 72. As July began, AP and MC both placed the comet at $9.^m5$ with a 2.'5 coma as seen in reflecting telescopes while DS was able to see a 3.'5 coma in binoculars. Consequently he made the comet a little brighter at $9.^m1$ on Jun 29.81 and $8.^m8$ on July 3.82. The coma was now becoming more strongly condensed with a diffuse outer halo. The photometric estimates secured by these observers show the comet to have increased steadily in lustre over the next week or so. Both DS and AP agreed the comet was $7.^m6$ on July 16-17 when the coma was 4' across.

By July 27.28 AP and MC agreed that the magnitude was 5.8 or 5.9 in binoculars while DS could see the comet at $5.^m4$ with the naked eye. All three observers were reporting a tail roughly in PA 220°-230° and by the month's end, this faint narrow appendage was perhaps as long as 2 degrees. The coma had also increased in size to about 8'.

During the first few days of August, moonlight was troublesome but the strongly condensed coma was still clearly visible with a magnitude of $4\frac{1}{2}$ to 5^m. By Aug 8 the comet was possibly as bright as $4.^m1$ according to DS but observations were becoming more difficult to secure as the comet was becoming less favourably placed for southern observers.

It was now time for the northern observers to take over. MJH near Colchester was the first to see the comet from the UK. He observed the comet very briefly in a 13 x 60B when it was barely 2 degrees high with a magnitude of about 4 on August 15.8. SWM observed the comet on Aug 17.8 but the first evening when the comet was widely seen was on Aug 18 when LE, MJH, RWP HBR and GSK all agreed the magnitude was $4.^m7$ to $4.^m9$ and the coma diameter 5'. A straight narrow type 1 tail was noted by these observers who all reported its length to be about 1 degree in PA 20° or thereabouts. A photograph by MJH showed $1\frac{1}{2}$ degrees of tail on this date. The coma was strongly condensed.

Over the next couple of nights, the comet climbed further northward and moved into darker skies. On Aug 19.88 RWP observed with 15 x 80B and saw a 2¼ degree tail streaming out from the coma which MJH, HBR and GSK all estimated to be $4.^m7$ to $4.^m8$. The following night HBR photographed the tail as being 6 degrees long in PA 25°. Using a 30cm reflector GSK also noted a short diffuse fan to the northward while the coma itself resembled an open umbrella with fans and jets springing out from the intense central region. Over the next couple of nights, photometric estimates by CC, LE, HBR and GSK all agree to within 0.1-0.2 mag and show a gradual fade in the comet's brightness.

By the 24th of the month, the comet was quite spectacular when observed with binoculars in a dark sky. GSK could see about 4 degrees of tail streaming from a 5' coma in PA 35° using a 10 x 50B while the amount of detail in the coma and tail presented by the 30cm reflector at x62 is far too lengthy to report here in full. A photograph taken by HBR actually showed 12 degrees of tail on this particular date when the comet was $5.^m3$ and 5' across in binoculars. The following night GSK observed considerable detail using only a 20 x 80B. The narrow gas tail was several degrees long in PA 37° while numerous short rays formed a fan of material to the south of the main plasma tail between PA 72° and 92°. A brighter spine or jet issued from the coma in PA 58° and gradually curved northward to join the main stream of material in the long tail at a distance of 20' from the coma at which point the tail was 2.'3 across.

Over the next few days, magnitude estimates by LE, MJH, KM, HBR and GSK all show a continuing slight fade in brightness. HBR found the comet to be $5.^m2$ on Aug 25.9 while GSK found a value of $5.^m5$ on Aug 29.9 when the well-condensed 2.'6 coma sported a 40' gas tail in PA 34° with a much shorter diffuse fan of material visible to the east. The long gas tail was brighter on its southern edge and was generally a little distorted. These details were noted with the 20 x 80B in strong moonlight.

As September began most observers reported the comet to have faded near to $6.^m0$. On Sept 2.0 RWP, HBR and GSK reckoned the comet to be $5.^m9$ to $6.^m1$ in small instruments. By Sept 7.9 both HBR and GSK could see a ½ to 1 degree tail in PA 35°-40°. The $6.^m4$ to $6.^m5$ coma was about 2' across and well condensed. The 30 cm reflector used by GSK on this particular date produced a detailed view of the plasma tail at x63. The coma was essentially elongated NE/SW with a diffuse and irregular outer halo to 2.'7. The main gas tail was fine and quite bright for ½ degree in PA 35°. It was flanked on either side by more diffuse material creating an overall tail width of 1½'. The intensity of the tail was uneven with several brighter patches along its length, especially 15' downstream from the coma. Beyond this point the tail seemed to curve slightly southward. Between PA 90° and 128° there was a bundle of at least 3-4 jets which created a weak diffuse fan of material extending out from the coma by about 2'. A number of superb photographs by RA and AY show some fine views of the tail structure. In addition there is a lot of detail and information which the large telescope user can record visually, especially near the coma where photographic image is often burnt out. We hope to analyse some of these more detailed photographic and visual physical observations in due course.

Further photographs exposed by MJH with the 10cm f/4.5 Cooke camera on Sept 11.86 and 13.84 showed the tail to be straight and narrow up to 2 degrees long in PA 30°-35°, while both MJH and GSK judged the pear-shaped coma to be $6.^m6$ in binoculars on Sept 14.8.

The comet will remain well-placed and could be visible in amateur instruments for the remainder of the year and we very much look forward to receiving observations from members of the Section.

Other Comets

During the past few months members have also continued to monitor the very distant and rather faint comet Bowell 1980b. This object has always been very poorly placed from the UK and the observations are generally rather sparse. During the summer months the object was about $11.^m0$ to $12.^m0$ and about 1' across. A report on this comet and also on recent outbursts of P/Schwassmann-Wachmann I (1925 II) will be prepared for the next Bulletin.

Of the remaining comets currently visible GSK reports seeing comet P/Churyumov-Gerasimenko 1982f at $13.^m2$ on 1982 Aug 29.11 and $12.^m7$ on Sept 18.17 using the 30cm reflector at Wrington. The comet was photographed by MJH on 1982 Sept 21.9

showing only a faint almost stellar image with the 10cm camera and a 45 min exposure. GSK also saw comet P/D'Arrest 1982e to be visible at about $7.^{m}9$ in 20 x 80B on Sept. 21.82. The comet was extremely low and further sightings from the UK are unlikely. The former comet, P/Churyumov-Gerasimenko, should brighten somewhat over the next few months and should hold more promise for observers wishing to secure a long sequence of observations.

References

1 Morris C.S., Publ. Astron. Soc. Pacific, 85, 506 (1973

2 Sky & Telescope, 61, 2, 107 (1981)

3 Morris C.S., International Comet Quarterly, 2, 2, 24 (1980)

4 Marcus, J.N. Comet News Service, 80, 1 (1980)

5 Bortle J.E. Sky & Telescope, 54, 2, 107 (1977)

(We thank Christopher Clayton for assisting with the photometric analysis of comet Bradfield 1979 X)

The International Comet Quarterly

A large volume of photometric estimates has been despatched to the ICQ file during the past year. The table below gives the number of estimates contributed by each observer for the various comets which have appeared since the summer of 1981.

Comet	1925II.	Encke.	1980b.	1980g.	1980h.	1980i.	1980k.	1980q.	1980t.	1980u.	1981h.	1981j
Observer												
Canton									1			
Clark			6						1			
Entwisle									1			
Hendrie		1		2	1			2	1	4		
Hurst	4	1		6				2	2	3		3
Jones					34							
Keitch	7	26	7	69	31	4	6	37	14	59	5	29
McKim									1	1		
Panther		2		12	5			5	2	22		3
Pickard									2			
Ridley				9	1			2	7	10		
Shanklin		13	3	50	22			33	13	83		17
Sturdy										2		
Taylor									3			

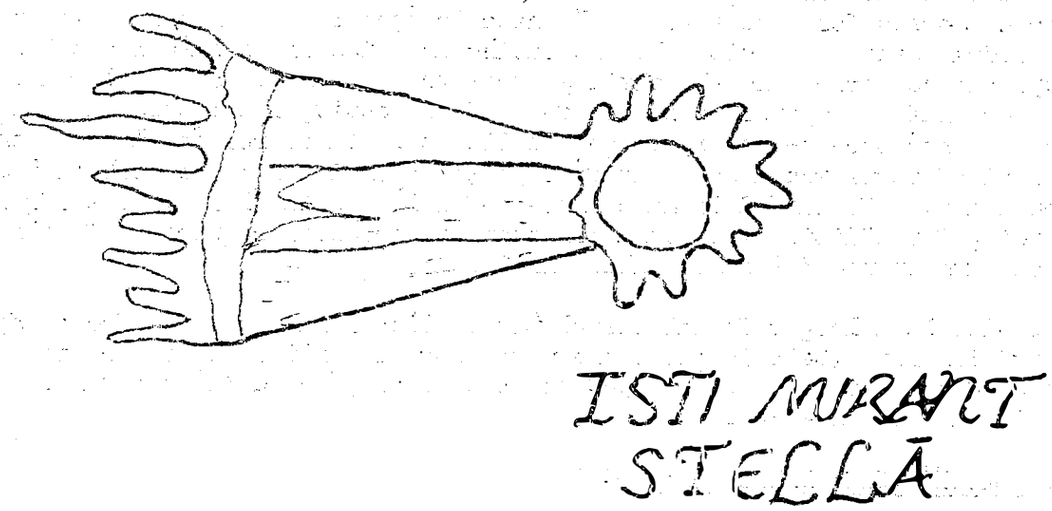
(Observations of Bortle & Morris are submitted directly to the ICQ)

In addition 268 observations of comet West 1976 VI (221 obs) and comet Bradfield 1979 X (47 obs) have also been forwarded to the ICQ recently. The breakdown of observations as contributed by each observer will be given in the next Bulletin.

The observations used in the Comet Section Report which will appear in the Journal in the near future on BAA observations 1948-1954 have also been passed to the ICQ and about half of them have been published already in the ICQ Vol 4 No 1 (1982 January) and the remainder will appear before very long.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



BULLETIN NO. 19

APRIL 1983

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THE COMET SECTION KEEDY AWARD

Our member David R. Keedy, B.A., F.R.A.S., from South Shields has very kindly offered to fund a prize for the member of the Comet Section who, in the opinion of the Director, has made the most valuable contribution to the observational work of the Section during 1983. The value of the award will be £20.00.

The Director will consult with his officers before deciding on the winner of the award and, of course, neither he nor they shall be eligible to win it. The decision will be made shortly after the end of the year and the result announced in the Bulletin for March 1984. It is intended to make the Award annually.

David Keedy has also donated £10.00 towards Section funds to help with the cost of the Bulletin. We are grateful for these generous contributions in support of the work of the Comet Section.

ASSOCIATION'S ANNUAL EXHIBITION MEETING

This meeting will be held on Saturday May 28 at Hawkstone Hall and a special effort is being made to make a good showing of the Section's work this year. We do not want to receive the wooden spoon. Please see the notice in Bulletin 18 also, and let the Director know as soon as possible what you intend to exhibit and how much space it will take up. Directors have to book space well in advance to enable the organiser, Alan Dowdall, to complete the arrangements in good time. It may well be a case of no booking - no space this year, so let me know in good time and do try to provide something that we can show. After comet Austin there is really no excuse for not having a drawing or photograph to exhibit.

The usual official notice of the arrangements will appear in the Journal for April.

NEW OBSERVING REPORT FORMS & NOTES

The unusually cloud weather this winter has had at least one benefit for observers, it has enabled Harold Ridley to design new report forms and to write new notes for observers. The need to update these has been apparent for several years, but with the increasing exchange of information between groups and countries and the setting up of the International Comet Quarterly computer file of physical observations and the coming International Halley Watch, it has been necessary to wait until we could be reasonably sure that the revised forms would carry us through the eighties with no more than minor admendments. We wanted to make these compatible with those of the ICQ while providing for additional information that we ourselves require. We also wanted them in use for comet Halley in 1985/1986.

There will be a larger format Visual Observation Form and a new Photographic Observation Form (both A5 size) and more extensive notes on how the form should be completed. It is hoped to have these printed and ready for distribution by mid-1983.

COMET SECTION OBSERVATION 'DATABASE'

There is a need for a "database" to hold observational data, that would allow observations to be entered in any order, sorted on several fields, stored on tape and recalled for further processing in subsidiary programs. It would have to run on 48k tape-base Sharp MZ80K computers of which there are at least 4 owned by Section members. If anyone feels they could tackle this and has access to an MZ80K, I should be pleased to hear from them. A commercial "database" program that I have is too restricted to be really useful for this purpose. The problem would be eased if disks were used, but at present the cost rules this out.

INDEX TO THE JOURNAL

It has been decided that as a first step towards the provision of an Index to the Journal, each Section should prepare an index covering its own subject. The last published index to the Journal covered the first 50 volumes (1890-1939). Peter Stanley has very kindly agreed to undertake this task for the Section, which will mean visits to the Library to delve through past issues of the Journal looking for references to comets and the work of the Section.

DISTRIBUTION OF THE BULLETIN

At the present no charge is made for the Bulletin, although we do ask that U.K. readers send SAE to the Publication Assistant (Stan Milbourn). This not only helps defray costs but also makes it easier to keep track of who wishes to "subscribe" (no envelopes, no Bulletin!). We do try to avoid cutting off supplies due to oversight on the part of the subscriber, but the only safe way to ensure that you will receive the Bulletin is to keep track of the envelopes yourself and send a fresh supply when the last is used.

We do not ask overseas members to pay postage (though some have helped us by doing so) as it is felt that they benefit from membership of the Association less than those who can attend meetings and borrow books and equipment. Also a number of overseas readers suppy a copy of their own publication in return. In several cases the BAA benefits greatly from this arrangement.

However, a charge of some sort may have to be made before long if production and postage costs continue to rise as seems likely. It would help if members who write to the Director and officers would send a stamp or SAE of suitable size for a reply. Many already do this and they are helping to keep costs down and enable us to keep the Bulletin free for the time being.

RECENT COMET BOOKS

"Introduction to Comets" by Brandt and Chapman, Cambridge Univ. Press.

The softcover edition mentioned in Bulletin 18 is now available at £7.95.

"Comets" Ed. Wilkening, Univ. of Arizona Press.

Mentioned in Bulletin 18, this excellent book is now on sale in the U.K. but due partly no doubt to the fall in the value of sterling, the price has been as high as £25.00. A review by the Director in the Journal (1983 April) recommends "Comets" as likely to remain the most up-to-date and authoritive work on comets until after the coming apparition of comet Halley. Even at this price it is good value by today's standards and should certainly be read by any serious student of comets and the Solar System.

"Comets; Vagabonds of Space" by David Seargent, Doubleday (?) 1982.

Although advertised in Sky and Telescope this book by our New South Wales Branch BAA member and Director of the Australian Comet Section should be about soon, though it does not seem to have appeared on the shelves of bookshops here yet. I hope to have read it before the next Bulletin; it should be very interesting.

"The Cosmic Serpent" by Clube and Napier, Faber & Faber, 1982 £12.50.

I have not yet read this book but it has been reviewed in the Journal (1982 December Vol 93 No 1). It sets out new proposals for explaining man's fear of comets, based on historical records a super-comet may have been a feature of the inner Solar System in the not too distant past.

DESIGNATIONS OF COMETS DISCOVERED & RECOVERED IN 1982/1983
(Cont'd B18)

1982i	P/Halley
1982j	P/Tempel I
1982k	P/Kopff
1983a	Comet reported by Perth Observatory but not confirmed
1983b	P/Pons-Winnecke
1983c	P/Bowell-Skiff

ROMAN NUMERAL DESIGNATIONS FOR 1981

1981 I	Jan 27.1	(Solwind 2)	-----
1981 II	Jan 27.3	Panther	1980u
1981 III	Jan 29.9	P/Reinmuth 2	1980n
1981 IV	Feb 20.0	P/Borrelly	1980i
1981 V	Mar 6.3	Russell	1980l
1981 VI	Mar 17.0	P/Schwassmann -Wachmann 2	1979k
1981 VII	Mar 25.7	Gonzalez	1981g
1981 VIII	Apr 11.1	P/West-Kohoutek-Ikemura	1980r
1981 IX	Apr 17.0	P/Kohoutek	1980j
1981 X	May 4.4	P/Howell	1981k
1981 XI	Jun 11.4	P/Bus	1981b
1981 XII	Jun 20.0	P/Finley	1981e
1981 XIII	Jul 20.3	(Solwind 3)	-----
1981 XIV	Jul 30.8	Bus	1981d
1981 XV	Aug 18.2	Elias	1981c
1981 XVI	Oct 21.8	P/Longmore	1981a
1981 XVII	Nov 18.8	P/Gehrels 2	1981f
1981 XVIII	Nov 19.0	P/Slaughter-Burnham	1981i
1981 XIX	Nov 27.5	P/Swift-Gehrels	1981j
1981 XX	Nov 30.4	P/Kearns-Kwee	1981h

THE NEED FOR ASTROMETRIC OBSERVATIONS OF COMETS

The Editorial in the Minor Planets and Comets Circular MPC 7515 (1982 Jan 28) contains extracts from a report, prepared by E. Roemer, President of the IAU Commission 20, of the commission's meetings in Patras, Greece in August 1982.

The notes concern responsibilities on naming and designating minor planets and comets, the need to re-measure old minor planets plates, and the need for more astrometric work on both minor planets and comets. In the latter context it says that "the general paucity of up-to-date astrometric observations of comets, even bright ones, was deplored. These are urgently required nowadays for several new types of study, e.g. prediction of occultations, attempts at contacts by radar, observations generally at non-optical wavelengths."

INTERNATIONAL HALLEY WATCH

As reported in the last Bulletin this international project is going ahead. The Amateur Observers Handbook is due at any time but I have not yet seen a copy of the final printed version. I understand that it will be necessary for the IHW to make a charge for copies, whereas it was originally intended that they should be distributed free. However, if the charge is kept low as we understand it will be, the Handbook will be well worth acquiring. In fact it will be impossible for us to relay or copy all the relevant data that observers may want, though we shall of course be providing notes covering BAA requirements. While these will enable us to evaluate the observations we receive for passing on to the IHW, the way in which these observations fit into IHW thinking will only be available from the AOH. Observers are therefore encouraged to set themselves up with a copy well in advance of the coming apparition. When the Handbook is available a notice will be put in the Journal, Circulars or the next Bulletin giving the cost and ordering instructions. It may be available through some booksellers and agents.

The IHW also publishes a Newsletter and for Amateur Observers an "Amateur Observers Bulletin" of which the first issue appeared in 1982. It is available from the Editor, Mr. Stephen J. Edberg, California Institute of Technology, Jet Propulsion Laboratory, 4800 Oak Grove Dr., Ms T-1166, Pasadena, CA91109, USA.

While the AOH is for the serious observer there will also be an "IHW Comet Watcher's Guide" for the interested but "unscientific" observer (not yet available).

PROGRAMME OF OBSERVATIONS FOR P/HALLEY

During the next 6 months I shall be drawing up a programme of work for the Section's involvement in the coming apparition of P/Halley, and I hope that I shall be able to publish some guidelines in Bulletin 20.

The IHW are proposing to use the return of P/Encke early in 1984 as a "dummy run" for P/Halley procedures and if a brighter comet is discovered they will probably use that too. In the two years remaining from next September before the comet becomes visible in the majority of amateur instruments, it will be necessary to get as much practice as possible and iron out any inconsistencies in our procedures and reporting if our results are to be of scientific value.

It is expected that many experienced observers, who do not normally observe and report comets to the Section, will want to make observations of P/Halley, and we want to encourage as many as possible to do so. So that their results will be compatible with those of regular Section observers, we must encourage them to observe at least one comet before P/Halley arrives, and to obtain our observing instructions. A notice in the Journal will probably be the best way of bringing this to their notice, though much can be done by word of mouth.

At present there are no Section members carrying out photo-electric photometry on comets and I should like to hear from anyone who thinks he could contribute to this work. Also the IHW requires low-dispersion spectrographic work which we do not at present cover. There will also be a need for astrometric work both on P/Halley and to keep other comets under observation while everyone else is looking at P/Halley! If anyone knows anyone who would be interested in work in these areas I should be pleased to hear from them.

COMET HALLEY CO-ORDINATING COMMITTEE

At a Royal Astronomical Society special meeting on Comets held in February, the setting up of a small body to represent and encourage UK astronomers engaged in observations of comet Halley was proposed. The first meeting of the Comet Halley Co-ordinating Committee (CHCC) was held in Burlington House on March 22 with Professor J. Meadows of the University of Leicester in the chair. Representatives of the two Royal Observatories (at Herstmonceux and Edinburgh), Jodrell Bank, SERC, The Rutherford Appleton Laboratory, University teams working with both ground-based and satellite/probe facilities, British Antarctic Survey (by our member Jonathan Shanklin) and the BAA Comet Section (by the Director, also representing other amateur interests in the UK) were invited to attend to discuss the setting up of the CHCC and its aims and organisation. A further meeting will be held in July to discuss observing programmes.

COMET P/HALLEY 1982i

As readers will know this comet was recovered last October and has been under observation since, though at 23-24 magnitude it will be another two years before it is within the reach of most of us.

As reported in Bulletin 18 attempts were made to recover this important comet in 1981 December (and had in fact been made in the late 1970's also) but it was beyond the reach of even the 5.1m (200-inch) reflector at Palomar. Recovering positions were near RA $7^h\ 11^m$ + 9^o 33' (1950.0).

The following are extracts from recent IAU Cards;

IAUC 3737 - (dd 1982 Oct 21)

D.C. Jewitt, G.E. Danielson, J.E. Gunn, J.A. Westphal, D.P. Schneider, A. Dressler, M. Schmidt and B.A. Zimmerman report that this comet has been recovered using the Space Telescope Wide-Field Planetary Camera Investigation Definition Team charge-coupled device placed at the prime-focus of the 5.1m telescope at Palomar Observatory. Five exposures of 480s effective duration each (in seeing measured to be 1."0 fwhm) were taken on (1982) Oct 16 through a broad-band filter centered on 500nm. Definite images near the expected position and having the expected motion of P/Halley were noted. No coma was detected, and the object had a Thuan-Gunn magnitude of (g) = 24.3 +/- 0.2 (corresponding to V $\backsim$ 24.2; and presumably B $\backsim$ 25). Two exposures were also made in the (r) band. (Preliminary positions were given).

The comet's heliocentric and geocentric distances at recovery were 11.04 and 10.93 AU respectively.

IAUC 3742 (dd 1982 Nov 5)

M.J.S. Belton and H. Butcher, Kitt Peak National Observatory, have confirmed the recovery of this comet (Halley) using a cryogenic camera and a charge-coupled device on the 4m reflector. They have derived the following precise positions (for 1982 Oct 18.4 and Oct 20.4 UT.) The comet's image is slightly fainter than V = 24 and the resulting perihelion time is T = 1986 Feb 9.2-9.3 UT.

IAUC 3753 (dd 1982 Dec 14)

J. Baudrand, M. Combes, E. Gérard, J. Guerin, J. Lecacheux, B. Sicardy, G. Lelièvre, J.P. Lemonnier and J.P. Picat provide the following precise geocentric positions, obtained using the prime-focus electronographic camera on the Canada-France-Hawaii telescope. The Oct. images are marginal (that on Oct 16 being from deep IIIa-F exposure). In Nov. B = 24.6 +/- 0.4. (positions are given for Oct 16, 17 and Nov 15, 16).

IAUC 3758 (dd 1982 Dec 27)

The following precise position has been measured by R.M. West, European Southern Observatory, from a 45 minute exposure by H. Pedersen using a charge-coupled device on the Danish 1.5m reflector at La Silla. A preliminary determination of the magnitude of the comet is V = 24.7 +/- 0.3. (position for 1982 Dec 10.3 UT).

IAUC 3767 (dd 1983 Jan 28)

D.K. Yeomans, JPL, provides the following improved orbital elements, derived from 625 observations over the interval 1835 Aug 21 to 1982 Dec 10;

T	= 1986 Feb 9.44394	Epoch 1986 Feb 19.0 ET	
w	= 111°84804)	e	= 0.9672759
☊	= 58.14538) 1950	a	= 17.94104 AU
i	= 162.23930)	n°	= 0.01296978
q	= 0.5871045 AU	P	= 76.0 years

Perturbations by all nine planets were taken into account (the non-gravitational parameters are given).

IAUC 3770 (dd 1983 Feb 10)

Another position (for 1983 Jan 14.3 UT) has been measured by R.M. West from a 45 minute exposure by H. Pedersen with the 1.5m reflector at the ESO, using a CCD and 400-700nm filter. The visual magnitude was 23.5 +/- 0.3. It seems probable that the object varies intrinsically in brightness.

IAUC 3776 (dd 1983 Feb 22)

M.J.S. Belton and H. Butcher, KPNO, report the following precise position (for 1982 Dec 13.2 UT), derived from the average of 20 60s exposures with the 4m reflector. The comet's image is starlike with V = 24.0 +/- 0.2. This formal error indicates only the consistency of the measurement process; the actual uncertainty is perhaps 2 or 3 times larger. (near $6^h\ 56^m + 9^o\ 3'$)

PROSPECTS FOR 1983

When these notes appear, the comets of 1982 will have faded from the grasp of all but the larger instruments; P/Churyumov-Gerasimenko may be marginally visible at Mag. 13+, and Comet Bowell (1980b), now departing from the Solar System, may be visible at mag. 13-14 moving slowly near the ecliptic in Aquarius and Capricornus during the Spring and Summer months.

It would be useful to keep this latter object under observation until the last possible moment, as like many other comets of large perihelion distance it has shown some interesting features.

This year's crop of returning periodic comets promises a busy time for those who like to cultivate the fainter objects; those who do not, of course, are never very busy. As usual, we must ignore the m_2 magnitudes given in the B.A.A. Handbook and rely instead on realistic expectations based on past visual observations. It is interesting in this connection to note that in the case of P/Halley, 1982i, the m_1 formula gives a closer prediction of the recovery magnitude than the m_2 formula does - yet the latter is alleged to apply at large heliocentric distances.

P/Pons-Winnecke, 1983b. This interesting comet has fallen on hard times in its more recent apparitions, partly because of less favourable circumstances and possibly owing to some intrinsic fading. However, when one looks at the m_2 formula, based on a purely reflective body, one wonders whether its pessimistic predictions have deterred observers from attempting to see the comet. From 1819 through 1939, the comet was consistently seen at magnitudes from 6 to 9 - even 4th magnitude in 1927 when it made a very close approach (0.04 A.U.) to the Earth. Such close approaches are no longer possible, and perihelion times have been less favourable, but even so one would expect the observed magnitude to be about 12 in April this year, when the object will be in the morning sky in Capricornus - not a good position for U.K. observers. It would be very useful to have some reliable up-to-date visual observations of this comet.

P/Tempel (1), 1982j. The discovery apparition of this comet was, as is often the case, a particularly favourable one, and since then has been less so; the comet was lost during the period 1879 - 1966. Since its rediscovery it has been seen at 12th magnitude, and this year being somewhat more favourable, it may well reach 11th. It will be around the north-eastern border of Virgo during the spring months, moving rather rapidly south into Libra during the early summer.

P/Temple (2), 1982d. From its discovery in 1873 through the return of 1967, this comet was seen at mag. 8 - 9 at seven of its more favourable apparitions, when it usually had a short tail and was apt to flare near perihelion. This year, the circumstances are moderately favourable and maximum brightness, probably in the range 9th - 10th magnitude, will be long-enduring because after perihelion the Earth-distance continues to decrease. When at its best, from June till October, the comet will be in the morning sky, moving from Pisces into Cetus and northern Eridanus. The m_2 formula in the Handbook (misprinted) appears to be purely theoretical.

P/Kopff, 1982k. This comet will spend the period from February to August moving slowly in Libra and will be quite well placed for observation. In 1945, and again in 1951 the comet was observed to flare somewhat at perihelion and if it does so this year it may reach 9th magnitude; if not, the magnitude will be around 10-11 at brightest. The Handbook magnitudes are presumably m_2, though designated as "m", but in any case they are about four magnitudes too faint.

P/Crommelin, 1956 VI. This often-lost comet used to rejoice in the name of P/Pons-Coggia-Winnecke-Forbes, at which point the I.A.U. decided that enough was enough and adopted P/Crommelin in honour of the latter's work on the orbit. The Handbook magnitudes are in this case quite reasonable, and indicate that it will be near the end of the year before the comet becomes generally observable by amateurs. Perihelion is not until 1984 February 20, when the magnitude should be somewhere between 7 and 9, but the comet will be badly placed then.

P/Schwassmann-Wachmann (1), 1974 II. Normally of magnitude 18, the comet will remain slow-moving a few degrees south of Spica until it is lost in the solar glare in August. There were two outbursts to 12th magnitude in 1982, in late January and again in April, and the position should be monitored for further brightenings, which may occur at any time. (IAUC 3777 reports an outburst to $12^{m}.0$ on 1983 Feb 19.05 - J.C. Merlin, Le Creusot, France).

P/Swift-Tuttle, 1862III. It is getting rather late now to expect the recovery of this bright comet, associated with the Perseid meteors, and it may be that it has already passed an unfavourably placed perihelion, though it is hardly credible that it will escape detection altogether, unless it has suffered a catastrophic disintegration.

1982 was a poor year for discoveries; only one was made (Austin), all the other nine objects picked up being recoveries or rediscoveries of previously known comets. Let us hope that the law of averages (whatever that might be) will restore the balance in 1983.

H.B. Ridley
West Chinnock
1983, February 11.

COMETS IN 1980 (cont.)

1980k = 1980IV. Cernis-Petrauskas. Discovered by K. Cernis and J. Petrauskas on 1980 July 31.71 U.T. whilst at the Vilnius Observatory's station on Maidanak Mountain, Uzbekistan. The comet was reported to be of magnitude 9, diffuse without condensation or tail, moving eastward in the southern part of Ursa Major.

Preliminary elements showed the comet to be past perihelion and a rapid fading occurred. By mid-August the magnitude was down to 11 and to 14.5 by Sept 1.

On Aug 29.14 U.T., E. Everhart (University of Denver) exposed a plate which showed a strong anti-tail 14' long. At the time of the observation the Earth was less than 2° from the comet's orbital plane and other observers also recorded the feature between Aug 15 and Sept 7.

The following parabolic elements by Dr. B.G. Marsden are based on 11 observations 1980 August 2 - Sept 7 (MPC 5640):

T	1980 June 22.44093 E.T.	Peri	337°81539
		Node	159.92822 1950.0
q	0.5232492 AU	Inc	49.07386

19801 = 1981V Russell. Discovered by K.S. Russell (U.K. Schmidt Telescope Unit) on 1980 Sept 6.71 U.T. The comet was of magnitude 17 and was recorded as a fuzzy trail with indications of a tail. The motion was westward in Fornax.

Although perihelion was not until 1981 March, the comet was receding from the Earth and remained a faint object. No observations appear to have been made after 1980 Dec. 6 and the following parabolic elements by Dr. B.G. Marsden are based on 10 observations 1980 Sept 6 - Dec 6 (MPC 5837):

T	1981 Mar. 6.34282 E.T.	Peri	297°27145
		Node	232.07359 1950.0
q	2.1107036 AU	Inc	128.70488

1980m = 1980XIV P/Harrington. Recovered by P. Jekabsons (Perth Observatory) on 1980 Sept. 4.49 U.T., the comet being diffuse with condensation, magnitude 18-19. Originally discovered in 1953, the comet was re-observed at the 1960 return but not seen during the two subsequent returns. No prediction appeared in the Handbook but one by G. Sitarski (Acta. Astron. 23,119) required a correction of 0d.60 to T.

1980n = 1981III. P/Reinmuth (2). Recovered by P. Jekabsons (Perth Observatory) on 1980 Sept. 10.50 U.T. A diffuse object with condensation, magnitude 18, the recovery position was in close agreement with the prediction in the Handbook 1980. Originally discovered in 1947, P/Reinmuth (2) was making its 6th appearance.

1980o = 1980III P/Russell (2). Discovered by K.S. Russell (U.K. Schmidt Telescope Unit) on an exposure obtained by J. Barrow on 1980 Sept 28.40 U.T. The image, although trailed, showed a sharp central condensation with outer coma, magnitude 17. Pre-discovery images were later found on exposures taken on 1980 Aug. 9. Well past perihelion, the comet was fading and the following elliptical elements by Dr. B.G. Marsden are based on only 5 observations 1980 Aug. 9 - Oct. 6 (MPC 5639):

T 1980 May 19.54788 E.T.

Peri	245°44682	e	0.4163503
Node	44.45127 1950.0	a	3.7018610 AU
Inc	12.53125	n°	0.13838019
q	2.1605899 AU	P	7.12 yrs

1980p. An object found on plates exposed with the 1.2m Schmidt telescope at Palomar on 1980 Oct. 8.5 and 19.5 U.T. was reported as a comet but these images were later found to be spurious. Although the letter designation stood, 1980p does not exist.

1980q = 1980XII. Meier. Discovered by Rolf Meier (Ottawa) on 1980 Nov. 6.11 U.T., the comet being diffuse with condensation, magnitude 10.5 and moving SSW in Hercules. Visual magnitudes were in the range 9.0 - 9.6 from 1980 Nov. 8 to 1981 Feb 13 but by the end of April a fading to 10.4 had occurred. Little was reported about the physical aspect of the comet although observations continued until 1981 June 3.

The following near-parabolic elements by Dr. B.G. Marsden are based on 55 observations 1980 Nov. 6 - 1981 June. 3 (MPC 6518):

T 1980 Dec. 9.65001 E.T.

Peri	87°.96420	e	0.9946570
Node	24.73754 1950.0		
Inc	100.98059	q	1.5195502 AU

1980r = 1981VIII P/West-Kohoutek-Ikemura. Recovered by H.-E Schuster (European Southern Observatory) on 1980 Nov. 12.06 U.T. The comet was essentially stellar but with some indication of diffuseness, magnitude 18-19. Making its first return since discovery in 1973, the indicated correction to the prediction in the Handbook 1980 was Delta T = -1.37 days.

1980s = 1980V P/Lovas. Discovered by M. Lovas (Konkoly Observatory) on 1980 Dec. 5.06 U.T. The comet was diffuse with condensation, magnitude 17 and moving west in Lynx. The comet remained a faint and undistinguished object, fading slowly.

From 14 observations 1980 Dec. 5 - 1981 April 3, Dr. B.G. Marsden supplies the following elliptical elements (MPC 5975):

T 1980 Sept. 3.44000 E.T.

Peri	72°.56994	e	0.6145202
Node	342.32564 1950.0	a	4.3470025 AU
Inc	12.29282	n°	0.10874749
q	1.6756818 AU	P	9.06 yrs

1980t = 1980XV Bradfield. The eleventh comet to be discovered by Bill Bradfield (Dernancourt, Adelaide) came on 1980 Dec. 17.75 U.T. when, whilst sweeping in Scorpius, he found a 6th magnitude diffuse object with condensation and a $\frac{1}{2}^{\circ}$ tail. The comet brightened to around 4th magnitude in early January with the tail increasing in length to 4°. By Jan 12, the magnitude was down to 5.6 but an outburst the following day caused an increase in brightness of one magnitude. At this time the tail was around 3° in length but towards the end of January a rapid fading set in with the magnitude down to 9 with the tail less than 1° long.

A prediscovery image was found by K.S. Russell on a plate exposed by J. Barrow and R.J. Smyth with the 1.2m Schmidt of the U.K. Telescope Unit on 1980 July 18.42 U.T. Using this observation together with 32 others to 1981 Aug. 27, Dr. B.G. Marsden has calculated the following near-parabolic elements (MPC 6519):

T 1980 Dec. 29.54165 E.T. Epoch 1980 Dec. 27.0 E.T.

Peri	358°.28553	e	0.9997251
Node	114.64650 1950.0		
Inc	138.58821	q	0.2598232 AU

1980u = 1981II Panther. Discovered on 1980 Dec 25.79 U.T. by our own Roy Panther (Walgrave, Northampton) after some 600 hours of sweeping. The comet was a 10th magnitude diffuse object moving slowly north in Lyra.

The circumstances of the orbit were that the comet continued to move north and passed very close to the Pole on 1981 March 12 giving a long period of visibility and observations continued until December 1981.

Visually the comet brightened to around magnitude 8.5 by March 1981 then began to fade and by June the magnitude was down to 11.

Full details surrounding the discovery were given in Bulletin 15 (March 1981).

Prediscovery images were found on plates exposed for the Damon Sky Patrol by A.J. Aho and G. Schwartz on 1980 Oct 9 and Oct 27. Using these together with a further 96 observations to 1981 Dec 9, Dr. B.G. Marsden supplies the following near-parabolic elements (MPC 6519):

T 1981 Jan. 27.32296 E.T. Epoch 1981 Feb. 5.0 E.T.

Peri	105°.60341	e	0.9989738
Node	331.29916 1950.0		
Inc	82.64193	q	1.6572712 AU

1980XI P/Encke. Returning to perihelion in 1980, P/Encke was recorded by E. Helin using the 1.2m Schmidt telescope at Palomer on 1980 Aug. 8.46 U.T. The comet appeared as an almost stellar object at magnitude 20. By late September P/Encke had brightened enough to be observed visually at magnitude 12.7 and the rapid increase in brightness continued until by Nov. 19 the magnitude was 6.7. After this the comet became difficult to observe as it moved south rapidly. Following the usual pattern with this comet, the coma increased in diameter from 3' in September to 12' by October 21 followed by a rapid decrease to 2'.6 by mid-November.

S.W. Milbourn.

COMETS: NOTES FROM THE LITERATURE OF 1982

by G.J. Hodgkinson, 57 Bursill Crescent, Ramsgate, Kent.

Reviews: a general review by Hughes (Contemporary Physics, 23(3), 257,1982) on radio observations, with over 100 refs by L.E. Snyder (Icarus 51(1), 1, 1982), and on ultraviolet spectroscopy of comets (J. Rahe, Astrophys. Space Sci. Library, 96, 323,1982) and on this there is also the paper by M.C. Festou et al., on the spectrum of comets as derived from I.U.E. observations (Eur. Sp. Agency Spec. Publ. 176,445,1982).

Comet Halley: Review in Ann. Rev. Earth & Plan. Sci., 10,297,1982, by R.L. Newburn, Jr., and D.K. Yeomans. Relating to the forthcoming apparition, there were forecasts on the visual brightness (C.S. Morris, et al., Astron. J., 87,918,1982); M.J.S. Belton, H. Butcher, Nature (Lond.) 298,249,1982). An unsuccessful search was reported (P.Felenbok, et al., Astron. Astrophys., 113(1), L1,1982) and the successful search was reported in Nature (Lond.), (300,318,1982), and Sky & Tel., (64(6),551,1982). By way of completion, mention should be made of Brady's paper in the Journal (JBAA 92,209,1982). Of other comets specifically mentioned in the literature there are papers on the near-infrared spectroscopy of Bradfield 1980t (C. Barbieri, et al., p.317, in Comparative Study of the Planets, Der Reidel, 1982), dynamic coma models for Bennett 1970 II (A. Cuchiaro, D. Malaise, Astron. Astrophys., 114(1),102,1982), vapourisation in comets-outbursts from Comet Schwassman-Wachmann. I. (J.J. Cowan, et al., Icarus, 50,53,1982), and P/Stephan-Oterma-narrow-band photometry and the backscattering properties of cometary grains (R.L. Millis, et al., Astron. J., 87,1310,1982).

On the origin of comets and dynamics: an interstellar origin for comets (W.M. Napier, Astrophys. Sp. Sci. Lib., 96,375,1982), and a second paper from J.G. Hills (Astron. J., 87,906,1982; paper I in A.J. 86,1730,1981) on the formation of comets in the outer solar system by "shepherding" of dust particles by radiation pressure towards concentrations of dust (from which direction the radiation pressure would be smaller).

There is a paper on the improved orbital elements for P/Schorn (1918 III), by C de Vegt, et al., (Astron. Astrophys., 114,147,1982). There are two papers on the orbits of Long-Period comets: one on the distribution of orbits (R.S. Bogart, P.D. Noerdlinger, Astron. J., 87,911,1982), the other on stellar perturbations of their orbital elements (S. Yabushita, et al., Monthly Notices R.A.S., 200,661,1982).

Technical Papers: Kelvin-Helmholtz instabilities in cometary tails (T. Ray, Plan. Sp. Sci., 30(3), 245,1982), disconnection events in cometary plasma tails in determination of inter-planetary sector boundaries (M.B. Niedner, Jr. Astrophys. J., Suppl. Ser., 48,1,1982), a model of a comet coma with inter-stellar molecules in the nucleus (L. Biermann, et al., Astron. Astrophys., 108,221,1982), the role of the critical ionisation velocity phenomena in the production of inner coma cometary plasma (V. Formisano, et. al., Plan. Sp. Sci., 30,491,1982), contribution of dust grains originating by condensation to the integral brightness of a comet (L.M. Shul'man, Astrom. Astrofiz., 46,68,1982), evaluation of IR line emission from constituent molecules of cometary nuclei (T. Yamamoto, Astron. Astrophys., 109,326,1982).

OH radical fluorescence in comets (D.G. Schleicher, M.F.A'Hearn, Astrophys. J., 258,864,1982; refers to Comets Bradfield (1979X) and Seargent (1978XV, which also find mention in M.C. Festou, et al., ibid., 256,331,1982); carbon monosulphide (CS) in comets-the ultraviolet spectra of Comet Bradfield (1979X) obtained with the I.U.E. satellite showed that emissions from sulphur and carbon monosulphide were concentrated towards the cometary nucleus. A very rapid variation of carbon monosulphide "brightness" with heliocentric distance was found (W.M. Jackson, et al., Astron. Astrophys., 107,385,1982). Energetic solar photons and solar wind protons may lead to the formation of the monosulphide ion, CS^+, from the monosulphide, CS (P.D. Singh, ibid., 108,369, 1982).

Finally, in the case of Comet Bradfield (1979X), M.K. Wallis finds that more-realistic models for sublimating icy comets imply a less volatile material than water and of mainly organic composition (Sur. Sp. Agency Spec. Publ., 176,451, 1982).

'Comet Digest' from Sky & Tel.,: vol. 64, pp.102,198,294,397, 504,615 (1982), with photographs of Comet Austin 1982g and description of the comet of 1882 II (c.f. Sun-grazing comets).

SUN-GRAZING COMETS

The recently reported discovery of a comet (Howard-Koomen-Michels 1979XI) by D.J. Michels, et al., (Science, 215,1097,1982) that apparently collided with the Sun (Z. Sekanina, Astron. J., 87,1059,1982) has been followed by the reported discovery of two similar comets that encountered the Sun on 27 Jan. and 20 July, 1981 (N.R. Sheeley, et al., Nature (Lond. 300,239,1982). Observations were made with the SOLWIND coronagraph operating on board a USAF satellite since March 1979. Like 1979XI, the two new comets seem to have been members of the Kreutz group of sungrazers - all have similar orbits bringing them to within 0.01 a.u. of the Sun. Before the beginning of the Solwind operations only nine members of this group were known (B.G. Marsden Astron. J., 72,1170,1967) during the period 1668 to 1979. Recent, visual, examples of the family are Comet White-Ortez-Bolleli, and comet Ikeya-Seki in 1970 and 1965 respectively. A more spectacular member was the Great Comet of 1882 (Comet 1882 II), recently described in Sky & Tel., (64,237 and 294,1982). Perihelion occurred on 17 Sept., 1882, and was visible in daylight until the 25th, fragmentation of the comet occurred early October, 1882 (c.f. Sky & Tel. 64,397,1982) into at first two, then later six, components in the coma.

COMET AUSTIN 1982g — Graham S. Keitch

The last issue of the Bulletin (No. 18) reported on the observations of comet Austin secured by the Section up to the middle of September last year. We referred to a fine series of pre-perihelion observations secured principally by MC, AP and DS in Australia. A further valuable contribution to this set of data has now been provided by AFJ (New Zealand) who monitored the comet very closely during the period 1982 June 26.76 to August 8.76. During this time he reports that the comet increased in brightness from $10^m.8$ (317mm refl.) to $4^m.7$ (50mm binocular). Further observations have also been received from JEB and CSM (USA), T. Tanti and F. Ventura (TT, FV; Malta) and GMH, JS, MDT (UK). These observations commence around Aug 16 when the comet became accessible from northern latitudes as a bright object of around $4^m.7$ to $4^m.8$ and are consistent with the observations already detailed in the last Bulletin. This present report will concentrate on the comet's performance from 1982 mid September onwards.

Between Sept 11-14 JEB, GMH, CSM, HBR, JS, TT, FV and GSK all agreed that the comet's brightness was somewhere between $6^m.5$ and $7^m.1$ as estimated with binoculars. The coma was generally described as being well condensed and approximately 3' across (144,000km). The tail was traced for up to half a degree in position angle 40° by JEB, MJH, CSM, JS and GSK. By Sept 19-21, the brightness of the coma had dropped to $7^m.3$ to $7^m.4$ according to CSM, TT, FV and GSK and by the month's end the magnitude was nearer $8^m.0$. Both JS and GSK found values of $8^m.2$ to $8^m.3$ using 20x80 Bin. on Sept. 30 by which time the 3' coma had become a little less strongly condensed.

Few reports were received after September as the comet became fainter and more diffuse although JEB, CSM, JS and JSK continued to follow the object into the morning sky. The comet had now become too faint for easy observation with binoculars although GSK was still able to see the comet at $8^m.5$ in a 20x80 B while JS reported an even later sighting on Oct 17.77 when the coma was 4!7 across (359,000 km) and $9^m.6$. Around this time larger instruments showed only 2' of coma. When GSK observed on Oct 24.19 the 300mm reflector still showed a faint tail in PA 38° while a few days later, JEB and CSM agreed that the 2' coma was $10^m.0$ to $10^m.1$. The comet was now quite faint and rather diffuse.

Very few sightings were made in November as the comet became a morning object although JEB and GSK were able to follow the comet from mid-November to the month's end. On Nov 15.20 GSK (300mm refl) saw the coma as a faint diffuse patch 1!8 across with a 2' tail in PA 44°. The magnitude was $10^m.6$. The following day JEB estimated it to be $10^m.9$ and by the month's end, GSK found the comet to have faded further to $11^m.3$; JS also observed during this period although he reports the comet to have been several magnitudes fainter in the large refractors at Cambridge.

The last visual sightings occurred in December. On Dec 18.27 CSM found the comet to be $11^m.7$ and 2' across (165,000km). The coma was totally diffuse in the 250mm reflector at Prospect Hill Observatory while GSK placed the comet at 12.1 a few days later when the 300mm reflector at Wrington still showed traces of a weak extension in PA 45°. The coma was very slightly brighter towards the middle. During 1983 January, JEB reports that the comet could not be seen with his 50cm reflector although plates taken with Dr. Waterfield's 15cm Cooke lens at Woolston have recorded images of the comet during 1983 February.

A total of 243 estimates of the comet's total brightness secured between 1982 June 16.76 and Dec 23.23 were used for the photometric analysis. The contributors are detailed below.

CB(4), JEB(22), LE(5), MJH(6), GMH(12), AFJ(21), DK(1), GSK(27), JM(1), RMcK(2), CSM(29), RWP(3), AP(13), HBR(17), JS(26), KMS(1), TT(21), MDT(10), FV(22).

The estimates were corrected to a standard aperture of 6.78cm as recommended by Morris(1) and then fitted to the usual formula:

$$M_v = H + 5 \log \Delta + 2.5_n \log r$$

using a Sharp MZ80K microcomputer. The following photometric parameters were determined:

$$\begin{aligned} H &= 7.61 \ (\pm 0.03) \\ n &= 2.83 \ (\pm 0.09) \end{aligned}$$ (heliocentric arc: r = 0.648-2.213 au)

Unfortunately, a fine series of pre-perihelion estimates by MC and DS together with some post-perihelion estimates by DS and KMS were inadvertently omitted from the analysis; however, none of these estimates differ greatly from those used and it is unlikely that the parameter values given above would alter very significantly if we re-analysed the complete data set. When time permits, we propose to re-run the analysis using all the estimates, approximately 300 in all.

The following table gives selected un-corrected magnitude estimates for the comet:

SELECTED UNCORRECTED ESTIMATES OF COMET AUSTIN

Date (U.T.)	m_v	I	Obs	Date (U.T.)	m_v	I	Obs
1982 June 21.87	10.2	25L	MC	1982 Sept 02.83	5.9	8B	JS
26.92	9.6	15L	AP	06.77	6.4	5R	FV
July 01.90	9.4	15L	AP	09.77	6.8	5B	TT
07.75	9.8	32L	AFJ	12.85	6.9	8B	GMH
15.74	7.4	4.5R	AFJ	18.84	7.4	8B	JS
21.77	6.8	8B	DS	21.83	7.8	8B	JS
23.74	6.3	4.5R	AFJ	29.80	8.2	8B	JS
27.90	5.8	6.5B	AP	Oct. 04.80	8.5	8B	GSK
31.90	5.0	6.5B	AP	06.99	8.8	25L	CSM
Aug. 03.80	4.9	2.5B	DS	10.99	8.8	32L	JEB
08.80	4.1	8B	DS	17.77	9.6	8B	JS
15.36	4.9	8B	JEB	23.40	9.9	32L	JEB
18.88	4.7	8B	McK	28.40	10.0	25L	CSM
19.96	4.8	4B	HBR	Nov. 15.20	10.6	30L	GSK
22.05	4.9	8B	CSM	24.22	11.2	30L	GSK
23.90	5.0	4B	MDT	29.23	11.3	30L	GSK
25.88	5.2	4B	HBR	Dec. 18.27	11.7	25L	CSM
28.79	5.3	5R	FV	23.23	12.1	30L	GSK

I = Instrument aperture (cm) and type (L = reflector, R = refractor, B = binoculars)

Obs = Observer

References: Morris C.S., (Publ. Astron. Soc. Pacific, 85,506(1973)).

THE INTERNATIONAL COMET QUARTERLY

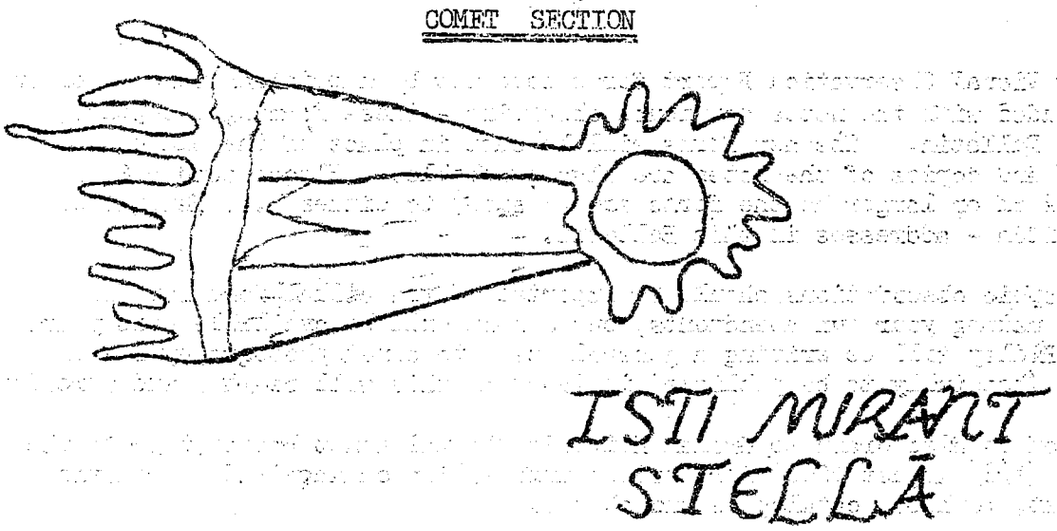
The following BAA observations have been forwarded to the ICQ

Comet	1980b	1982a	1982e	1982g
Observer				
Hurst				16
Jones	36	1	23	38
Keitch				1
Tanti				21
Taylor				12

This table continues the information given in the last Bulletin. Observations by our Australian and American contributors are sent direct to the ICQ by the observers themselves.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



BULLETIN NO. 20 OCTOBER 1983

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SECTION NEWS & NOTICES

M.J. Hendrie

Dr. Gerald Merton

Members may already know of the passing of Dr. Gerald Merton, Director of the Comet Section from 1945 until 1958. Dr. Merton had been a member of the Association since 1920 and was its President from 1950 to 1952. He was treasurer of the Royal Astronomical Society over the period 1956-67, and was very well known in astronomical circles for his work on comet orbits and methods of solving them. He was also an observer and used the 12 inch refractor at the University Observatory, Oxford. His two Presidential Addresses on comets and astronomical photography (printed in the Journal) still make interesting and valuable reading. He set the high standards, when rebuilding the Section after the War, that subsequent Directors have tried to maintain. He was always ready to help the newcomer with practical advice and encouragement, in his hand-written letters. I joined the Section during his term (in 1950) and benefitted greatly from his experience and help. Dr. Merton's other interests included flying his own plane (he served with the Air Transport Auxiliary during the second world war). An obituary will appear in the Journal.

New Observing Notes and Report Forms

The design of the new Visual Observation Report forms has now been decided and the notes on visual observing, prepared by Harold Ridley, completed. It was decided not to go for a computer input type form at this stage as the data are still handled manually to a large extent and in a somewhat piecemeal fashion due to the geographical separation of the Section officers and helpers. Our computers are without disk drives (for financial reasons) and until we have these we should be too limited if we tried to handle everything by direct input to computer. Also that type of form requires a "yes" or "no" answer and often in comet work a "possibly" or "probably" conveys more to the analyst. We are having to introduce a number of changes to come into line with our own updated requirements, those of the ICQ and IHW and we feel also that it is best to make those changes in advance of changing to a different system, and all this just before Halley's comet. No doubt we shall move to a more mechanised system before long, as has been our intention for some time now, but it must save time not make work and this means getting it right when we do it.

The new Visual Observation Report forms have now been printed and a specimen is included with the notes or visual observing - these forming a supplement to this Bulletin. The new forms will be sent in place of the old ones on request and copies of the notes are also available. Please send a SAE (16 x 22 cm or larger as the forms are A5 size) to either M.J. Hendrie or G.S. Keitch - addresses in this Bulletin.

Photographic observations should be reported on the Visual form for the moment, making your own amendments, but a form will be available next year. Harold Ridley will be writing a general guide to comet photography for the Journal (hopefully to be published in 1984) as this will reach a wider readership.

Attention is also drawn to Graham Keitch's "Visual Comet Photometry" in the Journal (1983 August p200) for further information on magnitude estimation, equipment, methods, catalogues and charts.

Section Co-rdinators

The Section workload is increasing steadily as more members observe more and fainter comets with more sophisticated equipment. There has also been an increase in BAA members wanting to join in the work of the Section. To improve the response to members' problems, and to relieve me of some correspondence, we have decided to introduce Section Co-ordinators now instead of waiting until the start of the comet Halley programme in 1985/86. These co-ordinators will also handle the vetting of observations to be sent on to the IHW and other bodies archives.

Therefore, from now on, if you have queries on suitable equipment, technical problems, section observing objectives and methods of observation adopted by the Section you should contact them direct instead of writing to me (please send a SAE of suitable size). The following have kindly agreed to act as co-ordinators covering the different means of observation:

Graham S. Keitch — Visual Co-ordinator
2 South Meadows,
Wrington,
Avon, BS18 7PF
(0934 862 924)
- visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Analysis of light curves. Observations to the ICQ

Harold B. Ridley — Photographic Co-ordinator
Eastfield Observatory,
Eastfield Lane,
East Chinnock,
Yeovil, Somerset, BA22 9EP
(093 588 222)
- General photographic and spectrographic observations, equipment, films & plates, processing, etc.

Charles Munday — Photoelectric Co-ordinator
The Observatory,
Rowney's Farm,
Wakes Colne,
Colchester, CO6 2AS
(0206 240 328)
- Photoelectric observations, equipment detectors, amplifiers, recorders, filters, etc. IHW requirements.

Michael Hendrie — Astrometry Co-ordinator
(address above)
(0206 240 021)
- Requirements and reductions - contact with IHW, CHUKCC (For photographic requirements see Harold Ridley)

Stan W. Milbourn
(address above)
(0342 712168)
- All computing problems. BAA Circulars Editor, distribution of Bulletin SAE and queries.

Peter Stanley
20 Elsted Close,
Ifield,
Crawley,
West Sussex.
(0293 22816)

- Distribution of ephmerides (see below for details of this trial service for fainter comets)

Notes on New Arrangements

1/ Until further notice all observations should continue to be sent to me for passing on to the Co-ordinators. However, as soon as we have a painless way of their keeping me informed of what all these comets are doing, we shall revise these arrangements.

2/ General queries and requests for information about the Section or its work and members of the BAA wishing to join in the work of the Section should continue to write to me; also for contributions for the Bulletin and any other business not mentioned elsewhere.

Comet IRAS-Araki-Alcock 1983d

I explained the circumstances of the discovery of comet 1983d at the short formal meeting during the Association's Exhibition Meeting in May (see JBAA 1983 August 93,5, p224 for a report). The observations of this comet are discussed by Graham Keitch in this Bulletin.

Here I should like to congratulate George Alcock (as well as the IRAS team) on his 5th independent comet discovery. When he reported his discovery to me on the evening of May 3 the weather was generally bad and worsening, with only a clear strip in the Northampton-Peterborough area. Fortunately the comet was confirmed visually by Guy Hurst (Wellingborough) and Roy Panther also saw it that evening. Observations continued the same night in the USA. By the morning news was received from the CBAT that the comet was identical to an object reported by the IRAS team (discovered late in April) and with a comet reported by the Japanese observer Araki.

Annual Exhibition Meeting

This was generally rated one of the best in recent years and the Comet Section display was larger and more topical than of late. Comet Austin 1982g and Iras-Araki-Alcock 1983d were well represented by drawings and photographs and thanks are due to those who sent or brought along exhibits. Thanks are also due to Harold Ridley and Peter Stanley for helping to set up the exhibits and mind the stand while I was "circulating". Let us have another good display next year in preparation for 1985/86.

Ephemerides of the Fainter Comets

The BAA Handbook provides ephemerides of most periodic comets likely to be within the reach of our members (and some too faint also of use to those recovering these comets) while the BAA Circulars cover new comets brighter than about 11 magnitude. It is not economic to issue BAAC for those fainter comets that may only be of interest to half a dozen members. For some time I have sent out a few ephemerides to those who have specially requested them or those who I know could make good use of them on occasion. The number of members who could benefit is growing - some do not need them as they already receive the TA services or IAU cards (though the cards usually take 10 days to arrive).

On a trial basis Peter Stanley has offered to photocopy computer print-outs sent to him by me based on elements provided by Stan Milbourn, and despatch them by first-class post to those who request them. Initially we intend to make no charge for the photocopying but whether this can remain free depends on the numbers of comets and requests. Those active members who could usefully use ephemerides (generally on a daily interval basis) for comets not covered in other BAA publications should send SAE (stamped first-class minimum rate, size not smaller than 110 x 220 mm) to Peter Stanley. They should mark the last envelope in each batch so that they know when to send more as we cannot issue reminders at this price! We shall review the situation at the time of the next Bulletin

to see what the response has been. (At present we regret that we can offer to send these to UK members only, but we should be interested to know whether any overseas members would be interested in paying postage on such an arrangement.) We anticipate that these would be sent out usually three or four days after receipt of the information by Stan Milbourn.

Designations of Comets Discovered and Recovered in 1983 (to Sept 25)

1983a	Comet reported by Perth Observatory but not confirmed		
1983b	P/Pons-Winnecke	reached about	12m - obsvd in Australia
1983c	P/Bowell-Skiff	"	16
1983d	IRAS-Araki-Alcock	"	1½
1983e	Sugano-Saigusa-Fujikawa	"	6½
1983f	IRAS	"	17
1983g	P/du Toit-Neujmin-Delporte	"	19 ? (m_2)
1983h	P/Johnson	"	19 ? (m_2)
1983i	P/Russell 3	"	14 ?
1983j	P/IRAS	"	11
1983k	IRAS	"	18 ? (m_2)
1983l	Cernis	"	9
1983m	P/Wolf	recovery mag	20 ? (m_2)
1983n	P/Crommelin	"	20 (m_2)
1983o	IRAS	"	16
1983p	Shoemaker	"	11

(magnitudes are indications in case of fainter comets, more precise data will appear later in S. Milbourn's Comet Notes).

The IRAS Comets

As can be seen above the IRAS team has discovered 5 comets since their Infra Red Astronomical Satellite became operational in April this year. Its life is short, probably not more than 9 months and these comet discoveries were by-products (and astronomically speaking not the most important of the satellite's amazing discoveries) of the main survey work. What might a dedicated comet seeking/observing satellite achieve?

In a short article in Comet News Service (CNS 83-4 1983 Sept) Don Machholz, discoverer of 1978m and still a very active comet hunter, also ponders on the future of the visual comet hunter. Future satellites and probes must now be expected to discover more comets in those parts of the sky that were the hunting ground of the visual observer. Maybe the larger sky survey Schmidts will still find most of those fainter comets near opposition. The message seems to be, if you want your name in a comet catalogue, don't leave it too long to start looking!

EQUINOX 2000.0

There has been some discussion about the effect of the decision to introduce the new standard equinox for reporting and cataloging positions from 1984.0. In a recent IAU Circular (No 3844) Dr. Brian Marsden explains that this will not affect astrometric work on minor planets and comets until some later date. It is best to use his own words of explanation:

"Recent communications to the CTB indicate that there is some confusion concerning future IAU policy. The following statement is issued following consultation with E. Roemer, President of Commission 20: "Contributors to these Circulars are advised that, although the new standard equinox 2000.0 (J2000.0) will be brought into use for some purposes as of 1984 Jan 1, IAU Commission 20 points out that this equinox should not immediately and automatically be used in publication of observations of comets and minor planets. In general, observations should be

reduced exactly as hitherto, in terms of the standard equinox 1950.0 (B1950.0). An exception would be made for minor planet observations of very high precision specifically referred to in some new star catalogue that has been constructed with consideration of the new constant of precession, new theory of nutation and changed procedure for handling the elliptical-aberration terms. The very great majority of observations are not of this type, and it is not appropriate simply to adjust by precession an observation made according to the old procedure. Likewise, orbital elements and ephemerides should continue to be published with reference to the 1950.0 equinox. It is anticipated that the 2000.0 equinox will be introduced in the work of the IAU Commission 20 at some time in the future, but not until suitable star catalogues (and charts) are widely available".

National Astronomy Week 1985 (1985 November 9-16)

I have been asked to join this committee as Edmond Halley and Halley's comet are to be the theme of this Week. The dates chosen are when the comet will be well-placed for evening observation and there will not be a Moon. A meeting was held at the London Planetarium on June 25 and another will be held in November. Patrick Moore has agreed to act as Vice-President, the President being the Astronomer Royal, Prof. F. Graham-Smith, FRS. The committee includes representatives of the RAS, BAA, JAS and regional societies, as well as the RGO, Universities, National Maritime Museum etc. A leaflet setting out the aims and objectives will be circulated widely late in 1983. Dr. David Hughes and Peter Stanley also serve on this committee.

Comet Halley UK Co-ordinating Committee

The second meeting of this committee, now CHUKCC, was held at Burlington House on 1983 July 14 attended by representatives of a number of institutions (see Bulletin 19) and 3 visiting discipline specialists from the IHW. The all-day meeting discussed observing programmes, organisation and related matters. "Lead Investigators" were appointed to form a link between observers and the committee and generally oil the wheels: I was asked to undertake the "LI" for the Astrometry Group. I have provided the Chairman with a short report on the likely level of effort within the UK and UK controlled observatories (i.e. including La Palma, Siding Spring etc.). I have also provided Dr. Yeomans of the IHW (Discipline Specialist, Astrometry Net) with similar information at his request.

Other BAA members on this committee include Dr. David Hughes (Giotto), Jonathan Shanklin (British Antarctic Survey) who hopes to observe the comet from Halley Bay, and since the meeting George Spalding, Director of the BAA Meteor Section has agreed to undertake the LI job for the Meteor Group.

The next meeting will be held in November and a public announcement of aims and plans is expected soon afterwards.

International Halley Watch (IHW)

Stephen Edberg (Co-ordinator Amateur Observations) has kindly sent me an advance copy of the recently published "IHW Amateur Observers' Manual for Scientific Comet Studies" (Parts 1 and 2) - JPL Publication 33-16. I understand that copies will soon be available and that Sky Publishing will handle them. I have written to ask whether they will be available in the UK direct from any source. I understand that a charge will have to be made but that it will not be excessive. The final result is a neat two-volume compendium on comet observing and it should be very useful beyond the immediate object of providing for a consistent guide to IHW observation requirements for the Halley apparition. It covers visual, photographic, astrometric, photoelectric, spectographic and meteor work. Part 2 includes an ephemeris (daily) and charts showing the track of the comet across the sky with comparison magnitudes (BAA Tirion Charts for brighter phases and AAVSO Variable Star Atlas charts for fainter stages - together they cover the period when the comet is expected to be brighter than $9\frac{1}{2}$ mag (from 1985 November 1 until 1986 May 30). When I hear where these will be available and the price I will put an announcement in the Comet Section Notes in the Journal or on a BAAC.

Brightness of P/Halley

Based on the official IHW magnitude estimates the comet may not quite be visible with the naked eye at all from the UK, though surely it must be an easy object in the smallest telescope. However, Dr. Joe Marcus in another fascinating issue of Comet News Service that he edits, (CMS 83-4 1983 Sept 3) continues his series of articles in which he produces evidence to suggest that the comet could be 1½ mags brighter than expected. Only time will tell who is right (or more nearly right!) but as this would make the comet 4 times brighter, if it does come about, then observations that might be impossible would become possible, exposure times could be cut to a third and the period of observation extended. While being prepared for the worst is wise where comets are concerned, we should also not be unprepared for the best in case the opportunity arises to undertake more observations. Of course even if we were certain what the comet did in 1910 we still could not predict what it will do in 1986, so we must keep a fairly open mind for some time yet. We must however have a guide and those brave observers who have stuck their necks out and made predictions so far in advance are doing us a great service though they can expect no thanks if they turn out to be wrong!

The Comet Section Programme and the IHW

I spoke to the BAA at Savile Row in April on "The Comet Section & P/Halley", being an outline of the organisation of the IHW and the work and Halley plans of the Section and this should appear in the Journal very soon. Please refer to this to save repetition here (I also gave a talk to Loughton Astronomical Society on August 4 on the subject of the Halley apparition and plans for observing it.)

The Section intends to observe in the following categories:

Visual description and drawings of large scale features and inner head features, "nuclear" charges, occultations, photometry (m_1 mags) and coma diameter measures.

Photographic wide angle tails etc., and narrow field head and inner tail, filter photographs of tails, photographic astrometry.

Spectrographic Objective prism and grating photographs of comet spectra.

Photoelectric coma and tail observations through various apertures and narrow band filters, occultations and traces over head and tail.

The Comet Section will analyse and publish its results in due course and pass on selected results to the International Comet Quarterly and IHW and also to the CHUKCC Archive. It is co-operating with the IHW Astrometry Net (Dr. Yeomans and Dr. Marsden). Full details on the programme will be made available later.

Trial Comet : P/Crommelin 1983n

The IHW has chosen 1983n instead of P/Encke as the trial comet, to test techniques and procedures for the IHW. All observers are asked to observe this comet as often as possible by all techniques to be used on P/Halley. As with comet Halley there will be "Halley Watch Days", in this case they will concentrate on the period 1984 March 25 to 31. Those taking part in astrometric work are asked by Dr. Yeomans to make observations during 1984 February and March. Comet P/Crommelin was recovered by L. Kohoutek (Hamburg) on 1983 Aug 9 and independently by S. Wyckoff & P.A. Wehinger (Arizona State Univ.) on Aug 13, m_2 mag was 20 but this is said to be much brighter than expected. It is too early to say how this might effect estimates of the comet's brightness around perihelion but a value of 7 mag was previously suggested based on observations made in 1956 (the Comet Section has supplied observations for use in this analysis).

Although the circumstances for UK observers in 1984 Feb/March are not very good, they are not unlike those for comet Halley towards the end of 1985/January 1986 so should provide a useful test of problems of dealing with comet Halley. Further information will be given in the Comet Section Notes in the Journal.

Observations from Space

In addition to the ESA Giotto, two USSR Venera (Vega) and the Japanese Planet A and M5.ST probes to comet Halley, British Astronomers intend to use the IUE satellite to make ultra violet observations of P/Crommelin at the end of 1984 Feb. The USA will divert ISEE-3 satellite to make a flyby of comet P/Giacobini-Zinner during 1985 (close approach scheduled for 1985 Sept. 11). This comet should be around 8th magnitude.

It will be important to make observations on or near the Halley Watch Days (we have seen and commented on a list of proposed dates) and these will include the close approaches of the comet probes concentrated near the comet's descending node during the period 1986 March 8 to 14. Unfortunately for those of us in the UK, the comet will not be visible at that time.

Astrometric Observations of recent Comets

Members have provided precise positions of comets IRAS-Araki-Alcock, Sugano-Saigusa-Fujikawa, P/Kopff, P/Tempel 1, P/Tempel 2, Gernis, P/IRAS and Shoemaker. Details will appear in a later Bulletin.

Observations have been made at Dr. Waterfield's observatory at Woolston and Harold Ridley's at West Chinnock and plates have been measured by Peter Birtwhistle and M. Hendrie.

COMETS: A Guide to the literature of 1982-1983

compiled by G.J. Hodgkinson, 57 Bursill Crescent, Ramsgate, Kent.

Reviews: there have been several reviews published during this period, several will be mentioned later, but two are of general interest. They are on the nature and origin of comets (J.A. Fernandez and J. Jockers, Reports. Progress. Physics, 46(6), 665,1983), and on ultraviolet spectroscopy of comets and the composition of cometary ice (P.D. Feldman, Science 219,347,1983).

Interaction of the solar wind with comets: the penetration of the solar wind into the cometary ionosphere is discussed by A.I. Ershkovich and D.A. Mendis (Astrophys, J.,269,743,1983). For recent reviews on the subject see D.A. Mendis, H.L.F. Houpis, Rev. Geophys. Space Physics,20 (4),885,1982) and T.K. Brews (Space Science Reviews,32,361,1982). Wide-angle photographs of comets have been examined in connection with their large-scale shape, with specific interest in the widening of the tail with distance from the head (called 'flaring'). Photographs of Kohoutek 1973f and Bradfield 1974b show that on some days this flaring is quite prominent, on other almost non-existent with the tail almost cylindrical in shape. A.I. Ershkovich et al., (Astrophys. J., 262,396,1982), find that the gas pressure of tail ions and the magnetic field strength at the flanks of the ionopause cause the flaring state, with the tailflaring to larger distances the higher the field strength. Solar wind data have been gathered from four spacecraft to interpret the very rapid turning of the plasma tail of comet Bradfield 1979X on 1980 February 6. Photographs by Brandt et al., (in 1980) showed a growing undulation of the tail. Helios 2, 0.15 a.u. from the comet, recorded a rapid increase in solar wind velocity, being preceded by an exceptionally low solar-wind density, shortly before the disturbance of the cometary tail. (J.F. Le Borgne, Astron. Astrophys.,123,25,1983).

Other papers appearing on this subject are:

Dynamic stabil sation of hydromagnetic surface waves: applications to cometary plasma tails, by B. Buti, Astrophys. J.,268,420,1983 and Charge exchange in solar wind-cometary interactions, by T.I. Gombosi et al., Astrophys,J.,268,883, 1983.

The effects of charged particles on icy surfaces is summarised, along with some recent measurements, by R.E. Johnson et a ., (Astron. Astrophys.,123,343, 1983), and a discussion of the implications for ice-grains and comets. At distances greater than 5-6 a.u. fast ions become the most important agents of erosion (G.Strazzulla, et al., ibid.,93). The production of some molecules

via erosion is also shown to be function of solar distance. Molecular hydrogen may be formed by ion bombardment of water-ice (V.Pirronello, G. Strazzulla, ibid., 118,341,1983).

Chemistry of Comets: T. Yamamoto et al., (Astron. Astrophys., 122,171,1983), investigated the chemical composition of the ices of a cometary nucleus on the basis of condensation models. From taking an interstellar-like composition and calculating the resultant fractional condensates (lacking the very volatile species) it was shown that the major components of the ice are water and carbon dioxide, in the ratio of about 10:1. Their model follows the cond sation of ice on a grain surface in an interstellar cloud which later formed the primordial solar nebula, and later still - the formation of the cometary nucleus, during which some processing of the ice may have occurred.

G.F. Mitchell et al., (Astron.J.,87,1600,1982) have shown that a carbon-dioxide rich nucleus fits well the dependence on heliocentric distance of the emissions from CN, C_2, and C_3 from comet West.

There were three papers related to the photochemical heating of the cometary atmospheres: W.H. Ip, Astrophys.J.,264,726,1983; and thermodynamic structure of water-dominated comets, M.L. Marconi, D.A. Mendis, Astrophys.J.,260,386,1982, and in Moon & Planets,27(4),431-52,1982.

Origin of Comets: there are two currently leading theories for the origin of the Oort cloud. An interstellar origin is unlikely as the capture is thought to be very inefficient. The most likely birthplace of comets appears to be in the Uranus-Neptune region. (J.A. Fernandez, Astron.J.,87,1318,1982). P.R. Weissman (Astron.Astrophys.,118,90,1983) gives an estimate of the mass of the Oort cloud of 1.9 Earth masses, which may be as little as 1/6 of the original, mostly concentrated in the size range of the observed long-period comets. Other papers on this subject were by M.E. Bailey,(Nature,302,399,1983) and M.J. Valtonen (Observatory,103, no 1052,1,1983).

Cometary Orbits: New "Original" and "Future" Cometary Orbits, by E. Everhart and B.G. Marsden, (Astron.J.,88,135,1983) updates the paper by Marsden et al., (ibid.,83,64,1978) which provided 200 original and future orbits of long-period comets. The main concern is with the reciprocal of the semi-ma or axis of the comet's orbit. A positive value in the past indicates that the comet was originally bound to the solar system, if negative it would indicate a comet from interstellar space. When the future orbit has a negative value then the comet leaves the solar system. No convincing evidence was found for original hyperbolic orbits.

Comet Halley (1982i): observations of P/Halley have been reported, the B magnitude was 24.6 ± 0.4 in November, 1982, (and a value of the nuclear radius in the range of 1.5 to 6.6km derived, the actual value depending on the albedo assumed (B. Sicardy et al., Astron. Astrophys.,121,L4,1983). A brightness increase of about 1 magnitude between 10 Dec 1982 and 14 Jan 1983 was reported by R.M. West and H. Pedersen (ibid.,L11) and it was suggested that some kind of activity had commenced.

Theoretical infrared spectra have been calculated for Halley (Th. Encrenaz, et al., Icarus 51,660,1982), more detailed calculations on some molecules are in progress (J. Crovisier,J.Le Bourlot, Astron.Astrophys.,123,61,1983).

Comet Bowell (1980b): several arguments point to water being a dominant parent molecule for some of the gases detected in comets. Hydroxyl, OH, has been detected in emission in Comet Bowell through ground-based and IUE observations. Hydroxyl arises through the photo-dissociation of water. Infrared observations reported by H. Campins et al., (Astron.J.,87,1867,1982), represent the first search for frost in a comet beyond 2 a.u. from the Sun but no absorption features were detected between 1.25 and 2.3μm. Later, they reported the observation of a deep absorption feature at 3.25μm in Comet Bowell, when the comet was between 3.4-3.5 a.u. from the Sun, and 2.9 and 2.6 a.u. from the Earth, which they identify as being due to water frost. (Nature,301,405,1983).

Comet IRAS-Araki-Alcock: IAU Ci cular 3817 reports a pre-discovery position, ammonia and water line detections, and a visual occultation of SAO 98040 on May 12, and a minor meteor shower; no 3811 reports the visual appearance of the

nuclear condensation. J.E. Bortle gives a summary of the observations, with photographs, in his "Comet Digest" of August 1983 (Sky & Tel.,66(2),175,1983).

Technical Papers:

Fluorescence excitation of CO in comets K.S. Krishna-Swamy, Astrophys. J., 267,882,1983; high - resolution spectra of diatomic carbon Swan bands from comet West 1976VI. D.L. Lambert & A.C. Danks, ibid.,268,428,1983; Lyman-α observations of comet West 1976 VI and P/d'Arrest 1976 XI with Copernicus. M.C. Festou, et al., ibid.,265,925,1983; electrodynamics of sub-micron dust in the cometary coma. M.K. Wallis, M.H.A. Hassan, Astron.Ap., 121,10,1983; two dust populations of particle fragments in the striated tail of comet Mrkos 1957 V Z.Sekanina,Astron.J.,87,1836,1982; emission features in the solar corona after the perihelion passage of Comet 1979XI. D.Chochal et al., Astrophys.Sp.Sci.,91,71,1983; investigation of the orbit of periodic comet Ashbrook-Jackson. L. Buffoni, F. Chlistovsky, Astron.Nachr.,303,309,1982; § Aurigid meteor stream points to unknown short period retrograde comet as parent. J.D. Drummond, Icarus 51,655,1982; observations of the red auroral oxygen line in 9 comets H. Spinrad,Publ.Astron.Soc. Pacific, 94,1008,1982; diatomic hydrogen production in comets V.Pirronello et al., Astron.,Astrophys., 118,341,1983; remote comets and related objects, VJHK colorimetry and surface materials W.K. Hartmann. Icarus 52,377,1982; on the spectrum of comet Bradfield 1980t C.B. Cosmovici, et al., Astron.Astrophys.,114373,1982; speculations on the infrared molecular spectra of comets M.J. Mumma, NASA-Conf.Publ. CP-2223,717,1982.

Other papers:

Advances in Space Research, volume 12,1982, contains several papers on proposed scientific instruments to be carried aboard the flyby probes to observe comet Halley in 1986.

O. Gingerich, in Sky & Telescope 65,124,1983, writes of the comet predicted for 1857 that never came, its prediction being based on the erroneous assumption that comets of 1264 and 1556 were "the same". J.E. Bortle's series in Sky & Telescope includes notes on P/d'Arrest 1982e (65,565,1983), Tempel 2 (ibid., 477), Tempel 1 (ibid.,382), comet 1843 I (ibid.,291), Austin 1982g, P/d'Arrest 1982e, P/Churyumov-Gerasimenko (ibid., 195), and see p.99.

By way of completion, mention should be made of visual c met photometry by G.S. Keitch, J.B.A.A. 93,200,1983, and of comets Austin 1982g and IRAS-Araki-Alcock 1983d, ibid.,210, by R.L. Waterfield.

TWO LOW-ACTIVITY COMETS FOR 1984

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We shall be fortunate, in the coming year, in being able to witness favourable returns for two of the strangest specimens in the cometary zoo - namely, the short-period comets Arend-Rigaux and Neujmin I. Observations at the coming apparition of these comets will be of great value in our attempts to determine the evolution of these objects and may shed some light on the final state of the cometary phenomenon.

The unusual feature shared by these two objects is their apparent lack of activity except for a brief period near perihelion passage. For most of the time they could easily be mistaken for asteroids and would probably have been listed with these objects had it not been for the observation, at their discovery apparitions, of faint, diffuse, gaseous glows surrounding the "asteroidal" nuclei. The "asteroidal" character of these comets even extends to conformity with the phase law of asteroidal bodies and the total lack of non-gravitational effects!

Traditionally, these two comets have been displayed as paradigm cases of transitional objects - former comets which are now well on their way to becoming inert asteroids. At an earlier epoch (so this argument runs) we would have seen two bright and active comets. At a later epoch, we would have seen two asteroids moving in "cometary" orbits. But thanks to pure chance, we happen

to live in an epoch where we can catch this evolutionary (or "degenerate", if you prefer) process in action.

Some support for this hypothesis is found in the nature of the orbits of these two comets. Thus, unlike most other short-period comets, these two move in remarkably stable orbits which keep them relatively free from the disturbing influence of Jupiter. They are, in a sense, trapped in their present orbits. Now, a minority of short-period comets should evolve into these types of orbits, however, as most of these objects are relatively short-lived on the cosmic timescale, it is unlikely that any will be seen at any particular epoch. Being unable to escape their plight, they will quickly dissolve and become invisible ("quickly", on the cosmic timescale of course). The only comets which can survive for long periods in stable orbits are those which possess some rather unusual feature rendering them especially long-lived. A feature such as an asteroidal core, for instance?

Therefore, according to this line of argument, these two comets are still visible in their stable orbits in virtue of their asteroidal cores, and (conversely) it is because of their long sojourn in these stable orbits, that their ices are now practically stripped of the asteroidal cores allowing only a minimum of activity to take place.

This hypothesis is quite straightforward, however it is not without its problems. First, it is not at all clear how an object with an asteroidal core and a thick volatile mantle could have formed in the early solar system. The most likely candidate, radioactive heating due to the presence of 26 Al, could have caused differentiation of cometary materials (if at all) only in very large nuclei. Yet, there is no evidence that even large comets possess non-volatile cores. On the contrary, they seem to be completely homogeneous on a large scale. Evidence for this conclusion comes from two main sets of observations:

(a) Large (as well as small) comets have sometimes been observed to break into several fragments, yet studies of the relative motion of these fragments, and their general dynamic and photometric behaviour, suggest that they share the same composition, i.e. that the parent nucleus was homogeneous in composition.

Furthermore, the sungrazing group of comets (almost certainly fragments of a large comet which broke up at a previous perihelion passage) appear to be every bit as fragile as small periodics, according to research by (e.g.) Opik. Clearly, the original sungrazer must have been a large comet, yet even it does not seem to have possessed a core (this observation may be interesting in so far as it may yield some indication of the size of the original sungrazer. If 26 Al really was incorporated into comets, it is reasonable to suppose that nuclei of about 20 km or larger would have been subjected to sufficient radioactive heating to result in <u>some</u> degree of differentiation. The apparent homogeneity of the sungrazers may mean that the original nucleus was not quite the giant that it is sometimes accredited with having been, although, of course, it would still have been large as comets go).

(b) In all the thousands of asteroid trails detected on deep wide-angle plates, not one has yet been found to move in a long-period orbit. But is it not strange that a comet moving in an orbit similar to that of Swift-Tuttle, or Halley or, for that matter, even Bennett, should not have already degenerated into an asteroid? Where are the corpses of ancient comets of moderate or long periods? Why must it be only short-period objects that form asteroidal bodies? Secondly, there appears to be equal difficulties with the alternative method by which a comet is supposed to turn into an asteroid, viz. by the formation of an insulating crust. This is thought to be the deposit of dust not carried away by the escaping gas. Nevertheless, it is questionable whether such an insulating crust would be sufficient to reduce cometary activity to zero or near zero. Moreoever, there seems to be good evidence (e.g. in the formation of transitory sub-nuclei) that any crust which does form is fragile and likely to "peel off" in rather large pieces. In other words, the presence of a thick blanketing crust is not well supported.

With such thoughts in mind, we may suggest that low-activity comets are not transitional objects but "missing links" - objects that have <u>never</u> been active

in the full cometary sense but which will maintain such levels of activity as they do reveal until the very end. It is logical to postulate the existence of these types of objects - they would simply be ice-rock bodies which formed too close to the infant sun to retain their full share of volatiles, but not so close as to be totally denuded of all ices. Too close to be "full" comets, but not sufficiently close to be "mere" asteroids.

Because of their low level of activity, these objects would be expected to be much longer lived than "full" comets of the same initial dimensions. Therefore, their presence in stable orbits of short period would be merely a selection effect. Being (it seems) very rare objects, the chances are against finding any in the unstable "temporary" orbits of most short-period comets, but their long life renders their existence in more stable orbits possible.

Is this speculation correct? I do not know. But it seems to avoid the problems encountered by the alternative hypothesis, while accounting for the observational facts in quite a straightforward and simple manner.

Perhaps 1984 will throw some more light on the problem!

COMETS IN 1981

S.W. Milbourn

1981a=1981 XVI. P/Longmore. Making its first return since discovery in 1975, P/Longmore was recovered by T. Seki (Geisei) on 1981 Jan. 2.80 U.T. The comet was diffuse with condensation, magnitude 18. The prediction by S.W. Milbourn in the 1980 Handbook required a correction to T of +0.33 days.

1981b=1981 XI. P/Buss. Discovered by S.J. Buss on a plate exposed by K.S. Russell (Siding Spring) on 1981 Mar. 2.58 U.T. Of magnitude 17.5, the comet was centrally condensed with a faint tail extending 20" northwest. The comet faded slowly and was under observation to early June. The following elliptical elements by Dr. B.G. Marsden are based on 18 observations 1981 Feb 9 - June 6 (prediscovery images having been found on plates exposed on Feb. 9 and Feb. 13):

T 1981 Jun.	11.35645	E.T.		
Peri	24°64460		e	0.3747439
Node	181.52781	1950.0	a	3.4906853 A.U.
Inc	2.57825		n°	0.15112559
q	2.1825723	A.U.	P	6.52 yrs

(MPC 6194)

1981c=1981 XV Elias. Discovered by J.H. Elias (Cerro Tololo Interamerican Observatory) on 1981 Apr. 3.02 U.T. The comet was diffuse with condensation but without tail, magnitude 15. Little was reported about the subsequent physical appearance of the comet but an observation as late as 1983 Apr. 4 enabled Dr. B.G. Marsden to calculate the following hyperbolic elements based on 23 observations 1981 Apr. 3 - 1983 Apr. 4 with a mean residual of 1".4:

T 1981 Aug.	18.22568	E.T.	Epoch 1981 Aug. 24.0 E.T.	
Peri	310°24103		e	1.0006593
Node	176.00680	1950.0		
Inc	115.31702		q	4.7425175 A.U.

(MPC 8051)

1981d=1981 XIV Buss. Discovered by S.J. Buss (California Institute of Technology) on 1981 Apr. 26.32 U.T. using the 0m.46 Schmidt telescope at Palomar. Of magnitude 16½, the comet was diffuse with condensation but without tail and remained a faint object. Using 24 observations 1981 Apr 26 - 1982 Jan 16, Dr. B.G. Marsden supplies the following near-parabolic elliptical elements (mean residual 1".5):

T 1981 Jul.	30.75387	E.T.	Epoch 1981 Jul. 15.0 E.T.	
Peri	189°83481		e	0.9990206
Node	23.55691	1950.0		
Inc	160.68532		q	2.4581429 A.U. (MPC 6945)

1981e=1981 XII. P/Finlay. Recovered by M.P. Candy and P. Jekabsons (Perth Observatory) on 1981 May 7.88 U.T., the comet being diffuse without condensation, magnitude 16. Originally discovered in 1886, P/Finlay was making its 10th recorded appearance having been missed in 1913 and between 1926 and 1953. No prediction appeared in the Handbook but the recovery position was in close agreement with a prediction by D.K. Yeomans on MPC 5653.

1981f=1981 XVII. P/Gehrels(2). Using the 2m.7 reflector at the McDonald Observatory, A Cochran and W. Cochran recovered this periodic comet on 1981 Jun. 8.44 U.T. Having a featureless spectrum, the comet was essentially stellar in appearance, magnitude $18\frac{1}{2}$ - 19. Making its first return since discovery in 1973, the recovery position was in good agreement (Delta T = +0d.05) with the prediction by R.J. Buckley in the Handbook 1981.

1981g=1981 VII. Gonzales. Discovered by L.E. Gonzales on 1981 Jun. 29.26 U.T. using the Maksutov astrograph at the Cerro El Roble station of the University of Chile. The comet was diffuse with condensation but without tail and faded slowly. It was followed until the end of November 1981. Using 18 observations 1981 Jun. 29 - 1981 Nov. 27, Dr. B.G. Marsden has calculated the following near-parabolic elliptical elements (mean residual 1".7):

T	1981 Mar. 25.66163 E.T.	Epoch	1981 Mar. 17.0 E.T.
Peri	181°.61117	e	0.9993955
Node	143.27005 1950.0		
Inc	107.15222	q	2.3336010 A.U.

(MPC 6889)

1981h=1981 XXI. P/Kearns-Kwee. Recovered by T. Seki (Geisei) on 1981 Jun. 29.77 U.T. and confirmed by Y. Sheffer (Wise Observatory) on 1981 Jul. 13.04 U.T. Of magnitude 18, the comet was diffuse and faint but an exposure by C.-Y. Shao (Oak Ridge Observatory) on 1981 Aug 1 showed a well condensed image with coma. The comet became bright enough for visual observation and estimates by G.S. Keitch (Wrington) made between Nov. 27 and Dec. 3 were close to mag. 13.6.

Discovered in 1963, Kearns-Kwee was making its third appearance and the prediction in the Handbook 1980 by the Rev. C. Dinwoodie et. al. required a correction of Delta T = -0d.1 approximately

1981i=1981 XVIII. P/Slaughter-Burnham. Recovered by G. Schwartz and C.-Y. Shao (Oak Ridge Observatory) on 1981 Jul. 9.29 U.T. using the 1m.5 reflector. Of magnitude 20, the image was slightly diffuse with condensation. Originally discovered in 1958, the comet was making its third appearance and the prediction by J.V. Carey in the Handbook 1981 required a small correction to T of +0d.08.

1981j=1981 XIX. P/Swift-Gehrels. Recovered by C.-Y. Shao and G. Schwartz on 1981 Jul. 31.27 U.T. using the 1m.5 reflector at Oak Ridge Observatory. The comet was essentially stellar in appearance, magnitude 18.5 and became brighter than expected, reaching a magnitude of 10 in 1981 December. Originally discovered in 1889, the comet was lost until found by T. Gehrels in 1973. The prediction in the Handbook 1981 contained a misprint in the argument of perihelion which should be 84.4924 not 83.4924 as printed. This prediction, by R.J. Buckley, was based on the 1973 observations only and T required a correction of about -8 days. A prediction by G. Sitarski (MPC 5638) which linked the 1889 and 1973 observations required a correction to T of +0d.21.

1981k=1981 X. P/Howell. Discovered by E. Howell (California Institute of Technology) on 1981 Aug. 29.35 U.T. using the 0m.46 Schmidt telescope at Palomar. The comet was tail-less, diffuse with slight condensation, magnitude 15. On Sept. 4 the condensation was strong with a hint of a tail to the SW. Observations to Sept. 7 showed that the orbit was a short period, the comet having passed some 0.6 A.U. from Jupiter in 1978 and perturbed from a former somewhat larger orbit. Using 41 observations 1981 Aug 9 (prediscovery observation) to Dec. 21, Dr. B.G. Marsden has calculated the following elliptical elements (mean residual 1".5):

T 1981 May 4.35817 E.T.		Epoch 1981 Apr. 26.0 E.T.	
Peri	214°.60890	e	0.5074519
Node	75.35355 1950.0	a	3.2796782 A.U.
Inc	5.56849	n°	0.16594235
q	1.6153993 A.U.	P	5.94 yrs

(MPC 6889)

19811 P/Vaisala. Recovered by J. Gibson on 1981 Dec. 7.48 U.T. using the 1m.2 Schmidt telescope at Palomar, the comet being essentially stellar in appearance, magnitude 20.5. P/Vaisala was originally discovered in 1939 and was making its fifth appearance. The prediction in the Handbook by J.V. Carey required a small correction to T of -0d.03.

P/Schwassmann-Wachmann (1) experienced one of its irregular outbursts in 1981 February. On Feb. 1 it was at its usual magnitude of 18 - 19 but on Feb. 10.29 it was photographed at magnitude 13 by C.-Y. Shao and G. Schwartz using the 1m.5 reflector at Oak Ridge Observatory. The bright coma was described as appearing like a spiral emanating from the nucleus of the comet. (IAUC 3573, 3577).

COMET OBSERVATIONS

Graham S. Keitch

We are continuing our work of analysing both past and present observations. Most of the work for the period 1948 to 1974 is being undertaken by the Director and Charles Morris (1948-54[1] and 1955-1960[2] underway). Since 1980 we have tried to analyse the data on a reasonably current basis and have also given attention to the more important comets of 1975-1980. Comets Kohler 1977 XIV and Bradfield 1979 X have been dealt with [3], [4] and brief details of comet West 1976 VI are presented in this report. Unfortunately, it has not proved worthwhile to persue analyses of comets P/D'Arrest 1976 XI, P/Ashbrook-Jackson 1978 XIV, Meier 1978 XXI, Meier 1979 IX and P/Wild 2 1978 XI. With the exception of the first object we have only data from John Bortle. The sprinkling of UK estimates are generally only quoted to the nearest magnitude and amount to little more than confirmation that the comet was seen. Photometric parameters have been derived for these objects and there is little point in redoing the work just to include a few BAA estimates. However, before anyone is unduly alarmed by the foregoing comments, the situation has greatly improved in the last couple of years as our members have become more aware of photometric standards. In addition, we are now receiving some excellent contributions from A. Pearce, M. Clark et al., in Australia while J. Bortle, C. Morris and A.F. Jones continue to send their extensive and much valued observations from the USA and New Zealand.

Comet West 1976 VI

Christopher Clayton undertook the analysis of about 300 BAA observations of this memorable comet although there is still insufficient space to present his report; for the time being this will be retained in the Section's archives. For the photometric analysis, 227 estimates by 27 observers were selected and then corrected for aperture effects using the formula recommended by Morris[5]. As the comet was one of the brightest of the century, numerous naked eye estimates were secured and these were given a correction of +0.4 magnitude to bring them into line with estimates obtained with apertures near the standard size of 6.78 cm. The comet underwent an outburst of several magnitudes around the time of perihelion and became a daylight object at $-3^{m}.0$ during the last week of February 1976. When taken as a whole, the 17 pre-T and 210 post-T estimates yielded the following parameters for the usual powerlaw formula of cometary brightness, $M_v = H + 5 \log \Delta + 2.5n \log r$:

$H = 4.95 \pm 0.04$ $n = 3.12 \pm 0.04$ (heliocentric arc r = 0.197 to 3.346 AU)

We thank Mr. Clayton for his valuable work on this comet.

Comet P/Churyumov-Gerasimenko 1982f

This reasonably faint comet was well monitored by the Section. It was first located by GSK with the 29.8cm reflector at Wrington on 1982 Aug 29.11 UT. The small faint coma was 0.'6 across (23000 km). On Sept 18-19, JEB, CSM and GSK agreed that the well condensed coma was between 0.'5 - 1.'0 across and $12.^m7$ to $12.^m9$. Both JEB and GSK noted material emitting to the west of the coma. During October the 11^m coma steadily increased in brightness and by November a number of observers had the comet under scrutiny. In the second half of November, JEB, GMH, AFJ, RWP, JS and GSK all placed its brightness between $10.^m0$ and $10.^m5$ with a coma diameter of about $1\frac{1}{2}'$ (26000 km). The comet was now displaying a considerable amount of structural detail with various jets and material issuing predominently towards the west.

Maximum brightness occurred during December when the comet was readily visible in large binoculars. Around midmonth, JEB, CSM, JS, and GSK found values of $9.^m3$ - $9.^m7$ in 20x80 B, the coma being reasonably well condensed and perhaps as large as 5' across (94000 km). As 1983 began it had already started to fade slightly and its brightness fell from a little fainter than $10.^m0$ in large apertures at the beginning of January to about 11-$11.^m5$ by mid-Feb. At the same time, the coma gradually became less intense at its centre although JEB and GSK continued to record the westward projection. However, the comet had not faded as rapidly as expected. In fact it was kept in view by JEB, CSM and GSK until March by which time the brightness had dropped to 12^m. The last observation by JEB on Mar 16.14 put the 1.'5 coma (79000 km) at $12.^m6$. It was quite diffuse and was not seen again when he looked with the 50cm reflector in April.

The photometric estimates were generally of a good standard and a total of 124 estimates were selected for analysis from the following: JEB (25), MC (5), GMH (1), CSM (43), AP (4), RWP (7), DS (3), JS (12), GSK (24). After making the necessary corrections for aperture (which are not very diverse as most observers now use more or less standard equipment), the estimates show very close agreement and consistency. Often, half a dozen observers from the above list are found to agree within $0.^m5$ and on some nights the scatter is down to a few tenths of a magnitude. The estimates were analysed using a Sharp MZ80K microcomuter which plotted the data graphically. The Comet's heliocentric brightness is seen to increase quite sharply up to and after perihelion. The remainder of the curve shows the comet at more or less constant brightness despite increasing solar distance, and this accounts for the much slower fade than expected during 1983. If the light curve is analysed on the basis of pre and post-T data (even though the assymetry is not perfectly coincident with perihelion the following parameter values are found:

Pre-T : (r = 1.306 to 1.571, 36 observations)

H = 10.54 ($\pm$ 0.36)

n = 6.43 ($\pm$ 1.08)

H_{10} = 11.33 ($\pm$ 0.32)

Post-T : (r = 1.306 to 1.904, 88 observations)

H = 11.44 ($\pm$ 0.17)

n = 0.21 ($\pm$ 0.39)

H_{10} = 9.89 ($\pm$ 0.60)

Comet IRAS-Araki-Alcock 1983d

The apparition of 1983d was one of the most exciting cometary events of the century; the comet being the brightest since West in 1976. The first observations following Alcock's initial report of his discovery came from RWP and GMH who found the coma to be quite large and diffuse with binoculars. They reported a brightness of $6.^m2$ to $6.^m5$ and a diameter of 10 to 12' (100,000 km) for May 3.9. Within the next 24 hours the comet was seen by JEB, CSM, and GSK who agreed that the coma was $6.^m0$ to $6.^m1$ and up to 19' across. By the night of May 6-7 numerous UK observers were observing the 5^m to $5.^m5$ comet and several noted coma diameters already in excess of $\frac{1}{2}$ degree. Diameters up to $\frac{3}{4}$ to 1 degree were noted by JEB and GMH. Most of the coma material was fanned

out towards the Sun and in addition, some observers could see faint and temporal jets in various position angles. There was also a reasonably prominent and possibly variable 9 to 10^m nucleus. Over the next couple of nights the comet became a naked eye object and by May 9-10 it had reached $2.^m9$ and was almost 2 degrees across. On the following night it was a most conspicuous object appearing as a bright luminous 2 to 3 degree disc (235,000 km) well placed in a dark sky. The $2.^m1$ comet was now so close to the Earth that one could actually see it moving through the field of a moderately high magnification telescope when it passed close to a field star for reference! The sunward aspect of the coma material could be seen even without optical aid and a wealth of detail was visible in the telescope. In fact the coma showed interesting changes from night to night, which we hope to analyse in due course. On the night of May 11-12 the comet was even brighter although it had now dropped low into the western sky with a maximum brightness of $1.^m5$ to $1.^m9$ as noted by JEB, MJH, CSM, AP, DS, and GSK. Within a further 24 hours the comet had faded considerably as it passed into the hands of our southern observers. The Australian observers MC, AP and DS kept a close watch on the comet during May as it faded to $7\text{-}7.^m5$ with a coma diameter up to 10' (206,000 km). During June, a good set of observations was secured by AP using 20x65B but by Jul 10.47 the coma had faded considerably to $10.^m5$ in the 15 cm reflector and was soon lost from view. These fine observations from the south are especially valuable for the photometric analysis as the northern data cover only a short heliocentric arc.

A total of 70 estimates were selected for the analysis on the Sharp computer. The naked eye estimates were given an empirical correction of $+0.4^m$ to bring them into line with values obtained with apertures near the standard 6.78 cm. For the period when the comet was under observation from the north, i.e. up to May 13.07 (r = 1.001 to 1.035 AU), an H_{10} value of 9.72 ($\pm$ 0.31) applies. The plot of all the data again shows some interesting characteristics. Taken as a whole, the 70 observations (pre and post-T) yield the following parameter values:

$H = 9.55 \quad (\pm 0.71)$

$n = -1.08 \quad (\pm 0.98) \quad (r = 0.991 \text{ to } 1.303, 70 \text{ observations})$

$H_{10} = 9.39 \quad (\pm 0.63)$

The unusual n-value is most likely due to the fact that the majority of observations cluster around $\Delta < 0.19$ and $r = 1.0$. The unusual value could either be due to the Δ - effect or a selective bias in the distribution of the data. The post-T data, with more even distribution of observations between May 21 and July 10 yield a more likely parameters of

Post-T $H = 8.68 \quad (\pm 0.15)$

$n = 2.55 \quad (\pm 1.06) \quad (r = 0.991 \text{ to } 1.303, 18 \text{ observations})$

$H_{10} = 8.54 \quad (\pm 0.48)$

The post-T estimates do show a distinct dip to begin with when Δ was still less than 0.5 AU and there is little doubt that some observers did under-estimate the comet's brightness. However, this is understandable in view of the problems presented by the object for photometry. It is unlikely that binocular users would have defocused their instruments sufficiently and it is interesting to see how some of our members dealt with the problem. Some used spectacles (and others took them off) to defocus the comparison stars while DS focused his eye on a pencil held at arms length so that the background stars at infinity became blurred. JEB preferred to use a very small refractor at very low power. Others simply carried out the process as an image in their mind, something which cannot be done without a great deal of experience watching stars defocus at the telescope. Despite the very different approaches our most experienced observers agree very closely in their estimates.

Selected uncorrected estimates of comet 1983d

Date UT	MV	I	Obs	Date UT	MV	I	Obs
May 3.96	6.2	8B	GMH	May 11.90	1.6	E	GSK
4.98	6.1	5B	GSK	11.95	1.6	E	MJH
5.11	6.1	5B	JEB	12.08	1.7	5R	JEB
6.15	5.4	5B	JEB	12.38	1.5	E	DS
6.89	5.4	E	JS	13.55	3.0	E	AP
7.08	5.3	5R	JEB	16.42	4.8	E	DS
8.20	4.6	5R	JEB	18.48	5.4	E	MC
8.89	4.3	E	JS	29.48	7.0	6.5B	AP
9.90	3.0	8B	RWP	Jun 3.50	7.3	6.5B	AP
10.08	2.9	5R	JEB	10.47	7.4	6.5B	AP
10.89	2.1	E	GMH	Jul 1.48	9.6	15.2L	AP
10.96	2.0	E	GSK	10.47	10.5	15.2L	AP

Instrument type E = naked eye, B = Binocular, R = refractor, L = reflector

The following observer abbreviations have been used in this report:

JEB	J.E. Bortle	GSK	G.S. Keitch
MC	M.L. Clark	CSM	C.S. Morris
MJH	M.J. Hendrie	RWP	R.W. Panther
GMH	G.M. Hurst	AP	A. Pearce
AFJ	A.F. Jones	DS	D.A. Seargent
		JS	J.D. Shanklin

International Comet Quarterly

Observations by the following observers have recently been submitted to the ICQ:

Panther, Shanklin, M. Taylor, Stott, Medway, Milbourn, McKim, Hendrie, Gainsford, Keitch, Jones, Hurst, Sturdy, Frydman, Tanti, Bembrick, Ridley, Entwisle, Keedy, Ventura.

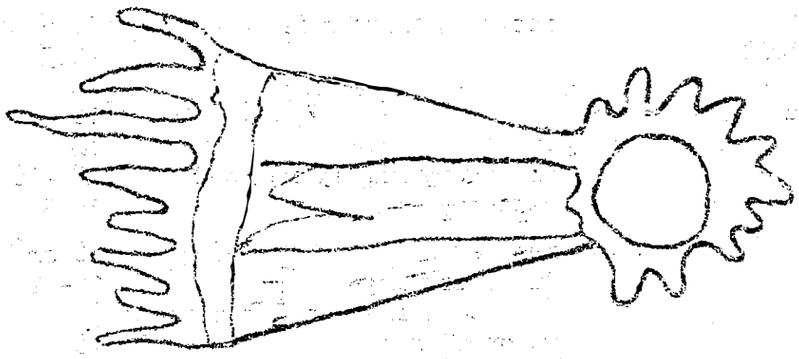
Fu ler details will be given in the next Bulletin.

References

1 Hendrie M.J. & Morris C.S., J. Brit. Astron. Assoc., 93(1), 1 (1982)
2 Hendrie M.J. & Morris C.S., J.Brit., Astron. Assoc., (in preparation)
3 Hendrie M.J. & Keitch G.S., J. Brit. Astron. Assoc., 91(3),251, (1981)
4 Keitch G.S. BAA Comet Section Bulletin, 18, 10 (1982)
5 Morris, C.S. Publ. Astron. Soc. Pacific., 85,506 (1973)

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



ISTI MIRANT STELLA

BULLETIN NO. 21

APRIL 1984

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SECTION NEWS AND NOTICES

M.J. Hendrie

Observing Notes and Forms

The new Visual Observation Report forms are available from Graham Keitch or myself, but old stock of the smaller forms should be used up first please. When asking for more forms it would help if you would enclose a stamped, self-addressed envelope.

The Notes for the Visual Observation of Comets by Harold Ridley are also available from Graham or myself, SAE please.

Harold Ridley has just completed Notes on the Photographic Observation of Comets and these may be obtained from him, SAE please.

(SAE should be not less than 16 by 22 cm in size as the forms are A5 size and the notes A4. They will not fold to go within a standard envelope of A4 width.)

HBR's address: Eastfield Observatory, Eastfield Lane, East Chinnock, Yeovil Somerset, BA22 9EP

The BAA Comet Section Keedy Award 1983

The first recipient of this annual award of twenty pounds kindly donated by David Keedy is George Alcock. While his independent discovery of comet Iras-Araki-Alcock 1983d was the immediate reason for the award being presented to him, it also reflects the very considerable contribution made over several decades to the work of the Section. Though his work on the search for novae has reduced his routine comet observations in recent years, the discovery of 4 novae as well as his 5 comets surely justifies his decision not to spend all his observing hours observing known comets. We still rely on him for checking visually reported discoveries of new comets, of which we get several in most years, but usually they are not confirmed. However, when he phones and says he thinks he has found a comet, you can be pretty sure that it is one! We hope that there will be more observations and more discoveries of comets and novae.

Designations of Comets Discovered and Recovered in 1983/1984 (cont'd - to 1984 March)

1983q	P/Arend	recovery magnitude	20.5
1983r	P/Harrington-Abell		20.5
1983s	P/Wild 2		20
1983t	P/Kowal-Vavrova		16
1983u	P/Taylor		20
1983v	P/Hartley-Iras	discovery mag 15 reached	8 '84 Feb
1983w	P/Clark	recovery mag	19.5
-----	P/Encke	reached	8 or brighter
1984a	Bradfield	discovery mag	11-12
1984b	Clark	(not confirmed on later plates)	
1984c	P/Neujmin I	recovery mag	18
1984d	P/Russell 4	discovery mag	13/14 (fading)

Roman Numeral Designations of Comets in 1982

1982 I	Mar 12.3	Bowell	1980b
1982 II	Mar 30.4	P/du Toit-Hartley	1982c, 1982b
1982 III	May 9.3	P/Peters-Hartley	1982h
1982 IV	May 15.0	P/Grigg-Skjellerup	1982a
1982 V	Jul 30.6	P/Väisälä I	1981l
1982 VI	Aug 24.7	Austin	1982g
1982 VII	Sep 14.3	P/D'Arrest	1982e
1982 VIII	Nov 12.1	P/Churyumov-Gerasimenko	1982f
1982 IX	Nov 23.2	P/Russell 3	1983i
1982 X	Nov 26.9	P/Gunn	----

From Minor Planet Circular (MPC) 8438, 1982 II is given to both components of P/du Toit-Hartley, two comets discovered on one plate, 1982c appeared to be the primary component. Comets Encke and Gunn no longer receive preliminary designations.

COMET NEWS SERVICE

Members are reminded that the very interesting and useful publication edited by Dr. J. Marcus "Comet News Service" can be obtained on subscription through the BAA. This saves the trouble of ordering directly from the USA and incurring the charges associated with payment in dollars. There have been several articles in recent issues of CNS on Halley's Comet and its brightness at the 1910 apparition, with some predictions for 1986. In addition CNS reports on papers and meetings that are not readily available outside astronomical libraries. With the approach of Halley, a subscription could help to keep you informed. For further information see the Journal or ask for a sample copy from the BAA Office.

Photo-Electric Photometry

A joint meeting of the IAPPP and BAA is being arranged for 1984. This may take place at the RGO (Herstmonceux) probably in late August or early September. Several Comet Section members are interested in attending. The arrangements will be made known in the Journal and Newsletter (it will probably take place before the next Bulletin). Those interested in photo-electric work on comets should contact Charles Munday, The Observatory, Rowney's Farm, Wakes Colne, Colchester CO6 2AS.

Comet Section Meeting

The BAA has decided to devote its Saturday meeting on November 10 to Halley and the comet. This will not be purely an observational meeting but will probably include some historical background. Details will be announced later.

In view of this it has been decided to hold a Section meeting early in 1985 to review plans and methods for observing comets Giacobini-Zinner and Halley. A joint meeting with the Meteor Section is a possibility being considered. Further information will be available later.

Plans for Observing Comet Halley and the IHW

An article on the BAA Comet Section plans for observing comet Halley and the relationship between the BAA and the IHW appeared in the December Journal. This was written in 1983 March/April so was a little out of date but no great changes have occurred. We have been in touch with the co-ordinator for Amateur Observations (Steve Edberg) on a regular basis and have sorted out most if not all of the practical problems of communication and reporting.

I have also been in contact with Dr. Don Yeomans of JPL who is the Discipline Specialist for the IHW Astrometry Network and have provided information on UK based members who will be obtaining positions. Communications are working well so far and observers are receiving the Astrometry Network Newsletter and special star catalogues etc. A meeting of the IHW Astrometry Network Workshop is being held in Munich in June (18-19) to discuss the results of the Crommelin trial run and all the preparations for comets Halley and Giacobini-Zinner. I shall be attending this meeting and two other observers have expressed an intention to go so far. Short papers will be presented by participants in the astrometry effort from many parts of the World.

Comet Giacobini-Zinner will be an IHW comet as the ex-satellite ISEE-3 (now renamed ICE, International Cometary Explorer) will make a close approach on 1985 September 11, during a period when Halley should also be visible from the UK. Giacobini-Zinner is expected to reach 8 mag about that time and is well-placed for northern observers from 1985 April (15m ?) until mid-September after which it moves south and fades. Observations of all kinds will be required on this comet as well as Halley and UK observers will actually have a better or longer period when rapid communication of astrometric results will be required by the IHW than for Halley. For Giacobini-Zinner the especially crucial period will be 1985 August 1 to after encounter, September 12 and for Halley 1986 January 1 to after the encounter about mid-March, but from the UK the comet will be in strong twilight by mid January.

The possibility is being explored through CHUKCC of giving the BAA Comet Section access to the professional information network by means of a computer link. Discussions by the Director are progressing satisfactorily Also the BAA observations will, after analysis and reduction, be offered to the CHUKCC Archive to be set up to hold all UK based observations of Crommelin, Giacobini-Zinner and Halley. Observations sent to the IHW by the Section may also be included in the IHW Archive.

The 1984 September issue of this Bulletin will contain a more detailed review of plans and instructions for observers. By then all members should have obtained the visual or photographic notes and new forms mentioned above, and have ready access to the IHW Amateur Observers' Manual. The IHW Astrometry Meeting will have taken place and more should be known about the outcome of discussions with CHUKCC. It should be possible to present a fairly detailed programme of what is required and how reporting should be carried out. As mentioned above a meeting to discuss observing methods and distribute final instructions is expected to be held during the first 4 months of 1985.

No plans and programmes are much use unless observers are in practice. Therefore the most important thing at present is to get some practice in and equipment in good order. Photographers should also try out their ideas and equipment over the next year - only a year today we hope that those with the larger instruments will have recorded positions of comet Giacobini-Zinner and a year's intensive work will have begun. While Section Officers will always be willing to help and give advice, clearly the important work must come first, so please get your questions sorted out over the next few months and do not wait to phone up just as we are going out to the observatory to observe Halley's Comet!

BAA ANNUAL EXHIBITION MEETING

The annual exhibition meeting of the B.A.A. will take place at Hawkstone Hall, London on May 19th 1984. (See JBAA 1984 April p112). I have been asked by Michael to appeal for material for display. Anything "Cometic" will be very welcome including drawings, photographs of equipment and comets, and anything

that could be applicable to the Comet Section's programmes.

Please identify each item with your name, and send to me enclosing a SAE for safe return.

PETE STANLEY
20 Elsted Close,
Ifield,
CRAWLEY,
West Sussex. RH11 0BH

Tel: 0293 22816 (After 6.00 p.m.)

NOTES FROM IAU CIRCULARS — M.J. Hendrie

Comet P/Halley 1982i — IAUC 3928 (1984 March 13) reports that several observers from Meudon and CFH report that electronographic bidimensional photometry at the CFHT (Canada-France-Hawaii Telescope) prime focus showed a suspicion of strong variability from night to night and the following B magnitudes in the course of one night: Feb 4.266 UT, 24.4; 4.298 UT, 24.2; 4.334 UT, 23.2; 4.404 UT, 22.8 mag.

Comet Crommelin 1983n — IAUC 3921 and 3927 report observations of the spectrum of this comet in some detail. (see a preliminary report on this comet by Graham Keitch).

Minor Planets or Comets ?

1983 TD — This fast moving minor planet (or comet) discovered by Simon Green with the IRAS was found to have an orbit very close to that of the Geminids (see IAUC 3878, 3881), as pointed out by Dr. Whipple. The period appears to be about 1.49 years and the planet can make very close approaches to the Earth. It has probably the smallest perihelion distance of any known minor planet (0.138 AU). It is of the Apollo type of asteroids.

Other minor planets with cometary orbits are (IAUC 3919) 1983XK, 1983SA, and 1982YA. 1984BC reported on this last circular also appears to have a cometary orbit with a period of 6.3 years and perihelion distance of 1.55 AU.

The two asteroidal comets P/Neumin I and P/Arend-Rigaux, which generally show no coma or tail, are both at perihelion in 1984 so perhaps something more may become known about them. It maybe that we should have designated these two minor planets or the recent cometlike asteroids should have been designated comets. It would be very interesting to know if these two comets and these minor planets are entirely devoid of cometary atmosphere, something that may have to wait for a close approach of a spacecraft or an observation with the Space Telescope.

COMETS - VAGABONDS OF SPACE by David A. Seargent

Doubleday & Co., Inc., Garden City, New York, 1982

$ 15.95 (Cost to me via Astro Books, £14.30, inc. p & p.)

pp 234 + xviii, hardback. 21cm x 14cm

This introductory book by a well-known Australian amateur who actually observes comets fills a gap in the recent literature and can be read with profit by beginner and experienced astronomer alike. As one would expect of a work from the pen of this writer, the style is lively and interesting and not altogether uncontroversial, though the author does make it clear when he is expressing his personal opinions. The general treatment is sound, and I found little to raise my blood pressure, though much to stimulate my thinking. Beginners could do much worse than to start their study of comets by perusing this book, and those of us who have already acquired some knowledge and a lot of opinions will still find new facts to add to our store and fresh approaches to old problems.

There are four main chapters: on The Anatomy of Comets, Discoveries Orbits and Origin, Famous Comets, and Halley's Comet. Additionally there are useful appendices on Suggested Observations (visual), Centuries of Comets, Some Interesting Comets, and Magnitudes of Astronomical Objects. Finally, there is a useful Glossary.

Few errors were noted: on p.39 the signs in the formula should be positive, not negative, and on p.71 the B.A.A. is referred to as the British Astronomical Society. On p.40, I must confess myself puzzled by the remarks on the source of cometary light close to the Sun, and on the effect of extreme closeness. On p.99, it is said that last century most comet magnitudes were determined with small wide-field telescopes, giving enhanced brightness estimates, and that these are compared with modern photographic magnitudes, producing an apparent fading of the comets. The reverse is really the case; the magnitudes determined with large instruments in the past are being compared with binocular estimates today, giving rise to an apparent increase of brightness in many cases. Photographic magnitudes are generally only used for determining 'nuclear' brightness.

These minor blemishes, however, do not vitiate the overall quality of a very readable book.

H.B. Ridley
1984, March 14

THE RETURN OF HALLEY'S COMET by Patrick Moore & John Mason

Patrick Stephens Limited, Cambridge, 1984, pp 121 Hardback £7.95

This up-to-date book devoted to Hal ey's Comet explains the basics of comets and then looks at the historical background to the comet and the man, moving on to the more recent apparitions which are dealt with in some detail, and giving useful tables and diagrams for the apparition in 1986. There is a chapter on the associated meteor streams. Nicely produced at a reasonable price it is recommended to all with an interest in comets and Halley's and it could be a present for any interested person. Serious observers will need other publications as well but at this price no one need be without it. A review will appear in the Journal within the next few months.

M.J. Hendrie

THE INTERNATIONAL HALLEY WATCH AMATEUR OBSERVERS' MANUAL FOR SCIENTIFIC COMET STUDIES by Stephen J. Edberg originally published by NASA and JPL and available from Washington. A single cover edition is available from Sky Publishing and Enslow Publishers. For UK observers it can be obtained from Enslow Publishers, PO Box 38, Aldershot, Hants, GU12 6BP. Price £7.75 post paid.
(See JBAA 1983 Dec)

A brief outline of the contents of this work was given in the last Bulletin, I have also mentioned it in the Journal on more than one occasion. It contains information on the visibility of the comet, a daily ephemeris, charts of the path on the sky, notes on different types of observations and specimen report forms. To have one's observations considered for inclusion in the work of the IHW it is necessary to register individually by returning the Observer Index form in the Manual. Observers will no doubt submit their observations to the BAA Comet Section (in the UK and elsewhere) for analysis and summarising but even so the IHW would like registration by the individual (copy to the Director Comet Section please).

The Manual is very well produced at a reasonable price and every serious observer of Halley's Comet should have ready access to it. A review will appear in the Journal shortly, but meanwhile you should order a copy if you want to know what the rest of us are talking about when we refer to Halley's Comet.

M.J. Hendrie

NOTES FROM OTHER JOURNALS

Compiled by G.J. Hodgkinson, 12 Mallory Close, Ramsgate, Kent.

The Journal of Physical Chemistry is, I agree, a most unlikely source of astronomical papers but there is a specific issue that carries a series of papers on the topic of ice grains in space. Of these, two concern comets and seem to present a reasonable synopsis of the structure and behaviour of comets (A.H. Delsemme, volume 87, no.21, p4214; S. Wyckoff, ibid., p4234, 1983). O.V. Dobrovols'kii et al., claim to establish a relationship between age and the decrease in brightness of the comets Encke and Halley (Dokl. Akad. Nauk. Tadzk., SSR, 26(1), 25, 1983). The age being calculated from an equation relating the density, size and mass of the nucleus, its orbit and the solar constant. Two papers in Astronomical Journal follow on from a 1982 paper discussing the formation of comets in the outer protosun by radiation pressure from the sun and neighbouring protostars. The radiat on pressure tends to increase the degree of clumpiness already present in the infalling material: grains feel a net radiation pressure toward the centre of the protocomet dust cloud due to absorption and backscattering of radiation by the dust (J.G. Hills, M.T. Sanford II, Astron. J., 88,p1519 & 1522, 1983).

Summary of technical papers: photodissociation lifetimes of hydroxyl (OH & OD) radicals in comets (P.D. Singh, et al., Icarus, 56, 184, 1983); expected and observed profiles of CO & CS in cometary spectra (K.S. Krishna-Swamy, Moon Planets 29(2), 191, 1983); infrared fluorescence of molecules in comets (J. Crovisier, T. Encrenaz, Astron. Astrophys., 126, 170, 1983); and the atmosphere of a dirty-clathrate cometary nucleus: a two phase multifluid model (M.L. Maxoni, D.A. Mendis, Astrophys. J. Lett., 273, 381, 1983).

Other Notes: J.E. Bortle's series in Sky & Telescope includes notes on Churyamov-Gerasimenko 1982f (vol 66, 84, 1983), IRAS-Araki-Alcock (p175, 271, & 373) and Crommelin (p.578). David Hughes has two notes, one in Nature on the Sun-grazing comets (Nature, 308, 16, 1984) the other in Monthly Notices of the R.A.S. on temporal variations of the absolute magnitude of Halley's Comet (vol 204, 1291, 1983).

Comet P/Encke: In addition to the well known asymmetry about the 1980 perihelion there were short term variations in the rate of production of specific molecules, the most dramatic being a rapid decrease in hydroxyl (OH) production prior to perihelion, (M.F. A'Hearn et al., Icarus, 55, 250, 1983).

Comet IRAS-Araki-Alcock (1983d): Descriptive articles in Sky & Telescope: B.G. Marsden, D.W.E. Green, vol.66 p26, and by J.E. Bortle, p.175. Radio observations suggested that ammonia constituted about 6% of the gases subliming from the cometary nucleus (W.J. Altenhoff et al., Astron. Astrophys., 125, L19 1983), and ultraviolet spectra obtained with the International Ultraviolet Explorer spacecraft, when the comet was only 0.032 au. from the Earth, showed the presence of diatomic sulphur (S_2). This is the first detection of this species in an astronomical object (M.F. A'Hearn et al., Astrophys. J. Lett., 274, 99, 1983).

Late News: The infrared spectra of Comet West 1976 VI obtained during the 1976 apparition was analysed and discussed by J.R. Johnson et al., Astrophys. J. 270, 769, 1983); brightness profiles of the inner coma of Comet Kohoutek 1973XII have important consequences for the astrometric positions used to calculate cometary orbits. They imply that when a dusty comet is fully active in the inner solar system, its centre of mass may be several arcseconds radially behind its centre of brightness (A.H. Delsemme, M.R. Combi, Astrophys. J., 271, 388, 1983).

PROSPECTS FOR 1984

In previous years I have restricted my remarks to those comets which seem likely to be within reach of amateur observers, but since in any case I have to investigate all the comets due in a given year, it occurs to me that I might as well pass on any interesting points about them, regardless of brightness.

As there are fifteen short-period comets due at perihelion in 1984, I have also summarized my findings in Table I, and as a bonus there are lists in Tables II and III of comets for 1985 and 1986, which of course will be dealt with in detail in future notes.

As I write these notes (early Dec.) the present comets, like the year, are running out, and unless there is a good discovery this month 1983 will leave us with a meagre inheritance. The four comets that have kept us busy during the past few months, Cernis, Shoemaker, P/IRAS and P/Tempel 2, will not be followed far into the New Year; P/Halley will not be of observational concern to us yet, and P/Cromellin will brighten but briefly and in difficult circumstances. In fact, the predictable outlook for 1984 is not exactly br lliant, as a glance at Table I will show. P/Encke looks encouraging at first sight, but closer inspection shows that this is not a very favourable return.

P/Taylor Discovered in 1916, this was a 9th mag. object, but was seen by Barnard to split into two components, each with its own tail. However, the originally brighter part, component A, faded and disappeared, and it is considered that the survivor recovered in 1977 was component B. This return is no less favourable than that of 1916, but owing to an increase of q and the fact that we only have half a comet, nothing better than 15^m-16^m can be expected. (Recovered: 1983u)

P/Cromellin (1983n) For want of anything better, this comet has been chosen by the IHW for testing out observational techniques and reporting and communication procedures proposed for P/Halley. Perhaps it is appropriate, for P/Halley in its post-perihelion circumstances will offer similar difficulties. Much will have been written elsewhere concerning P/Cromellin, and there is little that I can add to my notes for 1983. Amateurs may hope to acquire the comet early in 1984 and it should brighten quite rapidly in the following weeks to and for a week or so after perihelion, though the Moon will be a nuisance and the small elongation will give rise to twilight trouble. During the first two weeks of March, when the IHW effort is to be mounted, there will be no interference from Moonlight and the elongation will increase, but the comet will go south, keeping it near the horizon, and northern observers will find little improvement as the brightness fades. It is pleasing to note that our Director shared the honour of recovering this comet with M. Pajdusakova in 1956, when it was way off the ephemeris and virtually lost to professional astronomers with large instruments.

P/Smirnova-Chernykh: Discovered in 1975, this is a faint object with large q, and although this apparition is of almost optimum favourability, 15^m is about all that we can expect. The orbit is interesting in that it is similar to that of the Hilda group of asteroids, the main difference being that whereas the Hilda orbits are stable, locked in resonance with that of Jupiter, the comet orbit is unstable and will sooner or later experience a severe perturbation, leading probably to a large increase of q and a much longer period - this happened to P/Oterma, which occupied a similar type of orbit.

P/Tritton Also making its first post-discovery return, this comet is unlikely to engage our attention. Only seven observations were secured in 1977, when it was around mag. 18pg, and little better can be expected this time: one for the professionals.

P/Encke Making its 53rd observed return since it was discovered by Mechain in 1786, this comet has, by virtue of its very short period and comparative brightness, contributed more to our knowledge and understanding of comets than its more illustrious fellow, P/Halley, and it is a pity that it is not making a more favourable return this year, so that the original idea of using it for Halley-practice could have been adopted. There is no convincing evidence for any significant fading of P/Encke during the past two centuries; given a good apparition it is still seen at 5^m - 6^m. In 1980 Dec. it was reported at $6^m.5$. March perihelia are moderately favourable (May - September are the worst) and in 1852 the comet was observed at perihelion on March 11. In 1951 (T=March 16) the comet was observed as

7^m with 1° of tail. We cannot expect to follow it this time to less than about ten days short of perihelion, and are therefore unlikely to see it brighter than 7th mag. After perihelion it becomes better placed for southern observers.

Particular care should be taken with the determination of coma-diameters, as there is generally a marked shrinkage as perihelion is approached. However, as the comet inevitably gets into twilight at this time, the effect may not be entirely real. It would be interesting to relate a series of careful measures to the varying altitude and elongation of the comet, and to the time of observation in relation to the time of sunset.

The ephemeris in the BAA Handbook, apart from being incorrect, left a rather pessimistic ten-weeks gap around perihelion, but a revised version by Michael Hendrie, with no gap, has been published on BAAC 638.

P/Clark This is a rather faint and poorly-observed comet, but the circumstances are very favourable this year (similar to discovery apparition) and it may be glimpsed at 13^m by well-equipped observers in the southern hemisphere.

P/Wolf(1983m) This comet has one thing in common with P/Halley - it has been recovered (1958) by the Hale telescope at Mount Palomar. There the similarity ends, for although it was a reasonably bright object at its first five returns, it suffered a drastic perturbation by Jupiter in 1922, which shifted q out by 1 a.u. and increased the period by eighteen months. Now, mag. 18 pg seems to be its normal level.

P/Faye Discovered in 1843, this object has been observed at 17 previous returns, but is distinguished for reliability rather than brilliance. As is often the case, it seems to have been unusually bright at discovery but has never since fulfilled its early promise (sounds like my school report!) This is not a good return; the comet will be distant from the Earth and at small elongation when at perihelion. Subsequently it may be seen again towards the end of the year, but we shall be lucky if it gets as bright as 12^m.

P/Tuttle-Giacobini-Kresak A regular inhabitant of the lost-and-found department, this comet tends to be extremely faint unless the encounter conditions are optimum, as they are for an April-May perihelion. For late July, things are much worse, and my forecast of 13^m may be a little optimistic. However, the comet's position should be monitored, for in 1973 there were two extraordinary outbursts of ten magnitudes, well seen by John Bortle and photographed by Dr. Waterfield. Ten magnitudes represent a 10,000-fold increase of brightness, and one wonders what could have produced two such enormous eruptions only six weeks apart.

P/Wild 2 (1983s) Jupiter, like most deities, 'giveth and taketh away', and this comet came within our ken as a result of a perturbation by that planet in 1974. During its discovery apparition in 1978, John Bortle saw it at mag. 10.4, but unfortunately the circumstances are poor this time and although the comet may reach 12^m, it is less likely to be seen, because of its proximity to the Sun.

P/Wolf-Harrington. At a good return, this comet can come up to 11^m, but this apparition is rather unfavourable, and it is doubtful that it will be bright enough for observation by amateurs.

P/Neujmin 1. The discovery apparition of this comet in 1913 was, as one might expect, of optimum favourability, but the past three returns have been poor. The present one is moderately good. Originally described as of "asteroidal" (i.e. stellar) appearance, the comet nevertheless had a small coma and tail, and nobody was in any doubt as to its true nature. It reached 10^m then, and in 1948, at 16^m, a 12" coma was reported. Unfortunately for northern observers, this one is for our southern colleagues; by the time it gets up to the equator it will have faded beyond amateur grasp. The Handbook magnitudes should give a reliable guide to the expected brightness.

TABLE I

P/Comet	Last Obs. Return	N	Period yrs.	T 1984	q a.u.	Probable maximum brightness Date	Mag	Approx. location	Elong °	Full Moon
Taylor	1977 II	2	6.98	Jan 7.3	1.96	Jan 1-21	15-16	mid-Gemini	173-161	Jan 18.6
Crommelin	1956 VI	4	27.41	Feb 20.2	0.73	Feb 20-Mar 1	6.5-7.5	S.p. α Piscium	44-47	Feb 17.0
Smirnova-Chernykh	1975 VII	1	8.50	Feb 21.5	3.56	Feb 20	15	4° S β Leonis	153	
Tritton	1977 XIII	1	6.36	Mar 3.1	1.44	Feb 10	16-17	nr γ Arietis	72	
Encke	1980 XI	52	3.31	Mar 27.7	0.34	Mar 17	6-7	mid-Pisces	26	Mar 17.4
Clark	1978XXIII	2	5.50	May 29.1	1.55	Jun 9	13	α Microscopii *	135	Apr 15.8
Wolf	1976 II	12	8.22	May 31.8	2.42	Nov 1	18	Border of Tau-Eri	152	May 15.2
Faye	1977 IV	17	7.35	Jul 10.4	1.59	Jul 9	12-13	Hyades	40	Jun 13.6
						Dec 16	12-13	θ Hydrae	121	
Tuttle-Giacobini-Kresak	1978 XXV	6	5.58	Jul 28.4	1.12	Jul 28	13	nr β Leonis	46	Jul 13.1
Wild 2	1978 XI	1	6.18	Aug 20.2	1.49	Jun 29	12	δ Cancri	28	Aug 11.7
Wolf-Harrington	1978 VI	6	6.53	Sep 23.0	1.62	Sep 23	14-15	δ Geminorum	66	Sep 10.3
						Dec 16		ν Sextantis	104	
Neujmin 1	1966 VI	4	18.21	Oct 8.2	1.55	Sep 17	12-13	3°S ζ Sagittarii *	108	Oct 10.0
Arend-Rigaux	1978 III	5	6.84	Dec 1.4	1.45	Dec 26	11	ζ Hydrae	138	Nov 8.7
Schaumasse	1960 III	6	8.18	Dec 7.3	1.20	Dec 7	12	nr β Aquarii	65	Dec 8.5
Haneda-Campos	1978 XX	1	6.27	Dec 25.7	1.22	Dec 26	14-15	nr ϵ Aquarii *	57	

Notes: N = No. of previously observed apparitions

* = More favourable for S hemisphere observers

TABLE II

PERIODIC COMETS DUE TO RETURN IN 1985

P/Comet	Last Obs. Perm.	Return Prov.	T 1985	P yrs	q a.u.	N	Discovery appn.
Tsuchinshan 1	1978 IX	1978a	Jan 2	6.7	1.51	3	1965 I
Schwassmann-Wachmann 3	1979 VIII	1979g	Jan 11	5.4	0.94	2	1930 VI
Honda-Mrkos-Pajdusakova	1980 I	1980c	May 25	5.3	0.54	6	1948 XII
Schuster	1978 I	1977o	Jun 2	7.2	1.53	1	1978 I
Gehrels 3	1977 VII	1975o	Jul 3	8.1	3.44	1	1977 VII
Russell 1	1979 V	1979d	Jul 5	6.1	1.61	1	1979 V
Kowal 2	1979 II	1979a	Jul 10	6.5	1.50	1	1979 II
Tsuchinshan 2	1978 XVI	1978p	Jul 21	6.8	1.79	3	1965 II
Daniel	1978 XII	1979b	Aug 3	7.1	1.65	6	1909 IV
Giacobini-Zinner	1979 III	1978h	Sep 5	6.6	1.03	10	1900 III
Giclas	1978 XXII	1978k	Oct 3	6.9	1.84	1	1978 XXII

TABLE III

PERIODIC COMETS DUE TO RETURN IN 1986

P/Comet	Last Obs. Perm.	Return Prov.	T 1986	P yrs	q a.u.	N	Discovery appn.
Ashbrook-Jackson	1978 XIV	1977g	Jan 24	7.5	2.31	5	1948 IX
Boethin	1975 I	1975a	Jan 26	11.2	1.11	1	1975 I
Halley	1910 II	1909c	Feb 9	76.0	0.59	29	(-239)
Holmes	1979 IV	1979f	Mar 14	7.1	2.17	6	1892 III
Wirtanen	1974 XI	1974i	Mar 20	5.5	1.08	5	1947 XIII
Kojima	1978 X	1977r	Apr 5	7.9	2.41	2	1970 XII
Spitaler (lost)	1890 VII	1890f	May 17	6.5	1.84	1	1890 VII
Shajn-Shaldach	1979 I	1978i	May 27	7.5	2.33	3	1949 VI
Whipple	1978 VIII	1977h	Jun 25	8.5	3.08	7	1933 IV
Wild 1	1973 VIII	1973c	Oct 1	13.3	1.98	2	1960 I

P/Arend-Rigaux By a coincidence, this comet follows the previous one to perihelion only a couple of months later; both are regarded as candidates for extinction in the not too distant future, or for preservation in a quasi-asteroidal state if that is the fate of some comets. The orbits, however, are quite different and although not discovered till 1950, P/Arend-Rigaux has already visited us five times. The sixth return is almost a repeat of the first, which again was about the best possible. Not too badly placed, the comet should reach 11^m at the end of the year. Whether these last two comets look asteroidal or not is largely a matter of instrument size; when observed in 1978 with the AAT, P/Arend-Rigaux had a small coma and a 15" tail - also typical cometary emission features were detected in its spectrum. In 1950 the coma was 1' in diameter, easily detectable in amateur instruments. The interesting article by David Sergeant in the last Bulletin should whet the appetite of observers for seeing what they can of these unusual objects.

P/Schaumasse In 1952 this comet gave us an unexpected treat by coming up to naked-eye visibility at perihelion; a perihelic opposition together with a bit of a flare-up was responsible for elevating this normally modest object to an unaccustomed eminence. This time, alas, is only an average occasion, and those of us with suitable instruments may just get it at 12^m, at the beginning of December.

P/Haneda-Campos It is unusual for amateurs to discover new short-period comets now, but, like P/Schaumasse, this one has q not far beyond the Earth's orbit and can make an occasional close approach. Intrinsically a very faint object, it came within 0.2 A.U. of the Earth in 1978 and was netted by its discoverers at 10^m. We cannot expect it to be brighter than 14^m - 15^m at this apparition, and it will be badly placed for northern observers in spite of the misprint at the end of the Handbook ephemeris.

Pursuing its leisurely path in south-eastern Hydra, P/Schwassmann - Wachmann 1 should be monitored for outbursts, two of which occurred in 1983. It looks as though we may have to write off P/Swift-Tuttle as lost; in spite of its evident propensity for shedding dust particles, even IRAS has not detected it.

H.B. Ridley
1983, December 7

COMETS IN 1982 S.W. Milbourn

1982a=1982 IV. P/Grigg-Skjellerup. Recovered by J. Gibson using the 1.2-m Schmidt telescope at Palomar on 1982 Jan. 15.29 U.T. The comet was essentially stellar in appearance, magnitude 19, the recovery position being in close agreement with the prediction in the Handbook 1982.

By late April the comet was under visual observation and reported magnitudes ranged from 13.0 on April 30 to 9.6 by mid-May, fading to 10.4 by mid-June. Originally discovered in 1902, the comet was lost until rediscovered in 1922. Since then it has been observed at each return, the current apparition being the 14th recorded appearance.

1982b and 1983c=1982 II. P/Du Toit-Hartley. Two comets were discovered on the same plates exposed on 1982 Feb. 5.73 U.T. and Feb. 6.75 U.T. by M. Hartley using the 1.2-m Schmidt telescope at Siding Spring. 1982b was the brighter at magnitude 14 whilst 1982c was of magnitude 17. Z. Sekanina suggested that the two objects were components of a single comet which had split and the fainter 1982c was actually the primary object. These suggestions were confirmed when S. Nakano found a linkage with P/Du Toit (1945 II) and 1982b became very faint and diffuse at magnitude 19 whilst 1982c brightened to magnitude 14 - 15 by the end of May.

For 1983c, Dr. B.G. Marsden has calculated the following elements based on 26 observations 1982 Feb. 5-Apr. 23. The elements are not linked to 1945:

T	1982 Mar. 30.44498 E.T.		
Peri.	251°.67242	e	0.6019606
Node	308.58454 1950.0	a	3.0013712 AU
Inc.	2.93846	n°	0.18955031
q	1.1946641 AU	P	5.20 yrs

The corresponding time of T for 1982b is 1982 Mar 30.81245 ET.

(MPC 6890)

1982d. P/Tempel (2). Recovered by J. Gibson on 1982 Feb. 3.46 U.T. using the 1.2-m. Schmidt telescope at Palomar. The comet was stellar in appearance, of magnitude 20-20.5 and the recovery position was in close agreement with the prediction in the Handbook 1982. P/Tempel (2) became bright enough for visual observation in 1983 and magnitudes ranged from 10.4 in May, peaking at mag. 9 in July and fading to 11 by October. This comet has been missed at 5 returns since discovery in 1873 and was making its 17th recorded appearance.

1982e=1982 VII. P/d'Arrest. Recovered by J. Gibson on 1982 Apr. 30.44 U.T. using the 1.2-m. Schmidt telescope at Palomar. Subsequently the comet was found on a plate exposed at the Oak Ridge Observatory on Apr. 23 by G. Schwartz. The images were very diffuse at magnitude 19 and the prediction in the Handbook 1982 required a correction to T of +0d.13. Visual observations were also made of this short-period comet, the magnitude increasing rapidly from 12 at the end of August to 9 by early October and then fading to 10 by the end of November. Originally discovered in 1851, the comet has been badly placed at some returns and was making its 14th recorded appearance.

1982f=1982 VIII. P/Churyumov-Gerasimenko. Recovered by J. Gibson on 1982 May 31.45 U.T. using the 1.2-m Schmidt telescope at Palomar. The comet was essentially stellar in appearance, of magnitude 18½-19 and the prediction in the Handbook 1982 required a small correction of +0d.03. The comet was making its 2nd return since discovery in 1969, and provided another example of a short-period comet becoming bright enough for visual observation. Reported magnitudes showed a steady increase in brightness from 12.9 in September to reach a peak of 9 in December and then fading to 12½ by March 1983.

1982g=1982 VI. Austin. Discovered by R.R.D. Austin (New Plymouth, New Zealand) on 1983 Jun. 18.67 U.T., the comet being a diffuse object of magnitude 10. Preliminary elements showed that the comet could become a naked-eye object by mid-August and it duly obliged by brightening from 9.4 at the beginning of July to reach 4.7 on August 20. A slow fading then set in but with the comet moving into darker skies the best views were obtained during the last few days of the month when a tail was visible up to 5° long.

The orbital elements needed constant refining, the final set being by Dr. B.G. Marsden and based on 97 observations 1982 Jun 19 to 1983 Apr 3 with a mean residual of 1".1:

T	1982 Aug. 24.72931 E.T.	Epoch 1982 Aug. 19.0 E.T.	
Peri.	33°.82600	e	0.9994012
Node	325.56373 1950.0		
Inc.	84.48951	q	0.6478114 AU

(MPC 8051)

1982h=1982 III. P/Peters-Hartley. A diffuse magnitude 15 object discovered by M. Hartley (U.K. Schmidt Telescope Unit) on 1982 Jul 11.47 U.T. was subsequently linked with Comet P/Peters 1846 VI. The possible identity was suggested by I. Hasewega, S. Nakano and M.P. Candy and exhaustive calculations by Dr. B.G. Marsden confirmed the link and showed that the errors in the 1846 elements were greater than estimated at the time. Only 11 observations were obtained at the present return (July 11 - 23) and there is

still some uncertainty in the number of revolutions since 1846. The following elements by Dr. Marsden are based on these 11 observations and not linked to 1846:

T	1982 May 8.69094 E.T.		
Peri	338°.28824	e	0.5990418
Node	259.34178 1950.0	a	4.0491499 AU
Inc	29.86137	n°	0.1209646
q	1.6235399 AU	P	8.15 yrs.

(MPC 7149)

1982i. P/Halley. The long awaited recovery of P/Halley came on 1982 Oct. 16.5 U.T. when D.C. Jewitt et al reported that images had been recorded on three exposures made with the Space Telescope Wide-Field Planetary Camera Investigation Team charge-coupled device placed at the prime focus of the 5.1-m. (200 inch) telescope at Palomar. The comet was 0s.6 west of the prediction by D.K. Yeomans (1981. The Comet Halley Handbook). By the end of 1982 further observations had been made by the Kitt Peak National Observatory, the Canada-France-Hawaii telescope and the European Southern Observatory at La Silla. The magnitude was around 24.

The following updated elements by D.K.Yeomans are from The Comet Halley Handbook - Second Edition 1983 and include observations up to 1983 January 14:

T	1986 Feb. 9.45175 E.T.	Epoch	1986 Feb. 19.0 E.T.
Peri	111°.84809	e	0.9672760
Node	58.14536 1950.0		
Inc	162.23928	q	0.5871047 AU

1982j P/Tempel (1) Recovered by T. Seki (Geisei) on 1982 Dec. 11.84 U.T. and by E. Barker (McDonald Observatory) on 1982 Dec. 16.48 U.T. The comet was somewhat diffuse of magnitude 19 and the recovery positions were in very close agreement with the prediction in the Handbook 1982. P/Tempel (1) was originally discovered in 1867, reobserved at the 1873 and 1879 returns but then lost until recovered in 1966 and was making its 7th recorded appearance.

In 1983 this comet became another short-period to be observed visually 13th magnitude in mid-March and brightening to 9.5 in May and June when a short tail was visible.

1983k P/Kopff. Recovered by E. Barker and S. Odenwahn on 1982 Dec. 20.51 using the 2.7-m. McDonald reflector. The comet was essentially stellar in appearance, of magnitude 20 and the prediction in the Handbook 1982 required a small correction to T of -0d.03. P/Kopff was originally discover d in 1906, missed at the next return but observed at every return since 1919 and was making its 12th recorded appearance.

Once again, this was a case of a short-period comet being observed visually and from 12th magnitude in mid-March 1983 the comet attained a maximum of 7.5 in July 1983.

P/Schwassmann-Wachmann (1). Two outbursts of this normally faint periodic comet were reported during 1982 - in January and April when the magnitude reached 12 on both occasions.

A SUMMARY OF OBSERVATIONS OF RECENT COMETS by Graham S. Keitch

The following reports are based on observations received so far. Full analyses have not been undertaken for these objects, most of which were poorly observed from the UK. We would very much like to encourage observers to pay more attention to some of these fainter (but certainly not less interesting) comets. Again, there has been a most welcome and substantial input of observations from the Australians.

Terry Mahoney has offered the Section assistance in the processing of observations which should enable us to analyse some of these comets in greater detail in due course. For these particular comets, contributions received from abroad vastly outnumber those provided from within the UK. Even with Terry's help, the large number of comets being observed from both hemispheres can sometimes prove rather overwhelming and on such occasions we could get by if we simply produced an analysis of UK (and other observers' observations not included elsewhere) results for comparison with those obtained by American, Australian and Dutch groups. To do this we require more observers than the very few that have been following the comets reported here. If any observers in the Section require assistance in observing some of these fainter objects, we should be glad to help wherever possible. For some time we have been collating and reviewing comparison star data and we now have the computer power to provide detailed and accurate ephemerides for these fainter objects.

Comets Crommelin, Hartley-IRAS and Encke

We are unable to report on these objects at the present time as we await members reports. In the case of Crommelin which has been used as a Halley test run, WE NEED YOUR REPORTS AS SOON AS POSSIBLE PLEASE, to enable us to compile our account of the comet's performance without undue delay. PRELIMINARY RESULTS WILL BE DISCUSSED AT THE CHUKCC MEETING ON MAY 9TH, so please do not delay and sport a first-class stamp on this occasion.

Graham Keitch (GSK) has observed the comet from 1984 Jan 24.79 (mag 9.9 in 30cm refl.) to Mar 3.81 (mag 7.9 in 20x80 bin with tail to north-east). He also followed Hartley-IRAS 1983v from 1983 Dec 26.75 (mag 10.1 in 30cm refl.) to 1984 Jan 5.76 (mag 10.0 in 30cm). Apparently the comet underwent a brief flare in February when it reached mag 7.8 according to John Bortle in the USA who observed the comet with binoculars. It has since been photographed by Harold Ridley, B.G. Manning, D. Buczynski and Mike Hendrie (around mag 12 in early April from photographs).

(Photographs for astrometric observations of comet Crommelin were taken by the following, and some yielded usable positions. The exceptionally unfavourable weather in the UK has seriously affected the amount and quality of both visual and photographic work, Hendrie having only one evening when comet Crommelin could be photographed (Mar 7.8), a 15 minute slot with the comet 10 degrees from the horizon and only 20 degrees from the 4 day old Moon. Others fared only a little better. Encke passed with no opportunities at all for observations at Colchester.

J. Stapleton and F. Vincent (St. Andrews), B.G. Manning, H.B. Ridley, D. Buczynski, R.L. Waterfield and H.B. Ridley, M. Swan, R.W. Arbour and M.J. Hendrie (so far reported) M.J.H.)

Comet P/Kopff 1982k

This comet appeared as a reasonably bright but rather poorly placed object during the summer of 1983. Jonathan Shanklin (JS) searched for the comet as early as 1983 Mar 15 but did not produce any positive sightings until May 9 when he located it as a small diffuse 1.1 arcmin condensed patch as seen with the 32 cm refractor (x95) at Cambridge. The magnitude was estimated as 11.9 although GSK noted the comet to be significantly brighter than this on the same night with 20x80 Binoculars, the comet was easily located and found to be 3 arcmin across at mag 8.9. A few days later, JS also reports seeing it in binoculars as a reasonably bright object although the larger refractors at Cambridge continued to show the comet at nearer 11.5 mag. On May 15, KM located P/Kopff with 10.2 cm refractor x 60.

As June began, GSK observed the comet at mag 7.8-7.9 with a diffuse tail to the north and north-east as viewed with binoculars. The level of brightness was sustained throughout the month and throughout July. During this period, GSK noted considerable tail structure in the form of various jets and sometimes diffuse broad appendages. From June onwards, good coverage was provided from the southern hemisphere by the Australian group of observers,

D. Seargent, M. Clark, A. Pearce, Price, Lowe and Lovejoy. AP noted nuclear outbursts in June and July. The central condensation was variable in intensity and was sometimes irregular in shape. He also recorded the difficult but fascinating tail structure. Several streamers up to 0.25 deg in length were seen and these appeared to close together in late July and August to produce a broader more diffuse feature over 0.5 deg long. The comet remained well-condensed and both the Australian and UK observers reported coma diameters up to 7 arcmin across in binoculars.

As August began, GSK found the comet's brightness to have faded slightly to around mag 8.0-8.1 in 20x80 Binoculars. It was now becoming very poorly placed from the UK although JS was able to keep it in view until Oct 24 when he found it to be mag 10.5 and 1.4 arcmin across in the 20cm refractor x40. AP's observations during the first and second week of September recorded the comet as still being reasonably bright at mag 8.2-8.5 in a 15cm reflector. It therefore appears as if this interesting object suddenly faded rather quickly as AP placed the comet at mag 10.5 in October. MC kept the comet in view until Nov 8 using the 41cm reflector x86 when he estimated the brightness at mag 12.0

(It was reported in Sky & Telescope 1984 March p226, that a yellow-light photograph taken with the 4 meter Mayall reflector at Kitt Peak showed an oval cloud trailing the comet by some 0.5 million km. The date of the photograph was 1983 Aug 13 (3 days past perihelion). It was thought the cloud was real but confirmation is required. This comet is of special interest as it has recently been announced that comet Kopff has been selected for the Mariner Mark II Comet Rendezvous and Asteroid Flyby-CRAF mission-see for example Spaceflight 1984 May p199. Launch would be in 1990 and after one or two approaches to minor planets the CRAF would orbit the nucleus of Kopff until the comet's approach to the Sun makes moving off to a safer distance advisable; this would give the spacecraft some 2 years close to Kopff before perihelion in 1996 (Jul 2.2) - MJH).

Comet Cernis 1983l

This object was located by GSK using the 30cm reflector x62 on 1983 Aug 4.08. Despite the crescent Moon, the comet was easily seen at mag 10.1. The coma was 1.2 arcmin across with a very small central condensation.

Throughout August, he found similar brightness values of 10.3 or 10.4. Coma assymetry and detail was also noted. On Aug 13.08 a diffuse broad tail was seen in PA. 25 deg. while a short fan appeared to the west together with a jet in PA 200. The stellar nucleus was mag 12.5. Jonathan Shanklin located the comet on Aug 15 and kept it in view for several months. It was observed by Roy Panther on Sept 19 when the 4 arcmin coma was mag 10.1 in his 20cm reflector x35.

During September GSK continued to note the gradual increase in brightness, the comet reaching mag 9.4 in 20x80 B by Sept 19. David Seargent in Australia placed it between 9.3 and 9.7 in 15x80 B during the period Aug 30-Oct 2 while in the UK, J. Shanklin also observed the comet with binoculars. Between Aug 14-Sept 4 Maurice Clark used the large reflector (41cm) which placed the comet about 10.0 mag. A magnificent set of observations has been secured by Andrew Pearce, also in Australia. On Aug 10.9 he estimated the coma as being 1.8 arcmin across and mag 10.1 in his 15cm reflector and by the time he last saw it on Dec 2.54 it was 2.5 arcmin across and mag 10.6.

During this period he reports the comet brightening to around 9.0 mag on Oct 5 (15cm refl) before slowly fading again. Observations by GSK between Oct 5-14 show the comet to have peaked at mag 8.7-8.8. in 20x80B. The coma was up 4 arcmin across with various tails and structure. In his observation of tail structure AP informs us that he first detected a distinct tail in mid-September when it was about 0.3 deg long. The best views were had in October when it reached a length of 0.5 deg. The beginning of the tail was as wide as the coma and it extended between PA 0-30 deg.

The comet became rather diffuse as it faded. By Nov 4 DS found it to be mag 10.1 and the last sighting by MC on Dec 10 placed the magnitude at 11.4 in the 41 cm reflector.

Comet Shoemaker 1983p

Comet Shoemaker was located by GSK with the 30cm reflector on 1983 Sept 19.1. It was mag 11.7, faint, small and diffuse with a tiny, weak condensation. On Oct 4.93, it was 1 arcmin across at mag 12.0, although the brightness picked up again to 11.5 by Oct 13.97 by which time the comet was rather poorly placed from the UK. The Australians also kept a watch on the comet. Using the 41cm reflector x41, between 1983 Oct 1.67 and Nov 26.56, M. Clark saw the 1.5 arcmin coma become very diffuse as it faded from mag 11.3 to 12.8.

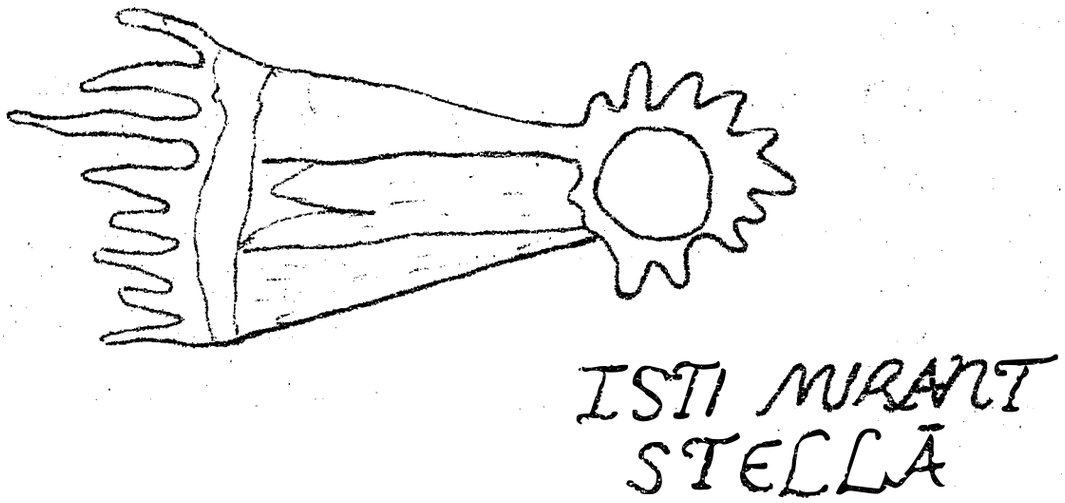
Andrew Pearce also observed between Sept 27.58 and Oct 5.72 when he found it to be mag 10.8-11.0 with a possible short tail in PA 315.

Comet P/IRAS 1983j

Observations of this comet were secured by JS, AP, MC, HBR and MJH. Between 1983 Aug 15.84 and Sept 4.87, MC found the comet to be mag 11.0-11.2 in the 41cm refl. x86 while AP found values of 10.5-10.7 for the 2 arcmin coma between Sept 4.87 and 16.81 as seen in the 15cm reflector at x30. From the UK, it was kept in view by GSK from Sept 1.88 to Oct 30.00. Initially the 30cm reflector placed the mag at about 11.7 but by the first fortnight of October, the 3 arcmin coma had reached mag 11.0 somewhat fainter values than recorded by the Australians. The comet was observed by JS on Oct 11.86 as a small, well condensed patch in the 33cm refractor x45 while MJH/HBR photographed it at Colchester on Oct 28.86. The coma appeared circular, 1 arcmin across and well condensed as photographed with the 8.5cm aperture f/5.8 lens. Two days later, GSK made his last visual sighting. In a rather poor sky the comet was very faint and small at mag 12.9 in the 30cm reflector x89.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



BULLETIN NO. 22 SEPTEMBER 1984

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SECTION NEWS AND NOTICES

Michael Hendrie

If you have queries on section observing objectives, suitable equipment, technical problems and methods of observation, you should contact the coordinators direct instead of writing to me (please send a stamped self-addressed envelope of suitable size). Any general problems about the Section can still be sent to me, and I will deal with problems on astrometry, anything for the Bulletin (as I am temporary editor), but those wishing to receive the Bulletin, free at present, should send SAE to Stan Milbourn, who arranges the actual publication and distribution of the Bulletin and keeps track of the subscribers and those to whom we send issues on a complimentary or exchange basis.

Please note that we have to keep costs down and we cannot send reminders, so please keep track of how many Bulletins you have received and send more SAE when Stan will be running low on your envelopes, otherwise, do not be surprised if they stop coming!

Addresses of Section Co-ordinators

Graham S. Keitch — **Visual Co-ordinator** — visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Analysis of light curves. Observations to the ICQ.
2 South Meadows,
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Harold B. Ridley — **Photographic Co-ordinator** — General photographic and spectrographic observations, equipment, films and plates, processing, etc
Eastfield Observatory,
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Charles Munday The Observatory, Rowney's Farm, Wakes Colne, Colchester, CO6 2AS (0206 240 328)	Photoelectric Co-ordinator	- Photoelectric observations, equipment detectors, amplifiers, recorders, filters etc. IHW requirements, etc.
Michael Hendrie (address above) (0206 240 021)	Astrometry Co-ordinator	- Requirements and reductions - contact with IHW, CHUKCC. (For general photographic requirements see Harold Ridley)
Stan W. Milbourn (address above) (0342 712168)	Computing Co-ordinator	- All computing problems, BAA Circulars Editor, distribution of Bulletin SAE and queries. Distribution of ephmerides.
Peter Stanley 20 Elsted Close, Ifield, Crawley, West Sussex. RH11 OBH (0293 22816)	Meetings Co-ordinator	- Meetings Organiser.

Designations of Comets Discovered and Recovered in 1983/1984 (cont'd to 1984 Sept 19)

1984e	P/Giacobini-Zinner	discovery/recovery magnitude	24
1984f	Shoemaker		14
1984g	P/Wolf-Harrington		17
1984h	P/Faye		13
1984i	Austin		7
1984j	P/Takamizawa		10
1984k	P/Arend-Rigaux		18
1984l	P/Gehrels (3)		20
1984m	P/Schaumasse		19
1984n	P/Kowal-Mrkos		15
1984o	Meier		12

BAA Halley Meeting - 1984 November 10

The Council has decided to devote the major part of the November meeting at Savile Row to Halley. Notices will appear in the Journal. Speakers are expected to include Colin Ronan and some members of the Section and will cover historical aspects as well as plans for 1985/86.

Comet Section Meeting

Arrangements are being made for a Comet Section meeting to be held on Saturday 1985 April 27, in Crawley, West Sussex. This centre has good communications by rail, motorway and is close to Gatwick. An all-day meeting is proposed.

The main purpose of the meeting will be to explain and discuss requirements for observing the two comets, Halley and Giacobini-Zinner, though it will of course be relevant to other comets. Further information will be made available through this Bulletin, Journal and Newsletter.

BAA/IAPPP Meeting

The third European Symposium of the IAPPP (International Amateur-Professional Photoelectric Photometry) was hosted by the BAA and RGO, and held at Herstmonceux Castle on 7-9 September 1984. Several Section members attended.

Comets - October-December 1984 Michael Hendrie

These brief notes cover comets that may be observable during the last 3 months of 1984. Harold Ridley is producing his Prospects for 1985 but they are not available yet. However, the comets that will be reviewed were tabulated in Bulletin 21. Those requiring further information urgently should ask him for a copy when they become available, but the full notes will appear in B23.

Several faint periodic comets have in fact been visible to some observers, and I cannot say too strongly that members should attempt observations of these fainter objects whenever there is a reasonable chance of success. By this I mean that they should have a very clear dark sky and the comet should be at a reasonable altitude, free from moonlight etc. One cannot expect to see them with small binoculars from the middle of Piccadilly. Andrew Pearce found comet P/Clark 1983w to be 10.6 mag in July, brighter than expected. Comet Faye 1984h has been observed by Charles Morris at about 13^m but may become brighter, he has also observed P/Wolf-Harrington at $12.^m8$ on Aug 28.5. His observing conditions are probably much better than most if not all of ours, but even so a comet of that brightness should be possible in the larger instruments at the better locations. Even negative observations are valuable as they set a limit to the comet's brightness. However, it is just as important to give all the information about time, instrument, sky etc if you are reporting not being able to see a comet, otherwise we do not know if you were in Piccadilly or it was just a foggy night.

P/Arend-Rigaux 1984k is another comet that will be available for observation this autumn and winter and it may be bright enough. It is an interesting comet, appearing nearly stellar at some apparitions and observations are required. Ephemerides for these comets are in the Handbook, do not worry too much about the magnitudes shown though, as these are almost certainly too faint for visual observations. P/Gehrels (3) 1984l comes to perihelion in 1985.

Comets P/Wolf-Harrington, P/Faye, P/Arend-Rigaux and Austin are all morning objects and good practice for Giacobini-Zinner and Halley during the first part of their visibility next year! Comet Takamizawa 1984j is very low from the UK and appears to be below 11^m in mid-September, but has varied in brightness as Graham Keitch reports.

Comet Shoemaker 1984f is now too close to the Sun but may reach 10^m in 1985 but it is moving south and will be a southern object near perihelion in a year's time.

Comet Meier 1984o - just announced - is in Serpens Caput, magnitude 12 -

T 1984 Oct 13.63 E.T.	Peri	127.15	
	Node	10.75	-1950.0
q 0.8567 A.U.	Inc	145.64	

Date 1984	R.A. (1950.0) h m	Dec ° ′	Δ	r	Elons °	Mag
Sep 27	14 54.12	+5 46.2	1.390	0.910	40.8	12.1
Oct 2	14 47.31	+3 18.7	1.499	0.883	34.7	12.1
Oct 7	14 41.16	+1 9.6	1.598	0.866	28.6	12.2
Oct 12	14 35.43	-0 46.2	1.685	0.857	22.8	12.3
Oct 17	14 30.03	-2 32.3	1.760	0.859	17.1	12.4

BAA Circulars cover comets Austin and Takamizawa, and all observers should subscribe to them. Ephemerides also appear in the ICQ and IAU Cards and Minor Planet and Comet Circulars. However, for these comets the BAA sources are adequate.

P/Schaumasse 1984m is also a morning object and may reach 11 mag later this autumn as it moves eastwards. At the time of writing there are now five comets possibly brighter than 13 mag on a single page of Norton's! After Austin moves away, Schaumasse, Arend-Rigaux, Wolf-Harrington and Faye will be

left, and at times two or more may be visible on the same photograph. The brightness is uncertain in all cases but Faye and Wolf-Harrington have been observed visually already. Attempts to observe these comets should be made when possible.

Comets Halley and Giacobini-Zinner — Michael Hendrie

As reported in Bulletin 21, both Halley and Giacobini-Zinner will be visited by spacecraft over 1985/86. The IHW Astrometry Network has asked all observers in the net to observe Giacobini-Zinner as well as Halley (see the notes on the Munich meeting elsewhere in this Bulletin). However, Giacobini-Zinner will not be considered an IHW comet unless additional funds become available (in the way that Crommelin and Halley itself are), so arrangements for sending the IHW observations (other than for astrometry) apply only to Halley. Of course, Giacobini-Zinner is of special interest and everyone plans to make the most of this favourable apparition and ICE flyby. More information on plans for this comet will be given later.

Our immediate task is to ensure that everyone knows in plenty of time what arrangements have been made so that they may equip themselves suitably if they want to participate fully in the BAA/IHW programmes. Further notes will be provided nearer the time. This note deals with arrangements agreed with our own Coordinators and IHW for dealing with Halley observations.

All Observations (except Astrometry)

The IHW Amateur Observations Coordinator, Steve Edberg, will be bringing together all amateur observations for possible inclusion in the final IHW Archive and passing to the Discipline Specialists. The BAA has been asked to act as a filter for comet (and through the Meteor Section, meteor) observations made in or communicated to the UK. Our task will be to consider the accuracy, completeness and value of observational material we receive and to pass on to the IHW useful data. We shall of course also be preparing a detailed report on the Halley apparition for the BAA, and also passing on to CHUKCC data for the UK Archive. Observers do not have to agree to have their observations considered for passing to the IHW, but both we and the IHW hope that all will do so. It does not deprive observers of any rights of use or publication of their data.

Reporting Observations

Those who do not wish to take part in the IHW programme (I hope there will not be any!) should send their observations in to the BAA on BAA forms in the usual way. Observations sent to us only in this way will not be communicated to the IHW.

Those who are willing to take part in the IHW programme must send in their observations on copies of the appropriate Report Forms to be found in the IHW Amateur Observers' Manual, now readily available in the UK at a modest price (see JBAA 1984 June - Volume 94 page 192 for review and availability) the Enslow address in Aldershot is: Enslow Publishers, PO Box 38, Aldershot, Hants, GU12 6BP price £7.75 post paid).

These must be sent to us in duplicate so that we can retain a copy and use it for BAA report and analysis. These observers need not complete a BAA form also, unless they wish to do so to include extra information.

It follows that IHW Observers must acquire or have ready access to the IHW AO Manual (a) to get copies of the Report Forms (b) to get the notes on making the observations and filling in the forms (c) to get the Observer Index form. This Observer Index form gives the IHW details of the observer's address etc and also instruments used. It should be completed and sent as soon as possible to Steve Edberg at JPL direct and a copy sent to me also. We need the copy to interpret what observers are sending in and in analysing their observations. (So far I have received only 3 copies, so either my earlier requests for copies have been overlooked or only 3 of our observers have so far registered with the IHW).

Observers who have not registered with the IHW by means of this form and who have not supplied the Director of the Comet Section with a copy will not be able to have their observations sent to the IHW.

To summarise, will observers please:

1. Obtain the IHW Amateur Observers Manual or make sure their Society has one handy.
2. Complete the Observer Index Form and send it to the IHW, copy to me.
3. Nearer the time, get copies of the Reporting Forms from the Manual (see below about replacement forms).
4. Enter your observations as completely and clearly as possible.
5. Send 2 copies to the BAA Coordinator (Visual, photographic etc.)
6. The Section will examine, analyse and send on suitable data to the IHW.
7. Those registered with the IHW will receive the Amateur Observers' Bulletin, and other communications, keeping them informed of the IHW activities and any changes (see below). Please take steps 1 and 2 as soon as you can and encourage others to do so. Both the BAA and IHW are trying, by the expenditure of considerable effort on the part of their officers, to avoid last minute floods of enquiries and paper-work. When the time comes the Observations will have to take priority over answering letters about problems that could have been sorted out in good time. So do please help us to avoid such problems later on.

Making the Observations

There are instructions on making the observations in the IHW Manual and these should be followed so far as possible. Note that calibration of films etc. is required and make some tests in good time. Where the BAA require additional observations, notes will be provided by the Coordinators; they will however assume that you thoroughly understand the Manual.

The Section Coordinators have already written some Notes to assist observers and some more are planned. Supplementary notes will be provided well before the event - again it will be assumed that you have seen the Section notes and if you do not already have those that refer to your mode of observation, it would be helpful if you were to ask for copies. To keep the cost to the BAA down we are asking for a small "Donation" of 50p in some cases, and again to cut costs I suggest that 3 x 17 pence or 4 x 13 pence stamps would be appropriate payment. We will provide the envelopes as well as the copies! A list is appended to this note.

General Points

Visual magnitude estimates will probably be based on the IHW Manual Charts which are based on AAVSO mags and are for periods when Halley is above 9th mag. For other times when the comet is fainter, special sequences will be available, work is proceeding on this to get an agreed basis for intercomparison between groups of observers. More information later.

Those who have registered and are getting IHW news will see that there are new Reporting Forms for Photographic, Spectrographic and Meteor observations, replacing those in the Manual - another good reason for Registering soon with IHW!

Australian Observations

Steve Edberg, David Seargent and I have agreed that David should send all Australian Observations he handles, including the BAA ones, direct to the IHW, copied to us. This will save time and help us; it is also logical that David should compare BAA with other southern observations on the spot and communicate them by the shortest route.

Astrometric Observations

Observers should continue to report their observations via their usual channels, where these are working well, but may do so through me in cases of difficulty. We expect to have access to the professional computer network (Starlink) now that SERC have approved the loan of a computer terminal and modem for the apparition. More information on this development later.

Note that positions should be reported to Don Yeomans, IHW Astrometry Discipline Specialist at JPL and copied to Brian Marsden at CBAT. Some notes on astrometry are in preparation (see also the Munich notes).

General Problems

Please do contact me or the other coordinators with any problems as soon as possible, they will be very willing to help and advise, but next year will be a busy one and once the apparition starts, the observations must come first and we shall not be so accessible for advice that could have been obtained in good time, though we shall always try to help with any genuine new problem that arises.

We still have Bulletin 23 in March, and a Section Meeting, in April at which to communicate final advice and instructions. We may also use the Association's Newsletter insert in the Journal as a quick means of reaching non-Section members as well as members.

BAA Comet Section Notes

The following are available as offprints, photocopies or duplicated sheets from me. A small charge is payable on those where stocks are already low to cover copying, envelope and postage. Where indicated an SAE (A4 or foolscap size is required):

"Notes on the Visual Observation of Comets"	H.B. Ridley	5pp	SAE
"Visual Comet Photometry" (JBAA 1983 Aug V93 N5)	G.S. Keitch	5pp	3x17p or 4x13p stps
"Notes on the Photographic Observation of Comets"	H.B. Ridley	9pp	3x17p or 4x13p stps
"The Comet Section and P/Halley" (JBAA 1983 Dec V94)	M.J. Hendrie	4pp	3x17p or 4x13p stps

"Notes on Photoelectric Observation of Comets"	C. Munday	(in preparation)
"Notes on Cometary Astrometry"	M.J. Hendrie	(" ")
"Notes on Searching for New Comets"	G.S. Keitch & P.C. Stanley	(" ")
"Notes on Computing in the Comet Section"	S.W. Milbourn	(" ")
"Notes on the Spectrographic Observation of Comets"	H.B. Ridley	(" ")

A notice will appear when the notes being prepared are available, those on astrometry and photo-electric work should be available by the time the next Bulletin, the others probably later.

For members who want a record of the apparition but do not want to get too involved in the scientifically based work another note is in preparation covering simple recording and drawing of a comet through binoculars or a telescope and taking simple photographs of comets using ordinary cameras. This should be available later this year for an SAE.

A note summarising the information contained in this present note and including any developments that may take place over the next 6 months or so will be available next year.

NOTES FROM OTHER JOURNALS

compiled by G.J. Hodgkinson, 12 Mallory Close, Ramsgate, Kent

Reviews: Most of the review articles deal with the chemistry of comets, and their origins. Of these, two may be singled out as being the least technical: Hearn, M.F.A., Chem.Eng.News vol 62,no22,pp32-6,38,40,45-7, &49,1984; and Knacke, R., Sky & Tel., 68,206,1984. The first has an emphasis on chemical evolution, while the other is on dust. The other articles are by: Krishna-Swamy, K.S., J.Ind. J.Sci.Ind.Res. 43(1),17-21,1984 Fernandez, J.A., Jockers, K., Progress of Physics 46(6),665-72,1983 and others will be mentioned later.

The methods involved in the discovery of fast-moving objects by IRAS were described in Nature (Davis, J.K., et al, vol 309, 315,1984). Six comets were discovered in this way, two with short periods and high inclinations to the ecliptic. One of these has an orbit nearly perpendicular to the ecliptic (Comet Hartley-IRAS; see Sky & Tel.,68,188,1984). Five known comets were recovered by IRAS: Pons-Winnecke, Tempel-1, Tempel-2, Kopff and Cernis.

Individual Comets:

Comet Austin 1982g ---- in chemical composition and appearance very similar to Comet Bradfield (1979X) (Goraya, P., et al, Earth, Moon, Planets 30,63,1984).

Comet Bowell 1980b ---- changes in the emission of hydroxyl radical with heliocentric distance are explained by vapourisation of water grains in the coma at large distances, and of the nucleus near perihelion (A'Hearn, M.F., Astron. J. 89,579,1984).

Comet IRAS-Araki-Alcock ---- a contrast of data from IRAS and ground observations (A'Hearn, M.F., Millis, R.L., Astrophys. J.Lett. 282,43,1984), and the detection of new molecules in the visible spectrum (Cosmovici, C.B., Ortolani, S., Nature (London), 310,122,1984).

Comet Halley: "The Return of Halley's Comet" by P. Moore and J. Mason has been published by Patrick Stephans Ltd at £7.95, and there is a review of comets and the European Space Agency's space mission GIOTTO to Halley's comet in Naturwissenschaften (Fechtig, H., Rahe, J., vol 71(6),275-93,1984). On the latter mention should be made of the Agency's publication ESA-SP-198 which contains papers on the likely effects of the high relative velocity between spacecraft and comet. A summary of the prospects for observing comet Halley were given in Sky & Tel., (vol 67,9,1984) with a listing of past maked-eye sightings of the comet. New image processing techniques applied to 1910 photographs of the comet revealed spiral jets unwinding from the central condensation that evolve into expanding envelopes. They are believed to be the result of dust particles ejected from discrete regions on the sunlit side of the rotating nucleus. (Larson, S.M., Sekanina, Z., Astron. J. 89,571, 1984). Dust loss in previous revolutions and subsequent evolution of the comet's orbit may account for the displacement of the meteoroid streams that give the associated Orionid and Eta-Aquarid showers. (McIntosh, B.A., Hadjuk, A., Monthly Notices Royal Astron. Soc., 205,931,1983).

Other news: Close encounters..... a search of comets listed in Marsden's catalogue revealed 36 cases of close encounters of comets with the Earth, i.e. separation of less than 0.1 AU (Sekanina, Z., Yeomans, D.K., Astron. J., 89,154,1984). Collisions with active comets appear to be less frequent than with asteroids, a collision rate of one in 33 to 64 million years is found, and compares with the frequency of global 'catastrophes' (see Sky & Tel. 67, 406, 1984; and 'Notes' in the Journal 94(5) 228,1984).

Infrared photometry..... there is a review by M. Hanner in Naturwissenschaften (vol 70,581-5,1983). Don't be put off by the German title, the text is in English! Earlier reviews are cited in a paper discussing infrared molecular line emissions in comets (Weaver, J.A., Mumma, M.J., Astrophys. J., 276,782,1984).

Other papers on this theme are: search for 10μm silicate feature in comet Grigg-Skjellerup (Hanner, M.S., et al, Astron. J., 89,170, 1984); absorption feature at 3μm in the spectrum of comet Cernis 1983l as evidence for water-ice particles (Hanner, M.S., Astrophys, J., 277, L75, 1984). Others were on the spectrophotometry of comets (Spinrad, H., Newburn, R.L., Astron. J., 89,289,1984); fluorescence mechanisms in the inner coma (Crovisier, J., Astron. Astrophys., 130,361,1984); radio observations of the hydroxyl radical in comets... Meier (1978XXI) Bradfield (1979X), and Austin (1982g) (Bockelee-Morvan, D., Gerard, E., Astron. Astrophys. 131,111,1984); the forbidden oxygen lines in comets (Krasnopol'ski, V.A., Kosm. Issled., 22,292, 1984; Krishna-Swamy, K.S., Spinrad, H., Earth, Moon, Planets 30,105,1984); comet capture from molecular clouds (Clube, S.V.M., Napier, W.M., Month, Not. RAS, 208 575,1984).

Finally a summary of the Comet news in Sky & Tel.:

Vol 67,p100,1984	Comet Tempel 1
195	
290	Comet Tempel 2, 1982d, light curve
386	
483	Comet Kopff, 1983k. Planned 1994 rendezvous with a NASA spacecraft (vol 68,p114)
589	
Vol 68, p93	Comet Giacobini-Zinner, 1984e
188	Comet Halley
284	Comet Crommelin

RECENT VISUAL OBSERVATIONS

Graham S. Keitch

Comet P/Crommelin 1983n

Comet Crommelin passed perihelion during its fifth recorded apparition on 1984 Feb 20. The apparition was of particular interest because the comet is generally only visible for a short period on account of its photometric behaviour and has not been really well covered in the past. Furthermore, the comet was chosen for test purposes by the IHW in preparation for comet P/Halley in 1985/86. The week March 25-31 was selected for the trial run to test the various IHW disciplines both in terms of methods and communications. However, it was realised that this particular object would not be an easy target for the visual observer. For the duration of the test period, the comet would be poorly placed at low altitude from the UK and, in any event, its brightness would be in decline. Nevertheless, Crommelin was selected for the trial in the absence of a more suitable object, and as a consequence, it received far greater attention that is usual for such an uninspiring object.

A good summary of the visual observations has been documented elsewhere by Green and Morris (1) so, in this report, we will present details of the BAA visual results obtained in the UK and Malta. Visual observations have been reported by Roy Panther (RWP), Jonathan Shanklin (JS), Keith Sturdy (KS), Guy Hurst (GH), Frank Ventura (FV) - Malta, and Graham Keitch (GSK). As is usual for the early months of the year, the UK observers had to contend with overcast and poor skies. The comet was first spotted by French observers, J-C Merlin and M. Verdenet on 1983 December 29, when it was a small, faint 12m object, GSK secured the first UK observation a few days later with the 29.8cm f/5 reflector at Wrington, Avon on 1984 Jan 3.77. The comet was 2' across (127,000 km) at mag 10.5 as seen at X62. The same observer recorded the comet again on the 5th (mag 10.0) and by Jan 24.79, the same instrument showed the comet to have brightened to mag 9.9 with the coma now slightly condensed and 2-3' across. By the end of the month, JS has succeeded in locating the object with his 33cm reflector at X45. On Jan 29.77 he noted the comet at the somewhat fainter magnitude of 10.9 with a correspondingly smaller coma size and two days later, KS saw it briefly at mag 9 in his 22cm

reflector. Guy Hurst saw it in 15x80B on Feb 9.8, coma very diffuse diameter 2' and 8.7 mag. The large reflector used by JS gave values 9.7m and 2.7' for the somewhat condensed coma on Feb 13.77.

A good set of observations by Frank Ventura in Malta commenced on Feb 20.76 when he located the mag 8.8 comet in a 20cm Celestron which showed the 2.1' coma as being moderately condensed and slightly fanned in PA 300°. He observed again on Feb 23.75, this time using a 15cm refractor which showed the comet at approximately 8½m with a coma size of 3.1' diameter. Again, it was fanned out in PA 300°. On Feb 24.75 the coma was 2.5' across and mag 8.6 with a short tail in PA 300° at X50 and on the following night he found the comet to be slightly more condensed with a ninth magnitude stellar nucleus, the coma itself was 8.4m and he was able to glimpse it in a 5cm refractor X20.

The comet was now reasonably bright and when GSK next observed on March 2.80 he was able to use 20 x 80 binoculars which showed the 3.0' coma at Mag 8.1 with a 3' tail in PA 45°. RWP observed the comet in his 20cm reflector at X35 on the following night and he recorded values of 8.4m and 4.5' for the coma while on the same night, GSK's 20 x 80B gave a brightness of 7.9m. A few days later, JS observed again with his 33cm reflector which gave a rather faint 9.4m for the comet's brightness, however, the comet was now rather poorly placed. It was observed in moonlight by FV on March 13.76 when the coma was found to be a fairly large 6' across (209,000km) at 8.4m as seen in the 15.2 cm f/8 refractor at X50. The coma edges were diffuse and there was a distinct condensation towards the centre. He was unable to detect the comet later in March on the 19th and 25th when he attempted further observations with the 15cm refractor.

Observations from other groups in Australia (including a fine series by BAA and ACS members communicated by David Seargent) and the USA show the comet's brightness to have been in decline by the second half of March and the last observations appear to have been made during the first few days of April.

A summary of BAA observations from the UK and Malta is given below:

P/Crommelin 1983n (m_1 uncorrected for aperture)

Date	Mag	I	Obs	Date	Mag	I	Obs
1984 Jan 3.77	10.5	29cmL	GSK	Feb 24.75	8.6	15cmR	FV
5.79	10.0	"	GSK	26.75	8.4	"	FV
24.79	9.9	"	GSK	Mar 2.80	8.1	8cmB	GSK
Feb 13.77	9.7	33cmL	JS	3.81	7.9	"	GSK
20.76	8.8	20cmC	FV	13.76	8.4	15cmR	FV

I = instrument, L = reflector, R = refractor, B = Binoculars

C = Celstron (catadioptric)

Comet P/Encke

P/Encke was visible at the same time and fairly close to Crommelin in the sky during the first few months of 1984. However, the same bad weather which restricted coverage of Crommelin also took its toll with Encke and only Jonathan Shanklin (JS) seriously attempted to observe the comet. His attempts were unsuccessful during January and early February, although he reports possibly seeing the comet at mag 10.8 on 1984 Feb 13.78 with the 33cm reflector. A further observation was attempted on Mar 7.82 when a coma diameter of 2.4' (125,000 km) was recorded at mag 9.2 in the 33cm refl. X45. By mid-April, the Australian observers found the comet to be quite bright at mag 7½ although this had reduced to 9-9½ by the month's end and early May. During this apparition the usual extensions due to outgassing on the sunward side of the nucleus, which is a faint feature of this object, were noted by Andrew Pearce in Western Australia. The usual good coverage

was provided by our American colleagues, John Bortle and Charles Morris: the former having observed this comet with particular interest over a good number of apparitions. These two observers located it in late January and early February at mag 11.7 and they kept it in view as it brightened more noticeably than expected to around 7½m which is consistent with the Australian results.

P/Wild(2) 1983s, P/Clark 1983w and P/Russell(4) 1984d

These objects were all faint and passed unobserved (visually) from the UK. P/Clark reached 10.6m in late June (A Pearce). JS could not locate P/Wild(2) with his 33cm reflector and both he and GSK were unsuccessful with P/Russell (4) during 1984 March and April. Charles Morris (CSM) found P/Wild (2) at mag 13.0-13.1 on April 21-22 and he also observed comet P/Clark at mag 10½-11 in May and June. These latter objects could not be attempted by GSK because of business commitments. (P/Wild (2) was photographed by Brian Manning on 1984 April 1.9, nearly stellar and 14.5 magnitude. The photograph yielded a good position.)

Current comets P/Takamizawa 1984j and Austin 1984i

These two objects are under observation at the time of writing. A certain amount of confusion has accompanied the former object which seems to have undergone some extremely energetic brightness surges. It was discovered by Kesao Takamizawa on 1984 July 30.528 as a small mag 10 object in 20 x 120B when he was sweeping in Capricornus. CSM estimated the comet as being mag 9.3 (20cm reflector) on Aug 1.4 and a few days later on Aug 6.00 GSK used 20 x 80B to record a value of 9.0m. However, 10 minutes before this observation, a photograph was secured at Dr. R.L. Waterfield's observatory at Woolston which shows a bright image of Mag 7! This particular anomaly has yet to be fully investigated but GSK's visual estimate is consistent with other visual values obtained about this time. This discrepancy is not the only peculiarity: the prediscovery images (photographic) and other observations tell their own story.

P/Takamizawa 1984j

Date	Observer	Mag	Date	Observer	Mag
1984 July 6.03	Wild	16.C(P)	Aug 6.00	Keitch	9.0(8B)
8.04	Wild	13.0(P)	6.78	McNaught	9.4(12B)
26.-	Seki	6.5(P)	19.90	Keitch	10.0(29L)
Aug 1.41	Morris	9.5(20L)	21.10	Bortle	10.1(32L)
4.55	McNaught	9.1(12B)	Sept 1.98	Keitch	below 11 (not seen in 29L)
5.99	Waterfield	7.-(P)			

Notes added by MJH

1. This comet was observed by George Alcock with 8cm binoculars during Nova sweeping on 1984 July 19.9 at 9-9½ mag but he did not have the opportunity to investigate it further and it was not reported until after discovery was announced.

2. P = photographic observation. The plates used by Dr. Waterfield (103a-0 by Kodak) are only sensitive to wavelengths shorter than about 5000 Angstroms in the blue - the discrepancy in magnitudes between visual and photographic observations could possibly be due, in part at least, to strong cometary emission in the blue and absence of dust - but at present there is no information to hand on this)

3. Harold Ridley secured a photograph of the comet on 1984 Sept 17.9 with the Ross Xpress f/6.3 lens of 50cm focal length, exposure 60 minutes on a 103a-F plate. The comet appeared near the plate limit, one arcminute across. Though the sky was very clear, the comet was at low altitude, only some 12 degrees. Estimated magnitude 12.

Comet Austin 1984i

From Australia comet Austin was seen to reach about 5m in late July with a 2 degree tail. It closed with the Sun in August and was first located from the UK in the morning sky on September 1 and 2 by George Alcock and Graham Keitch. It was then $6\frac{1}{2}$ mag in 8cm binoculars. It was also easily found with hand-held binoculars through breaks in the cloud by Michael Hendrie on the morning of September 6 well-condensed and about 7 mag. Graham Keitch has been following the comet as it slowly fades and has noted considerable tail structure. Observations by Roy Panther in bright moonlight on Sept 10.16 made the comet 7.6 mag, total diameter 7' and on Sept 13.13 7.8 mag, diameter 5' DC 3, also in moonlight. Reports from the IAU Cards show that the comet has a prominent anti-tail in September, the Earth crossing the comet's orbital plane on September 13.9. A full report will appear in the next Bulletin.

Ref (1) C.S. Morris & D.W. Green, International Comet Quarterly No 51, Vol 6 (No 3) p55 (1984 July).

IHW ASTROMETRY NETWORK WORKSHOP - 1984 June 18-19

Held at the European Southern Observatory, Munich FRG.

The following is based on notes taken by M.J. Hendrie at the meeting. The Proceedings of the meeting will be published during the autumn of 1984 and should be distributed before Christmas 1984. Brian Manning and Peter Birtwhistle also attended from the UK.

Introduction

The workshop was attended by about 50 astronomers from 20 countries. The contingent from the USSR did not appear unfortunately. However, astronomers working in the following countries were present: Argentina, Australia, Austria, Brazil, Canada, China, Czechoslavakia, France, West Germany, Italy, Japan, The Netherlands, Poland, Sweden, Switzerland, UK, USA and Venezuela.

The first day started at 0900 until 1800 followed by a reception and Conference Dinner at Ismaning, where most of the hotels were situated. The second day meeting started at 0830 until 1300 and the afternoon session was a tour of the facilities at the ESO headquarters at Garching where the workshop was being held. The meeting was very well organised and the lecture hall comfortable and cool, the weather outside was hot and sunny on both days. There were quite long breaks for coffee and lunch, giving time for informal discussions among participants. Generally, a very worthwhile two days and worth the trouble of travelling to Bavaria. The opportunity to meet other observers, many using the best available facilities at Palomar, Lowell, La Silla for example, was in itself worth the trouble of attending the workshop. Despite the large number of contributions and tight timetable, the organisers did keep to the Agenda for the most part and there was time for discussion.

Agenda

Introduction: Crommelin trial results, Nature of Comets, Near Nucleus Studies
Astrometric Observation of Comets: Practical Problems and Recommendations, Programmes planned at several Observatories.
Star Catalogues: Progress and availability of special Catalogues for Halley and Giacobini-Zinner, Dealing with poor Star Positions, Occultations.
Reduction of Astrometric Plates: Measuring Techniques, Reduction Methods, Communications.
Orbit Determination: Requirements for Halley and Giacobini-Zinner, for Probes navigation, Improving old comets' orbits by using new star positions
Discussion of Standards & Procedures: Review of workshop talks and questions.
Tour of ESO Darkrooms, Measuring Machines and Image Processing Facilities.

Crommelin Trial Results: the following main points emerged:

1 283 observations were received from 37 observatories
2 The special star catalogue was not much used
3 RMS final orbit was 1.3 arcsec after removing poor observations
4 Non-gravitational forces were small and negative
5 The residuals for the majority of observations from most observatories were much larger than one would have expected, often more than 5 arcsec and many far worse reported, a few even hundreds of arcsec. A listing was available (I have a copy); Jim Gibson's Palomar Schmidt results were the most consistently good. Brian Manning's compared very well with the better professional ones and were well above the average.

Halley Results to 1984 Spring

1 44 observations had been received, mean residual about 1 arcsec, this is expected to get slightly worse (as the comet becomes larger etc)
2 An accuracy of about an arcsec will be necessary to fulfil all the objectives

Notes on Comets Generally (Marsden): some statistics were presented including:

1 Less than 10% of observers contributed over 50% of the observations
2 For 55 apparitions there were fewer than 10 observations per comet (1964-84)
3 For Encke, only 2 observations since 1980
4 The situation for Short Period comets was very poor

Reporting Positions

1 Halley 1985 November to March important for Giotto & Vega
1986 January to March - report within 48 hours whenever possible
2 Giacobini-Zinner
1985 August - mid September - report within 48 hours when possible
3 Other times report within a month at most, firstly to JPL copied to IAU MPC can be sent through ESO
4 Marsden wants observers generally for all comets to get into habit of reporting monthly and keeping up to date - early observations are more valuable and more likely to be used than those reported years later, though these are better communicated then than not at all
5 Minor Planet & Comet Circulars are completed about time of Full Moon each month
6 Marsden does not want telephoned reports to MPC but Yeomans will have a telephone service probably.

Requirements for Observations (Ted Bowell agreed Brian Marsden & Others)

Uniformity

1 Provision of homogeneous data set - aim for uniformity
2 shortest useful exposure consistent with good signal/noise ratio
3 Preferable to expose many images, but to supply not more than 2 positions per night
4 red filter preferred - central condensation generally smaller in red light than blue
5 use of K 2415 or 098-04 emulsion (a variant of 103a-F I believe, but finer grain?)

Quality Control

1 Only well-made observations are of any use
2 require good tracking, preferably on comet not star (ie stars trailed)
3 be critical, reject suspect observations
4 measure UTC to 1 second, beginning and end of exposure

Documentation for retrospective evaluation of observations:

1 observer identification: name, telescope, image scale, location ...
2 sky/weather conditions
3 provide nuclear/total magnitude, but only if reliable

Marsden added:

4 Adequate observations generally have 2-3 arcsecs residuals, some observers get 1-2 arcsecs and a very few below 1 arcsec.

Ken Russell (UKSU) added:

5 Report accurately - check first differences or against reference orbit

Films and Plates

Ted Bowell: tests show that film is dimensionally stable for comet work, but some films are less effective than their plate counterparts because the emulsion layer is thinner.

Edgar Everhart:

1 Uses K 2415, hypered in 4 x 5 sheets, 10 x 8 and 10 x 10 sheets available by special order
2 Reckons reciprocity failure reduced to nil if hypered
3 Resolution 5 times better than 103a-0, about 320 lines per mm
4 Too slow without hypering
5 He uses a vacuum back to keep really flat-says difficult to design, will help anyone
6 Hypered film loses sensitivity especially if exposed to humid air - he batches every 6 weeks but his observatory is dry (Marsden says highest in the world doing this work - 8700 feet). Jim Gibson, Palomar, says it loses speed there, up to 50% in first hour. Ken Russell also says that they keep exposure to air to a minimum when loading and a flow of nitrogen or covering film of transparent plastic (a zero filter) is used. Brian Manning stores faced against a glass plate. Others use nitrogen boxes etc. While not a fatal flaw in its use, in our damp climate it is something that needs to be taken care of if best results are to be achieved. The general opinion was that it is a very good film for comet work if hypered and gives small images and high speed.

Special Star Catalogues

Progress on the provision of the special Halley and Giacobini-Zinner star catalogues is good and most sections are now available. IHW would prefer to supply on tape or floppy disk. An order form was available, blank (mainframe type) tapes should be sent to Bob Harrington at USNO while Don Yeomans would deal with floppy diskettes at JPL. Brian Manning and Peter Birtwhistle are to obtain the catalogues by these means so that some hard copies can be printed out over here for distribution to measurers in the UK who do not have them. It is expected that the observatories will use the catalogue directly from the tapes and the catalogue could be on Starlink. However, a printed catalogue on paper would be most useful for amateur measurers working at home. Computer programs to plot the stars were in use at many observatories: it would probably not be worth the trouble of entering stars into our micros for those who do not use disks, but we plan a simple program to plot the stars from approximate positions entered through the keyboard, and combined with a scaling factor, should allow a smallscale chart to be obtained on screen or printer to speed up the process of identifying stars on plates to be measured.

Occultations (Ted Bowell)

1 List of stars concerned will appear in the IHW Newsletter, some are quite bright
2 To study dust in coma, use 100A wide filter (in red)
3 Large comet - guide on comet and let it drift through aperture by moving telescope
4 Small comet - guide on star and let comet drift past aperture
5 Anticipated results - for gas, nothing, for dust, possibly near nucleus
6 Fast photometry may be necessary if effects are very local

Measuring Photographs (Jim Gibson)

1 Move X-wires in only one direction when measuring
2 Never back-up after overshooting
3 Come up to image-set directly on it - do not ponder too long on setting
4 Emulsion side up (films have to be between glass plates normally)
5 He sets star trails along one axis (not a common practice I think, but he gets results
6 Increasing x should be easterly, y northerly for Turner Method
7 Fading trails - set on ends, centre of curvature and take mean
8 Diffraction spikes do not always pass through real centre of image-beware
9 Comatic images - centre on comatic triangle, not whole image (including flare)
10 Variations in thickness of oil on screws can give trouble
11 Rotate through 180 degrees and re-measure

Marsden added:

12 For scanning machines, measuring in one direction sufficient
13 For bisection methods reverse plate and remeasure
14 Measure comet position before stars and again at the end - do all measuring at one go

Richard West (ESO) added:

15 A linear glass encoder scale is preferable to reading a screw
16 Cross hairs with concentric circles are good
17 Make 4 settings on each image and take mean
18 Don't look at x and y results to see how they are going during measuring
19 Lift hand off screw at each measure or the hand will 'remember' the previous setting
20 Complete reduction before removing plate from machine

Ken Russell added:

The use of a Gating technique can be helpful. The shutter is closed for a known period (carefully timed) to leave a gap (or several gaps) in the star trails. The gap can be measured instead of the trail. Can be useful with long trails where it is difficult to set accurately on the centre, or where the stars are over-exposed - also can be useful if sky is deteriorating so that end of trail may not be measurable accurately.

Reductions (Marsden)

1 Linear solutions (reflectors, astrographs) use at least 6 stars
2 For Schmidts etc use twice as many stars as there are terms in each coordinate
3 Avoid 3 star reductions
4 Use plate constants and least squares method in preference to dependencies
5 Brightness of comet about 1 magnitude above plate threshold
6 Reject dubious images
7 Topocentric not geocentric positions
8 No corrections for elliptic aberration
9 Use special catalogues
10 Report results to RA 0.01 s and Dec 0.1 arcsec, UTC to 1 second (5 decimals)
11 Only correct star positions for Proper Motion-catalogues are 1950.0 (FK4 system)

Everhart commented:

12 As a check on star positions and measures he has 3 methods
   a) Determine the focal length of the telescope for each pair of stars in turn; dud ones will soon show up
   b) and c) had a mathematical grid method which I did not fully understand
13 Direct and reverse measures, when added, should give a constant for x's, so for y's
14 Everhart uses 6 to 8 stars in each reduction, Bowell up to 30
15 You can also calculate the residuals for each star in turn, in terms of all the others. (Peter Birtwhistle uses this method too.)

Bill Penhallow (Rhode Island) pointed out:

One poor star position will not have a great effect on the result where a fairly large number of stars is used.

NOTE

On the evening of 1985 September 14 (14.9) Comets Halley (12 mag ?) and Comet Giacobini-Zinner (8 mag ?) will be within 2.1 degrees on the sky.

It will be interesting to get the full text of all the talks and these should be circulated to all participants of the IHW Astrometry Network.

If there are any comments on my notes, either questions that I might be able to remember the answers to, or anything that does not make much sense, please let me know. My notes ran into about 20 pages, but were necessarily brief in view of all that was covered and also reflected my own interest in what I could hope to make some use of, or would be of particular interest to individual observers of limited means. From what I could make out, not all professional astronomers fare much better, telescope, measuring machine and computer being in different sites, having others measure plates, trying to get time on telescopes, and being restricted to moonlit skies for example. At the other end of the scale, the best telescopes in the world will be in use for this purpose from time to time at least, and the darkroom, image processing and measuring facilities at ESO made me wonder if anything could be accomplished in my establishment. The fact that Brian Manning's residuals were among the best for Crommelin shows that it is possible for us to do valuable work on these two comets and perhaps even more important in the end, on comets that the professional observatories will not have the time to cover after the Halley apparition.

It is not easy to get good results but it is possible as Dr. Waterfield has shown over the past 30 years. There are definite problems associated with using large telescopes for cometary astrometry which go some way to offset their advantages - for faint comets they are of course essential, though even a 16 inch can now record 21 magnitude stars in good conditions (Everhart). The amateur has the advantage that the telescope can be dedicated to this work and kept available.

Every success for 1985/86

Mike Hendrie 1984 Aug 8

These Notes have already been circulated to members of the CHUKCC Astrometry Group. They represent my understanding and recollection of who said what - full and accurate texts will be available to IHW Network members later this year. The principal speakers concerned with the subjects reported here were:

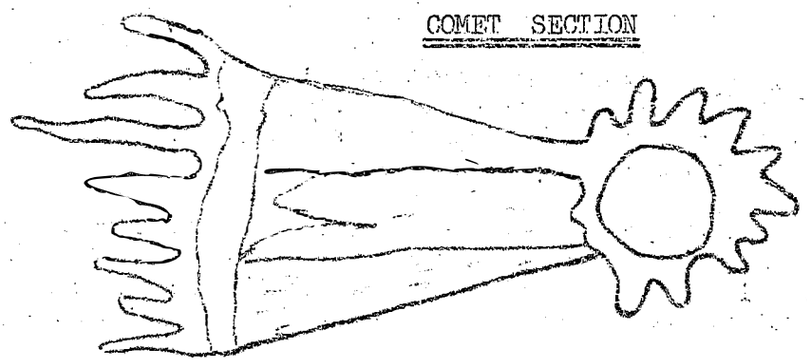
B.G. Marsden	Director of the Minor Planet Center and CBAT
L.G. Bowell	Lowell Observatory
K. Russell	UK Schmidt Unit, Siding Spring
E. Everhart	Chamberlin Observatory, University of Denver
J. Gibson	(48 inch Schmidt) Palomar Mountain Observatory
D.K. Yeomans	JPL and Discipline Specialist, IHW Astrometry Network
R.M. West	European Southern Observatory and Deputy to Yeomans
R.S. Harrington	USNO
S. Penhallow	University of Rhode Island

(Comet discoverers present included: Bowell, Everhart, Kohoutek, Mrkos, Russell, Wild, and West - I have not worked out the total tally represented - perhaps someone would care to do so?)

Michael Hendrie

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



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BULLETIN NO. 23 — MARCH 1985

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SECTION NEWS and NOTICES

Michael J. Hendrie

As mentioned elsewhere in this Bulletin, we intend to publish Bulletin 24 about 1985 July so that it can carry final comments and instructions before the Halley observing period gets under way. We will include anything that comes to light during the Section Meeting in April and that may not have been included in earlier instructions, for example in Bulletin 22. It is essential that those wanting to contribute to the IHW register with them (see Bulletin 22) - from the number of copy forms received it is clear that many have not yet done so or have not copied forms to me. Without them we cannot send on observations to the IHW and they will not accept them.

The BAA Section Notes in preparation (B22) have not yet been completed: anyone having problems should approach the Coordinators directly. The Photoelectric notes should be completed soon, but now that the Cometary Astrometry book has been published (IHW) the notes on this subject are less urgent and no one has come forward to say they will be making spectrographic observations, so these notes will probably be deferred for the time being.

The BAA Comet Section Keedy Award 1984

It was the unanimous decision of the Comet Section officers and Mr. Keedy that the second David Keedy award should go to Andrew Pearce of Woodlands, Nr. Perth, Australia.

Andrew's observations are both numerous and of very high quality and fill an important place in the world coverage of comets by visual observers. A contributor also to the Australian Comet Section, Andrew writes that he has observed 22 comets in the past 2½ years and tried unsuccessfully for another eight. In addition to the observations communicated by NSW Comet Section and Australian Comet Section Director, David Seargent, Andrew Pearce writes long letters giving additional information which is very valuable in bringing together all the observations of a comet. We hope that the good work will continue for many years and expect great things for Halley and Giacobini-Zinner. We wish Andrew every success for the future. Our thanks to David Keedy for providing this £20 prize again this year and offering it again in 1985.

Comet Section Meeting - 1985 April 27 (Saturday)

The Comet Section meeting will be held at Ifield Community Centre, Ifield Drive, Ifield, Crawley, Sussex from 1000 until about 1800. Please obtain further information from the organiser, Peter Stanley: in view of the interest in Halley's comet we do not know how many BAA members might attend, therefore we ask that you contact Peter for further particulars as soon as possible. There will be a small charge which should cover a snack lunch, coffee, etc.

The main subject of the meeting will be the observation of comets Halley and Giacobini-Zinner, covering visual, photographic, astrometric and photo-electric means of observation. It is hoped to stage a small exhibition of equipment and/or photographs of comet-related items and to have on hand samples of Halley publications etc.

The Section Coordinators will explain the BAA and IHW requirements for observations and reporting procedures and answer any questions. We hope to have several short talks including Paul Doherty on Recording Inner head features, Alan Young on attempts to record Halley to date, Ron Arbour on his comet camera attachment and Denis Buczynski on his observing methods and equipment.

It is intended to devote the next Bulletin largely to final instructions incorporating anything that has come to light during the Section Meeting, and to have it available during July or early August, before Halley observations really get under way.

The meeting is open to all members of the BAA and we hope that those planning to observe the comet more than casually will come or be in touch with us before the event. We have been at pains to keep members informed through the Journal and have had a good response from non-Comet Section members. However, there are still observers who have not sent in copies of the IHW Observer Index form, and I hope that they have registered with the IHW and will send me the necessary form. Observations should be sent via us as agreed with Steve Edberg, so we need to have the same information about observers that he will have, hence the request for a copy.

Bulletin 22 carried a fairly extensive report on what observers should be doing to prepare for the apparition and this will not be repeated here. We are open to any suggestions, but believe that we have kept members informed.

BAA Annual Exhibition Meeting - 1985 May 18 (Saturday)

The annual Exhibition Meeting of the Association will be held this year at Morley College, London, not far from the usual venue (Hawkstone Hall). Details and a map showing the area will appear in the next issue of the Journal.

Peter Stanley will be organising the Section's exhibit and is looking for a better showing than last year, especially as this is a vintage comet year. We understand that Morley College is a better venue and should encourage more visitors. Please contact Peter in good time with details of your exhibits. He has to keep BAA organiser Alan Dowdall advised and book space and tables.

With the recent large number of comets, and with Halley near at hand, there should be plenty of interest. Equipment and photographs of equipment, observatories etc. used for comets are always of interest to other observers. Also, of course, photographs and drawings of comets. Anything relating to earlier apparitions of Halley, not necessarily made by the exhibitor, would be of interest this time. Please help us and Peter especially to put on a good show this year and an even better one next year, when no excuses will be accepted from any observer! Please contact Peter over any queries, as soon as possible.

Roman Numeral Designations of Comets in 1983 (from MPC 9389)

Comet	Perihelion Passage	Name	Preliminary Designation
1983 I	T = 1983 Jan 19.0	IRAS	1983f
1983 II	Mar 15.2	P/Bowell-Skiff	1983c
1983 III	Apr 2.2	P/Kowal-Vávrová	1983t
1983 IV	Apr 7.5	P/Pons-Winnecke	1983b
1983 V	Mar 1.3	Sugano-Saigusa-Fujikawa	1983e

Comet	Perihelion Passage	Name	Preliminary Designation
1983 VI	T = 1983 May 2.7	IRAS	1983k
1983 VII	May 21.3	IRAS-Araki-Alcock	1983d
1983 VIII	May 22.4	P/Arend	1983q
1983 IX	Jun 1.3	P/du Toit-Neujmin-Delporte	1983g
1983 X	Jun 1.5	P/Tempel 2	1982d
1983 XI	Jul 9.8	P/Tempel 1	1982j
1983 XII	Jul 21.2	Cernis	1983l
1983 XIII	Aug 10.3	P/Kopff	1982k
1983 XIV	Aug 23.8	P/IRAS	1983j
1983 XV	Nov 23.7	Shoemaker	1983p
1983 XVI	Nov 28.0	IRAS	1983o
1983 XVII	Dec 1.7	P/Harrington-Abell	1983r
1983 XVIII	Dec 3.2	P/Johnson	1983h
1983 XIX	Dec 27.8	P/Bradfield	1984a

Designations of Comets Discovered and Recovered in 1984/1985 (to 1985 March 6)

1984p	P/Tsuchinshan 1	discovery/recovery magnitude	20.5
1984q	P/Shoemaker 1		13
1984r	Shoemaker		16
1984s	Shoemaker		12
1984t	Levy-Rudenko		10
1984u	P/Shoemaker 2		15
1984v	Hartley		15

"COMETS - A Descriptive Catalog" by Gary W. Kronk

Enslow Publishers, PO Box 38, Aldershot, Hants, GU12 6BP
Paperback 344 pages £15.50.

This volume, recently to hand, will be reviewed in the Journal. Those who use Vsekhsvyatskii's "Physical Characteristics of Comets" will find this volume of value, it goes to 1982 while Physical Characteristics ends at 1957. There is much useful information here on the comets' appearance and visibility. It is not too easy to read - a little more space or more emphatic print would have helped, and the data and references given by Vsekhsvyatskii were valuable, though he has often been criticised for inaccuracies - unfortunately most of his data was destroyed during the war in Kiev, and much had to be re-assembled. Data on physical aspects of comets is scattered through journals and circulars and Gary Kronk's work will certainly be very useful to researchers but is not intended to be read like a book at one sitting.

"Mr Halley's Comet" Sky & Telescope $2.00

This little 30 page guide to seeing Halley's Comet is fairly elementary and printed on rather poor paper - the diagrams are for 40 and 30 degrees north, so are not much help for UK observers who could do better to invest 40p on the BAA 4 page "Notes on Seeing Halley's Comet from the UK" from the office (see Journal).

"Comet Halley Returns" A Teacher's Guide 1985-1986

Published by Nasa this seems a very good guide having 40 A4 type pages on good paper, covering comets in general, Halley's comet, sky diagrams, some photographs; probably nothing new for readers, but well collected together. Part II is devoted to educational activities for schools etc. and includes some observing notes. Good for teachers, interesting but not particularly useful for comet astronomers.

Equipment for Sale

3-inch Broadhurst Clarkson refractor, alt-azimuth trunnion mounting on very strong tall wooden tripod. Tube and mounting are crazed black finished, and accessories include a terrestial eyepiece, five astronomical eyepieces, star diagonal and dewcap. The whole instrument is in excellent condition. It was left to the Association by the late Mr. John Costin, and Council decided to offer it for sale to a member of an observing section so that good use could be made of it.

The suggested price is £180, and proceeds of the sale will be used to purchase a rack for the Library bearing a plaque to Mr. Costin. Enquiries should be made direct to the Curator of Instruments please; the instrument has not been seen by the Comet Section.

BAA Member Steve Anderson has for sale a set of optics for an f/4 Maksutov of 8 inches aperture. Focal length 32 inches. The optics by James Muirden comprise a 12 inch primary mirror and an 8 inch Maksutov shell. The focal surface is curved. Mirror aluminised. Mr. Anderson would consider offers around £225. The buyer would have to build a camera, film-holder, mounting, etc. Enquiries direct to Steve Anderson please at: Middle Birley Fold, Saccary Lane, Mellor, Nr. Blackburn, Lancs.

A comet camera built round optics of this type could provide a powerful instrument but Section officers have not seen the items and cannot advise on their suitability or condition.

Addresses of Section Co-ordinators

Graham S. Keitch 2 South Meadows, Wrington, Avon, BS18 7PF (0934 862 924)	Visual Co-ordinator	- visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Analysis of light curves. Observations to the ICQ. Halley "Real Time Network" UK organiser.
Harold B. Ridley Eastfield Observatory, Eastfield Lane, East Chinnock, Yeovil, Somerset, BA22 9EP (093 588 222)	Photographic Co-ordinator	- General photographic and spectrographic observations, equipment, films and plates, processing, etc. Prospects for returning periodic comets.
Charles Munday The Observatory, Rowney's Farm, Wakes Colne, Colchester, CO6 2AS (0206 240 328)	Photoelectric Co-ordinator	- Photoelectric observations, equipment detectors, amplifiers, recorders, filters, etc. IHW requirements, etc.
Michael Hendrie (address above) (0206 240 021)	Astrometry Co-ordinator	- Requirements and reductions - contact with IHW, CHUKCC. (For general photographic requirements see Harold Ridley). General Section business - Editor of Bulletin.
Stan W. Milbourn (address above) (0342 712168)	Computing Co-ordinator	- All computing problems, BAA Circulars Editor, distribution of Bulletin, SAE and queries. Distribution of ephemerides.
Peter Stanley 20 Elsted Close, Ifield, Crawley, West Sussex, RH11 0DH (0293 22816)	Meetings Co-ordinator	- Meetings Organiser. Section and Exhibition Meeting information. Initial requests for information about the Section, IHW, etc.

IHW Astrometry Network — Michael J. Hendrie

The report of the Workshop held in Munich last June (see Bulletin 22) mentioned star catalogues and a publication of the proceedings. Both have now been made available.

The Special Catalogues of stars along the path of comets, Halley and Giacobini-Zinner have been made available and observers have been able to obtain the parts they require on mainframe tape, diskettes and as hard copy. If anyone who intends to measure and reduce photographic positions of either comet, they can still obtain the catalogues from JPL or USNO depending on format, but it may be possible to copy from our own sources. They are of little value except to active measurers and as they are quite extensive, the cost of copying is not negligible and it would not be worthwhile to copy the hardcopy. In case of genuine difficulty, and necessity I will see what we can do to get copies.

Those members registered with the IHW Astrometry Network will have received the published proceedings "Cometary Astrometry" of the Munich meetings. This is an excellent and most valuable work and should help observers and measurers for years to come. The editors have done an excellent job in getting it out on time and in this form. I will not repeat the contents here as it is essentially the same as I reported from the Workshop itself in the last Bulletin, but of course in full and accurate detail.

As reported in the last Bulletin both IHW and CHUKCC intend to treat Giacobini-Zinner as a IHW comet deserving special treatment from an astrometric viewpoint, and observations of the comet should be attempted as soon as possible. Halley will probably be out of reach of almost all of us until after conjunction this summer, so further information will be given later.

Observers are asked to send full details of their observations to me please even where they have been communicated through another channel, telex etc., as we want to build up a complete set of UK observations for CHUKCC. Please make it clear that the observation has already been reported where this is so.

Comet Halley UK Coordinating Committee (CHUKCC)

The committee met last month and things are coming along well on all fronts. Experiments for Giotto are on schedule and time being sought on instruments in several parts of the world. It is planned to study Giacobini-Zinner to help in the ICE programme and for comparison and testing of Halley methods.

National Astronomy Week 1985-Giotto etc

The NAW launch for the press was scheduled for 1985 March 13 (anniversary of the discovery of Uranus and announcement of discovery of Pluto). NAW are preparing teachers' packs for schools. There is expected to be a great deal of media interest in Halley with special programmes on radio and TV at various levels of technicality, including perhaps live coverage of the Giotto encounter on 1986 March 13 (0 to 4 hr UT): earliest launch date 1985 July 2. The first Japanese craft and the two Soviet Vega craft are already on their way, the two Vegas via Venus.

Attempts by members to photograph Halley's Comet

Attempts at recording Halley have been reported by Ron Arbour (40cm f/5 reflector), up until February 16. No definite images recorded and trees will now make photography of the area (north of Orion) difficult.

Alan Young has been using his 57cm f/4.7 reflector since 1984 October 6 and has taken exposures as long as 90 minutes on gas-hypered Kodak 2415. Although there have been possible images of the comet, there has been no definite success yet.

At St. Andrews University Observatory Roger Stapleton and Fiona Vincent have used the 94cm James Gregory Telescope (Schmidt Cassegrain) to search for the comet in 1984 November and December and again in January, so far without success.

Astronomers in contact with observers using the larger telescopes say that the comet is still fainter than 18 magnitude and probably nearer 19th in 1985 January and February. It has been varying in brightness but this is not thought to be entirely due to a rotating nucleus. Most of us will have to wait until after conjunction to photograph or see the comet. Attempts to see (visually) Halley with large telescopes have not yet resulted in any undisputed sightings, though we have heard of one observer who regularly sees it with a 6cm aperture telescope!

(Daily Telegraph reports March 2 that Stephen O'Meara has seen the comet from Mauna Kea (14000 ft) Hawaii. Mr. O'Meara is well known for his fine visual comet observations with the Harvard 23cm Clark refractor.)

Recent Observations of P/Halley

IAUC 4025 reports (dated 1985 Jan 7)

C. Birkett and S. Green, (Leicester Univ): A. Longmore, (ROE): J. Zarnecki (Univ. of Kent) report what is believed to be the first infrared detection of P/Halley. Observations were performed with the infrared photometer on the 3.8m U.K. Infrared Telescope (UKIRT) using an 8 arcsec aperture guiding first on the comet's predicted path and then on the same path after the comet's passage for background subtraction. Two separate 25 minute observations on 1984 Dec 20.5 yielded positive detections, each at about the 7 sigma level. The resulting mean gave a 1.25-μm mag J = 18.6 +/- 0.1. If one assumes this to be an observation of the bare nucleus, the observed magnitude would imply a nuclear radius of about 6km for an assumed albedo of 0.1, but a contribution from scattered dust cannot be excluded.

IAUC 4029 (dated 1985 Jan 28)

Low resolution spectra (about 1.5nm) of P/Halley were obtained by two Arizona groups using the Kitt Peak 4m telescope and cryogenic camera (spectral range 460-800 nm) and the Mount Hopkins 4.5 MMT with intensified image reticon (range 300-750nm). The Kitt Peak group observed on 1984 Feb 4 (V = 23.5 exp time 3600s), Oct 30 (V = 21.3, 5800s) and Nov 26 (V = 20.5, 4000s), while the MMT group observed on 1984 Nov 26 (V=20.5, 4000s). The data show no detected molecular or atomic emission features, but only a reflected solar continuum. The Nov 26 Kitt Peak spectra probably indicate an albedo increase by about 30% over the range 460-800nm relative to earlier spectra. The Oct 30 data (obtained with a long slit) show an extended/resolved coma about 16 arcsec in diameter (55000 km) in the sunward direction.

IAUC 4034 (dated 1985 Feb 8)

This circular reports confirmation of the first infrared observations by UKIRT using the 3m NASA infrared facility on Mauna Kea.

It also reports an analysis by C. Morbey of Dominion Astrophysical Obs. of 41 magnitude observations of Halley for periodicity of magnitude fluctuations. The most likely periods appear to be 2.005 days and 0.684 days. Brightness variation has been in the region of 1.6 magnitudes.

Halley's Comet "Hotline" (From BAA Newsletter No. 10)

As from 1985 January 14, British Aerospace, Space and Communications Division, and Halley's Comet Society, in conjunction with British Telecom, has begun the Halley's Comet Nationwide "hotline" Service.

By dialling the following numbers:

London	01-790 3400	Bristol	0272 279494
Birmingham	021-355 6144	Cardiff	0222 399855
Glasgow	041-552 6300	Belfast	0232 230505
Liverpool	051-236 6474	Manchester	061-246 8061
Leeds	0532 8013		

callers will receive the latest information about the World's most famous comet together with background information and interesting anecdotes about previous appearances, and that famous Englishman, Edmond Halley, whose name it bears.

This special service will be available 24 hours a day for the next 17 months and will be updated every week.

NOTES FROM OTHER JOURNALS Gerald J. Hodgkinson

Comet Halley: Brooks tells where to observe the comet (E.M. Brooks; Sky & Tel., 68,304,1984) and predictions of occultations of early type stars by the comet during 1985 and 1986 are listed by Gordon Taylor (Astron.Astrophys.,135,181,1984). The stars lack stellar absorption lines in their spectra thus enabling observers to detect dust in the coma. Ferrin has used ancient observations of Halley to reveal an ageing effect - a dimming of 0.055 mag per apparition (I. Ferrin,ibid., 135

L7,1984). The space missions GIOTTO and VEGA are described in Naturwissenschaften (vol. 71,pp 275-93,295-302 resp.,1984). Although of German origin both articles are in English. There are notes on future space missions to comet in Nature (Lond.) (vol.311,209,1984) and Sky & Telesc., (68,114,1984), which also carried news of Pioneer Venus (orbiter) observations of Comet Encke (68,114,1984).

IRAS-Araki-Alcock 1983d: The molecules HCO and $H_2S(+)$ were identified and the inner coma was estimated to have an inclination of about 30°, directed towards the sun (C.B. Cosmovici, S.Ortolani, Nature (Lond.) 310,122,1984) and UV observations near closest approach of the comet to Earth suggest a rotating nucleus with a non-uniform distribution of volatile ices (P.D. Feldman, et al., Astrophys. J.,282,799,1984). Optical photometry was reported by M.F. A'Hearn and R.L. Millis (ibid., 282,L43,1984). The stellar appulse on 1983 May 8.956 revealed no significant absorption at a radial distance of 420km from the nucleus (another IRAS comet, 1983j, on 1983 Sept 14.036 a close appulse gave a small feature in the light curve that could be attributed to dust out to 350km from the nucleus) (J. Lecacheux et al., Icarus 60(2), 386-90,1984).

The green line of excited oxygen was detected in the spectrum of IRAS-Araki-Alcock, and this points to water as being the parent rather than any of the oxides of carbon (W.D. Cochran, Icarus 58(3) 440,1984; see also K.S. Krishna-Swamy, Earth Moon & Planets 30,105,1984).

Comet Bowell 1980b and others: IR photometry of comets Bowell, Elias, and Gunn reported (M.F.A'Hearn et al, Astrophys.J.,282,303,1984): charge-coupled device spectroscopy of Tuttle, Stephan-Oterma, Brooks 2, and Bowell yielded spectra from 5600 to 10400A (J.R. Johnson et al, Icarus 60(2),351,1984). Optical and IR observations of Bowell indicate that the bulk of the coma was formed at a heliocentric distance of 10 a.u. (D. Jewitt, ibid., 373). The anomalous dust tail of Comet Tempel 2 observed by IRAS is the result of low-velocity emission of large particles, some of which are estimated to have occurred more than 1500 days prior to the IRAS observations (N.Eaton et al., Monthly Notices R.A.S., 211,15,1984).

Comet Austin 1982g: observations are reported in the blue spectral region and Balmer (hydrogen) emission (M.Lieman, Sterne (Liepzig) 60 (2),117,1984; P.Shih, et al., Astrophys.J.,279,453,1984). Spectro-polarimetric observations reported for this and comet Churyumov-Gerasimenko (R.V. Myers, K.H. Nordsieck, Icarus 58(3),431,1984); and spectrophotometry of 1982g during the post-perihelion period also reported (P.S. Goraya et al., Earth Moon & Planets 30,63,1984).

The following comets are mentioned in J. Bortle's "Comet Digest" in Sky & Telesc., vol 68: Halley (p92), Giacobini-Zinner 1984e (p92), Hartley-IRAS (p188), Crommelin (p284), Comet 1948XI (p378), Austin 1984i (p482,583), Takamizawa 1984j (p482), and Encke (p583).

Other reviews or papers: cosmic dust and the relationship to comets (R. Knacke, Sky & Telesc.,68,206,1984); an improved thermal model for cometary nuclei (P.R. Weissman, H.H. Kieffer, J.Geophys.Res.Suppl.89, 358,1984); the interaction of low-energy cosmic rays with water-carbon dioxide ices can be an effective mechanism of formation of formaldehyde in comets (V. Pironelli et al, Astron. Astrophys. 134,204,1984); Cyanogen radiance/column density ratio for comets calculated from the Swing's effect (J.B. Tatum, ibid.,135,183,1984); excitation rates of CN, C_2, and C_3 molecules for interpreting photometric observations of comets (M.C. Festou, ibid., 134,L4,1984).

There is a computer program for calculating the number of days a comet will spend within the Earth's orbit (Sky & Telesc. 68,62,1984); the Oort cloud gets a mention in the determination of the boundary of the solar system (R. Smoluchowski, M. Torbett, Nature (London.) 311,38,1984); the distribution of perihelion distances of short period ($P < 20$ yr) comets governed by physical (sublimation) and dynamic (perturbations by Jupiter) effects (J.A. Fernandez, Astron,Astrophys. 135,129,1984); the aphelion of comet Russel 3,1983i, lies near the orbit of Jupiter and calculations have revealed two close approaches to the planet, one in December 1941, the other for May 2024 (G. Forti, Earth Moon Planets 30,95,1984); close encounter of Comet Wild 3 with Jupiter in 1977 (L.Duffoni et al., Astron. Nachr., 305(2) 87,1984); on the lost 28 short period comets (C.E. Spratt, J.R.A.S. Canada 78,39,1984); systematic and random deformations of long-period

comet orbits (V.A. Antonov, Z.P.Todriya Pis'ma Astron.Zh. 10(5),394,1984); comets belonging to the Jupiter family may escape the planet's influence (Yu.G. Babenko, Astrometriya & Astrofiz. 51,63,1984); perihelion passages of long-period comets are an almost random phenomena, within a time-scale of a few hundred years (T.KNakamura, Earth Moon Planets 30,289,1984); observational database on the motions and evolution of comets and asteroids (L. Kresak, Space Sci. Reviews 38,134,1984).

Compiled by G.J. Hodgkinson, 16 February 1985

PROSPECTS FOR 1985 Harold B. Ridley

In these notes I am assuming that the magnitude limit for most observers is in the range 12 - 13. Those observers with instruments capable of reaching fainter magnitudes will, of course, make the necessary modifications to my remarks.

1984 was almost a record year for comets, with 21 discoveries and recoveries, being exceeded only by 1983, when there were 22. To start 1985 there will be a useful carry-over from the 1984 apparitions but apart from these only two of the previously known short-period comets due at perihelion in 1985 and early 1986 will be bright enough for general observation: P/Giacobini-Zinner and P/Halley. These two will keep us pretty busy in the second half of the year and it might not be a bad thing if there were not too many others to dilute our efforts. Some notes on Giacobini-Zinner appear below, but so much has been said and written about P/Halley that it is unnecessary for me to add to the total, except to urge all observers to observe it at the first opportunity. Owing to conflicting forecasts and inherent fluctuations the uncertainty in the brightness at any time covers at least two magnitudes. Use the coming months to complete your preparations and get started as soon as there is any chance at all of making an observation; time is running out.

The little flock of faint short-period comets in the morning sky, P/Arend-Rigaux, P/Faye, P/Wolf-Harrington and P/Schaumasse should all be available during January, though the first three are getting pretty difficult now. P/Schaumasse has been brighter than predicted, and according to recent observations should be 10th - 11th magnitude for some time yet.

The Shoemakers have had a very good year, with five discoveries, which deserve a paragraph to themselves - which will save repeating the name too often. 1984f does not reach perihelion till 1985 Sept. 4, but when it does it should be at least 11th mag., though almost into Centaurus and therefore a southern object. 1984q will be quite well placed, but down to about 14th mag., while 1984r, never very bright, is rapidly getting even dimmer. Much more promising is 1984s, already 11th mag. and with a nice tail, probably rising to 10th mag., though a bit low for northern observers. 1984u is going away from us and the Sun, and will not concern us. 1984q and 1984u are both of short period and will no doubt be seen again in future years.

Comet Austin, 1984i, which has been the brightest comet of 1984, is getting beyond our reach, but 1984t, Levy-Rudenko, will be 9th mag. through January, going north and becoming circumpolar from the U.K. 1984v, Hartley, is not yet at perihelion but is unlikely to get any brighter, and was too faint for us from the start. That completes our inheritance from 1984, but P/Haneda-Campos may possibly be recovered early in 1985, though fainter than at its discovery apparition in 1978.

Of the eleven previously known short-period comets due at perihelion in 1985, five are faint objects discovered with large reflectors and are making their first returns; none of them seems likely to enter our magnitude range. The two Tsuchinshan comets, fourth time round, are similarly faint. P/Schwassmann-Wachmann 3, P/Honda-Mrkos-Pajdusakova and P/Daniel can all be reasonably bright at a good apparition, but we are out of luck this time; the first two may not be recovered at all because of their small elongations, and the latter will be badly placed and around 15th magnitude.

COMETS IN 1985 - Sheet 1

	Comet	Last obs. return	N	T 1984	Period yrs	q a.u.	Probable max. brightness: Date 1985	Mag.	Approx posn.	Elong. °	Full Moon
1984h	P/Faye	1977IV	17	Jul.10	7.35	1.59	Jan.15	13+	♎ Hydrae	149	Jan.7
1984i	Austin	-	-	Aug.12	-	0.29	Jan.15	13+	γ Pegasi	80	
1984q	P/Shoemaker 1	-	-	Sep.17	7.21	1.98	Jan.15	12+	α Andromedae	86	Feb.5
1984g	P/Wolf-Harrington	1978VI	6	Sep.23	6.53	1.62	Jan.15	13+	μ Hydrae	132	
1984k	P/Arend-Rigaux	1978III	5	Dec.1	6.84	1.45	Jan.15	12+	δ Cancri	159	Mar.7
1984m	P/Schaumasse	1976XV	7	Dec.6	8.26	1.21	Jan-Apr	10-11	Vir. - ζ Oph.	74	
1984t	Levy-Rudenko	-	-	Dec.14	-	0.92	Jan-Mar	9-11	Lyr-UMi-UMa-Lyn	73	Apr.5
	P/Haneda-Campos	1978XX	1	Dec.25	6.27	1.22	Jan.15	14-15	30 Piscium	56	
1984p	P/Tsuchinshan 1	1978IX	3	1985 Jan.2	6.7	1.51	Jan.15	15	ζ Leonis	144	May 4
1984s	Shoemaker	-	-	Jan.3	-	1.21	Jan-Mar	10-12	Eri.-Lep.-Mon.	118	
	P/Schwassmann-Wachmann 3	1979VIII	2	Jan.11	5.4	0.94	Jan.15	14+	Libra	-	Jun.3
	P/Honda-Mrkos-Pajdusakova	1980I	6	May 25	5.3	0.54	-	15+	-	-	
	P/Schuster	1978I	1	Jun.2	7.2	1.53	-	18?	-	-	Jul.2
1984l	P/Gehrels 3	1977VIII	1	Jun.3	8.1	3.44	-	18?	-	-	
	P/Russell 1	1979V	1	Jul.5	6.1	1.61	-	17?	-	-	Jul.31

COMETS IN 1985 - Sheet Two

	Comet	Last obs. return	N	T 1985	Period yrs	q a.u.	Probable max. brightness: Date 1985	Mag.	Approx posn.	Elong. °	Full Moon
	P/Kowal 2	1979II	1	Jul.8	6.5	1.50	-	18?	-	-	
	P/Tsuchinshan 2	1978XVI	3	Jul.21	6.8	1.79	-	18?	-	-	Aug.30
	P/Daniel	1978XII	6	Aug.4	7.1	1.65	Sept.	15-16	β Geminorum	42	
1984e	P/Giacobini-Zinner	1979III	10	Sep.5	6.6	1.03	Sept.	8-9	Auriga	79	Sep.29
1984f	Shoemaker	-	-	Sep.4	-	2.70	Sept.	10-11	Xi Hydrae *	43	
1984v	Hartley	-	-	Sep.26	-	4.02	-	17	-	-	Oct.28
	P/Giclas	1978XXII	1	Oct.1 1986	6.9	1.84	Nov.	16	Cetus	-	
	P/Boethin	1975I	1	Jan.23	11.2	1.11	Dec.	13-15	Aquarius	53	Nov.27
	P/Ashbrook-Jackson	1978XIV	5	Jan.24	7.5	2.31	Aug.	12-13	Cor.Australis	145 *	
1982i	P/Halley	1910II	29	Feb.9 1989	76	0.59	Dec.	4-6	Aquarius	57	Dec.27
	P/Schwassmann-Wachmann 1	1974II	4	Oct.26	14.9	5.8	Jun.	18 (12)	Scorpius	164	

Notes

All the 1984 comets likely to be observed by amateurs have been included. All comets known to come to perihelion in 1985 have been included, irrespective of brightness. The first three of the 1986 comets are included, together with the annual P/Schwassmann-Wachmann 1.

Full details have not been given for comets unlikely to be observed by amateurs.

N = No. of previously observed returns.

* indicates the comet will be best observed from the southern hemisphere

Two comets due at perihelion in 1986 January may be picked up during 1985: P/Boethin and P/Ashbrook-Jackson. The former might just get bright enough for us, but has only been observed at one previous apparition, its discovery in 1975 being attended by a certain amount of confusion, as some of us will remember. P/Ashbrook-Jackson is better known, and we can hope for it to be at least 12th mag., though it will be a southern object. Next in line for perihelion is P/Halley, about which we have already heard.

P/Schwassmann-Wachmann 1, south of Antares, will be rather low for U.K. observers, but those more favourably placed may profitably keep an eye on it for the occasional outburst.

P/Giacobini-Zinner, making its 11th observed return, must receive our close and continuous attention over as long a period as possible, not only because it should achieve 8th magnitude but because it has become the target for the first encounter of a spacecraft with a comet. The ICE satellite, also known as ISEE, has been re-orbited for a fly-by in September, but the probe has no cameras aboard, and visual and photographic observations will be essential for the interpretation of the physical data received; astrometry is also needed for orbit-update and probe-comet separation parameters.

The comet will move from Aquila in April through to Cassiopia in late July - August, then go rapidly south through Perseus, Auriga and Gemini in September. During the last three months of the year it will continue south, passing Sirius in mid-October and ending the year in Columba before moving north again. It should be possible for us to observe it from May onwards, but earlier attempts should be made.

P/Giacobini-Zinner is of special interest for another reason - it has generated two of the strongest meteor storms of this century, in 1933 and 1946. From an examination of the past performances of the meteor stream in relation to the encounter circumstances, there does not seem to be much chance of a major display this time, but there is a sporting chance of a modest display, and predicting meteor rates is an even more chancy business than forecasting comet magnitudes; so watch for activity from the radiant in the head of Draco during the period October 8 - 10.

All in all, a busy and interesting year lies ahead of us, and those of us who observe from the U.K. must pray that our normally hostile weather will relent for once and give us a fair chance of doing some really useful work.

H.B. Ridley
1985, January 5

COMETS IN 1983

S.W. Milbourn

1983a Although 15th mag. cometary images present on plates exposed at Perth Observatory (Bickley, W. Australia) on 1983 Jan. 5, 7 and 9 were given the designation 1983a, no object was later detected and it was concluded that the images were unusual plate defects.

1983b = 1983 IV P/Pons-Winnecke. Independent recoveries of this comet were made by E. Everhart (University of Denver, field station) and T. Seki (Geisei) on 1983 Jan 12.51 U.T. and Jan 14.85 U.T. respectively. The comet was diffuse with condensation, mag. 19 and the recovery positions were in close agreement with the prediction in the Handbooks 1983/4. Originally discovered in 1819, the comet was making its 19th recorded appearance.

1983c = 1983 II P/Bowell-Skiff. Discovered by E.L.G. Bowell on plates exposed by B.A. Skiff using the 0.33-m photographic telescope at Anderson Mesa on 1983 Feb 11 and Feb 15. Of magnitude 16, the comet was diffuse with slight condensation. By May 16 the comet had faded to mag. 19 but was followed until June 10. Using 31 observations 1983 Feb 11 - Jun 10, Dr. B.G. Marsden has calculated the following elliptical elements:

T	1983 Mar. 15.17040	E.T.	Epoch 1983 Mar. 7.0	E.T.
Peri	168°99679		e	0.6893948
Node	345.60478	1950.0	a	6.2612979 AU
Inc	3.79174		n°	0.06290824
q	1.9447919 AU		P	15.67 yrs.

Mean residual 1".4 (MPC 8052)

1983d = 1983 VII IRAS-Araki-Alcock. The most widely observed comet of the year. Independent discoveries were made by IRAS (Apr 25.85 U.T.), G. Araki (May 3.61 U.T.) and G.E.D. Alcock (May 3.92 U.T.), the comet being extremely large with the coma diameter approaching 20' arc, mag. 6-7. The comet was rapidly approaching the Earth and preliminary elements showed a minimum distance of 0.03 AU around May 11. At the time of closest approach the comet became an easy naked-eye object of mag. 2 with the coma diameter almost 3° and the motion of over 1° per hour was clearly perceptible without optical aid. After passing through Ursa Minor the comet moved rapidly south, fading as it receded from the Earth. By early June the magnitude was down to 9 but observations continued until Oct 4.

Using 213 right ascensions and 217 declination of 254 observations 1983 Apr 27 - Oct 4, W. Landgraf (Max-Planck-Institut fur Aeronomie, Lindau) has calculated the following near-parabolic elements:

T	1983 May 21.25486	E.T.	Epoch	1983 May 26.0	E.T.
Peri	192°84553		e	0.9898227	
Node	48.40554	1950.0			
Inc	73.24586		q	0.9913405	AU

Mean residual 1".2 (MPC 8381)

1983e = 1983 V. Sugano-Saigusa-Fujikawa. Discovered independently by these three observers on 1983 May 8.76 U.T., May 8.77 U.T. and May 8.79 U.T. respectively. The comet was described as diffuse and uncondensed, mag. 7. A photograph by E. Everhart (University of Denver, field station) on May 9.43 U.T. showed a thin straight tail 30' long in p.a. 315°. Preliminary elements showed this to be another comet making a close approach to the Earth and would be at a minimum distance of 0.063 AU on June 12 when the magnitude was expected to reach 5. Such are the vagaries of comets. 1983e promptly began to fade and was down to 9th magnitude by late May although a later brightening brought the magnitude up to 6.6 by the end of the first week of June. It then faded right out and does not appear to have been followed after Jun 17.

Dr. B.G. Marsden calculated the following elements from 46 observations 1983 May 9 - June 17:

T	1983 May 1.32877	E.T.	Epoch	1983 Apr. 16.0	E.T.
Peri	82°16611		e	1.0000198	
Node	82.34232	1950.0			
Inc	96.62217		q	0.4710806	AU

Mean residual 1".9 (MPC 8052)

1983f = 1983 I IRAS. A further discovery by the Infrared Astronomy Satellite when it detected a moving object on 1983 May 13.13 U.T. Confirmation was obtained on May 18 by K.S. Russell (UK Schmidt Telescope Unit, Siding Spring) who described the object as almost stellar with a trace of nebulosity, mag. 17. The comet was well past perihelion and had faded to mag. 19 by mid-June. Only 7 precise positions were obtained and using these Dr. B.G. Marsden supplies the following parabolic elements:

T	1983 Jan 19.03044	Peri	227°06895	
		Node	118.92541	1950.0
q	1.4164834 AU	Inc	152.19479	

(MPC 8052)

1983g = 1983 IX P/Du-Toit-Neujmin-Delporte. Recovered by J. Gibson on 1983 May 20.45 U.T. using the 1.2-m Schmidt telescope at Palomar. The comet was essentially stellar in appearance with just a trace of coma, mag. 19. Discovered in 1941, the comet was lost until recovered in 1970 on the basis of a prediction by Dr. B.G. Marsden, not seen in 1976/77 thus the 1983 recovery was the third recorded appearance. No prediction appeared in the Handbook but an ephemeris on MPC 7476 required a correction to T of -0d.11.

1983h = 1983 XVIII P/Johnson. Recovered by A.C. Gilmour and P.M. Kilmartin at Mount John Observatory on 1983 Jun 7.61 U.T. the comet being of stellar appearance, mag. 19. Discovered in 1949 the comet was making its sixth recorded appearance. The prediction in the Handbook 1983 required a small correction of -0d.02 to T.

1983i = 1982 IX P/Russell (3). Discovered by K.S. Russell on 1983 Jun 14.71 U.T. using the 1.2-m Schmidt of the UK Schmidt Telescope Unit at Siding Spring. Of magnitude 16, the comet was diffuse with a tail 3'-4' long. Gradually fading, the comet was followed until the end of October and the following elliptical elements by S. Nakano are based on 37 observations 1983 Jun 14 - Oct 31:

T	1982 Nov 23.24194	E.T.	Epoch	1982 Nov 7.0	E.T.
Peri	353°.45584		e	0.3445714	
Node	248.00115	1950.0	a	3.8300006	AU
Inc	14.09785		n°	0.13149396	
q	2.5102917	AU	P	7.50 yrs	

Mean residual 1".2 (MPC 9304)

1983j = 1983 XIII P/IRAS. On 1983 Jun 28.76 U.T., IRAS detected another comet which was confirmed by J. Gibson using the 1.2-m Schmidt telescope at Palomar on Jun 30.48 U.T. The image was almost stellar in appearance with no tail, mag. 15. By August the comet had brightened enough to be observed visually (Aug 15, $12^m.5$ (J. Bortle); Sept 9, $11^m.3$ 3'.5 tail in p.a. 230° (J. Bortle); Oct 30, $12^m.0$ (C.S. Morris)). The last reported observation was obtained at the Oak Ridge Observatory on 1984 Feb 22 but the latest availabe elements are by Dr. B.G. Marsden and based on 70 observations 1983 June 30 - Nov 9:

T	1983 Aug 23.80205	E.T.	Epoch	1983 Aug 14.0	E.T.
Peri	356°.89159		e	0.6955725	
Node	357.16024	1950.0	a	5.5738392	AU
Inc	46.17994		n°	0.07489838	
q	1.6968299	AU	P	13.16 yrs	

Mean residual 1".4 (MPC 8386)

1983k = 1983 VI IRAS. Yet another comet detection by IRAS came on 1983 Jul 11.48 U.T. which was confirmed by an exposure obtained by J. Dawe (UK Schmidt Telescope Unit) on Jul 14.35 U.T. Nothing was reported about the physical appearance of the comet except for the magnitude which was given as 17 by IRAS and 18 by Dawe. The comet was expected to fade but an accidental discovery by K.S. Russell of a comet on a plate exposed by M. Hawkins (UK Schmidt Telescope Unit) on 1984 Mar 6.64 U.T. proved to be 1983k unexpectedly bright at mag. 16. Using 10 observations 1983 Jul 14 - 1984 Mar 7, Dr. B.G. Marsden supplies the following near-parabolic elements:

T	1983 May 2.70030	E.T.	Epoch	1983 Apr 16.0	E.T.
Peri	265.57677		e	0.9990414	
Node	171.09113	1950.0			
Inc	138.84401		q	2.4179038	AU

Mean residual 1".3 (MPC 8671)

1983l = 1983 XII Cernis. Discovered by K. Cernis (Vilnius Observatory) on 1983 Jul 19.02 U.T. using a 0.48-m reflector f/5, x65, the comet appearing as a diffuse 12th magnitude object with no tail. The comet remained a diffuse object with no structure but brightened to 9th magnitude by late September when the coma diameter was 4' and later faded to 11th magnitude by early November. Comet Cernis was still under observation in 1984 November but the latest available elements are by Dr. B.G. Marsden and based on 72 observations 1983 Jul 21 - Oct 11:

T 1983 Jul 21.15695 E.T.			Epoch 1983 Jul 5.0 E.T.	
Peri	186°20421		e	1.0015927
Node	208.88247	1950.0		
Inc	134.70205		q	3.3177059 AU

Mean residual 1".2 (MPC 8272)

1983m P/Wolf. Recovered on 1983 Aug. 1.23 U.T. by J. Gibson using the 1.2-m Schmidt telescope at Palomar, the comet appearing as an essentially stellar object, mag. 20. No prediction appeared in the Handbook but the recovery position was in close agreement with a prediction by E.I. Kazimirchak-Polonskaya on MPC's 7659 and 7666. Discovered in 1884, the comet was on its 13th recorded appearance.

1983n P/Crommelin. Recovered by L. Kohoutek on 1983 Aug. 9.01 U.T. using the 0.8-m Hamburg Schmidt telescope at the German-Spanish Astronomial Centre, Calar Alto and independently by S.Wyckoff and P.A. Wehinger (Kitt Peak National Observatory) on Aug 13.49 U.T. using the No. 1 0.9-m reflector with a CCD camera. Of stellar appearance the magnitude was 20. The recovery positions indicated a small correction of -0d.04 to T for the prediction in the Handbook 1983. By the end of December the comet was under visual observation but still below 12th magnitude. Brightening steadily it had reached 10th magnitude by the end of January and peaked at 8th magnitude in late February. By April it had faded to 10th magnitude and was quickly lost from view. Originally discovered by Pons in 1818, rediscovered by Coggia and Winnecke in 1873 and once again by Forbes in 1928 it was left to Crommelin to link these apparitions to a single comet and in recognition the comet was renamed P/Crommelin. The comet was observed again in 1956 and was making its 5th recorded appearance.

Using the observations from the current apparition D.K. Yoemans has calculated the following elements from 279 observations 1873 - 1984:

T 1984 Feb 20.17073 E.T.			Epoch 1984 Mar 1.0 E.T.	
Peri	195°85443		e	0.9191981
Node	250.19098	1950.0	a	9.0904137
Inc	29.10259		n°	0.03596074
q	0.7345227	AU	P	27.41 yrs

Mean residual 2".1 Non-gravitational parameters A1 = -0.08, a2 = -0.0003

(MPC 9213)

1983o = 1983 XVI IRAS. Yet another IRAS discovery. An 18th magnitude object was detected on three passes on 1983 July 27 and a 16th magnitude object on Sept 1. These were reported by J. Davies and S.F. Green (University of Leicester and Rutherford-Appleton Laboratory) and Davies suggested that the two objects were of single identity. A rough computation by C.M. Bardwell (Dentre of Astrophysics) supported this view and confirmation came on Sept 11 when A.C. Gilmore (Mount John Observatory) obtained two plates. The comet was not expected to brighten much but C.S. Morris observed it visually at mag. 12.8 on 1984 Mar 11. The comet was followed until 1984 June and using 22 observations 1983 Aug 4 - 1984 June 5 (a further image was found on a plate exposed with the 1.2-m Schmidt at Siding Spring on 1983 Aug 4) S. Nakano has calculated the following elements:

T 1983 Nov 28.00064 E.T.			Epoch 1983 Dec 12.0 E.T.	
Peri	333°98189		e	1.0001957
Node	200.56057	1950.0		
Inc	120.74303		q	2.2547765 AU

Mean residual 1".2 (MPC 9304)

1983p = 1983 XV Shoemaker. Discovered by C. Shoemaker on 1983 Sept 7.31 U.T. using the 0.46-m Schmidt telescope at Palomar. The comet was diffuse and condensed with no tail, mag. 16. Shortly afterwards several observers gave the magnitude as nearer 12 and a number of visual observations during September and October, magnitudes ranging from 11.5 in mid-September to 12 by mid-October. During the period Oct 4 - 7 a tail-like feature was observed to move from p.a. 248° to 217° and a short spike appeared at p.a. 199° on October 11. By the end of October the comet had faded to 13th magnitude (C.S. Morris, $12^m.8$ on Oct 29). Using 67 observations 1983 Sept 7 - Dec 9, Dr. B.G. Marsden has calculated the following elements:

T	1983 Nov 23.73874 E.T.		Epoch	1983 Dec 12.0 E.T.
Peri	176°.02398		e	1.0003908
Node	163.98298	1950.0		
Inc	137.60566		q	3.3450171 AU

Mean residual 1".1 (MPC 8387)

1983q = 1983 VIII P/Arend. Recovered by J. Gibson using the 1.2-m Schmidt telescope at Palomar on 1983 Sept 16.49 U.T., the comet being well condensed with a hint of tail 15" long in p.a. 285°, mag. 20.5. Discovered in 1951 the comet was making its 5th recorded appearance. The recovery position indicated a small correction to T of +0d.02 (Handbook 1983).

1983r = 1983 XVII P/Harrington-Abell. Recovered by J. Gibson using the 1.2-m Schmidt telescope at Palomar on 1983 Sept 17.47 U.T. Of magnitude 20.5 the comet was essentially stellar in appearance and the recovery position indicated a correction of -0d.34 to T for the prediction in the Handbook 1984. Discovered in 1955, the comet was making its 5th recorded appearance.

1983s P/Wild (2). Recovered by J. Gibson using the 1.2-m Schmidt telescope at Palomar on 1983 Sept. 18.44 U.T. A 20th magnitude object with a short tail the comet's position was in very close agreement with the prediction in the Handbook 1984. Wehinger and colleagues using the 4-m reflector at the Kitt Peak National Observatory on Jan 4 and March 4 1984 noted a well developed dust coma and tail structure in p.a. 96°. On April 21 and April 22 C.S. Morris observed the comet visually at mag. 13.0 and 13.1 respectively. Discovered in 1978 the comet was making its 1st return.

1983t = 1983 III P/Kowal-Vavrova. Discovered by C.T. Kowal on six exposures obtained with the 1.2-m Schmidt telescope at Palomar during the period 1983 May 8 - 15. Of magnitude 16, the comet was diffuse with condensation with a short tail. Subsequently it was realised that an object discovered by Z. Vavrova on May 14 and designated as a minor planet 1983 JG was identical with the comet and further inspection of the Klet plates showed that the image was slightly diffuse but without condensation. The comet was never bright enough to be observed visually and by Sept 28 the magnitude was down to 18 (J. Barrow, UK Schmidt Telescope Unit).

Using 12 observations 1983 May 8 - Sept 28, S. Nakano has calculated the following elliptical elements:

T	1983 Apr 2.42029		Epoch	1983 Apr 16.0 E.T.
Peri	19°.49666		e	0.5881667
Node	201.84722	1950.0	a	6.3347553 AU
Inc	4.31756		n°	0.06181720
q	2.6088632	AU	P	15.94 yrs

Mean residual 2".0 (MPC 9304)

1983u P/Taylor. Recovered by E. Everhart on 1983 Nov 3.40 U.T. using the 0.4-m reflector at the field station of Chamberlin Observatory, confirmation being obtained by J. Gibson using the 1.2-m Schmidt telescope at Palomar on Nov 11.53 U.T., who reported a diffuse and condensed image, mag 19. The recovery positions indicated a correction to T of -0d.3 to the prediction in the Handbook 1983. Originally discovered in 1916 the comet was lost until recovered in 1977 and was making its 3rd observed appearance.

1983v P/Hartley-IRAS. A fast moving object was detected by the Infrared Astronomy Satellite on 1983 Nov 10.4 U.T. and when K.S. Russell (UK Schmidt Telescope Unit) was requested to confirm it he reported that a single plate exposed by M. Hartley on Nov. 4.47 U.T. showed a cometary image which might be identical with the IRAS object. It was not until Nov 23 that a further plate could be taken that gave the necessary confirmation. At this time the magnitude was 15 but by the end of November the comet had brightened to mag. 12 and an exposure obtained by J. Gibson with the 1.2-m Schmidt telescope at Palomar on Nov 28 showed some condensation and a hint of tail. The comet continued to brighten and was widely observed. Reaching a maximum of mag. $7\frac{1}{2}$ in January 1984 it later faded and the last reported visual observation was by C.S. Morris on May 27 when he estimated the magnitude as 12.2.

Using 42 observations 1983 Nov 4 - 1984 Jun 5, S. Nakano supplies the following elliptical elements:

T	1984 Jan 8.70946	E.T.	Epoch	1984 Jan 21.0	E.T.
Peri	47°11405		e	0.8339123	
Node	0.80053	1950.0	a	7.7215795	AU
Inc	95.72474		n°	0.04593512	
q	1.2824590	AU	P	21.46 yrs	

Mean residual 1".4 (MPC 9304)

1983w P/Clark. Recovered by J. Gibson on 1983 Dec 15.52 U.T. using the 1.2-m Schmidt telescope at Palomar. The comet was diffuse with condensation, mag. 19.5 and there was a hint of a tail between 270° p.a. and 290°. During 1984 May the comet was observed visually at 11th magnitude (A. Hale and C.S. Morris). The recovery position was in close agreement with the prediction in the Handbook 1984. Discovered in 1973, P/Clark was making its 3rd recorded appearance.

Note When an epoch date is given with a set of orbital elements it indicates that the effect of planetary perturbations have been taken into account.

S.W. Milbourn.

Observations of Recent Comets by Members

M.J. Hendrie

Unfortunately we have had to postpone publication of Graham Keitch's detailed review of recent comet observations, but they should appear in the Bulletin 24 next July. It had been a busy time for those who can observe the fainter comets, though several have been quite bright, certainly brighter than expected.

For the moment I will list the names and approximate maximum brightness of comets for which I have received reports since those mentioned in Bulletin 22 last autumn:

P/Wolf-Harrington 1984g	12 app. max. mag
P/Faye 1984h	12
P/Arend-Rigaux 1984k	12
P/Schaumasse 1984m	9
P/Tsuchinshan 1 1984p	11
P/Shoemaker 1 1984q	11
Shoemaker 1984s	10
Levy-Rudenko 1984t	8

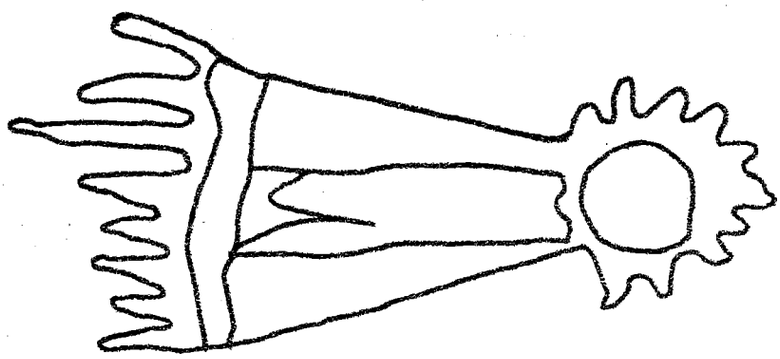
At the time of writing (March 6) 1984g, 1984h and 1984q all seem to be beyond the reach of visual instruments. 1984k is faint, below 12 mag in January. Comet 1984s seems to have faded rather rapidly, from being a miniature large comet with small head and tail, and did not appear on recent photographs. Comet 1984p is several magnitudes brighter than expected and Levy-Rudenko became rather diffuse as it moved across the northern sky, recently circumpolar.

There have been no recent reports of observations of Giacobini-Zinner in the IAUC cards and so far Halley has eluded our observers, though as reported elsewhere, it has now been seen visually by Stephen O'Meara from Hawaii.

Any observers who have observations to send in would greatly help us if they sent them soon so that they can be dealt with before the rush on Halley and Giacobini-Zinner starts later this spring.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



ISTI MIRANT STELLÆ

BULLETIN NO. 24

SEPTEMBER 1985

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SECTION NEWS AND NOTICES

Michael J. Hendrie

Charles W. Munday

It is with great regret that I have to report the death of Charles Munday, member of the Association since 1952 and Photo-electric Co-ordinator of the comet Section. Charles Munday had been seriously ill in hospital for several months and was unable to complete his plans for the Section's work on Halley's Comet. His well-equipped observatory near Colchester included a photo-electric photometer integrated with his microcomputer, darkroom, extensive library and workshop. He was working recently on some large flats for a solar telescope. He had held recent discussions with Dr. Vanysek at the Charles University in Prague (Deputy Discipline Specialist for Photometry IHW) and had also visited JPL and Steve Edberg last year. Although not very well known in the BAA he had visited many of the world's observatories in the East and the West and knew many astronomers and scientists. He had been President and was Honorary Secretary of his professional institute, the Institute of Measurement and Control and was inventor of the Munday Cell for determining oxygen levels in many applications. He was head of the BP Chemicals Instrument Development Section until his retirement. It is particularly sad that he should have missed seeing Halley's Comet by so small a margin, having put in a great deal of work for his own programme and those of others. We hope to be able to issue the notes for observers of comets that he had drafted out but was not able to finish.

Photo-electric Co-ordinator

With Charles Munday's approval Andy Hollis was looking after queries on PEP work on comets over the past few months (see his note in the Newsletter

No. 13 Aug 85). Andy has kindly agreed to take on both the job of Comet Section Photo-electric Co-ordinator and UK Photo-electric Co-ordinator for the IHW Amateur Observations Network. Any queries should now be addressed to him. As Director of the Minor Planets Section and an experienced variable star and PE observer, Andy is well qualified to advise us on the application of PEP equipment to the observation of comets.

Addresses of Section Co-ordinators

Graham S. Keitch 2 South Meadows, Wrington, Avon, BS18 7PF (0934 862 924)	Visual Co-ordinator	- visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Analysis of light curves. Observations to the ICQ. Halley "Real Time Network" UK organiser. IHW UK visual co-ordinator.
Harold B. Ridley Eastfield Observatory, Eastfield Lane, East Chinnock, Yeovil, Somerset, BA22 9EP (093 588 222)	Photographic Co-ordinator	- General photographic and spectrographic observations, equipment, films and plates, processing, etc. Prospects for returning periodic comets. IHW UK photographic co-ordinator
Andy J. Hollis Ormada, 85 Forest Road, Cuddington, Northwich, Cheshire, CW8 2ED (0606 882 908)	Photoelectric Co-ordinator	- Photoelectric observations, equipment detectors, amplifiers, recorders, filters, etc. IHW requirements, etc. IHW UK photoelectric co-ordinator.
Michael Hendrie (address above) (0206 240 021)	Astrometry Co-ordinator	- Requirements and reductions - contact with IHW, CHUKCC. (For general photographic requirements see Harold Ridley). General Section business - Editor of Bulletin. IHW UK correspondent and CHUKCC/IHW Astrometry co-ordinator.
Stan W. Milbourn (address above) (0342 712168)	Computing Co-ordinator	- All computing problems, BAA Circulars Editor, distribution of Bulletin, SAE and queries. Distribution of ephemerides.
Peter Stanley 20 Elsted Close, Ifield, Crawley, West Sussex. RH11 0BH (0293 22816)	Meetings Co-ordinator	- Meetings Organiser. Section and Exhibition Meeting information. Initial requests for information about the Section, IHW, etc. Halley telephone queries

First UK Observations of Halley's Comet

IAUC 4094 reports visual observations from the USA and France. First visual observations after conjunction appear to be by C.S. Morris and S. Edberg

(Table Mountain Observatory, California, USA, 0.61m reflector x390, coma diameter 10", very diffuse). Over August 10, 11 and 12 Morris and Edberg made the visual magnitude 14.5:14.5 and 14.3. By August 25 the comet had brightened to 13.2 mag. The first reported observations from the UK of Halley's Comet were made by Alan Young (Burwash, East Sussex 0.57 reflector) and R. Arbour (S. Wonston, 0.40m reflector). Both observers obtained weak images of the Comet on the morning of 1985 Aug 15 and subsequently A. Young obtained further longer exposures on Aug 17 and 18 while R. Arbour made exposures again on Aug 16 and 25. Both observers estimated the Comet at 15-16 mag in mid August.

We have also received photographs taken on 1985 Aug 19 and 20 by J. Genebriera (Barcelona, 0.35m telescope) which show the comet well. Poor weather has prevented other observers photographing the comet from the UK. It should now be within reach of telescopes of 15-20cm and astrographs of 10cm upwards but very small scale photographs will make identification difficult while the comet remains small and diffuse.

First confirmed visual observations reported from UK observers were by Graham Keitch (Wrington, 0.30m reflector) and by J.W. Mason and P.A. Moore (Selsey, 0.39m reflector). On Sept. 11.16 Keitch made the comet 12.8 mag (x89), very diffuse and 45 arcseconds across. Mason and Moore observing about the same time estimated the comet at about 13.0 mag (x70 and x96). The comet was seen again at both observatories the following morning, when Keitch made the coma up to 60' across. There seems to be little sign of a sharp condensation at present in instruments of this size.

The comet is close to the positions in the Handbook which is quite adequate to find the comet for all amateur purposes (except occultations and photo-electric work perhaps). The comet is currently about 0.5 mag below the values given, not a large difference at this stage. The comet should brighten steadily and be visible in moderate sized instruments in October.

A full account of the observations sent in by members will be given in later Bulletins and elsewhere. Observations should be sent direct to the appropriate co-ordinator, keeping reporting up to date will help them to assess the progress of the comet.

Occultations of Stars by Comets Halley and Giacobini-Zinner

Visual and photo-electric observers may be able to make valuable observations of the extent of the inner coma of comets by observing close appulses and occultations of stars by comets. The IHW has published lists of likely candidates and these are updated from time to time. Andy Hollis has current lists for any observer interested in this work (SAE to him please). Normally fairly accurate timing is required, preferably to a second or two.

Reporting Observations of Halley's Comet

Graham Keitch has issued the first two of his Visual Bulletins for visual observers, and if you have not received them, contact him (SAE please). These are essential for correct procedures, photometric sequences and reporting. Observations made visually of this and other comets should now be sent direct to him please as this saves time in using the observations.

Harold Ridley will be handling photographs (other than for measurement of precise positions) and they should be sent direct to him.

Astrometric observations should be sent to me, but it is unlikely that we can use those from observers who have not already joined the Astrometry Net as certain information and trials are required that we shall have little time to arrange. But as a longer term project we wish to encourage photographers with good equatorial telescopes to undertake astrometric work. Enquiries (after the Halley panic please) to me.

Observations intended to be sent on to the IHW MUST BE SENT IN ON IHW FORMS and the observer MUST HAVE REGISTERED DIRECT WITH THE IHW copy to the BAA. Unless observers have done this and their results are sent on the appropriate form we cannot send them on (and IHW will not accept them) - we shall not have time to transfer data to IHW type forms. Of course, ordinary BAA forms will be used for the BAA and CHUKCC records and reports; those sending IHW forms need not send BAA forms as well. If in doubt about this contact the co-ordinators, but there is not much time now and registration should already have been undertaken early in the year.

Giotto

As reported in ESA Bulletin No. 43 (1985 August), Giotto was launched successfully on 1985 July 2 by Ariane-1 launch vehicle. Lift-off from Kourou in French Guiana occurred at 11.23.16 GMT and the Transfer Propulsion System firing took place precisely as planned some 32 hours later to send Giotto off on the 700,000,000 km journey to rendezvous with Halley's comet. The orbit-insertion manoeuver was so precise that adjustments using the on-board thrusters were unnecessary. The probe will reach Halley's comet on 1986 March 13. The two USSR Vega probes are on course for close approaches on March 6 and 9 and their tracking and observations of Halley are to be used to make final adjustments to Giotto's orbit if necessary.

Royal Astronomical Society Regional Meeting - 1985 Sept 20

This years RAS regional meeting is being held at University College, Cardiff on Friday Sept 20 and is entitled "Comets Halley and Beyond". After the morning session there will be parallel afternoon sessions for Specialists and Non-specialists, the first being on Plasma Phenomena in Comets and the second on more general aspects of comets and observing. Among the speakers in this non-specialist sessions will be Graham Keitch talking about comets and the amateur astronomer and myself on spectacular comets of the past. Howard Miles will be talking about fireballs. There will be an exhibition on comets at the National Museum of Wales, who with University College and Cardiff Astronomical Society are organising the meetings.

Visit to the RGO and 28 inch refractor

Arrangements have been made with Carole Stott, Curator of Astronomy at the National Maritime Museum (Greenwich) for the members of the Association to observe Halley's comet with the 28 inch refractor at the old RGO. The date of Wednesday November 6 was chosen for lack of moonlight but the comet will be rather low in the east in the early evening and we hope arrangements can be made for observing to continue into the evening if the skies are clear. Later dates were either moonlit or during National Astronomy Week when special public viewing nights are to be held. A book is being kept for signing by all persons seeing the comet through this telescope, as it was also used in 1910. Nigel Henbest will be finalising arrangements and announcements will be made in a later Newsletter and at the AGM.

National Astronomy Week - 1985 November 9 to 16

Astronomers are now well aware of the NAW 1985 when events will take place and local societies will be trying to interest the general public in seeing the comet and in astronomy generally. NAW have produced some very good publicity material - further information can be had from Enid Lake (Co-ordinator) at 153 Powerscroft Road, London E5 0PR.

BAA Halley Hotline

As mentioned in Comet News JBAA for 1985 August, Peter Stanley has agreed to answer queries on the observability of Halley's comet over the telephone on

FRIDAY EVENINGS from 1800 to 2200 until January. Members with general queries are asked to contact him so that other lines can be kept for observational contacts. His telephone number is 0293 22816.

Halley Hotline

In Bulletin 23 we listed the numbers that the public can use to receive up to date information on Halley and Giotto. Members can help the BAA officers by directing casual callers to these numbers and to the National Maritime Museum who are anxious to answer callers questions. They will also have on sale many astronomical aids and books. The Hotline numbers are also given in Newsletter No. 10. The NMM numbers are 01-858 1167 and 01-858 4422.

National Maritime Museum "Spaceworks" Exhibition

The NMM "Spaceworks" exhibition will open during NAW and run until December 1986. Exhibits will include a full size Giotto, space-station models, a map showing the locations of UK observers (data provided by us) and the types of work they are doing, and George Alcock will be featured discovering one of his 5 comets (it will not be necessary for him to be there throughout the exhibition we understand). Observations will be displayed and we can include BAA material on Halley when we have some results to show.

Comet Section Meeting - 1985 April 27

The Section meeting held at Ifield, Crawley on the last Saturday in April was attended by some 40 observers and was considered to be a very useful and interesting day thanks to all those who contributed with talks, exhibits, questions and in other ways. Peter Stanley arranged the Hall and refreshments which were much appreciated as the day turned out to be far from springlike and many of us ran into blizzards on the drive home! The electric heating and hot drinks were much appreciated.

It was intended to carry the main comments on Halley observing in this Bulletin, but Graham Keitch is issuing special Visual Bulletins for observers (see this Bulletin for details) and so we are incorporating anything learnt at the meeting in these and in personal advice for photographers and those doing astrometry.

The subjects of the talks were:

Halley & Giacobini-Zinner programmes and BAA involvement	M. Hendrie
Requirements for Visual Observers of Halley's Comet	G. Keitch
Star Sequences for visual photometry of Halley's Comet	G. Hurst
Halley and the British Antarctic Survey	J. Shanklin
Requirements for Photographers and spectrographic work on Halley's Comet	H. Ridley
Photography of comets with a large telescope	A. Young
Computer controlled comet camera	R. Arbour
Requirements for Astrometry of Halley and Giacobini-Zinner	M. Hendrie
Improving Orbits and Residuals	S. Milbourn
Astrometry at Conder Brow Observatory	D. Buczynski

Comet Halley UK Co-ordinating Committee (CHUKCC)

A press conference was held by CHUKCC at the Royal Society on 1985 April 26 and attended by some 100 guests. The emphasis was on Giotto and spaceborne

experiments but other topics were mentioned. Several groups exhibited material and the BAA Comet and Meteor Sections put up a large display of members' work and Halley related material.

Explorer's Travel Club "Halley's Comet over Australia"

Our member Andrew Lound is taking this tour and would be pleased to contact any other member also going. His address is 17 Rodway Close, Newtown, Birmingham, B19 2JR.

Designations of Comets Recovered and Discovered - 1985 (to September 16)

1985a	P/Ashbrook-Jackson	Discovery/recovery mag.	18
1985b	P/Russell 1		19½
1985c	P/Honda-Mrkos-Pajdusakova	(visual recovery)	10½
1985d	P/Tsuchinshan 2		22
1985e	Machholz		10
1985f	P/Hartley		16
1985g	P/Giclas		20
1985h	P/Whipple		20
1985i	P/Shajn-Schaldach		19
1985j	P/Daniel		20
1985k	P/Maury		16
1985l	Hartley-Good		11

P/Honda-Mrkos-Pajdusakova 1985c

This comet was recovered visually by M. Clark, A. Pearce and J. Athanasou (W. Australia) using a 0.4m reflector on 1985 April 18.9. They had been fairly certain of seeing it a few days earlier. The comet was very diffuse without condensation of tail, a very difficult object in the Zodiacal Light and only 22 degrees from the Sun. The magnitude was 10 to 11^m. The apparition was a very unfavourable one, the comet already approaching the Sun again at the time of these observations and remaining close to the Sun throughout the summer. Visual recoveries of periodic comets are unusual now and the observers are to be congratulated for their fine recovery.

G/Giacobini-Zinner 1984e - Recent Visual Observations — Graham S. Keitch

Visual observations have been reported by the following observers: R. Panther (RWP), G. Hurst (GMH), D. Fischer (West Germany) (DF), E. Richardson (ECR), M. Taylor (MDT), M. Gainsford (MJG), P. Doherty (PD), M. Hather (MAH), A. Pearce (Australia) (ARP), D. Stott (DS) and G. Keitch (GSK).

The earliest observation so far has been provided by ARP who noted a magnitude of $12^m.4$ with a 20cm reflector on 1985 June 18.85. GSK did not manage coverage until July on account of repairs being carried out on the 30cm reflector at Wrington in preparation for P/Halley. The telescope was in action by early July and showed a $1'.4$ coma at $10^m.6$ on July 5.97. The coma was a little condensed and a faint tail had begun to develop towards the south-west. GMH and RWP also commenced their observations around this time. Over the next few nights the brightness increased and by midmonth, GSK could see the comet in binoculars; his 20x80 B and 10x50 B gave values of $9^m.4$ to $9^m.8$ between July 14 and 17 while the 30cm reflector showed the most interesting tail developments. Several streamers/plasma tails were traced for up to 5' in various directions to the west of the 2-3' coma and, in addition, there were jets to the NE.

Around midmonth, PD began to follow the comet and his subsequent observations with the 25cm reflector confirm the appearance of the comet with its principle gas tail in pa 240^o. Some very fine drawings have been submitted by PD and the detail recorded by this particular observer and GSK are in close agreement.

It is interesting to note however that such detailed tail structure does not show up on astrometric plates and this confirms the importance of visual work for recording faint detail in the coma and tail. The coma had become quite noticeably condensed by this time as confirmed by DF and RWP.

On July 20, GMH estimated that the comet had brightened to $9^m.1$ in 15x80 B. The following night GSK found a value of $8^m.9$ in 20x80 B and the 30cm reflector at x62 showed a gas tail for 8' in pa 240°, a diffuse fan (4') in pa 200° and a further 4' gas tail in pa 274°. The 21, 25 and 30cm reflectors used by MDT, MJG and DS on this particular night all gave somewhat fainter magnitude value of $9^m.8$ as would be expected in larger instruments. DF noted that the comet was becoming quite sharply condensed and most observers ascribed a DC value of 4-6 around the month's end, with instruments of higher resolution tending to give higher values.

A series of observations by DS with the 29.8cm reflector show that the principle gas tail moved from pa 240° through west to pa 290° during the period August 5-14. This effect was confirmed by several observers although the complexity of the tail structure which fanned generally from NW to SW made precise identification of certain features difficult at times. For instance on August 9.92 and 12.06 PD noted the principle gas tail for up to 12' in pa 270° embedded within a broader fan which was edged on each side by a brighter spike. Similar detail was also recorded by GSK who estimated a 4' coma as being $8^m.1$ in 10x50 B on August 11.95. At x62 the 30cm reflector gave a splendid view of the comet on this particular night. The gas tail extended for 21' in pa 266° while numerous streamers and rays occupied the area between pa 252° and pa 293° forming a diffuse fan which was traced out to 7' from the tiny dense 18 arcsecond nuclear condensation. A few days later on August 14.9 and 17.0, GSK again noted additional sunward jets in pa 54° and pa 132°.

During the period August 17-26, both GMH and GSK agreed that the comet had brightened to $7^m.6$ - $7^m.8$ as seen in 5cm and 8 cm binoculars. The gas tail was traced for $\frac{1}{2}$° in pa 300° by GSK on August 26.16. A more thorough analysis of the observations will appear in the next Bulletin. Meanwhile observers are asked to send their visual observations to the address below please:

G.S. Keitch, 2 South Meadows, Wrington, Avon, BS19 7PF

Comet P/Giacobini-Zinner 1984e - Precise Positions reported to JPL IHW and CBAT*

Date	UT		R.A. (1950.0)			Decl.		O-C residuals		IAU Code
1985										
Jun	16.98125	21	26	25.21	+41	37	59.8	-4.1	-4.3	494
	17.00000	21	26	28.14	41	38	36.6	-3.4	-4.4	494
Jul	5.99298	22	27	29.51	51	38	15.2	-3.1	-2.2	494
	6.02273	22	27	36.69	51	39	8.7	-3.5	-2.4	494
	6.02863	22	27	38.17	51	39	19.6	-3.0	-2.1	494
	16.96454	23	20	58.37	56	31	45.3	-1.4	-3.7	502
	17.00287	23	21	11.69	56	32	45.3	-0.6	+2.3	993
	17.01454	23	21	15.27	56	32	55.3	-3.8	-4.2	502
	20.93464	23	45	22.89	57	54	51.0	-4.9	+0.2	502
	20.99792	23	45	47.67	57	56	3.6	-4.5	-0.2	494
	21.01840	23	45	55.71	57	56	27.3	-4.0	-0.2	494
	24.97940	00	13	26.72	58	59	30.2	-7.7	-1.0	978
Aug	3.99547	1	35	35.57	59	32	29.3	+1.2	+0.1	482
	5.93101	1	52	48.23	59	11	44.9	-7.5	+0.2	978
	5.93448	1	52	50.41	59	11	41.4	-5.0	-0.7	978
	5.94140	1	52	54.44	59	11	36.2	-2.3	-0.5	482
	11.93750	2	46	14.43	57	00	17.4	-2.2	+1.9	984
	12.92882	2	54	49.17	56	28	21.9	-5.0	+1.5	502
	12.93924	2	54	54.61	56	28	1.7	-4.6	+1.8	502
	14.94649	3	11	55.01	55	14	20.4	-3.8	+0.7	502
	14.95994	3	12	1.69	55	13	47.2	-3.6	-0.5	978
	14.96411	3	12	3.41	55	13	39.9	-6.8	+2.0	978

Aug	19.96736	3	51	36.87	51	18	34.3	-4.4	+0.7	502
	25.01209	4	26	41.12	46	13	29.4	-3.3	+2.6	482
	26.14720	4	33	52.77	+44	56	41.6	-5.9	-5.4	978

Note: residuals are in arcseconds and are against published elements from IAUC 4061 to end July and from J.D. Shanklin for August. They are for comparison purposes only and do not truly represent deviations from the actual orbit. Generally the consistency amonst observers is good.

* reported by J.D. Shanklin, G.M. Hurst, P. Birtwhistle or measurer.

IAU Code	Observatory at	Instrument	Observers	Measured by
494	Stakenbridge	25cm f/7.5 refl.	B. Manning	B. Manning
502	Colchester	25cm f/7 refl.	M. Hendrie	M. Hendrie
993	Woolston	15cm f/4.5 astrograph	R.L. Waterfield H.B. Ridley	D. Buczynski
978	Conder Brow	47cm refl.	D. Buczynski J.D. Greenwood R.C. Moseley	D. Buczynski
482	St. Andrews	94cm Schmidt/cass	F. Vincent J.R. Stapleton	F. Vincent J.R. Stapleton
984	Eastfield	12cm f/5 astrograph	H.B. Ridley	M. Hendrie

Note added in press:

Further precise positions have been reported by B. Manning (6 plates) and D. Buczynski (3 positions) on 1985 Sept 4 and 6 before the ICE encounter. Those amateurs taking part in the CHUKCC Astrometry Group have communicated 40 positions to JPL so far. It will be interesting to see how we have fared when final residuals are available.

Notes from other Journals

The presence to star images trailing across photographs of comets makes mapping of the surface brightness of the comet troublesome. A technique which locates all stellar tracks and eliminates them from the photometry of cometary images has been developed. (S. Djorgovski, H.Spinrad, Astron.J. 90,869, 1985). The technique was applied to plates taken in 1980 of the comet P/Encke. The 'cleaned' image shows a strong asymmetric sun-directed jet and a extended coma, out to 10^5km. Their results agree with a model of an icy-grain component to the nucleus which evaporates quickly in the sun-light.

The continuous ejection of dust from discrete regions on a rotating nucleus may explain the evolution of spiral jets around the nucleus of Comet Halley during the 1910 apparition. (Z.Sekanina, S.M.Larson, Astron.J., 89,1408, 1984: ibid. 90,823, 1985). With an analysis of the images using this model they find, for instance, a rotation period of 1.7 days and evidence for an extended emission source stretching over more than 90° of the comets surface. Other notes on the nucleus of Comet Halley and its rotation may be found in Nature (Lon.), 313,178, 1985. The release of gases from the nucleus may have an influence on the motion of the comet. A precession model previously applied to P/Encke and P/Kopff was modified to explain the observed changes in motion of P/Giacobini-Zinner. (Z.Sekanina, Astron.J., 90,827, 1985). The model in this case was of a very rapidly rotating body with an outgassing pattern virtually symmetrical with the subsolar meridian. The model of a dust and gas atmosphere of a dirty-ice nucleus, presented in 1983 (M.L. Marconi et al.) was improved upon and applied to a 3km radius comet at a heliocentric distance of 0.89 au., corresponding to the position of P/Halley during the 1986 encounter with the European GIOTTO spacecraft. (M.L. Marconi, D.A. Mendis, Astrophys.J. 287,445, 1984).

A number of radio studies of comets was reported (e.g. W.M. Irvine et al.,

Icarus, 60,215, 1984), while J. Crovisier reviews recent developments in radio spectroscopy arising through the study of IRAS-Araki-Alcock 1983d and Sugano-Saigusa-Fujikawa 1983e (Astron. J., 90,670, 1985). For the planning of observing radio sources as P/Halley and P/Giacobini-Zinner pass close to or occult them see the catalogue prepared by I. dePater et al (Astron.J. 90,846, 1985).

The observed rate of production of hydrogen cyanide, HCN, cannot account for the production of cyanogen, CN, there must be some other source, and this may be cyano-acetylene (D. Bockelee-Morvan et al, Astron. Astrophys. 141,411, 1984: T. Hasegawa et al., Icarus, 60,211, 1984). The effects of cosmic rays and included radionuclides on cometary material was studied by I.G. Draganic etal., (Icarus, 60,464, 1984), and the possibility of Deuterium enrichment in comets was discussed by Vanysek (V. Vanysek, P. Vanysek, Icarus 61,57, 1985). The lifetimes of Hydroxyl (OH and OD) under the influence of solar radiation as measured from observations and compared to calculations are generally consistent, but some modification of the relevant models are required. (A. Dishoeck, A. Dalgarno, Icarus 59, 305, 1984). Production of the species of Oxygen giving rise to the 6300 and 6364A emission lines is of minor importance in the inner coma, but becomes more dominant at larger distances from the nucleus. Analysis of these emission lines are an important means of measuring the production rate of water vapour and the spatial distribution of the parent molecules. (U.Fink, J.R. Johnson, Astron.J., 89,1565, 1984). Observations of diatomic carbon, C_2, of comets Tuttle 1980h and Meier 1980q were used in the re-determination of the rate constants for the most important photolytic reactions affecting the production and destruction of C_2. (A.L. Cochrane, Astrophys.J., 289,388, 1985). The Zeeman splitting of the 1667 and 1665 MHz transitions of the hydrozyl radical may be of use in determining the magnetic field strength of comets; comet Austin 1982VI showed an increase in magnetic field strength over that of the interplanetary medium. The nature of the solar wind flow near comets was discussed by A.A. Galeev et al., in Astrophys.J., 289,807, 1985. The physical properties of cometary dust are described in relation to the interplanetary Brownlee particles found in the upper atmosphere by N. Eaton in Vistas in Astronomy (vol 27,111, 1984).

Comet Encke 1980XI: P.D. Feldman et al (Icarus 60,455, 1984) report ultra-violet observations of the comet and discuss the Hydrozyl brightness distribution, which suggests a nonuniform distribution of volatile ices on the surface of the nucleus.

Comet P/Crommelin: W.T.S. Deich et al report an unsuccessful search for 18m Hydroxyl emission (Astron.J., 90,373, 1985) and near-Infrared photometry by T. Encrenaz et al (Astron.Ap. 140,L13, 1984) indicates the presence of micron sized silicates.

Comet Bowell 1980b: This was observed to pass within 0.25 arcsec of a star, from which a mass of 3×10^{13}g for the coma, within 10^4 km of the nucleus was deduced. A fluffy carbonaceous composition was also indicated. (S.M. Larson, Icarus 58,446, 1984).

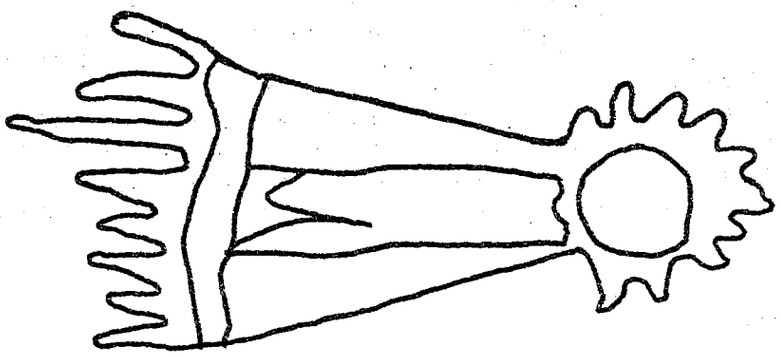
Finally, J. Bortle's "Comet Digest" in Sky & Telescope volume 69, 1985, includes notes on comets Levy-Rudenko (p578), p/Schaumasse 1984m (p88), recovery of Halley's comet (p377), 1910 apparition of Halley (p285, 473, 578). E.M. Brooks describes further observing sites for Halley's comet in Sky & Telescope vol 69, p485, 1985.

GJH 11 June 1985

Note: Regarding the Royal Astronomical Society Regional Meeting (see page 4), we regret that it was not possible to publish this Bulletin in advance of the event.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



BULLETIN NO. 25 SEPTEMBER 1986

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THE COMET SECTION AND THE FUTURE

Michael Hendrie

I am sorry that we were not able to produce a Bulletin during the Spring of 1986, but we have all been under a great deal of pressure because of the Halley's comet apparition. Those of us who did not leave the UK for a better view have not been idle. There have been exhibitions and reports, letters, queries and plans to consider. We have learnt a great deal from Halley, not only about comets but about the growing interest in our subject by professional astronomers, something that has been gathering pace over the past 30 years. They do want our observations and to know what we are thinking as plans are laid for further space and ground-based comet programmes. There are several meetings already arranged to carry the subject on beyond Halley and we can expect this interest to continue into the foreseeable future.

All this means that if we are to take an active part in this push to understand comets better, we must adapt and move with the times. Our contribution to the Halley apparition will have been very useful and appreciated, but there is no doubt that we could do more. We have tried to make available as much information about the requirements of the IHW and other groups as we can in the run-up to Halley, but there was not time to incorporate all the improvements that we would have liked. Perhaps this was as well as we have learnt from Halley and should now be in a better position to plan things for the future.

Graham Keitch has put down a few ideas about the Comet Section's Visual Programme in this Bulletin. Important developments have taken place in photography and astrometry with better instruments, more measuring facilities and a clearer idea of what we can do and what is required. We intend to improve the flow of information between observers and provide more information. If we are to contribute to the international body of information on comets, we shall have to continue to adapt to the generally agreed standards. These may not be the last word on the subject, but unless we can use the same standards our observations will not be comparable and will not be of much use. We have

been and are in a position to influence what these standards are and will be in the future, something that we cannot do if we are on the outside. As Graham has said this does lead to changes in what we have done, recommended and accepted in the past. It does not mean that this was all wasted, things do evolve and improvements are built on the work of those who have contributed so much in the past. As you will see from this Bulletin, there is a great deal happening and going to happen over the next decade or two and we intend to be involved in it. This can only be effective if the co-ordinators tell observers what is required and provide the means, then it is up to the observers. We hope to have more definite proposals before long. Meanwhile, 1987 could be a busy year for observers (see Harold Ridley's Prospects).

THE VISUAL PROGRAMME

Graham Keitch

Our visual observers have provided an impressive number of observations of Halley's comet and the processing and analysis of all this data will be given high priority. Members of the Section will have seen some preliminary reports which have appeared in the Journal which were based largely on my own observations so that members would in general receive the most up-to-date information possible about the comet's performance. We are about to tackle a proper report for the Journal and full credit will be given to all those observers who have contributed observations. We are grateful for all the fine efforts made by our members both at home and abroad during this historic apparition.

Needless to say, we have fallen behind somewhat in our reports of current comets. In the last year or so, several bright objects came into view, e.g. Hartley-Good, Thiele, P/Boethin, etc., although relatively few observations were received. We will report on these in due course, although Halley will remain our chief concern for some time yet.

The increasing number of comet observations worldwide, together with an increasing professional interest in the subject are beginning to place more pressure on the way in which we administer and co-ordinate our visual programme. The International Comet Quarterly (ICQ) for instance, expect a rapid and accurate input of data to their computer files and it is important that the Section responds quickly to these requirements. The preoccupation with Halley's comet has resulted in this subject not receiving the attention it deserves. As soon as possible, I want to streamline and improve the way in which we report and analyse our observations. It would be very desirable at this stage to build on the 'Halley experience' to establish a hard core of dedicated observers, but I am aware of increasing problems in this area. If one puts Halley work to one side, the trends are not encouraging and as Visual Co-ordinator I should be accountable for this to some degree! In order to bring our visual programme up-to-date in recent years it has been necessary to implement change and our Director has provided a healthy and progressive environment within the Section for this sometimes difficult and delicate matter to be tackled. New groups in The Netherlands, Australia, and France have sprung up in recent years and are now producing high-quality data. I have tried to establish similar standards within our Section to prepare members to meet ICQ and International Halley Watch (IHW) requirements and believe that this has been an important and necessary step, but I have no doubts that some observers have been left feeling a little disheartened at times. Visual comet work can be extremely difficult at times and the appalling conditions under which most of us operate is clearly making matters worse. The deteriorating conditions are making it even more difficult to obtain good quality data these days and I am not sure how we can minimise the problem. Our observers clearly need more encouragement in the light of these difficulties and we will be looking at the visual programme to improve communications and the throughput of data from the observer to the various outlets such as ICQ, Journal reports, etc., I would also like to provide our visual observers with a better service by making charts, and ephemerides more readily available. This has been under consideration for some time and we hope to formulate a definite plan in the near future. Meanwhile, we would welcome any ideas or offers of assistance from members.

REGINALD L WATERFIELD

Many members will already know that Dr Reggie Waterfield died at his home in Somerset last June aged 86, after a short illness. He had maintained his interest in astronomy and in comets especially until the last.

Born in 1900 he joined the BAA in 1914 and directed the Mars Section 1931-1942 and was President from 1954-1956. He took an active interest in solar eclipses making long journeys in the years between the wars to observe during the few minutes of totality. These expeditions and his time spent in the USA brought him into contact with many famous astronomers around the world. After the second world war he devoted his observing mostly to photographing comets and pioneered astrometric work by amateurs with small instruments in this field. Despite being confined to a wheelchair from 1950 he continued to observe every comet within reach, often trying the enthusiasm of those assisting him. In the 1960's he would drive from Central London down to Ascot where his observatory then was to take a plate, on the Meteorological Office's advice that there might be a few clear periods, and then back to London to develop the plate before a full day's work at Guy's Hospital, where he was a consultant.

I was fortunate enough to have the opportunity to observe with Reggie every year from 1956 until 1985 and while he was not tolerant of mistakes (especially his own), he was always cheerful and full of enthusiasm. Many visitors from around the world as well as the UK called in at Woolston Observatory, and it became known for the excellence of the results achieved as Ascot and Headley had before. Reggie Waterfield was tireless in his search for perfection. Nothing was too much trouble to align the twin 6-inch Cooke Refectors that he used on the pole, to set the focus of the camera to anticipate the change in temperature and to obtain accurate following of the comet's motion. These were sound lessons and an example to those seeking to obtain useful and beautiful pictures of comets.

He spent hours measuring, and if necessary remeasuring, his plates, using an old plate measuring machine he salvaged from an observatory spring-cleaning session that he said he purchased for 30/- (£1.50 in decimal currency). His calculations were made first with log tables and later with a Brunsviga lever-set machine. He never did use a pocket calculator, mainly because he found the keys too small to handle in his later years.

Before the publication of the SAO Catalogues it was necessary to find suitable stars in the AGK3 or elsewhere. Those of us who reduce our own plates now using convenient catalogues and microcomputers would not want to have to use the old methods now, but it was good training to have done so.

His friends and colleagues will miss visits to Woolston, where they could be sure to have their old enthusiasm for observing rekindled. A full obituary will appear in the Journal.

M J Hendrie

GLADYS E STONE

It is also sad to report that Mrs Gladys Stone died earlier this year. Although ill-health had prevented her from observing or attending meetings for several years, she was at one time a very active member of the Association, on Council and a Secretary from 1972-1976.

Her main interest was in the visual observation of comets and for many years her reports formed a substantial part of the records of the Section as a casual perusal through the bundles of forms for comets over 1950 to the 1960s shows. She used a pair of 10cm German ex-military binoculars and also a 12.5cm refractor.

She attended most meetings of the Association and was always helpful, to newcomers espeically.

M J Hendrie

THE BAA COMET SECTION KEEDY AWARD 1985

M J Hendrie

The 1985 BAA Comet Section Keedy Award went to Brian Manning for his work in obtaining precise positions of comets P/Giacobini-Zinner and P/Halley. The astrometric work done by UK amateurs was a valuable contribution to the whole International Halley Watch (IHW) program and helped accurate setting of ground-based instruments and, of course, the successful encounters by several spacecraft.

Brian Manning obtained a large number of positions that showed very small residuals, a tribute to the skill and care exercised at every stage of the process of photographing, measuring and reducing the observations. Our thanks go to David Keedy for providing this £20 prize and offering it again in 1986. He has produced a Certificate recording the award which will be sent to all recipients.

EXHIBITIONS AND MEETINGS

M J Hendrie

National Astronomy Week 1985

By all accounts NAW was a great success and enabled many people to see Halley's comet and learn something about comets. It was fortunate that the week coincided with a comparatively fine spell in the otherwise dismal apparition weather and up to 4 fine evenings occurred in some parts of the UK during November 9-16.

Royal Institution - Lecture and Exhibition

Peter Stanley saw to the BAA Comet Section exhibit at the Royal Institution Halley Lecture given by Carl Sagan in November 1985.

Royal Society Soirée and RS/RAS Meeting on Halley

We prepared exhibits for the CHUKCC Halley exhibit at the Royal Society meetings in May and June.

Annual Exhibition Meeting

The Association's Annual Exhibition Meeting held at Hawkstone Hall in May also provided an occasion for exhibiting members' Halley photographs. Thanks are due to those who exhibited and helped on the day.

ESA Comet Nucleus Sample Return Meeting

Graham Keitch attended this meeting at the University of Kent at Canterbury in July. (See his report in this Bulletin please.)

20th ESLAB Symposium on the Exploration of Halley's Comet

This meeting will be held in Heidelberg on 27-31 October 1986.

Symposium on the Diversity and Similarity of Comets

The European Space Agency and Institut d'Aeronomie Spatiale de Belgique have announced that a symposium will take place in Brussels during 1987 April 6 - 9, to consider the question: "To what extent can we apply the large amount of information gathered about Halley's comet to comets generally and other comets specifically?" There are obvious dangers in assuming that all cometary objects are very similar.

Comet Section Meeting

It is hoped to hold another Comet Section Meeting in 1987 at a venue to be arranged. The large amount of work due to the IHW and BAA programmes makes it impossible to hold one this year, priority being given to examining observers' observations and preparing a report.

Spaceworks Exhibition at the NMM

The National Maritime Museum "Spaceworks" Exhibition continues until the end of 1986.

COMET NUCLEUS SAMPLE RETURN MISSION — Graham Keitch

A workshop was organised by the European Space Agency (ESA) to determine the strategy for returning a sample of cometary nucleus material to a near-Earth environment for analysis. The international gathering of comet scientists met at the University of Kent at Canterbury for several days between 1986 July 14-17. In addition to assessing the feasibility of such a mission, various plans were formulated on the basis of the latest ground-based and in-situ observations of Comet Halley. I attended the meeting on behalf of the Comet Section as our long history of observations may well be of some value when the final target-comet selection is made. The following provides some background to the subject.

A joint ESA-NASA Comet Nucleus Sample Return (CNSR) Science Definition Team was appointed in 1985 September to identify and prioritize the scientific objectives of such a mission. Both ESA and NASA consider that a CNSR mission will have high scientific merit as it will result in the sampling and analysis of relatively unprocessed primitive Solar System material. The refractory components and condensed volatiles present within the nucleus would have resulted from aggregates of interstellar grains and sample analysis should provide data on the solar nebula environment during the period of disc acretion. Our understanding of the Oort Cloud and the evolutionary processes at work within the Solar System and the Galaxy itself should receive considerable input from such a mission.

Cometary volatiles provide direct evidence for the fact that the nucleus has been preserved at relatively low temperatures although most known comets within reach will have made numerous approaches to the inner Solar System. Consequently, we cannot expect them to have been completely unprocessed and in any event some alteration will almost certainly have resulted from impacts and cosmic-ray bombardment. Even so, it should be possible to determine the fundamental properties of the material. A rendezvous with a new active fresh comet at a considerable distance would be most desirable although the target-comet will have to be drawn from the existing set of know periodic objects. A recently captured object with a fairly large perihelion distance would be a suitable candidate. Of particular importance will be a precise knowledge of the orbit. On board radar and imaging facilities will be necessary to refine the orbital data and, at a later stage, to facilitate the selection and documentation of suitable sample sites.

Several core samples from various depths will be collected and much discussion took place at the workshop regarding the likely surface conditions which will be encountered. The Halley results show the existence of dark non-volatile surface crust although the exact nature of this is not entirely certain at this stage. Furthermore, the interior properties of the nucleus, and in particular the temperature at various depths, is also uncertain although we can expect to encounter more or less prestine material at depths of around 3 metres or more where the temperature should be below 180°K.

Various tactics for retrieving the sample were considered and most involved the despatch of a drill mechanism on a tow-rope from a mother craft some 500-1000 metres above the nucleus surface. It would not be possible to land on the nucleus on account of the negligible gravity and any attempts to anchor the craft to the surface would result in contamination of the sample and its immediate environment. The drilling process itself could present a problem, especially as it is not known whether a solid rocky or fluffy material will be encountered. The ice too could be solid and compact or it may be more akin to fine snow. Sample analysis will be conducted in a near-Earth environment although it may be possible to return the samples to Earth if they can be adequately protected during re-entry.

Scientists may well opt for an aphelion encounter to reduce the risk of damage to the craft by impact and this would present special difficulties for the simultaneous ground-based coverage. The mission will not take place until

the end of the century by which time our optical capabilities may well have improved to cope with the situation. We will provide more information about the project in either the Bulletin or the Journal in due course as this subject will be an important feature of comet astronomy over the next couple of decades.

DESIGNATIONS OF COMETS RECOVERED AND DISCOVERED (continued) 1985-1986

1985m	Thiele	discovery/recovery magnitude	12
1985n	P/Boethin		15
1985o	P/Kojima		20
1985p	P/Ciffreo		11
1985q	P/Wirtanen		19
1986a	P/Shoemaker (3)		13
1986b	Shoemaker		16
1986c	P/Hartley (2)		18
1986d	P/Singer Brewster		15
1986e	P/Machholz		11
1986f	P/Holmes		18
1986g	P/Forbes		19
1986h	P/Schwassmann-Wachmann (2)		20
1986i	Churyumov-Solodovnikov		13
1986j	P/Comas-Sola		20
1986k	P/Kohoutek		19
1986l	Wilson		12

NOTES ON RECENT COMETS

Now that we have notes in the Journal each issue reporting the activities of the various Sections and the objects they study, the Comet Section includes in Comet News a brief report of the discovery or recovery circumstances of each comet, it is no longer necessary to include these references to IAU Circulars in the Bulletin. We are continuing to have the Notes by Stan Milbourn which give the orbital elements and other information written in retrospect.

HALLEY'S COMET

We have published preliminary results of our members' Halley observations in several numbers of the Journal and a complete Section Report on Halley will appear in the Journal next year. Work on analysing the large numbers of observations received will start very soon, but it is expected to take several months. We do not propose to delay this process by writing another preliminary report here. We hope that observers' contributions have been acknowledged, but due to the large number of communications over the past year, it may be that some have not been, for which we apologise.

Gerald Hodgkinson refers to several publications giving Halley results, and there will be something on the Giotto results in the October Journal.

Halley's Comet should become observable again in November to some photographers and those with the larger visual instruments, and we appeal for further observations, extending for as long as possible.

Of course any observations not yet sent in should be sent without delay.

M J Hendrie

COMET WILSON 1986l

This comet was discovered by Christine Wilson on plates taken with the 1.2m Schmidt at Palomar on 1986 August 5.33. It was announced as being of $7.^{m}5$ but pre-discovery plates taken the previous day and plates taken over the next

few days showed it to be nearer 12^m, and early visual searches were unsuccessful. Described as diffuse with condensation and an apparent tail to the south-east in the discovery announcement (IAUC 4241), it appeared both visually and on photographs taken with smaller instruments to be very strongly condensed DC 7 - 8 and of small angular diameter, 25"/30".

Graham Keitch records a slow brightening from $11.^m8$ to $11.^m4$ during the second half of August and the first 10 days of September and visually it has remained smaller than one arcminute across and strongly condensed.

Photographs have been taken by several members, those that have reached me so far include Harold Ridley's 40 minute exposures with the 17cm aperture f/7 triplet on 1986 August 14.9 and 28.9, Brian Manning's two exposures on August 14.9 with his 25cm f/7 reflector, 10 minutes on hypered K2415, Martin Mobberley's exposures with his 35cm f/5 reflector on September 4.9 and 6.9 and my own with the 25cm f/7 reflector on September 3.9 and 7.9. Several of these are being measured for positions, but all show a small image around 30" across and strongly condensed. Traces of a tail appear on some but may not be real.

Comet Wilson will not come to perihelion until 1987 April 22.59 ET (orbit from IAUC 4243), at a perihelion distance of 1.22 AU. In early September the comet is still over 3 AU from the Sun and being near opposition, over 2 AU from the Earth. A value for m_o of about 4 represents the current magnitude trend, and if this continues into next year the comet could become a bright naked eye object in April and May but will be in high southern declination. However, it does provide an opportunity to observe an object over quite a long arc and for more than a year it should be within the reach of modest instruments, so members are strongly advised to give it some attention whenever possible.

1977 DV3 = PERIODIC COMET SKIFF-KOSAI (1976 XVI)

IAUC 4250 announces the discovery of a comet by B A Skiff on plates taken by C Kowal during the course of the UK - Caltech Asteroid Survey extension in 1977. The plate was taken with the 1.2m Palomar Schmidt. B G Marsden has identified this comet with an asteroidal object discovered by H Kosai and designated 1977 DV3. The cometary nature of the object has been confirmed by Kosai also on other plates taken in 1977, some showing traces of cometary coma. The period of this new periodic comet is 7.55 years with an uncertainty of about a week. It is of low inclination (3.°2) and q = 2.8 AU, the orbit being of low eccentricity (0.258).

M J Hendrie

1986 September 14

PROSPECTS - AND RETROSPECTS - for 1986

Owing to the non-appearance of the Bulletin earlier this year - caused by our preoccupation with P/Halley - my "Prospects for 1986" article, though compiled as usual, never saw the light of day. I did send copies to a few of our regular observers, but at the time it had not been decided to give the Bulletin a miss, and I apologise to any members who may have been deprived of some possibly useful information. All the comets dealt with in that article have either gone out of range or not been recovered and there is no point in publishing it now. Nor will I say anything about P/Halley, as members will presumably have seen the preliminary reports in the August issue of the Journal.

Two of the comets of 1986 surprised us by being brighter than expected: P/Boethin and P/Wirtanen. This emphasises the importance of looking for comets even though the predicted magnitudes may be quite discouraging. These predictions are based on reports from previous apparitions, taking the circumstances of the forthcoming return into consideration, and may be in error either because the previously reported magnitudes were not accurate or because the comet itself is not behaving normally.

Although there is no reason to expect P/Holmes, 1986f, to be unusually bright, it might be as well to take an occasional look at the ephemeris position, as the comet was experiencing a massive outburst when originally discovered, and may well repeat the process one of these days.

We are going to be busy in 1987 - weather permitting, which it rarely does. No less than 22 short-period comets are known to be at perihelion in 1987 - a list of these is appended. Notes on each one will appear in the next Bulletin, which hopefully will be published early in the year. Add to the 22 known comets a few discoveries, and Comet Wilson, 1986l, and there will probably be at least thirty comets under observation during the year, though not all of them will be bright enough for our instruments. However, there will be a particular need for amateur astrometric work, as the professionals will not be able to cover all the objects adequately, and will be in a state of post-Halley catharsis anyway.

Now is the time to refurbish one's equipment, and to think of improved techniques, perhaps in the light of experience (not always happy) gained with P/Halley. Those with suitable instruments are reminded that that famous (or infamous) object is available in the morning sky during the autumn months.

H B Ridley

1986, Aug 19

SHORT-PERIOD COMETS AT PERIHELION IN 1987

P/Comet	Last obs. Perm.	Return Prov.		T 1987	P yrs	q a.u.	N	Discovery apparition
Forbes (1986g)	1980 VI	1980a	Jan	2.5	6.26	1.47	6	1929 II
Neujmin 2	1927 I	1926g	Apr	2.4	5.39	1.27	2	1916 II
Howell	1981 X	1981k	Apr	12	5.94	1.62	1	1981 X
Jackson-Neujmin	1978 XXVI	1978q	May	24.5	8.42	1.44	3	1936 IV
duToit-Hartley	1982 II	1982b/c	Jun	14.3	5.22	1.20	2	1945 II
Grigg-Skjellerup	1982 IV	1982a	Jun	20.1	5.10	0.99	15	1808 III
Russell 2	1980 III	1980o	Jul	4.6	7.10	2.15	1	1980 III
Encke	1984	-	Jul	17.4	3.29	0.33	53	1786 I
Klemola	1976 X	1976j	Jul	22.6	10.9	1.77	2	1965 VI
West-Kohoutek-Ikemura	1981 VIII	1980r	Jul	27.5	6.40	1.57	2	1975 IV
Denning-Fujikawa	1978 XIX	1978n	Aug	5.1	8.85	0.76	2	1881 V
Gehrels 1	1973 I	1972k	Aug	13.6	15.1	2.99	1	1973 I
Comas Sola (1986j)	1978 XVII	1977n	Aug	18.8	8.78	1.83	7	1927 III
Schwassmann-Wachmann 2(1986h)	1981-VI	1979k	Aug	30.6	6.39	2.07	9	1929 I
Wild 3	1980 VII	1980d	Aug	31.7	6.90	2.29	1	1980 VII
Brooks 2	1980 IX	1980f	Oct	16.8	6.89	1.84	12	1889 V
Reinmuth 2	1981 III	1980n	Oct	25.7	6.72	1.94	6	1947 VII
Kohoutek (1986k)	1981 IX	1980j	Oct	29.8	6.65	1.78	2	1975 III
Harrington	1980 XIV	1980m	Oct	31.0	6.84	1.60	3	1953 VI
de Vico - Swift	1965 VII	1965e	Dec	7.1	7.40	2.18	3	1844 I
Bus	1981 XI	1981b	Dec	11.6	6.52	2.19	1	1981 XI
Borelly	1981 IV	1980i	Dec	18.3	6.86	1.36	10	1905 II

LONG-PERIOD COMET AT PERIHELION IN 1987

Wilson (1986l)			Apr	22.6	-	1.22	-	-

N = Number of previously observed apparitions

NOTES FROM OTHER JOURNALS

Gerald J Hodgkinson

Halley's comet: some of the earliest observations come from Babylonian clay tablets (F R Stephenson, et al.; Nature, 314, 587, 1985; F R Stephenson, Endeavour, New Ser. 10,2,1986); the latter article also gives notes on other astronomical phenomena recorded on the tablets as well as comments on the 164 BC apparition. Some idea of the spectacular, or otherwise, nature of past apparitions can be judged by relating the position of the Earth to the comet at perihelion passage (D Hughes, Quart. Journal R A S, 26,513,1985). The apparitions fall into five types, an extension of the grouping proposed by Bortle and Morris (Sky & Telesc., 67,9,1984).

There seems to have been no shortage of new books on either Halley or the comet, for lists see Sky & Telesc. 70,129,1985; 71,256,1986; Nature, 318,132, 1985. For hints on observation techniques see Sky & Telesc., 70,pp20,459, 1985; Scientific Amer., 253(5),148,1985; and for notes during the apparition see Sky & Telesc., 70,pp124,221,325,428, and 549,1985; ibid., 71,pp27,150,233, 455, and 558,1986; while for collections of photographs see in addition Sky & Telesc., 71,pp23,113,319,423, and 559,1986.

The preliminary results of the Russian, Japanese, and European spacecraft encounters with Comet Halley were reported in an extended issue of Nature, with a summary as the leading article (Nature,321,259-366,1986). Other summaries can be found in Nature (320,pp97,202, and 391), and in Science (232,pp320,1343, 1986). A pre-encounter review of the value of such encounters to cometary research was given in Science (M J S Belton, Science, 230,1229,1985). Results of the ICE encounter with Comet Giacobini-Zinner were published in detail in Science (232,p353,1986), while summaries can be found in Nature (317,381,1985), and Sky & Telesc. (70,pp198,223, and 426,1985).

Comet P/Arend-Riqaux: Infrared observations indicate a low albedo, 5%, and an average diameter of 9.6km for the necleus (A T Tokunaga, M S Hanner, Astrophys. J.Lett.,296,13,1985), and CCD photometry revealed variations in brightness of the inner coma with periods of 9.6 and 6.8 hrs (D Jewitt, K J Meech, Icarus,64,329,1985).

Comet IRAS-Araki-Alcock: infrared observations of the central core in May 1983, are reported as evidence for a nucleus of diameter about 10km (M S Hanner, et al., Icarus, 62,97,1985), while radio observations indicated a large halo of large particles, with little, if any, evidence for icy grains (C M Walmsley, Astron. Astrophys., 142,437,1985).

Precessing nuclei: a model of precessing spherical nuclei with directed gas emission was successful in fitting the perturbations in the motion of 5 periodic comets; the model appears to work for relatively small, gradual non-gravitational effects, as well as for more vigorous ones. (Z Sekanina, Astron. J., 90,2335,1370,1985; and references therein). The comets so far studied are: Encke, Kopff, Giacobini-Zinner, Comas Sola, and Brooks 2.

Reviews: in addition to article on Halley, mention can be made of reviews on the physics of comets, (D A Mendis, et al., Fundam. Cosmic Physics, 10,1-380,1985), the structure of comet tails (J C Brandt, M B Niedner, Jr., Scientific Amer., 254,39,Jan.1986), and the story of the discovery of comet Macholz (Sky & Telesc. 70,265,1985).

Other aspects: analysis of data acquired by IRAS has given evidence for the existence of dust trails in the orbits of comets Tempel 2, Encke, and Gunn, and tentatively identified trails in the orbits of Tempel 1, Kopff, and Shoemaker 2. Dust was found both ahead and behind the orbital positions of these comets, indicating ejection of large particles during successive perihelion passages. The trails provide a link between meteor streams and comet nuclei; through the different perturbations that they would experience, the dust particles may form a significantly different orbit and form a meteor stream. (M V Sykes, et al., Science,232,1115,1986). There is the suggestion that cometary dust may already be at hand; electron microscopic examination of micrometeorites, collected at altidues of about 20km, have revealed a number of highly porous, fragile particles, characteristics expected of debris from cometary meteors (J P Bradley, D E Brownlee, Science,231,1542,1986).

Further observational notes can be obtained from J E Bortle's 'Comet Digest' in Sky & Telescope: vol 69,pp473,578,1985; 70,pp93,188,292,395,509, and 629, 1985; 71,ppl14,221,323,426, and 527,1986. Most of them refer to comet Halley.

BOOK REVIEWS

The Mystery of Comets, by Fred L Whipple

Cambridge University Press, Cambridge, 1985. pp276, £12.95 hardback

Fred Whipple is the doyen of comet and meteor astronomers. Having been a meteor man myself, and latterly taking an interest in comets, Whipple's name has haunted me throughout my astronomical life; the first comet I searched for (and did not find) was Whipple's comet of 1933. It is good now to have a book from the pen of such an authority; not a flimsy effort aimed at the ephemeral Halley market, but a serious account of the whole fascinating field of cometary science.

The style is breezy, almost colloquial at times, but the easy-going phraseology cannot hide the author's profound understanding of what he writes about; by clear and unpretentious exposition he is is just making it easier for lesser minds to think that they understand it too. Mistakes there are (a list is given below of those that I spotted, but there may be others that I did not notice), but the general level is as high as one would expect.

It was courageous in a way for Whipple to publish his book just before the major results of the P/Halley apparition were available - he could have been proven wrong in so many ways. Perhaps the most surprising thing about all the data collected from P/Halley by so many different means, however, has been the lack of surprises. The fact is that practically all our previous ideas about comets were substantially correct, which is not say that we no longer have a great deal to learn about them. The principal value of the new observations has been to tighten up the numerical restraints on model-making, and, of course, the final direct proof that a comet does have a solid nucleus. It cannot be said, though, that Whipple's book is in any way out of date because he did not wait a bit longer to publish it.

The book is well-produced and fully illustrated, with almost as many pictures of people as of comets, the former often being more interesting than the latter. There are plenty of clear diagrams, a useful bibliography and an adequate index. All the usual aspects of comets are discussed, and in addition there is an appropriately sceptical treatment of the diseases-from-comets theory.

Altogether this is a useful addition to the bibliography of comets, and can be read with pleasure and profit whatever the state of one's knowledge of the subject.

The following errors were noted:

p3, line 1, for 'Zodiac' read 'ecliptic'
p70, the impression is given that IRAS was an exclusively NASA project
p96, line 4, for 'recurs' read 'occurred'
p98, last line, for 1772 read 1741
p99, line 3, for 1882 read 1872
Second page of colour illustrations following p148, for 'Left' read 'lower right', and vice versa
p252, line 9, for 50km read 500km
p259, para 2, line 4, for 1932 and 1936, read 1933 and 1946

It looks as though Fred is getting a little careless about dates.

H B Ridley

Catalogue of Cometary Orbits (1986 fifth Edition)

The latest Catalogue of Cometary Orbits by Brian G Marsden was published earlier this year and contains data on 1187 cometary apparitions, complete for comets observed up to the end of 1985 December. The 100 pages are mostly tables of elements and references to sources listed in various convenient ways.

This invaluable reference can be obtained direct from the Minor Planet Center, Smithsonian Astrophysical Observatory, 60 Garden Street, Cambridge, MA 02138, U S A. The price including postage is $12.00 with a 50% reduction in price to subscribers to either the Minor Planet Circulars or the IAU Circulars.

M J Hendrie

COMETS IN 1984

S W Milbourn

1984a=1983 XIX. Bradfield

On 1984 Jan 7.73 U.T. W A Bradfield (Dernancourt, near Adelaide) discovered his twelfth comet describing it as diffuse with no condensation or tail, magnitude 11. A plate exposed by M P Candy and J Johnston at Perth Observatory, Bickley on Jan 9.82 U.T. showed condensation and the comet to be of magnitude 13. Nothing further was reported about the physical appearance but the comet was observed until the end of May and the following long-period elliptical elements are by Dr B G Marsden using 32 observations 1984 Jan 9 - May 30 with a mean residual of 1.3 arcsec (MPC 9025):

T	1983 Dec 27.79249 E.T.	Epoch	1983 Dec 12.0 E.T.
Peri	219°.16071 :	e	0.9522136
Node	356.15972 :-1950.0	a	28.4067395 AU
Inc	51.79438 :	n	0°.00650987
q	1.3574554 AU	P	151.4 yrs

1984b. Clark

Cometary images found by M Clark on Harvard Patrol plates exposed on 1984 Jan 8.49 U.T and Jan 24.49 U.T were announced as a discovery but later exposures failed to confirm the existence of the object and it was evident that the images were spurious.

1984c=1984 XIX. P/Neujmin 1

Recovered by A C Gilmore and P M Kilmartin, Mount John Observatory on 1984 Feb 26.64 U.T. The comet was of stellar appearance, magnitude 18 and was close to the prediction in the Handbook 1984 (correction to T being +0d.01). C S Morris reported visual observations of the comet on Aug 25 (mag. 13.5), Aug 31 (mag 13.5) and Sept 23 (mag. 13.2). Discovered in 1913, this was the 5th recorded appearance.

1984d=1984 I. P/Russell 4

Discovered by K S Russell, U K Schmidt Telescope Unit on an exposure obtained by M Hawkins on 1984 Mar 7.73 U.T. The comet was also located on prism plates exposed on Mar 2 and Mar 4. Of magnitude 13, the comet had a short tail some 5' long. On Mar 12.36 U T G Schwartz using the 0.40-m astrograph at Oak Ridge Observatory gave the magnitude as 14 and no visual observations appear to have been made. It became clear that the orbit was of short period and the following elliptical elements based on 39 observations 1984 Mar 2 - May 7 with a mean residual of 1.2 arcsec are by S Nakano (MPC 9304):

T	1984 Jan 5.96790 E.T.	Epoch	1984 Jan 21.0 E.T.
Peri	91°.25187 :	e	0.3832412
Node	71.88801 :-1950.0	a	3.4454464 AU
Inc	6.24759 :	n	0°.15411177
q	2.1250093 AU	P	6.40 yrs

1984e. P/Giacobini-Zinner

Recovered by S Djorgovski et al on TI-CCD exposures obtained with the 4-m reflector at Kitt Peak National Observatory on 1984 Apr 3.41 - 3.42 U.T. The comet was essentially of stellar appearance, magnitude 23. Subsequently

images were found on CCD exposures obtained on Jan 28 (European Southern Observatory) and Mar 29 (Kitt Peak National Observatory). The recovery positions were in close agreement with the prediction in the Handbook 1985.

During 1985 the comet became bright enough to be widely observed visually and reported magnitudes ranged from 13.4 in May, peaking at around 7 in late August and fading to 12 by the end of November. A tail was frequently reported during July and August extending to over a degree towards the end of the latter month. Originally discovered in 1900, the comet was making its 11th observed appearance.

1984f, Shoemaker

Discovered by Carolyn and Eugene Shoemaker on 1984 May 27.39 U.T. using the 0.46-m Schmidt telescope at Palomar. Of magnitude 14, the comet was described as diffuse and moderately condensed with fanshaped coma structure to the north. During the first half of 1985, C S Morris reported visual observations of the comet (magnitude 13.0 on Jan 18 and 20, 11.0 on Apr 13 and 10.9 on May 18). On the latter date a broad fanshaped tail 10' long centred on p.a. 225° was seen. The latest elements to date are by T Kobayashi and based on 62 observations 1984 May 27 - 1985 Jun 19 with a mean residual of 1.3 arcsec (OAA Computing Section Circular NK 490-4):

T	1985 Sept 4.60005 E.T.	Epoch	1985 Sep 12.0 E.T.
Peri	235°.46452 :	e	1.0006794
Node	48.98520 :-1950.0		
Inc	116.66105 :	q	2.6964265 AU

1984q=1984 XVII. P/Wolf-Harrington

Recovered by J Gibson on 1984 Jun 4.46 U.T. using the 1.2-m Schmidt telescope at Palomar. The magnitude was 17 and CCD exposures with the 1.52-m reflector on Jun 8 showed a gas tail 50 arcsec long in p.a. 270°. Visual observations were made by C S Morris on Aug 28, Oct 2 and Dec 2 when the estimated magnitudes were 12.8, 13.3 and 13.2 respectively. The recovery positions indicated a correction to T of -0d.3 for the prediction in the Handbook 1984. Originally discovered by Wolf in 1924 and rediscovered by Harrington in 1951, the comet was making its 7th recorded appearance.

1984h=1984 XI. P/Faye

Recovered by J Gibson on 1984 Jun 10.48 U.T. using the 1.52-m reflector at Palomar and independently visually by C S Morris on Jun 23.44 U.T. using his 0.25-m reflector. Morris reported a coma diameter of about 1' arc and described the comet as diffuse with slight condensation, magnitude 12.5 A further visual observation by Morris on Aug 30 yielded a similar magnitude. Prediscovery images were later found on plates exposed with the 1.2-m Schmidt at Palomar on 1983 Aug 31. This was the 18th recorded appearance since the discovery of the comet in 1843 and the prediction in the Handbook 1983 required a correction of -0d.5 to T.

1984i=1984 XIII. Austin

Discovered by Rodney R D Austin (New Plymouth, New Zealand) on 1984 Jul 8.73 U.T. Of magnitude 8, the comet was diffuse with condensation. Visual magnitudes with binoculars were nearer 6.5 and although the comet was approaching conjunction with the Sun, reported magnitudes were close to 5 with a tail length of up to 3 degrees by early August when it was lost in bright twilight. By the end of August the comet was again under observation with the magnitude close to 6 and a tail length of 1 to 2 degrees. By the end of the month and during September, a prominent anti-tail was widely observed whilst the magnitude slowly dropped to 8. The comet continued to fade and was down to 12th magnitude by the end of November.

Using 53 observations 1984 July 8 - November 27, Dr B G Marsden has calculated the following near-parabolic elements with a mean residual of 1.2 arcsec (MPC 9425):

T	1984 Aug 12.13713 E.T.	Epoch	1984 Aug 8.0 E.T.
Peri	353°.12701 :	e	0.9998462
Node	170.87724 :-1950.0		
Inc	164.15979 :	q	0.2912839 AU

1984j=1984 VII. P/Takamizawa

Discovered by -. Takamizawa on 1984 July 30.53 U.T. who described it as a magnitude 10 object with a coma diameter of 2'. On Aug 1, C S Morris using his 0.25-m reflector estimated the magnitude as 9.5 and noted the coma to be very strongly condensed (diameter 1' - 2') and a tail 4' - 5' long to the west. The comet was past perihelion and faded to 12th magnitude by the end of September. Prediscovery images were found on exposures by P Wild (Zimmerwald) on July 6 and 8 and by T Seki (Geisei) on July 26.

The comet was another new short-period object and the following elliptical elements by Dr B G Marsden are based on 81 observations 1984 July 6 - Oct 27 with a mean residual of 1.2 arcsec (MPC 9211):

T	1984 May 24.94826 E.T.	Epoch	1984 May 20.0 E.T.
Peri	147°.53539 :	e	0.5740479
Node	124.22868 :-1950.0	a	3.7435047 AU
Inc	9.47039 :	n	0°.13607756
q	1.5945537 AU	P	7.24 yrs

1984k=1984 XXI. P/Arend-Rigaux

Recovered by J Gibson using the 1.2-m Schmidt telescope at Palomar on 1984 Aug 7.44 U.T. also independently by T Seki (Geisei) on Aug 8.77 U.T. and by E Everhart (Chamberlin Observatory field station) on Aug 9.42 U.T. Of Stellar appearance, magnitude 18.5, the recovery positions were in exact agreement with the prediction in the Handbook 1984. A number of observers reported visual observations of the comet between 1984 November and 1985 January, the magnitudes being in the range 11.8 - 12.5. IAUC 4041 contained the following report - W Wisniewski University of Arizona and T Fay, McDonnell Douglas Astronautics Corporation, report that they monitored this comet with the 1.5-m reflector at the Catalina Station during a total of eight nights (1985 Jan 17-21, Feb 15-17). The range of variability was 0.6 mag, and the observations are best represented by a rotation period of 27h 12m for the comet. Since the 12' diaphragm included a significant contribution from the coma, the amplitude of true variability must be considerably larger.

Originally discovered in 1951, the comet was making its 6th appearance.

1984l. P/Gehrels (3)

Recovered by J Gibson on 1984 Aug 7.47 U.T. using the Palomar 1.2-m Schmidt telescope. Of stellar appearance, the comet was a 20th magnitude object.

Making its first return since discovery in 1975, the prediction in the Handbook 1984 required a correction of +0d.21 to T and using the positions at the current return linked with those of the previous apparition, Dr B G Marsden has calculated the following improved elements (IAUC 3977):

T	1985 June 3.3883 E.T.	Epoch	1985 May 15.0 E.T.
Peri	231°.3037 :	e	0.149292
Node	242.4493 :-1950.0	a	4.046316 AU
Inc	1.0998 :	n	0°.1210917
q	3.442235 AU	P	8.139 yrs

1984m=1984 XXII. P/Schaumasse

Recovered by J Gibson on 1984 Sept 5.49 U.T. using the 1.2-m Schmidt telescope at Palomar, the comet being of magnitude 19. By October, the comet was under visual observation at mag 12.5 brightening to mag. 9.5 by early December and later fading to 11.5 by the end of January 1985. No prediction appeared in the Handbook, but a new computation by Dr B G Marsden yielded the following elements (IAUC 3987):

T	1984 Dec 6.482 E.T.	Epoch	1984 Dec 6.0 E.T.
Peri	57°.368 :	e	0.70324
Node	80.423 :-1950.0	a	4.08635 AU
Inc	11.840 :	n	0°.119317
q	1.21265 AU	P	8.26 yrs

1984n=1984 X. P/Kowal-Mrkos

Discovered by C T Kowal, California Institute of Technology, on plates exposed using the 1.2-m Schmidt telescope at Palomar on 1984 April 23 and 30. Of magnitude 15, the comet was described as almost stellar but with a faint but definite coma. An object discovered by A Mrkos on 1985 May 2 and given the designation 1984 JD is clearly identical with this comet. Further observations were obtained by Mrkos on May 19 and the following elliptical elements by Dr B G Marsden are from the 8 available positions (MPC 9211):

T	1984 June 7.63072 E.T.		
Peri	338°.10458 :	e	0.4825564
Node	248.49965 :-1950.0	a	3.7706050 AU
Inc	2.95678 :	n	0°.13461316
q	1.9510755 AU	P	7.32 yrs

1984o=1984 XX. Meier

The fourth comet discovery by Rolf Meier (Ottawa) came on 1984 Sept 18.035 U.T. when using his 0.4-m reflector he found a 12th magnitude diffuse object with condensation on the border of Bootes and Serpens Caput. Other visual observations obtained during the week after discovery ranged from 11.3 to 11.7. The comet was moving rapidly towards conjunction with the Sun and only six precise positions were obtained. Using these, Dr B G Marsden supplies the following parabolic elements (MPC 9212):

T	1984 Oct 13.94862 E.T.	Peri	128°.00498
		Node	11.00923 :-1950.0
q	0.8568559 AU	Inc	145.60832 :

1984p. P/Tsuchinshan (1)

Recovered by T Seki (Geisei, 0.6-m reflector) on 1984 Sept 4.76 U.T. and by J Gibson (Palmomar, 1.2-m Schmidt) on 1984 Sept 5.50 U.T. The comet was very faint at magnitude 20.5 and the recovery positions were in close agreement with the prediction in the Handbook 1984. A number of visual observations were obtained during this return ranging from 11.2 at the end of Dec 1984 to 10.7 in January 1985, fading to 11.8 late in March. Discovered in 1965 the comet was making its 4th appearance.

1984q=1984 XVI. P/Shoemaker (1)

Discovered by C S and E M Shoemaker on 0.46-m Schmidt telescope films exposed at Palomar on 1984 Sept 27.23 U.T. and Sept 28.29 U.T. The comet was condensed with a considerable coma, magnitude 13. A number of visual observations were reported during October and November, the magnitudes generally being in the range 11.5 - 12.0 although J Bortle recorded 11.0 and 11.1 on Oct 16 and 17.

Using 65 observations 1984 Sept 27 - Dec 26, Dr B G Marsden has computed the following elliptical elements with a mean residual of 1.3 arcsec (MPC 9425):

T	1984 Sept 16.62934 E.T.	Epoch	1984 Sept 17.0 E.T.
Peri	18°.67652 :	e	0.4714933
Node	339.31109 :-1950.0	a	3.7404408 AU
Inc	26.27180 :	n	0°.13624479
q	1.9768480 AU	P	7.23 yrs

1984r=1984 XV. Shoemaker

Discovered on 1984 Oct 23.46 U.T. by C S and E M Shoemaker using the 0.46-m Schmidt telescope at Palomar. The comet was diffuse with only weak condensation and no tail, magnitude 16. Although observations in 1984 continued only until Nov 16, the comet was reobserved at opposition in Sept 1985 by T Gehrels using the University of Arizona's 0.91-m reflector at Kitt Peak and the following near-parabolic elements by Dr B G Marsden are from 30 observations 1984 Oct 23 - 1985 Sept 21, mean residual 1.0 arcsec (MPC 10156):

T	1984 Sept 3.67614 E.T.	Epoch	1984 Sept 17.0 E.T.
Peri	183°.27444 :	e	0.9947935
Node	238.03285 :-1950.0		
Inc	179.21549 :	q	5.4891450 AU

1984s. Shoemaker

Another discovery by C S and E M Shoemaker using the 0.46-m Schmidt telescope at Palomar came on 1984 Oct 25.38 U.T. when plates showed a diffuse magnitude 12 object with strong condensation but no tail. Although moving towards the Earth and to perihelion, the comet did not become much brighter and the maximum magnitude attained appears to have been about 11 in late November. On three nights in mid-November, R H McNaught, Coonabarabran, NSW reported a possible short tail.

T Kobayashi has calculated the following near-parabolic elements from 113 observations 1984 Oct 25 - 1985 May 22 with a mean residual of 1.35 arcsec (OAA Computing Section Circular NK 490-3):

T	1985 Jan 3.88776 E.T.	Epoch	1985 Jan 15.0 E.T.
Peri	229°.23378 :	e	0.9709038
Node	222.75699 :-1950.0		
Inc	13.88561 :	q	1.2145115 AU

1984t=1984 XXIII. Levy-Rudenko

Independent discoveries were made by D Levy (Tucson, AZ - 0.4-m reflector) on 1984 Nov 14.12 U.T. and M Rudenko (Amherst, MA - 0.15-m refractor) on 1984 Nov 15.05 U.T. Early magnitude estimates were discordant, the mean being about 9.9 and the physical descriptions varied from very diffuse to extremely condensed. On Nov 15, J Gibson using the 1.2-m Schmidt at Palomar noted a 10'' jet extending eastward of stellar condensation. The comet brightened slowly and became an 8th magnitude object by early January 1985, later fading to 10.5 by mid-March.

Dr B G Marsden, using 93 observations 1984 Nov 14 - 1985 April 13 has computed the following near-parabolic elements, with a mean residual 1.3 arcsec (MPC 9685):

T	1984 Dec 14.25572 E.T.	Epoch	1984 Dec 6.0 E.T.
Peri	82°.74014 :	e	0.9992548
Node	330.46743 :-1950.0		
Inc	65.70944 :	q	0.9179539 AU

1984u=1984 XVIII. P/Shoemaker (2)

Discovered by C S and E M Shoemaker (their 5th of the year) on 1984 Nov 21.33 U.T. using the 0.46-m Schmidt telescope at Palomar. The comet, of magnitude 14.5, was diffuse with strong condensation and a hint of a short tail to the northeast. Prediscovery images were later found on plates taken by B A Skiff at the Lowell Observatory on Nov 18. The comet was too faint for visual observation and the latest set of elements to hand are by Dr B G Marsden and based on 9 observations 1984 Nov 18 - Dec 20 (MPC 9351):

T	1984 Sept 26.68508 E.T.		
Peri	317°.56221 :	e	0.6658448
Node	54.81828 :-1950.0	a	3.9491485 AU
Inc	21.56659 :	n	0°.12558821
q	1.3196287 AU	P	7.85 yrs

1984v. Hartley

Discovered by M Hartley, U K Schmidt Telescope Unit, on 1984 Nov 17.62 U.T. using the 1.2-m Schmidt telescope at Siding Spring. The trailed image had a faint halo around it, magnitude about 15.5. No further reports about the physical appearance are to hand. Not due at perihelion until 1985 Sept, the comet was extensively observed at Perth Observatory, Bickley from 1985 Oct to 1986 Feb (continuing?) but the latest set of elements to hand are by Dr B G Marsden and based on 18 observations 1984 Nov 17 - 1985 Oct 18 with a mean residual of 1.0 arcsec (MPC 10298):

T	1985 Sept 28.38043 E.T.	Epoch	1985 Sept 12.0 E.T.
Peri	255°.27494 :	e	0.9995170
Node	249.50980 :-1950.0		
Inc	89.32897 :	q	4.0001689 AU

P/Encke

Encke's comet was a perihelion on 1984 March 27 and numerous visual observations were made at this return. Reported magnitudes were very consistent and from 11.7 on Jan 28, the comet brightened to reach 7th magnitude just before perihelion. On March 20, C S Morris using 20x80mm binoculars noted a tail 70' long in p.a. 53°. After perihelion, D Seargent, The Entrance, NSW estimated the magnitude as 7.4 on April 11, 8.1 on April 14 and 8.5 on April 17. The last two observations were made under conditions of light sky and moonlight.

DATA PROTECTION ACT 1984 — M J Hendrie

The effects of this Act have been considered by the Association and we do not need to register provided that we give members the opportunity to object to having personal information held on a computer. There is no problem with the same information held on a card index. In the Comet Section I keep a card index of members' names, addresses, telephone numbers and what instruments they have, atlases, membership of local societies, special interests in astronomy and when joined the BAA and Section. I find that it is easier to maintain this essential information on cards as my computer often has other jobs on it and in any case, being still in the tape file era, loading lists of members is not worthwhile for a few entries.

However, the other Comet Section Co-ordinators also require members' names and addresses so it has been easier to keep a computer file updated and printed out once or twice a year so that a strictly limited number of copies can be run-off cheaply and easily for them. This listing gives, name, address, telephone number, note on main interest, joined BAA etc, Comet observing interests, visual, photographic, etc., telescopes and computer equipment in brief.

Council also requested a list of members of Sections be sent to the Assistant Secretary annually for checking that members of Sections are also BAA members.

Clearly it is impractical to photocopy 100/150 filing cards several times so the computer listing is useful and a great time saver. It could be used to address labels but is not at present because members send SAE.

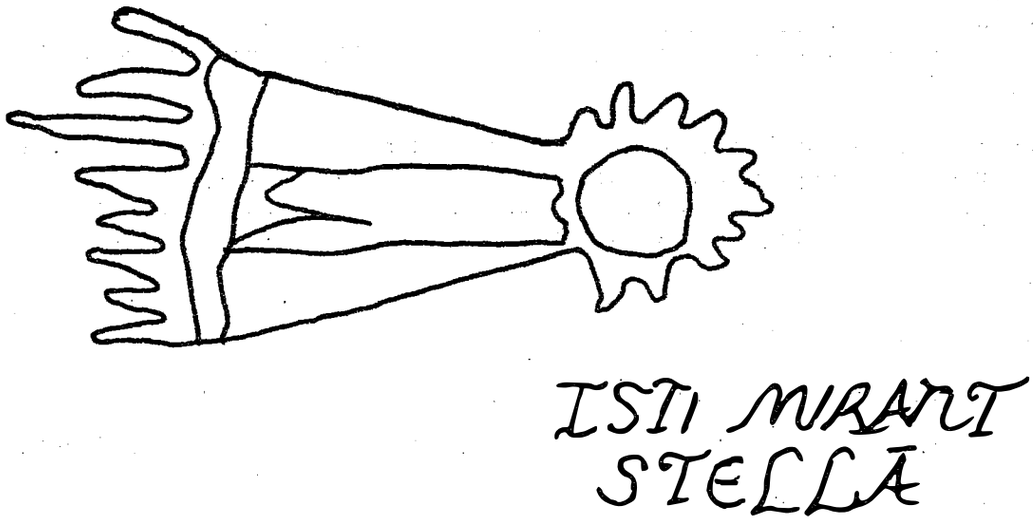
If anyone objects to having his name on this computer held list he should get in touch with me. We cannot function without keeping personal information on members in some form and this computer list saves a great deal of time and money in avoiding a photocopying system.

Addresses of Section Co-ordinators

Graham S Keitch 2 South Meadows Wrington Avon BS18 7PF (0934 862 924)	Visual Co-ordinator	- visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Observations to the ICQ. IHW UK visual co-ordinator.
Harold B Ridley Eastfield Observatory Eastfield Lane East Chinnock Yeovil Somerset BA22 9EP (093 588 222)	Photographic Co-ordinator	- General photographic and spectrographic observations, equipment, films and plates, processing, etc. Prospects for returning period comets. IHW UK photographic co-ordinator.
Andy J Hollis Ormada 85 Forest Road Cuddington, Northwich Cheshire CW8 2ED (0606 882 908)	Photoelectric Co-ordinator	- Photoelectric observations, equipment detectors, amplifiers recorders, filters, etc. IHW UK photoelectric co-ordinator
Michael J Hendrie (address on cover) (0206 240 021)	Astrometry Co-ordinator	- Requirements and reductions - contact with IHW, CHUKCC. (For general photographic requirements see Harold Ridley). General Section business - Editor of Bulletin. IHW UK correspondent and CHUKCC/IHW Astrometry co-ordinator.
Stan W Milbourn (address on cover) (0342 712168)	Computing Co-ordinator	- All computing problems, distribution of Bulletin, SAE and queries. Distribution of ephemerides.
Peter Stanley 20 Elsted Close Ifield Crawley West Sussex RH11 OBH (0293 22816)	Meetings Co-ordinator	- Meetings Organiser. Section and Exhibition Meeting information. Initial requests for information about the Section, IHW, etc.

THE BRITISH ASTRONOMICAL ASSOCIATION

COMET SECTION



BULLETIN NO. 26

FEBRUARY 1987

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SECTION NEWS

Michael J. Hendrie

Bulletin 26 is being published now so that we can publicise Harold Ridley's Prospects for 1987 as early in the year as possible. With 27 comets on his list and another four discovered in the first month of this year, it could be a busy year again even though none is expected to be as bright as Halley. Since his list was compiled three 1987 comets have been recovered and one at perihelion in 1988.

Now that we include notes on all comet discoveries and recoveries in the Comet Section notes in each number of the Journal, there is no need to repeat this information here, but Graham Keitch has written more detailed notes on members' visual observations of recent comets. We are pleased to have Jonathan Shanklin's report on the two Halley meetings that he attended last year. We have been represented at most of the recent Comet Symposia, and hope that this will continue, as further meetings are in prospect.

There is little about Halley's comet here because we are concentrating our efforts towards the Section Report for the Journal. This is well in hand although by the time it has passed through all stages it is not likely to be in print before late this year. If there are any reports not yet submitted, please send them now, we may be able to add them in, but not for much longer.

You will have noticed from the list of Section Officers in the Journal that I have appointed Graham Keitch to be Assistant Director of the Comet Section. The volume and complexity of Section work has been increasing, even before Halley, and we have only kept abreast of it by the efforts of the officers. It is inevitable that most of the work has fallen on Graham Keitch, Harold Ridley and myself though we could not have managed without the help of other loyal members of the Section. We have not yet decided how any reallocation of responsibilities will be arranged, having decided to deal with the Halley report first. By the time of the next Bulletin we expect to have some improvements to the service available to members. In particular improved computing power and communications should allow us to provide more detailed

information on new comets, etc. more quickly, to provide comparison star charts and maybe a Bulletin with pictures! It is intended now to put into effect our longtime plan to put all observation records into a computer database for more rapid processing and despatch to the ICQ, for example. I expect that Graham will be involved particularly in these developments in addition to carrying on as Visual Co-ordinator.

We would like to hold a Section Meeting in the late summer or autumn this year and if this proves possible to arrange details will be placed in the Newsletter distributed with the Journal.

I should like to thank all who have contributed to the work of the Section during the past very busy two years or so. There are very encouraging developments in skills, ideas and instrumentation within the Section and I am confident that it will have a good future.

EXHIBITIONS AND MEETINGS

Symposium on the Diversity and Similarity of Comets

As noted in B25 this meeting takes place in Brussels on 1987 April 6-9.

BAA Exhibition Meeting

This is on Saturday May 16 at Hawkstone Hall. Large exhibits can be taken to the Hall on the day, small items can be sent to me (MJH) (not Peter Stanley this year). Although we cannot expect the large number of exhibits that we showed last year, there should be enough to show that we do not need a Halley's comet every year.

Comets in the Post-Halley Era

Symposium at Bramberg, FRG on 1989 April 24-28

Halley Slides Sets

Several Halley slide sets have been advertised already and no doubt there will be others. The Armagh Planetarium set of 30 slides for £11.00 is good value and cover the apparition during the period 1985 November to 1985 April. They include some colour pictures of the nucleus from Vega and Giotto. They are of good quality, well chosen and well worth acquiring. They come in the usual transparent folder with a six page set of notes, photographs and diagrams.

HALLEY'S COMET - REPORT ON 2 MEETINGS

Jonathan D. Shanklin
(British Antarctic Survey
- Cambridge)

International Halley Seminar, Alden Biesen, Belgium 1986

This was a seminar on Comet Halley organised in conjunction with the opening of a space exhibition at the Cultural Centre of the Flemish Community. Talks were given by a number of professional and amateur astronomers. Many items also came up at the Eslab symposium, but in general they were presented rather better at this one. I gave the final talk at the symposium and described the work of the British Antarctic Survey (BAS) and the cometary observations which we have made in Antarctica.

Eslab Symposium at Heidelberg, West Germany (1986 October) on: "The Exploration of Halley's Comet"

Approximately 500 people attended the symposium. Some 350 oral and 110 poster papers were presented. The large number of oral presentations meant that each speaker got 10 minutes and many tried to cram too much into the allotted time. This provided me with a useful lesson for the future. The posters were better presented, but disappointingly the authors were often not present during the poster sessions. It was good to meet some of the people with whom I have corresponded over the past few years.

It is impossible to give a full report on all the papers, presented, even the book of abstracts is quite a weighty tome! The following is a subjective summary. Some technical knowlege is assumed.

The IHW

The final data archive will fill some 20 CDs. There is a plan for a continuing International Comet Watch which will provide a data archive and can be called into action as required. The BAS telescope and the one loaned to us by the IHW should remain in the Antarctic in case of such requirement.

Amateur Observations

About 10,000 IHW manuals were distributed and 1300 observers registered with Steve Edberg. Of these only 300 submitted a total of 5000 observations (I submitted 128!). Factors likely to affect magnitude estimates were: coma diameter and DC (experienced observers made the coma larger), experience, instrument (experienced observers used smaller apertures) and observing conditions. On Nov 9 for example estimates ranged from 6.0 to 10.7. Observing conditions and comet altitude were found not to be significant. Magnification should not exceed 120/coma diameter. Inexperienced observers had an excess of observations ending in .0 or .5! For Halley at any rate, correcting for aperture actually increased the scatter of observations. Representing the light curve by $m = a + f(T-t)$ may work but doesn't fit any physical model of cometary behaviour. The standard representation of the light curve does, but is discontinuous in the case of Halley. The discontinuities may be caused by seasonal effects on the comet nucleus, the Northern hemisphere being illuminated more after perihelion. Small outbursts (<1 mag.) lasting <1 day were seen, the best example being Apr 7 but these did not correlate with outbursts observed in narrow passbands.

Certain periodic comets were not discovered at previous apparitions when they should have been well placed. It is possible that they have periods of dormancy, so it is worth attempting to recover/observe supposedly extinct comets. P/Encke is fading and may have only about 20 apparitions left; if so it will fade increasingly rapidly.

Some popularisers of astronomy haven't much idea of practicalities. A quote from a chat show:

"Carl, where is comet Halley?" - long discourse on the awesome beauty of the universe etc.

"Carl, we have 30 seconds left, where is comet Halley tonight?" - "somewhere in the western sky" !!

Astrometry

Most people used 6 - 8 stars and did a linear fit using the SAO catalogue, with the plate in one orientation only. I had usually used >10 stars, repeated the measurement with the plate reversed and did a quadratic fit using the IHW catalogue when possible. A surprisingly large number of people claimed to have been among those obtaining the smallest residuals reported to the IHW! The transverse non gravitational force A2 is positive and constant implying direct rotation of the nucleus and a spin axis not far from the normal to the orbital plane. There is no obvious long term precession or evidence for an earth mass comet belt at 40 AU.

Photometry

There has been relatively little improvement in visual photometry since the time of Ptolomey and no improvement in routine photo-electric photometry since the first carefully made observations in 1910! For comets, standard UBV filters are not much good as you can't tell if the continuum or the emission lines have changed. I have a set of the IHW filters which are available for loan. Interference filters need to be kept dry, failure to do so often causes problems. Comets really require a specifically designed photometer with a large diaphragm, though this increases the chance of including background stars in the field. The sky background should be measured a long way from the comet (>1 deg. for a large coma). With small diaphragms the comet needs to be tracked during the integration time, especially if it is moving fast.

Meteors

The 1985 Giacobinid return occurred 3.5 hours before the predicted time which implies that the particles were released at an earlier apparition. The Orionids are at least 3000 years old. Those observed visually are much more massive than anything detected by the spacecraft. Clube proposed a "super comet" some 5 orders of magnitude bigger than Halley which appeared 20,000 years ago as the progenitor of the Taurid "stream" of P/Encke, asteroids 82TA, 84KB and Hephaistos, the 11th century fireball peak, the 1975 lunar swarm, and the Taurid meteors.

The nucleus

Giotto and Vega imaging showed a solid body, 16 x 8 x 7.5 km, roughly a triaxial ellipsoid of volume 600 cubic kilometers, with a big and a small end. The total mass is thought to be about 5 x 10 exp 14 kg with a density of about 0.2. Giotto only saw the crescent phase on the morning side, although it would have had a much better view after the encounter. The surface generally has low relief, a crater like feature was 1600m across and 200m deep. The sharpest slope seen was a possible "cliff" illuminated by the rising sun. The overall surface albedo is about 4%, with the possibility of some areas of different albedo. Some dust screening of the lowest 100m may occur. The imaging task was likened to trying to take a 50 x 50cm picture of the pilot of Concorde at 7mm resolution while the plane was flying past at Mach 2, 300m away.

The preferred rotation period is 54 hours, though a 7.5 day period found in some observational data may be the nutation period. Jet activity is confined to a localised area of 70 - 100 degrees in extent, but within this jets tend to propagate along fissure like tracks. Their activity is highly variable with little taking place on the night side. The expansion of material in the jets is proportional to 1/r, which implies that they are not collimated and are not strictly jets but expand freely from a surface source. The optical thickness of the dust is $<<1$, and even in the jets is <1 so that surface features should be detectable. Particle emission in the jets takes place on all scale lengths. Image enhancement shows up the jets on photographs taken by ground based observers - even Giotto's painting shows jets when treated in this way!

The surface temperature reaches 400 K, though the hot area is <25% of the total. Such temperatures require a thin insulating mantle of low thermal conductivity, made of non-volatile particles. The material must be dark even if the mantle has an open structure as the albedo of the dust particles is similar to the overall surface albedo. Cosmic ray bombardment of "new" comets down to 100m depth could alter the material sufficiently for them to have different activity to "old" comets at large r.

Water is the major species found in the coma, comprising about 80% and follows an r-2 law away from the nucleus. Other species detected include CO, CO2, C, CS, NH3, CH4 and C-H and C-C bonds. 30% of particles have CHON composition, though not all of the C is from "icy" material, and probably exists as a complex aromatic form. This would be compatible with the low albedo of the dust as linear hydrocarbon chains tend to give white compounds, while aromatics give dark compounds. The dust also includes layer minerals, silicates and "exotics". The material resembles carbonaceous chondrites but is less altered. Dust grains sizes go to subfemtogram (10 exp -15), with smaller sizes being more numerous but contributing little to the total mass. The largest particle detected by Giotto was about 1.5mg, with the total mass of particles 26mg (though the radio tracking experiment gave a much larger mass), Isoptope abundances are similar to normal solar system abundances, which suggests formation in the solar nebula but probably outside the planetary system, as the lower fractionation and low density suggest quiet conditions. There would have been enough A126 present for a 5km solid body to have a liquid water core.

A reasonable model for the nucleus would be a very fragile, fractal, inhomogenous agglomeration of bodies on all scales up to a few kilometres. Individual particles would consist of an elongate silicate core (possibly as a "string"), surrounded by an icy mantle. Such a body would not survive to the surface to impact should its path intersect the Earth's.

Plasma

The basics of plasma interaction with a comet are now understood. The plasma tail was seen from 1.8 AU pre- to 2.3 AU post-perihelion, approximately as indicated by theory. Sixteen major disconnection events (DEs) were observed, some apparently not associated with sector boundary crossings, although it is difficult to predict exactly where the boundary is. Current sheet crossings always gave a DE. The velocity of tail material increased downwind, with variable accelerations, though no deceleration was observed even at current sheet crossings. It takes about a day for a reversed field to "eat" through the magnetic barrier in front of the comet.

Roman Numeral Designations of Comets in 1984 (MPC 10320)

M.J. Hendrie

Comet	T	Name	Year/letter
1984 I	Jan 6.0	P/Russell (4)	1984d
1984 II	Jan 6.6	P/Taylor	1983u
1984 III	Jan 8.7	P/Hartley-IRAS	1983v
1984 IV	Feb 20.2	P/Crommelin	1983n
1984 V	Feb 21.4	P/Smirnova-Chernykh	-
1984 VI	Mar 27.7	P/Encke	-
1984 VII	May 24.9	P/Takamizawa	1984j
1984 VIII	May 29.1	P/Clark	1983w
1984 IX	May 31.8	P/Wolf	1983m
1984 X	June 7.6	P/Kowal-Mrkos	1984n
1984 XI	July 9.9	P/Faye	1984h
1984 XII	July 28.5	(Solwind 5)	-
1984 XIII	Aug 12.1	Austin	1984i
1984 XIV	Aug 20.2	P/Wild (2)	1983s
1984 XV	Sept 3.7	Shoemaker	1984r
1984 XVI	Sept 16.6	P/Shoemaker (1)	1984q
1984 XVII	Sept 22.8	P/Wold-Harrington	1984g
1984 XVIII	Sept 26.7	P/Shoemaker (2)	1984u
1984 XIX	Oct 8.2	P/Neujmin (1)	1984c
1984 XX	Oct 13.9	Meier	1984o
1984 XXI	Dec 1.4	P/Arend-Rigaux	1984k
1984 XXII	Dec 6.5	P/Schaumasse	1984m
1984 XXIII	Dec 14.3	Levy-Rudenko	1984t

Roman Numeral Designations of Comets in 1985 (MPC 11376)

1985 I	Jan 2.4	P/Tsuchinshan (1)	1984p
1985 II	Jan 3.9	Shoemaker	1984s
1985 III	May 23.9	P/Honda-Mrkos-Pajdušáková	1985c
1985 IV	June 3.4	P/Gehrels (3)	1984l
1985 V	June 5.2	P/Hartley (2)	1986c
1985 VI	June 8.2	P/Maury	1985k
1985 VII	June 11.6	P/Hartley (1)	1985f
1985 VIII	June 28.7	Machholz	1985e
1985 IX	July 5.2	P/Russell (1)	1985b
1985 X	Jul 21.2	P/Tsuchinshan (2)	1985d
1985 XI	Aug 4.3	P/Daniel	1985j
1985 XII	Sept 4.6	Shoemaker	1984f
1985 XIII	Sept 5.2	P/Giacobini-Zinner	1984e
1985 XIV	Sept 28.4	Hartley	1984v
1985 XV	Oct 1.2	P/Giclas	1985g
1985 XVI	Oct 30.1	P/Ciffréo	1985p
1985 XVII	Dec 9.1	Hartley-Good	1985l
1985 XVIII	Dec 18.6	P/Shoemaker (3)	1986a
1985 XIX	Dec 19.2	Thiele	1985m

Comet 1984 XII was a sun-grazing comet that was not given a provisional designation, 1981 XXI was belatedly given to another such object. P/Encke and P/Smirnova-Chernyckh are no longer given provisional designations. In 1985, designations 1808 III, 1976 XVI and 1983 XX have been given to P/Grigg-Skjellerup, P/Skiff-Kosai and Solwind 6 respectively.

Designations of Comets Discovered and Recovered (continued) 1986-1987

1986m	P/Grigg-Skjellerup	Discovery/recovery (D/R)	R	22 mag.
1986n	Sorrells		D	12
1986o	P/Urata-Niijima		D	16
1986p	P.Lovas (2)		D	14
1986q	P/du Toit-Hartley		R	19
1987a	Levy		D	10
1987b	P/Wiseman-Skiff		D	14
1987c	Nishikawa-Takamizawa-Tago		D	9
1987d	Terasako		D	8
1987e	P/Wild (3)		R	19
1987f	P/Bus		R	19
1987g	P/Tempel (2)		R	20

(For information about the discovery or recovery of these comets, see the Comet Section notes in recent numbers of the Journal.)

PROSPECTS FOR 1987

As, at the time of writing (1986 Dec 3) there are 27 comets to deal with, I am keeping my comments on each as brief as possible, and the Table is more condensed than previously. Ephemerides for 19 of the comets will be found in the BAA Handbook for 1987, notable exceptions being P/Halley, P/Denning-Fujikawa and P/Schwassmann-Wachmann 1. As usual, the magnitudes given in the Handbook are in most cases useless for our purposes, but can be made more serviceable by deducting the appropriate figure from m_0. However, the nuclear magnitudes generally assume n = 2 or 4, whereas most short-period comets require a larger factor, nearer n = 6. My estimates of maximum brightness are based on reports from all previous apparitions in conjunction with the circumstances of the current return, but can only give a rough guide as to what to expect. Modern methods and instrumentation tend to give brighter visual magnitudes than those of the past, and exclusively photographic magnitude estimates can be misleading from the visual point of view.

P/Halley, 1982i. Moving slowly in Crater, and fading gradually from 13th magnitude, the comet will turn north about the middle of January edging westwards into Sextans by the beginning of April. Only those with large instruments will be able to follow it; one wonders whether there will be the same competition to be the last U.K. observer to record the comet as there was to be the first.

P/Forbes, 1986g. At a favourable apparition this object can be 10th mag., but the present return could hardly be worse: a perihelic superior conjunction. It is unlikely that the brightness will exceed 15th mag.

P/Dubiago (?). This comet, with a period of more than 60 years, reached 10th mag when discovered in 1921. Using Marsden's elements from the original 19 observations, Carusi et al found T = 1982, Aug 9.9, the least favourable date possible, as for P/Forbes, and the comet was not recovered. A new solution by Townsend and Rogers gives T = 1987 Feb 13.9, which if correct will produce optimum circumstances. It remains to be seen who is right, but if the latter, the comet will be 11th mag. in Ursa Major in 1986 Dec, and 9th-10th mag in Bootes - Corona Borealis - Hercules during February. An ephemeris is available on request.

Sorrells, 1986n. This recently discovered long-period comet will move into the twilight early in February, but after perihelion it will emerge into the morning sky with little change of brightness, the variation being no more than one magnitude during the period 1986 Nov - 1987 July, being at a maximum of 10th mag in the first half of 1986 Dec.

P/Neujmin 2. Not having been observed for 60 years, this comet must be regarded as lost or defunct, though the circumstances for this apparition are optimum and by the standard of its previous two appearances it would reach 10th magnitude.

P/Howell. Making its first return after discovery in 1981, this faint comet is situated similarly to that apparition and will probably not exceed 15th mag, though southern visual observers might find it worth checking during May and June.

Wilson, 1986l. This is another long-period comet, well observed in 1986 at 11-12 mag, and showing a short but distinct tail that might develop nicely towards perihelion in 1987 April. Starting the year in conjunction with the Sun, the comet moves rapidly south and will become a good object for southern observers, possibly 6th - 7th mag, though its early promise may not be fulfilled. Post-perihelion, it comes north again, moving into the morning sky in October at about 11th magnitude.

P/Jackson-Neujmin. Although it reached 12th mag at discovery, the comet is poorly placed this time, and its magnitude is unlikely to exceed 17.

P/du Toit - Hartley 1986q. After being lost for 37 years, this comet was accidentally rediscovered in 1982, when it was found to have split into two components, 1982b and c. Sekanina suggested that the split occurred in 1976 and that the brighter part would rapidly fade out. This happened, and the fainter portion persisted. Although the circumstances are moderately good this time, the indicated maximum brightness is only 17th mag, but it is hoped that the comet will be recovered as it will be interesting to see how it has weathered the disruption. (Recovered at Kitt Peak 1986 Dec 27.3 at 19m (IAUC 4293).)

P/Grigg-Skjellerup, 1986m. The past history of this well-known comet has been extended back to 1808 since Kresak showed that an unconfirmed observation of a comet by Pons in that year undoubtedly referred to P/Grigg-Skjellerup. Although the comet is capable of an almost grazing encounter with the Earth, the circumstances are correspondingly critical and the period of reasonable brightness is very brief. This year the conditions are only fair, and magnitudes in the range 11th - 13th may be expected in June. Meteors associated with the comet from a radiant in Puppis were observed from Australia in 1977 at the rate of 40 per hour, but there is no reason to expect a strong display on this occasion, as the Earth will be at the ascending node of the cometary orbit nearly four weeks before the comet itself arrives there.

P/Russell 2. Although this is a very favourable apparition, as was the discovery one in 1980, the comet is a faint object and will be no brighter than 15th - 16th magnitude, unless the photographic brightness reported in 1980 is misleading.

P/Encke. It is strange that so famous a comet should be so difficult to observe, but the fact is that P/Encke is rarely an easy object, its small perihelion distance causing it to appear in twilight when at its best. A July perihelion means that only southern observers have much chance of seeing the comet well, and the latter may be rewarded by a 10th magnitude sighting in August.

P/Klemola. Making its third appearance, the comet is reasonably well-situated in late summer, and could be as bright as 12th magnitude during the period August - mid-September. As will be seen below, P/Klemola makes a fairly close approach to P/Brooks 2 on Sept 16, the spatial separation being 4½ million km., corresponding to a little less than 2° on the sky.

P/West-Kohoutek-Ikemura. Those who were observing at the time will recall the wonderful confusion that attended the discovery of this object, largely arising from Kohoutek's simultaneous discovery of another comet - also, as it happens, at perihelion this year. However, we are unlikely to have any trouble this time, as both are pretty faint. P/West-Kohoutek-Ikemura might achieve 14th mag in September, but is more likely to be 15th. It is annoying that so many comets arrange to be on the other side of the Sun when they come to perihelion.

P/Denning-Fujikawa. Discovered in 1881 by Denning at Bristol, the comet was subsequently lost for 97 years until its rediscovery by Fujikawa in 1978. Since the orbit had experienced no drastic changes during the interval, one wonders why it eluded us for so long, particularly as its brightness has not

greatly diminished - it reached 10th magnitude in 1978. This is a fairly good apparition, and the magnitude could reach 9 - 10 in July-August, though the comet brightens and fades rapidly as it passes perihelion. The orbit lies fairly close to that of the Earth at about $v = 60°$, and Porter calculated a meteor radiant in southern Sagittarius, but perturbations to the original elements require a fresh determination. An ephemeris is available on request.

P/Gehrels 1. This distant object is quite well placed this time, but the comet is faint and likely to be only 18th-19th magnitude.

P/Comas-Sola, 1986j. This reliable comet has always been seen at magnitude 12 - 13 on its seven previous appearances, and invariably has a few minutes of tail, but this is not the best of apparitions and the elongation is too small for the object to be seen at its brightest. By late September it might be glimpsed at 13th magnitude.

P/Schwassmann-Wachmann 2, 1986h. Another case of perihelion near superior conjunction, and we shall be lucky if the comet achieves 15th magnitude by the end of the year. After its next apparition in 1994, the comet will experience a close approach to Jupiter which will shift q out beyond 3 a.u., which will put it out of range of all but large instruments.

P/Wide 3 1987e. Although this apparition is very favourable, the brightness of this distant comet is unlikely to exceed 15th magnitude. In the past, this object spent a quiet life orbiting in the space between Jupiter and Uranus, but a couple of close encounters with the former have swivelled its apsides round so that the former perihelion is now aphelion. It will see our time out in its present orbit, but is due for another shake-up about 2300 A.D. (Recovered at Kitt Peak 1987 Jan 29.4 at 19.5^m - IAUC 4309.)

P/Brooks 2. This venerable comet has had an interesting history. Like P/Wild 3, it was originally more distant, orbiting between Jupiter and Saturn; eventually it fell foul of the former and had its aphelion pushed out beyond the latter. Finally a further encounter in 1886 reversed the apsides and put the comet into its present stable orbit. The 1886 event resulted in the comet passing only one planetary radius above the cloud-tops of Jupiter, reminding one of the Voyager mission, though luckily the latter vehicle was made of sterner stuff than the comet, which broke up under the strain and appeared in triple form when discovered in 1889. The two faint companions soon fizzled out, leaving a substantial remnant to engage our attention ever since; it has only been missed at two of its subsequent 13 perihelia. This is a very good apparition and if the comet runs true to form we may hope to see it at 10th-11th magnitude in October, when it will be well placed in Pisces. The present appearance is marginally better than that of 1932, when the comet reached mag 10.2, with 4 minutes of tail.

As mentioned above, this comet makes an appulse to P/Klemola in September and during the first half of the month the two comets will be separated by about 2°. The linear separation is too great, however, for any physical interaction to be likely.

P/Reinmuth 2. Observed at every return since its discovery, this comet can be 12th - 13th magnitude at best, but this apparition is a little less than optimum and the magnitude will probably be 13 - 14 in August, when southern observers will be favoured.

P/Kohoutek, 1986k. This is the comet that led to the confusion with P/West-Kohoutek-Ikemura in 1975, but that is its only claim to distinction. This being only a moderately favourable apparition, the magnitude is unlikely to be better than 14, at the end of the year.

P/Harrington. Another faint object, never brighter than 15th magnitude, and probably barely 16th on this occasion.

P/de Vico-Swift. At its discovery apparition, this comet was reported as a naked-eye object of 5th magnitude. However, frequent encounters with Jupiter endow it with a chaotic orbit, and it is a regular occupant of the

lost-and-found department. Originally, q was only 1.2 a.u., but for the present return it will be 2.2, and it would be surprising to find it brighter than 18th magnitude; probably surprising to find it at all.

P/Borelly. Although late on the 1987 scene, this comet will probably be the brightest predictable reappearance of the year. Missed only in 1939 and 1946, the comet has been observed at 10 apparitions, and this one will be as good as the previous best in 1911, when it reached 8.4 magnitude. It will be well to the south before perihelion, but makes a last-minute dash northwards and will be on the equator, on the borders of Pisces-Cetus when at its best in mid-December. A 30' tail was noted in 1911, but even in a bad year it usually has a few arcmins of appendage. The orbit is quite stable, with only minor fluctuations of the elements, perhaps partly because of the high inclination (for a direct-motion, short-period comet) of 30°.

P/Bus 1987f. If this comet is not recovered, we shall have to say that we have missed the Bus, but with a probable maximum brightness of 19th magnitude, it is hardly worth waiting for anyway. (Recovered Kitt Peak 1987 Jan 29.3 at 19.5m -IAUC 4310 - I will leave your joke in anyway! Ed.)

P/Schwassmann-Wachmann 1. Moving through Sagittarius, this distant comet should be monitored for the occasional outburst from its normal 18th magnitude to 12th; southern observers will be better placed for this task than those in northerly latitudes. J.-C. Merlin reported an outburst on 1986 April 4-5.

Short-Period Comets at Perihelion in 1988

Mercifully, the list is brief:

P/Comet	Last Obs. Perm.	Return Prov.	T 1988	P Yrs.	q a.u.	N	Discovery Apparition
Reinmuth 1	1980 VIII	1979j	May 10.0	7.29	1.87	7	1928 I
Finlay	1981 XII	1981e	June 5.9	6.95	1.09	10	1886 VII
Tempel 2*	1983 X	1982d= 1987g	Sept 16.7	5.29	1.38	17	1873 II
Longmore	1981 XVI	1981d	Oct. 12.2	7.00	2.41	2	1974 XIV
du Toit	1974 IV	1975g	Dec. 25.9	14.7	1.27	2	1944 III

N = Number of observed apparitions

* Recovered Kitt Peak 1986 Dec 29.5, confirmed Kitt Peak 1987 Jan 25.4 at m1 = 20.4 and 20.0 respectively - IAUC 4312).

COMETS IN 1987

Comet	Prov. desig.	T 1986	Mag.	Brightest Month	Elong.	Moon New	Moon Full
P/Halley	1982i	Feb. 9.4	13-14	Jan.	115		
		1987					
P/Forbes	1986g	Jan. 1.6	15	May	37		Jan. 15
			15	Nov.	160		
P/Dubiago (?)		Feb. 13.9	9.5	Feb.	87	Jan. 29	
Sorrells	1986n	Mar. 9.6	11	Jan.	73		Feb. 13
P/Neujmin 2		Apr. 2.4	?	Feb.-Apr.	150	Feb. 28	
P/Howell		Apr. 14.5	15	May-June	70 - 81		Mar. 15
Wilson	1986l	Apr. 20.7	6-7	Apr.May	79 - 90	Mar. 29	
P/Jackson-Neujmin		May 24.5	17	June	41		Apr. 14

Comet	Prov. desig.	T 1987	Mag.	Brightest Month	Elong	New	Full
P/du Toit-Hartley	1986q	June 14.3	17	June	67	Apr. 28	
P/Grigg-Skjellerup	1986m	June 18.0	11-13	June	61		May 13
P/Russell 2		July 4.4	15-16	July	158	May 27	
P/Encke		July 17.4	10	Aug.	44		June 11
P/Klemola		July 22.6	12	Sept.	161	June 26	
P/West-Kohoutek-Ikemura		July 27.4	14-15	Sept.	38		July 11
P/Denning-Fujikawa		Aug. 3.9	9-10	July	55	July 25	
P/Gehrels 1		Aug. 14.8	18-19	Nov.	154		Aug. 9
P/Comas-Sola	1986j	Aug. 18.7	13	Sept.	34	Aug. 24	
P/Schwassmann-Wachmann 2	1986h	Aug. 30.5	15	Dec.	71		Sept. 7
P/Wild 3	1987e	Aug. 31.5	15	May	150	Sept 23	
P/Brooks 2		Oct. 16.5	10-11	Oct.	168		Oct. 7
P/Reinmuth 2		Oct. 25.7	13-14	Aug.	162	Oct. 22	
P/Kohoutek	1986k	Oct. 29.7	14	Dec.	138		Nov. 5
P/Harrington		Oct. 31.9	15-16	Sept.	127	Nov. 21	
P/de Vico-Swift		Dec. 7.1	18	Dec.	76		Dec. 5
P/Borrelly		Dec. 18.3	8-9	Dec.	130	Dec. 20	
P/Bus	1987f	Dec. 19.5	19	Feb.	142		
		1989					
P/Schwassmann-Wachmann 1		Oct. 26	18(12)	Aug.	170		

NOTES FROM OTHER JOURNALS — Gerald J. Hodgkinson

Comet Halley: More results of the Vega encounters have been published (Pis'ma A.Zh., 12(8 & 9), 1986, in Russian), and will appear in English translation later; Advances in Space Research, vol. 5(12), 1986, carries reviews of the Halley and Giacobini-Zinner encounters. From other publications we read that the release of dust from the nucleus began in October 1984, when about 5.9 AU from the Sun (Meech, K., et al.; Icarus, 66,561, 1986); water was detected in the coma in December 1985 (Mumma, M.J., et al.; Science, 323, 1523, 1986), its production rate varied by a factor of 4 in two days. Dynamical properties of the tail at about that time were later described (Guerin, P., et al.; Astron. Astrophys., 167, 395, 1986). Pre-perihelion photometry indicated that the nucleus may be polymer-like in composition (Catalano, F.A., et al.; ibid., 168, 341, 1986).

The abundance of carbon monoxide was measured as 20% of the water abundance, making it the second most abundant parent molecule (Woods, T.N., et al.; Nature, 324, 436, 1986). Other far-UV observations were reported in the same issue of Nature (McCoy, R.P., et al.; ibid., 439). Line-profiles of water in the IR after perihelion were consistent with the release of water into the coma from multiple jets, rather than from a single jet (Larson, H.P., et al.; Astrophys. J.Lett., 309, 95, 1986), primarily from the sunlit side (Weaver, H.A., et al.; Nature, 324, 441, 1986).

Further observations of 3.2-3.6 micron emission discovered by the Vega craft indicates several components with carbon-hydrogen bonds; it was observed to several thousand Km from the nucleus (Knacke, R.F., et al.; Astrophys. J.Lett., 310, 49, 1986). Emission due to CN was observed as jets spirally out from the nucleus to distances of 60,000 Km,; it is believed to be formed in-situ

(A'Hearn, M.F.A., et al.; Nature, 324, 649, 1986).

A rotation period of 7.4 days for the nucleus was deduced (Millis, R.L., Schleicher, D.G.; Nature, 324, 646, 1986). Other periods have been proposed, and the subject is discussed elsewhere (Kerr, R.A.; Science, 234, 1196, 1986; Campbell, P.; Nature 324, 213, 1986).

Chemistry: The CS observed in comet IRAS-Araki-Alcock 1983d was probably formed by photo-dissociation of CS2 (Jackson, W.M., et al.; Astrophys. J., 304, 515, 1986). Production and destruction of C2 in comets is also governed by photochemical processes (Combi, M.R., Delsemme, A.H.; Astrophys. J., 308, 472, 1986). A survey of bimolecular ion-molecule reactions for use in modelling of planetary atmospheres, cometary comae, and interstellar clouds was given by Anicich, V.G., and Huntress, W.T., Jr. (Astrophys. J. Suppl. Ser., 62(3), 553, 1986).

Evolution: Two papers relate to the orbital evolution of comets (Donnison, J.R.; Astron. Astrophys., 167, 359, 1986; Bailey, M.E.; Nature, 324, 350, 1986); the former includes a short discussion of cometary magnitude measurements. It is worth consulting the note by Heisler, J., in Nature (vol. 324, 306, 1986). The capture of interstellar comets seems to be a very rare event (Torbett, M.V.; Astron. J., 92, 171, 1986).

The nucleus of Comet P/Arend-Rigaux is nearing extinction as a comet (Brooke, T.Y., Knacke, R.F.; Icarus, 67(1), 80, 1986); while a possible comet-asteroid link in the formation of comets is described by O'Dell, C.R. (Icarus, 67(1), 71, 1986). Small asteroidal particles are perturbed into eccentric orbits taking them out to the region of the Oort cloud. While slowly passing through their aphelia they acquire a mantle of icy material; larger bodies will gravitationally attract the smaller, so building up the 'dirty snowballs' which appear as comets on return to the inner Solar System. By this process, comets can be continually regenerated. The 'dirty snowball' model was further elaborated by Gombosi, T.I. and Houpis, H.L.F. (Nature, 324, 43, 1986).

VISUAL OBSERVATIONS OF COMETS — Graham S. Keitch

P/Giacobini-Zinner 1984e

Bulletin 24 (September 1985) gave details of this comet up to the end of 1985 August. During early September, moonlight interferred although GSK was able to locate the comet at 7.5m in 20x80 Binoculars (B) on Sept. 7.00 when the halfmoon was only about 10 degrees away. The comet was next observed in a dark sky from Wrington on Sept. 11.10, just hours before the ICE encounter. The 8cm binoculars showed a diffuse 7.1 arcmin coma which contained a smaller condensed inner region. A diffuse 20 arcmin fan tail was observed between 309-324° p.a. Over the next few days, the comet faded very suddenly. A value of 7.9m was noted in 20x80B on Sept. 12.11 and on Sept. 13.11 the brightness had dropped further to 8.2m. Considerable tail structure existed to the west of the coma and two days later Jonathan Shanklin (JDS) used the Cambridge 20cm refractor to secure a tail length of 32 arcmin in 285° p.a.

The arrival of P/Halley around this time meant that comet Giacobini-Zinner began to receive less attention. Furthermore, it was now becoming quite a faint diffuse object; the coma was 3.9 arcmin across and 8.9m when observed by GSK with the 20x80B on 1985 Sept. 26.19. Even so, the diffuse faint tail could still be traced for 12 arcmin in 281° p.a. The last UK observation was secured by this observer on Oct. 14.18 when the 2.6 arcmin coma was judged to be 9.4m in the 29.8cm f/5 reflector x 63, although a day earlier, JDS estimated the comet to be a whole magnitude fainter with the Cambridge refractor.

The photometric data secured by GSK on 23 nights together with a few selected estimates by JDS and Guy Hurst (GMH) were analysed in an attempt to find a formula to describe the comet's performance. The estimates were corrected to a standard aperture of 6.78cm in the usual way. Between 61 and 25 days before perihelion the comet brightened as follows:-

$$m_1 = 8.03\ (\pm\ 0.16) + 5 \log a + 0.04\ (\pm\ 0.0035)\ t$$

where a is the geocentric distance in AU and 't' is the number of days from perihelion.

The adjusted brightness them remained static until 7 days post perihelion when a sudden rather dramatic fade occurred. Thereafter the photometric performance is not too clearly defined due to the small number of observations.

P/Boethin 1985n

This period comet was first located from the UK by Guy Hurst (GMH) and Jonathan Shanklin (JDS) on 1986 Jan 3.75. Both observers agreed that the coma was 6 arcmin across. According to GMH, the brightness in 15x80B was 8.1m and GSK found the same value with 10x50B two days later. The magnitude remained fairly constant over the next week or so and values of 8.1m or 8.2m were found by these two observers on Jan 12.78 although somewhat fainter magnitude estimates were recorded with larger instruments used by Roy Panther (RWP) and JDS later in the month.

During February the comet began to fade. GSK estimated the 4 arcmin coma as being 8.6-8.7m in 20x80B on Feb 8,9,10. The same instrument gave 8.9m on Feb. 26.81 and 9.1m on Feb. 27.81. Both RWP and GSK followed the comet into March and on March 2, RWP measured the coma as being 3 arcmin across in his 20cm f/4 reflector at x 35. Estimates were secured by GSK with a 20.3cm f/10 Celestron at the Observatorio del Teide (8000 feet asl) on 1985 March 7, 8 and 9 when the comet was 9.6 - 9.8m and up to 3 arcmin across.

Comet Wilson 19861

Christine Wilson, Palomar Observatory, discovered 19861 on 1986 August 5 while participating in the second Palomar Sky Survey. So far, BAA observations have been received from GMH, GWP, Keith Sturdy (KS), JDS, Toni Tanti, Malta (TT) and GSK. There was some uncertainty over the discovery magnitude and a number of observers failed to detect the comet initially. Out first sighting was secured by JDS with the 20cm f/14 refractor x 120 at Cambridge on 1986 August 14.93 when the comet brightness and size was estimated as being 12.1m and 0.5 arcmin. The comet was small and very condensed and may well have been overlooked by those looking for a more diffuse object. The following night, a similar size and appearance was noted in the 26cm reflector used by GMH although he obtained a somewhat brighter magnitude of 11.7m. By the end of the month, GSK estimated the comet to be 11.5 - 11.6m with the 29.8cm reflector at Wrington. The coma remained strongly condensed and barely 0.5 arcmin in diameter.

As September began, GMH, TT, and GSK found the comet to be about 11.5m while JDS and RWP reported somewhat fainter values. GSK noted various jets, particularly to the south around this time. There is considerable disagreement between these various observers with regard to the comet's photometric performance during the month. The results obtained by GSK suggest that the comet maintained more or less the same brightness (11.3 - 11.5m) during September and GMH obtained similar values altough he did record a sudden drop to around 12.0m on Sept. 7 and 9. On the other hand, JDS reckoned the comet to have brightened from around 12.5m at the beginning of Sept. to 11.3m by Oct. 3.98. There is no doubt, however, that the comet did not brighten or behave as expected. It underwent a considerable fade during October which came as no surprise to the more experienced observers aware of the unpredictable nature of new comets at fairly large heliocentric distances. Throughout October, the coma remained small at around 0.6 arcmin although occasionally it reached 1.0 arcmin. On Oct. 24 and 25, GSK noted that it was somewhat extended to the north-east, around 50-60° p.a. and RWP similarly recorded an extension in 90° p.a. on Oct. 26.78.

During the first week of November, JDS estimated the coma to be 11.2 - 11.5m and about 0.6 - 0.9 arcmin across. Thereafter, it became poorly placed in the southwest evening sky although GSK managed to maintain coverage for several more weeks and by the end of the month, the comet showed signs of making a

recovery. With the 29.8cm f/5 reflector at Wrington, the magnitude was judged to be 11.1m on November 18.75. The coma was still well condensed at the centre although a diffuse faint halo could be traced out to 1.8 arcmin. Further observations from more southerly latitudes in the USA after this date suggest that the recovery was maintained throughout December, when the comet reached 9 magnitude.

It would be unwise to be confident about the comet's likely future performance. During 1987 January it will appear too close to the Sun for observation and in any event, its southerly motion will take it deep into the southern skies during April as it approaches perihelion. Around this time it may become a naked eye object but it will fade again during the early northern summer as it climbs northwards again.

Comet Sorrells 1986n

This comet was discovered photographically by William Sorrells of California who used a 40cm f/5 reflector on 1986 November 1.33. Both JDS and GMH observed it on the night of November 6 when the coma was judged to be 11.7 - 11.9m and a little condensed. Over the next week or so JDS made several observations with the 20cm refractor at Cambridge and recorded a gradual brightening to 11.4m by Nov 14.20 when the coma was 1.8 arcmin at x40. Similar values were also obtained by RWP around this time.

When GMH and GSK observed with their 26 and 29.8cm reflectors on Nov 26 the brightness was around 10m although GSK found the comet considerably brighter in his 20x80B. On this particular night he found values of 2.6 arcmin and 9.4m in the 8cm binoculars. Both GMH and GSK continued to use 8cm binoculars during December and they agree that the coma had grown to about 5 - 6 arcmin diameter with a total brightness of around 9.1 - 9.3m. Similar values were again found by these observers over the Christmas and New Year period. A last observation by GSK on 1987 Jan 28.80 using 20x80B showed the comet as a faint fairly small coma 2.3 arcmin diameter DC2 of 9.2 mag.

The comet is now receding from the Earth during the run up to perihelion which occurs on 1987 Mar 9.6. Consequently, it is unlikely to become particularly bright. By mid-February as it heads towards perihelion it will become too low in the evening sky for observation from the UK.

Comet Levy 1987a

David Levy, USA, discovered his second comet on 1987 Jan 5 at 10-11 mag. A further sighting was obtained on Jan 7 but the reported positions were inaccurate and this created difficulties in confirming the discovery. Visual confirmation was provided by GSK who was observing with visiting Australian comet observer Andrew Pearce. The observation was made in the very difficult circumstances during a brief 5 minute observing window between moonset and the onset of twilight on 1987 Jan 12.27 in temperatures of -10°C. According to these two observers, the coma was diffuse and up to 1.2 arcmin across and it shone dimly at 11.2m in the 29.8cm reflector x89.

Moonlight then interferred on subsequent mornings and further observations could not be secured. It is now moving away from perihelion which occurred on 1986 Dec 18.308 and it will probably fade. An observation by GSK on 1987 Jan 29.25 in a rather bright sky with the comet involved in several faint stars, suggested the coma was large and diffuse and fainter than 11m in the 29.8cm f/5 reflector x63 and x89. While the comet was not seen with complete certainty, the observation suggests an upper limit to its brightness.

Comet Nishikawa-Takamizawa-Tago 1987c

Observed by GMH on 1987 Jan 28.8 in rather poor skies using 15x80B at 8.3m while GSK made it 7.9m in 20x80B, with an intense central condensation and 3.4 arcmin ill-defined diffuse coma, DC 5-6.

Comet Terasako 1987d

Too far south to be observed yet from the UK, Albert Jones (New Zealand) observed it on 1987 29.4 in his 31.7cm reflector x86 he observed a slight condensation DC2. In 11x80B he made the comet 5 arcmin in diameter and 8.0 magnitude.

P/Halley 1982i

Positive observations were secured during 1986 December. The comet was 12.5m on December 6-7 when observed by J.W. Mason and P.A. Moore with the 39cm reflector at Selsey. The comet was also located about this time by S. Lubbock using a 44cm relfector. Observations by GSK with the 29.8cm reflector at Wrington on 1987 Jan 3.19 and 6.20 showed the coma to be 0.6 - 0.9 arcmin across and 12.5m. The comet was an extremely difficult object just a little over 20° altitude in the predawn sky. Halley will continue to fade slowly and became progessively more difficult over the next few months.

ADDRESSES OF SECTION CO-ORDINATORS

Graham S. Keitch 2 South Meadows Wrington Avon BS18 7PF (0934 862 924)	Visual Co-ordinator (and Assistant Director)	- visual observing including photometry catalogues and atlases, binoculars, and using telescopes for visual work. Observations to the ICQ. IHW UK visual co-ordinator.
Harold B. Ridley Eastfield Observatory Eastfield Lane East Chinnock Yeovil Somerset BA22 9EP (093 588 222)	Photographic Co-ordinator	- General photographic and spectographic observations, equipment, films and plates, processing, etc. Prospects for returning period comets IHW UK photographic co-ordinator.
Andy J. Hollis Ormeda 85 Forest Road Cuddington, Northwich Cheshire CW8 2ED (0606 882 908)	Photoelectric Co-ordinator	- Photoelectric observations, equipment detectors, amplifiers recorders, filters, etc. IHW UK photoelectric co-ordinator
Michael J. Hendrie (address on cover) (0206 240 021)	Astrometry Co-ordinator (and Director)	- Requirements and reductions - contact with IHW, CHUKCC. (For general photographic requirements see Harold Ridley). General Section business - Editor of Bulletin. IHW UK correspondent and CHUKCC/IHW Astrometry Co-ordinator.
Stan W. Milbourn (address on cover) (0342 712168)	Computing Co-ordinator	- All orbit computing problems, production and distribution of Bulletin, SAE and queries.
Peter Stanley 20 Elsted Close Ifield Crawley West Sussex RH11 OBH (0293 22816)	Meetings Co-ordinator	- Meetings Organiser. Section and Exhibition Meeting information.