THE BRITISH ASTRONOMICAL ASSOCIATION - COMET SECTION

Notes on the Visual Observation of Comets - prepared by Harold B. Ridley (1983)

These notes and the new Visual Observation Report forms have been prepared in the light of recent developments in cometary astronomy and international co-operation between observers. If properly completed in accordance with the notes, the forms will facilitate the Section analysts to extract information quickly and accurately and make it easier to tabulate data for transmission to the International Comet Quarterly and, in the case of comet Halley and any trial comets, to the International Halley Watch.

For more information on making magnitude estimates observers should consult the paper in the Journal by G.S. Keitch "Visual Comet Photometry" (1983 August, Vol 93, No 5, page 200). Notes on photographic observations and photographic report forms are being prepared. A paper on photographic instrumentation and methods by H.B. Ridley will appear in the Journal during 1984. Meanwhile photographs should be reported using the Visual Observation Report forms, adapted as necessary.

Kinds of Visual Comet Observations

Visual observations of comets are of four kinds, concerned with:

(i) Brightness - determining the equivalent stellar magnitudes

(ii) Dimensions - measuring the angular extent of various features

(iii) Structure - describing the shape and form of these features

(iv) Discovery - finding new comets, confirming reported discoveries

Methods of searching for new comets, and the procedure for reporting suspected discoveries, are dealt with separately, and these notes refer to the first three types of observation.

Brightness. Determining the equivalent stellar magnitude of comets at frequent intervals is one of the most important and useful things that an amateur observer can do, not only because the information is needed but also because there is virtually no professional work in this field. However, the usefulness of the observations depends entirely on the care and accuracy with which they are carried out, and unless certain standards are attained in this respect the observations are simply not acceptable for inclusion in general analyses. The following notes are intended to help observers to make their observations scientifically useful, and, in conjunction with the report forms, to report them adequately.

A star is a point source of light; a comet is an extended object, and therein lies the problem of accurate visual photometry of comets. Our only reliable standards are stellar magnitudes, and since we cannot make a comet look like a star, we have to make the comparison star look like a comet, and this is done by defocusing the star. Two methods of making the comparison are in general use: those of Bobrovnikoff and Sidgwick respectively; a third method which is a compromise between the two, due to Morris, is being tried.

The Bobrovnikoff (B) method is the older of the two, and consists of defocusing the comparison star until it has the same angular diameter as the (defocused) comet image, then estimating the relative brightness. Since both star and comet are out of focus, this is often called the 'out-out' method. It has the disadvantage that defocusing the comet renders the outer annulus of the coma invisible, and the Resultant magnitude estimate tends to be on the low side, Its advantage lies in being able directly to compare the two images without having to remember the brightness of one of them.

The Sidgwick (S) method involves forming an intense mental picture of the in-focus comet image and them comparing this with the star image defocused to the same size. The relative merits of this method, known also as the 'in-out' method, are the reverse of the Bobrovnikoff system.

The Morris (M) method calls for just sufficient defocusing of the comet image to smooth it out slightly and make it look more like an out-of-focus star. The remembered image is then compared with star images expanded to the same diameter.

On balance, modern practice favours the Sidgwick method, and observers are urged to employ this as their basic technique. However, in order to maintain comparability with historic observations, and to establish the precise relationship of estimates on the two systems, it would be useful in appropriate cases and when time permits, to use both methods, taking care not to let the result of one influence the outcome of the other. When a comet has a large angular diameter the Sidgwick method should be used, since the Bobrovnikoff method would involve excessive defocusing.

Whichever method of visual photometry is employed, the same basic procedures should be adopted. At least two comparison stars must be used, one brighter and one fainter than the comet, and the comet brightness is initially expressed as a certain fraction of the brightness difference between the two, e.g., A (6) comet (4) B, meaning that if the magnitude difference between the two stars is divided into ten steps, the comet lies six steps fainter than star A and four steps brighter than star B. If A and B are closely similar, the number of steps can be reduced. The next problem is to assign the magnitudes to A and B. These must be taken from a catalogue - taking disc-sizes from an atlas is simply not good enough. If no catalogue is available, then so long as the stars are unambiguously identified, the reduction can be done by whoever is working up the results. We are trying to standardize on magnitudes from AAVSO fields and the AAVSO Star Atlas would be a useful acquisition for any intending observer of comets.

Three factors that effect the apparent magnitude of a comet at a given time are the instrument used, the state of the observer's eye, and the condition of the sky.

For comets down to about 9th magnitude, suitably mounted binoculars are preferable for visual photometry; the more powerful ones, e.g., 20 x 80 will yield good results down to tenth magnitude. For fainter comets, and for structural details of most comets, larger instruments are necessary, the preference being for reflectors of fairly small aperture ratio -F/5 or so, and the largest possible aperture; amateurs are now operating such telescopes up to 50cm or more. Refractors are less popular now, but the faster ones - say 125mm F/5 are very good. The older types, around F/15, definitely produce lower magnitude estimates (make the comet fainter), but since most of the earlier observations of comets were made with them we still need such results to maintain comparability and continuity with previous work. An equatorial mounting is not essential for visual work and it may often be more convenient to use a portable alt-azimuth mounted telescope.

Magnification should generally be low to moderate (e.g., x 2 per cm of aperture for visual photometry of the comet's head), and eyepieces of 25mm to 50mm are suitable. Low power binoculars often produce a comet-like fuzziness from close pairs of stars however.

Most comets appear as faint, diffuse misty spots of light in the field, and one cannot expect to see them well unless the eye is thoroughly dark-adapted. Adaptation time varies individually, but a minimum of ten minutes should be allowed before actual observations begin. This time is usually taken up acquiring the object, identifying field stars and so on. If a light is needed for notes and charts, it should be as dim as possible, and preferably red.

For comet work, 'seeing' is not so important as transparency and darkness of the sky. The sky conditions are best described by noting the magnitudes of the faintest stars visible in the zenith and at the altitude of and near the comet. Any degrading factors, such as twilight, moonlight, local lights etc., should be mentioned.

Dimensions and Structure. Most comets have no tail visible in small instruments, and the head appears as a roughly circular patch of light. The angular diameter of this coma can be measured directly by micrometer or judged by reference to the separation of a pair of stars, or by using the known size of the field (less reliable). With a micrometer or a simple cross-hair, the coma diameter can be determined by stopping the telecope drive and checking the time taken for the coma to drift across the N/S web. The angular diameter is then given by 15t cos (declination)., t being the drift-time. Any assymmetry, and the direction of such, should be noted.

The coma may be a disc of uniform brightness, but more often there is some brightening towards the centre, and the degree of this condensation is estimated on a ten-point scale, zero representing complete uniformity, nine indicating practically all the light being in a virtually stellar central point. It is doubtful if the true nucleus of a comet has ever been observed, but when there is an almost stellar central condensation a 'nuclear' magnitude may be determined. The actual magnitude of this central feature is less important than any relative changes over a period of time, which might provide data for rotation studies.

Faint comets rarely show any structure in the coma other than a central brightening, or at least it can be difficult to see though this should not deter observers from making a careful examination and recording as 'possible' or 'suspected' any illusive features. Bright comets may exhibit quite complex features, as in the case of P/Halley. The two principal features that may be visible are jets and 'hoods', the latter being curved envelopes, roughly parabolic in outline, and distinctly brighter at their leading edges. The jets usually originate on the sunward side and then curve backwards to join the tail, either symmetrically like a vertical water fountain, or to one side. There may be two or more envelopes, slowly expanding and fading. The initial appearance and subsequent changes of these jets and hoods can yield important information on the possible rotation of the nucleus and the orientation of the rotation axis. Careful drawings should be made of the head using a moderate or high power, defining the diameter of the field and position angle of the axis through the parabolic hoods and nucleus. In fact hoods are seldom parabolic nor are they always symmetrical about this axis and the nucleus must be assumed to lie at the brightest point of the comet's head. The drawing should allow the distance <u>along the axis</u> from nucleus to hood boundary or edge and the two distances from the nucleus to the hood boundaries measured <u>at right angles to this axis</u> to be determined (the latter being the two halves of Whipple's 'pseudo latus rectum'). Field stars should be shown in all drawings of cometary features as these can be used to check the scale and orientation (even the time of observation, should any confusion have arisen over this). Drawings should be made at intervals of 20-30 minutes or as often as time allows, and should be timed to the nearest 10 minutes as features change rapidly in some comets.

Occasionally the nucleus of a comet splits, and in such cases large aperture and high magnification are advantageous if not essential. Separations and position angles of components should be noted, again at reasonably short intervals.

If a comet has a tail, the angular length should be estimated as for the coma, or, in the case of long tails, by measurement after plotting on an atlas. The position angle of the tail-axis, measured from North through East, should be determined, either by using the scale on the micrometer, or again by plotting on an atlas. In cases where the tail is broad, perhaps fan-shaped, the position angles of the leading and trailing edges should be given. Knots, spikes or rays, and any other features should be noted. Rarely, a comet may have a sunward-pointing tail, either alone or more often in addition to the normal tail. This can occur when the comet passes through the plane of the Earth's orbit, i.e., at one of the nodes, and the phenomenon is usually short-lived. Special watch for anti-tails should be made at all nodal passages, i.e., when the comet crosses the ecliptic.

The value of an observation - even a good one - depends very much on the accuracy and completeness with which it is reported, and observers are urged to give all the relevant information called for on the Report Forms. Filling up forms is a tedious and irritating chore, but no more so than trying to make sense of an incomplete report.

Notes on Completion of the Visual Observation Report Form

Many of the items requiring reportage have been dealt with in the Notes for Observers, but the following reminders and additional explanations may be helpful.

Comet	the name and provisional designation, e.g., P/Halley 1982i
Date and Decimal (UT)	the latter to three decimal places, e.g., 1983 March 25d 21h 40m entered as 1983 March 25.903.
Observer	your name please!
Location	town or village and nearest town, country if not U.K.
Sky Conditions	presence of Moon and age, twilight, mist, street lights, etc.
Magnitude	estimated to one decimal place
Method of Observation	B = Bobrovnikoff, S = Sidgwick, M = Morris
Comparison Stars-Source	the name of the catalogue from which magnitudes have been taken.
Instrument type	R = refractor, L = reflector, B = Binoculars, C = Catadioptric (specify)
Aperture	clear aperture in cm
Magnification	power or magnification used to make magnitude estimate (where a different power is used for other parts of the observation, indicate that used in appropriate place)
Focal Ratio	F/ = aperture ratio, i.e., focal length/aperture
Coma Diameter	given in minutes of arc and one decimal place, indicate any assymmetry and position angle of long axis, also position angle of displacement of central condensation.
Degree of Condensation	description in words, e.g., diffuse, moderately condensed, almost stellar, and scale, i.e., 0, 5 and 9 respectively.
Principal Tails	see text for details, which should include position angles of main tail or main axis and edges of tail, and lengths in minutes of arc or degrees.
Further Description	verbal description of any features, continue on back of form and draw field sketch when possible. Be sure to show diameter of field of view shown or scale of drawing, position of north and east points (position angles are always measured from north, through east 0-360 degrees) magnification and time of drawing.
Approx. Position	As near as possible from atlas. If interpolated from ephemeris, please indicate this. Give also equinox of charts used, e.g., 1950.0 or 2000.0

BRITISH ASTRONOMICAL ASSOCIATION (COMET SECTION) VISUAL OBSERVATION REPORT

Comet | Date & Decimal (UT)

Observer | Location

Sky conditions, moonlight, etc.

Total magnitude of comet (m_1) | Instrument type

Method used | Aperture (cm)

Comparison stars mags. | Magnification

Focal ratio

Source of comparison star mags.

Coma diameter (arc mins) | Degree of condensation

Principal tails : length | Position angle ($^{\circ}$)

General description of coma shape, nuclei, jets, tails, etc. Use reverse of form for sketch and other details.

Approximate position & equinox : R.A. Decl. ( )

BAA COMET SECTION NEWSLETTER

Issue Number: 1
Date: 23/1/89

FROM THE DIRECTOR:

This is the first issue of the BAA Comet Section Newsletter. The Newletter does not necessarily signal the end of our six monthly Bulletin (Istimirant Stella). If resources permit, we will continue with its publication as an outlet for reports and short articles. At present, we have a more urgent requirement to publish observational information on a rapid and frequent basis and it is for this reason that I have introduced the Newsletter.

The primary objective is to encourage Section members to secure comet observations of all types. The Newsletter will contain detailed ephemerides and other information to aid the observer and details of actual observations. Observers should report their results to the undermentioned on a monthly basis please.

Visual: Graham Keitch, 2 South Meadows, Wrington, Avon BS18 7PF
Photographic: Harold Ridley, Eastfield Lodge, Eastfield Lane, East Chinnock, Yeovil, Somerset BA22 9EP
Astrometric: Mike Hendrie, Overbury, 33 Lexden Rd, West Bergholt, Colchester, Essex CO6 3BX

Any other brief items of interest or notices should also be sent to me at Wrington. In particular, I would like to hear from our comet hunters so that we can collate statistics on this activity.

The Comet Section Newsletter will appear as frequently as is necessary (probably every four to six weeks). Regular communications and prompt reporting of observations within the Section will leave us better placed to report summaries of our work to the rest of the Association (via the Journal and at meetings) and to other agencies such as the ICQ.

Now the dust has settled after Halley, I would like to carry out a review of the Section's membership. A form is enclosed for your completion and return to assist me in establishing a new set of records. Finally, best wishes and good luck to you all in 1989.

IN BRIEF:

The Halley results - we are currently discussing the relative merits of publishing the BAA Halley results in the Journal or a memoir. Meanwhile, Mike Hendrie is putting the text together and we are very grateful for his assistance with this major task.

David Keedy Award - this award is given annually to a member of the Section by David in recognition of valuable contributions to our observing programme. Jonathan Shanklin was the recipient last session. Congratulations Jonathan and thank you David.

Prospects in 1989 - Harold Ridley has researched into the prospects of observing this year's periodic comets. His notes are attached and we thank him for this very useful contribution.

Cambridge Meeting Feb 25 - a joint meeting involving the BAA Comet, Asteroid and Remote Planets and Meteor Sections will be held at the Institute of Astronomy in Cambridge on Saturday February 25. The meeting commences at 1100h and there will be a small admission fee. Further details can be obtained from Jonathan Shanklin, 11 City Rd., Cambridge CB1 1DP (tel 0223 61188 -work or 0223 64778 - home).

April Bamberg Meeting - I hope to represent us at this international 'Comets in the post-Halley era' conference. Are any other members planning to attend?

ICQ Contributions - our contributions to the ICQ have slipped badly. This Newsletter initiative should encourage members to report their results to me more frequently which will assist in the collation of data for the ICQ. The attached form will also enable me to establish which members send their results direct to the ICQ.

OBSERVERS AND TELESCOPES:

Could the recent arrival of the two new Yanaka comets be anything to do with the fact that **Harold Ridley** had just put his instruments out of action for an overhaul? (Spode's Law). We look forward to Harold returning to action again soon. A new **0.5 f/4.2 reflector** for visual comet studies will be installed at Wrington some time in the next few months to replace the 0.6m f/5.3 reflector. The massive 0.6m instrument was acquired to extend my post-perihelion set of Halley observations but it is too cumbersome for routine use. **George Alcock** is very impressed with the latest double glazing which has been installed in his home which will enable him to conduct his nova and comet searches entirely from indoors. Good luck George.

COMET NEWS

Recent discoveries and recoveries. Comet Yanaka 1989a was found at mag 9 in 15cm binoculars only days after the same observer discovered 1988r. An ephemeris is attached. On Jan 2 Helin, Roman and Crockett discovered 15th mag 1989b with the 0.46m Palomar Schmidt and a few days later, Bill Bradfield located his 14th new comet (1989c). This 12th mag object is not accessible from the UK. The Mt Palomar 1.5m reflector was used by Gibson to recover the very faint P/Russell 3 which has been designated 1989d while 1989e was discovered at mag 13 by Shoemaker on Jan 13. A provisional ephemeris is also attached for this particular object.

Recent BAA results:

1988r Yanaka. This object has slipped low into the morning twilight and is no longer accessible. It was glimpsed from Wrington in 20X80B on Jan 13.

1989a Yanaka. The 0.3m f/5 reflector X62 at Wrington showed this comet as a quite large (2'.5) diffuse and illdefined object at mag 10.6 - 10.7 on Jan 11 and 13. A few days later on Jan 18 before moonlight interfered, the comet appeared somewhat fainter and was quite a difficult object. It has been photographed successfully by Shanklin, Manning and Bucznski.

YANAKA (1989a)

T 1988 Nov 1.13600 — Peri 351.78400 ¦
q 1.8989200 A.U. — Node 156.45900 ¦ -1950.0
Inc 52.47800 ¦

DATE	R.A. (1950.0)		Dec.		△	r	Rv	Elong	Mag_1
1989	h	m	°	'			°	°	
Jan 28	14	33.53	+19	5.1	1.830	2.186	287.7	97.3	+10.7
Jan 29	14	35.14	+19	30.6	1.827	2.192	288.0	97.9	+10.7
Jan 30	14	36.73	+19	56.2	1.824	2.198	288.3	98.5	+10.7
Jan 31	14	38.30	+20	22.0	1.822	2.204	288.6	99.1	+10.7
Feb 1	14	39.85	+20	47.9	1.819	2.210	288.9	99.7	+10.7
Feb 2	14	41.37	+21	14.0	1.816	2.216	289.2	100.3	+10.8
Feb 3	14	42.87	+21	40.3	1.814	2.223	289.6	100.9	+10.8
Feb 4	14	44.35	+22	6.7	1.812	2.229	289.9	101.5	+10.8
Feb 5	14	45.80	+22	33.2	1.810	2.235	290.3	102.1	+10.8
Feb 6	14	47.23	+22	59.8	1.808	2.241	290.6	102.6	+10.8
Feb 7	14	48.63	+23	26.6	1.807	2.248	291.0	103.2	+10.8
Feb 8	14	50.01	+23	53.5	1.805	2.254	291.4	103.8	+10.8
Feb 9	14	51.36	+24	20.4	1.804	2.261	291.8	104.3	+10.8
Feb 10	14	52.69	+24	47.4	1.803	2.267	292.3	104.9	+10.8
Feb 11	14	53.99	+25	14.5	1.802	2.274	292.7	105.4	+10.8

$Mag_1 = 6 + 5 \log \triangle + 10 \log r$

SHOEMAKER (1989e)

T 1989 Feb 15.67000 — Peri 15.70000 ¦
q 2.6595000 A.U. — Node 136.44000 ¦ -1950.0
Inc 96.39000 ¦

DATE	R.A. (1950.0)		Dec.		△	r	Rv	Elong	Mag_1
1989	h	m	°	'			°	°	
Jan 25	9	56.35	+26	55.6	1.731	2.669	294.9	158.1	+11.5
Jan 26	9	54.67	+27	38.1	1.726	2.668	298.4	159.0	+11.4
Jan 27	9	52.94	+28	20.6	1.722	2.668	302.3	159.8	+11.4
Jan 28	9	51.17	+29	3.2	1.718	2.667	306.4	160.5	+11.4
Jan 29	9	49.36	+29	45.7	1.715	2.666	310.9	161.1	+11.4
Jan 30	9	47.50	+30	28.2	1.713	2.665	315.7	161.5	+11.4
Jan 31	9	45.59	+31	10.5	1.711	2.665	320.7	161.8	+11.4
Feb 1	9	43.65	+31	52.7	1.710	2.664	325.7	161.9	+11.4
Feb 2	9	41.66	+32	34.7	1.709	2.663	330.8	161.9	+11.4
Feb 3	9	39.64	+33	16.5	1.709	2.663	335.9	161.6	+11.4
Feb 4	9	37.57	+33	57.9	1.710	2.662	340.8	161.3	+11.4
Feb 5	9	35.47	+34	39.0	1.711	2.662	345.4	160.8	+11.4
Feb 6	9	33.33	+35	19.7	1.713	2.661	349.8	160.2	+11.4
Feb 7	9	31.16	+35	59.9	1.715	2.661	353.8	159.4	+11.4
Feb 8	9	28.96	+36	39.7	1.718	2.661	357.5	158.5	+11.4

$Mag_1 = 6 + 5 \log \triangle + 10 \log r$

BRITISH ASTRONOMICAL ASSOCIATION - COMET SECTION

Prospects for 1989

The past six months have been barren of even moderately bright comets, and it looks as though 1988 will leave us with no legacy.Of the comets know to be appearing in 1989, only P/Brorsen-Metcalf will achieve a respectable magnitude, and we must wait for that till the summer months.We must hope that the comet-seekers will find something for us to observe before then, but at least we have a breathing space in which to catch up on the arrears of desk-work and to refurbish our equipment The following notes give some indication of what to expect from each comet, but we can always hope for surprises.

P/Tempel 1, 1987e1 When discovered in 1867, this comet was making a more favourable apparition than has occurred since, and attained a magnitude of 8½ - 9. The two subsequent returns were observed at mag. 10 - 11, but a Jupiter encounter in 1881 put the comet into a larger orbit and it was lost for the next 13 returns.As a result of computations by Marsden and Schubart,taking account of perturbations in 1941 and 1953, Roemer recovered the comet in 1967, but only a single observation was made and the identification had to wait until confirmed by the recovery in 1972 - hence the designation 1967VII when it was actually the first comet at perihelion in that year.The comet is now in a fairly stable orbit, librating around the 1/2 resonance with Jupiter, and will remain so for the next century and a half.Its present period of 5½ years means that perihelia alternate between January and July, the former being very unfavourable.The January perihelion this time means that the magnitude is unlikely to become brighter than 17. The comet was recovered in 1987 October when it was 21st magnitude.

P/D'Arrest, 1987k This interesting comet excelled itself in 1976, making its closest-ever (0.15 a.u.) approach to the Earth, and, indulging in its customary post-perihelion flare, achieved naked-eye brightness at 5th magnitude.The 1982 return was less favourable but still produced a good 8th mag. However, every third return is usually poor, and this time we have the least favourable apparition ever, perihelion coinciding with superior conjunction.The comet has already (April 24) been at its nearest to us (2.17 a.u.) and from October till 1989 May the elongation is too small for observations to be feasible. The comet was recovered in 1987 at the extraordinary magnitude (CCD) of 23, and the brightness is unlikely to exceed 20th for the rest of the apparition.We may console ourselves with the thought that the next appearance (1995) will be one of the best possible.

P/Perrine-Mrkos When discovered in 1896 this comet was 8th magnitude, with 30' of tail, but although the next-but-one return was slightly more favourable, it only reached 13th mag. It was then lost for the next six returns,being rediscovered in 1955 at 9th magnitude. It was much fainter at the next two returns, and has not been seen since 1968 It seems that the comet is subject to occasional outbursts, remaining very faint most of the time.It may well be in its death-throes, like a spent candle, and it is possible that we have seen the last of it. The present apparition is less favourable than any of those when it has actually been observed;closest approach to the Earth occurred on 1988 Aug.17, when the magnitude was probably not brighter than 20. Barring an unexpected outburst leading to recovery, this return may be written off.

P/Tempel-Swift Not having been seen for 80 years, this comet may be considered to be well and truly lost, and it is unlikely that anything other than an accidental rediscovery will restore it. Frequent approaches to Jupiter have increased the size of the original orbit, which is also subject to non-gravitational forces not well determinable from the four observed apparitions; there may also have been some intrinsic fading. Even at its 1908 level of brightness, the current apparition is unlikely to yield better than 18-19 magnitude. Having already passed its perigee, (1988 Aug.24) without being observed, the chances of recovery this time are very remote.

P/Churyumov-Gerasimenko, 1988i This comet will be as difficult to observe in 1989 as its name is to pronounce. A comparative newcomer to the list of short-period comets, it was discovered photographically in 1969 by chance. Its discovery was made possible by a drastic perturbation by Jupiter in 1959, which reduced q from 2.74 to 1.28, i from 27° to 7°, and increased e from 0.36 to 0.63. The present orbit will remain stable for as long as we shall be concerned with it. An optimum apparition in 1982 enabled the comet to reach 9th magnitude with a 10' tail, but once again this year things could hardly be worse with perihelion occurring near superior conjunction. Perhaps 14-15th magnitude will be reached in the autumn, but that is the best we can hope for. The comet was recovered on 1988 July 6 at about 19th mag.

P/Pons-Winnecke Only two other comets, P/Encke (54) and P/Halley (30) have exceeded the 19 observed apparitions of this object. Discovered in 1819 by the indefatigable Pons, it was promptly lost again until its rediscovery by Winnecke in 1858, since when it has been missed at very few returns. Initially, the small q and low inclination made close approaches to us possible; at discovery the separation was only 0.13 a.u. at which the comet was 6th magnitude. However, the orbit involves frequent encounters with Jupiter, the resulting perturbations causing both q and i to increase to their present values of 1.26 a.u. and 22° respectively. While q was close to 1.0, very close passages of the Earth were possible, and in 1927 the comet missed us by a mere 0.04 a.u., one of the closest approaches of a comet ever recorded. The brightness reached 3½ magnitude and a 1° tail was observed. Since the 6½ mag. of 1939, the rest has been anticlimax, with magnitudes in the range of 12 - 20. This year's return is only moderately favourable, and the brightest the comet is likely to be is 11 - 13th mag., in August, when it goes south of the equator. In 1916 a strong display of meteors was seen (the June Draconids), and was subsequently shown to be associated with this comet. Weaker displays occurred in 1921 and 1927, since when no strong recurrence has been observed.

P/Gunn This is one of four comets (the others are P/Encke, P/Smirnova - Chernykh and P/Schwassmann-Wachmann 1) that can be observed all round their orbits, and are not given provisional designations. P/Gunn was discovered in 1970 after a perturbation by Jupiter in 1965 had reduced q, but two pre-discovery images were found on Palomar plates of 1956. Until the mid-XVIIIth century the orbit was confined to the Jupiter - Saturn region, but a long slow encounter with the former during 1868 - 1884 resulted in temporary capture into a satellite orbit, followed by a return to heliocentric motion in the Mars - Jupiter zone. The orbit is somewhat chaotic and the comet will return to the Jupiter-Saturn region in the XXIIIrd century.
Because of the low eccentricity (0.314) perihelion only produces a modest increase in brightness, and this apparition is similar to the previous ones, with maximum brightness in the 14 - 15 mag. range.

P/Brorsen-Metcalf At last we have a comet that might reach a decent brightness.Discovered in 1847, the comet was recorded at 6½ magnitude, with a 15' tail.It was found to have a direct orbit with a period of about 70 years, and at its second apparition in 1919 it passed close to the Earth (0.2 a.u.) and reached 4½ mag., with a tail 1½°long.The tail was straight and narrow, of Type 1, and a remarkable disconnection event was recorded in late October.Visible to the naked eye in September and October, the coma diameter was 15'.
The orbit is very stable, no encounters with major planets occurring during the 500 years from discovery to 2450.The present apparition is quite a good one and the comet will be well placed for observation from mid-northern latitudes.In late September the brightness should reach at least 5th magnitude, though by then the comet will be in Leo, in the twilight of the dawn sky.From July to September the comet moves from Pisces through Pegasus and Triangulum into Perseus and Auriga,becoming just circumpolar from U.K. near the end of August, after which it goes rapidly south and sunwards as perihelion is approached.On September 21st when at its brightest, the elongation from the Sun will be only 30°.

P/Lovas 1 This is an undistinguished comet, intrinsically faint and pursuing an undisturbed orbit of moderate size.Although this is a more favourable apparition than the previous one at which it was discovered, the comet is unlike;y to be brighter than 15 - 16th magnitude.

P/DuToit- Neujmin-Delporte Perturbations by Jupiter in 1872 & 1884 reduced q from 1.7 to 1.3 a.u., making possible closer approaches to the Sun and the Earth, but it was not until 1941 that the comet was actually discovered.On this occasion there was an exactly perihelic opposition, and the Earth-distance of 0.3 a.u. was the least possible in the 200-yea interval from 1800 to 2000.It is likely that a perihelic outburst enhanced the brightness to its observed 9½ magnitude, for on subsequent returns it has been much fainter than expected.Further perturbations in 1954 and 1966 restored q to its previous value, and it was not until 1970 that the comet was observed again - this time at 18½ mag., and the next return in 1983 produced no better than 16½. The present apparition, if observed, will probably yield no greater brightness than 18 -19 mag.

P/Schwassmann-Wachmann 1 Because of the near-circularity of its orbit, (e = 0.045) perihelion makes very little difference to the brightness of this comet, revolving around the Sun about 0.8 a.u. beyond the orbit of Jupiter.Perturbations by that planet are effective because of the low relative velocity, but the orbit remains fairly stable and will not experience major changes in the next 500 years.The basic magnitude of 17+ to 19 would make this comet of mainly academic interest to us were it not for the fairly frequent (about two per year) outbursts which raise the brightness to 12 - 14th magnitude.These outbursts are quite unpredictable, and constant monitoring is needed to ensure that none are missed.Several authors have investigated the problem, arriving at different conclusions, but no statistically sound correlations have been found either with position in the orbit or the level of solar activity. It seems that internal forces must be responsible for the outbursts, unless one accepts the suggestion that they are caused by collisions with interplanetary boulders.What is needed is close surveillance over a long period of time, and we can contribute to this by keeping an eye on the comet's position, making a quick check whenever conditions permit.

P/Gehrels 2 This rather distant comet requires a fairly large aperture for its observation, its brightness not having exceeded 15th magnitude on its two previous apparitions.The orbit is pretty stable at present, but will change dramatically in 2031, when a deep slow encounter with Jupiter will more than double q and halve e.As a result, it will be even fainter than it is now, and may well be lost.The current apparitio is quite favourable, but even so the comet is not likely to be brighter than its normal 15 - 16th magnitude.

P/Clark Owing to its 5½-year period,periheliaof this comet alternate between May and November, the former being favourable, the latter very unfavourable.We are out of luck this time, the apparition being almost an exact repeat of that of 1978, when the brightness did not exceed 18th magnitude.By contrast, the previous return in 1984 yielded visual magnitudes of 10½ - 11.No great orbital changes are due to occur during the next 100 years, the comet librating gently around the 1/2 resonance with Jupiter.

H.B.Ridley,
Eastfield Observatory,
1988, December 14

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Comets in 1989

P/Comet	Prov. desig.	T 1989	Brightest Mag.	Brightest Month	Brightest Elong.	Moon New	Moon Full
Tempel 1	1987e1	Jan. 4.4	17	Feb.	34W	Jan. 7	Jan.21
D'Arrest	1987k	Feb. 4.2	20	June	38W	Feb. 6	Feb.20
Perrine-Mrkos		Mar. 2	-	-	-	Mar. 7	Mar.22
Tempel-Swift		Mar.14	-	-	-	Apr. 6	Apr.21
Churyumov-Gerasimenko	1988i	June18.4	14-15	Oct.	40W	May 5	May 20
Pons-Winnecke		Aug.19.9	11-13	Aug.	71E	June 3	June19
Gunn	-	Sep.25.0	14-15	May	170E	July 3	July18
Brorsen-Metcalf		Sep.27.6	5	Sep.	34W	Aug. 1	Aug.17
Lovas 1		Oct.10.7	15-16	Nov.	130W	Aug.31	Sep.15
DuToit-Neujmin-Delporte		Oct.18.4	18-19	July	117E	Sep.29	Oct.14
Schwassmann-Wachmann 1	-	Oct.26.7	18(12)	-	-	Oct.29	Nov.13
Gehrels 2		Nov. 3.1	15-16	Oct.	158W	Nov.28	Dec.12
Clark		Nov.28.4	18	Aug.	50E	Dec.28	

Short-Period Comets at Perihelion in 1990

P/Comet	T 1990	P yrs	q a.u.	N	Previous Apparitions First	Previous Apparitions Last
Kopff,1988k	Jan.20.4	6.46	1.585	12	1906IV	1983XIII
Tuttle-Giacobini-Kresak	Feb. 8.2	5.46	1.068	6	1858III	1978XXV
Sanguin	Apr. 2.6	12.50	1.814	1	1977XII	-
Russell 3	May 18.1	7.50	2.517	1	1982IX	-
Schwassmann-Wachmann 3	May 19.3	5.35	0.936	2	1930VI	1979VIII
Peters-Hartley	June21.6	8.13	1.626	2	1846VI	1982III
Tritton	July 7.2	6.35	1.439	1	1977XIII	-
Russell 4	July 7.5	6.57	2.223	1	1984I	-
Honda-Mrkos-Pajdusakova	Sep.12.7	5.30	0.542	7	1948XII	1985III
Encke	Oct.28.5	3.28	0.331	54	1786I	1987
Johnson	Nov.19.0	6.97	2.313	6	1949II	1983XVIII
Kearns-Kwee	Nov.22.7	8.96	2.215	3	1963VIII	1981XX
Wild 2	Dec.16.9	6.37	1.578	2	1978XI	1984XIV
Taylor	Dec.30.2	6.99	1.961	3	1916I	1984II

BAA COMET SECTION

I am a current member of the BAA and wish to be considered a member of the Comet Section.

Signed: ______________________________ Date: ______________________

Name: ____

Address: ____

____

Tel/Telex/Fax/E-Mail Nos: ____

Main Interests (please tick)

Visual ___ / Photography ___ / Astrometry ___ / Seeking ___ / Computing ___ / Historical ___ / Space Missions ___ / Others (please give brief details):

____

____

Main Instruments/Facilities (include computer and operating system)

____

____

Describe observing location and conditions. Give latitude, longitude and height above sea level if known:

____

____

____

____

Which of the following do you report your results to? (Please tick)

JAS ___ / TA ___ / ICQ ___ / Others (please give details)

____

Do you wish to receive the Newsletter or other Comet Section publications? YES / NO

(If YES please supply 10 first class stamps - not SAE)

Please return to:

Graham Keitch, Director BAA Comet Section, 2 South Meadows, Wrington, Avon BS18 7PF

BAA COMET SECTION NEWSLETTER

Issue Number: 2
Date 5/7/89

Director: Graham Keitch, 2 South Meadows, Wrington, Avon, BS18 7PF
Tel 0272 278658 (day), 0934 862924 (evenings)

FROM THE DIRECTOR:

When the BAA Comet Section Newsletter was launched last January, I envisaged a regular issue appearing once every 4-6 weeks (or perhaps more frequently) depending on the level of observational activity and news. As it happens, the past 6 months have been the most barren and disappointing I can recall and consequently, there has been very little to report. Nevertheless, I have decided to issue Newsletter No 2 to break the long period of silence.

I would like to thank all members who returned the membership forms issued with the last Newsletter. In the aftermath of Halley, I thought it would be a good idea to establish new membership records. The initial effect of an exercise like this is for a dramatic fall to occur in membership as all those who have lost interest are weeded out! It will probably take a while (and a good comet!) to rebuild a healthy and revitalised membership and for the reasons explained below, this is going to be quite a challenge.

In recent years, our membership has been dominated by visual observers with a very small number of extremely capable and dedicated astrometric and photographic workers. The small band of the latter continue to carry out their excellent work (which is internationally acclaimed) and generally continue to improve their facilities to achieve even higher standards. For the visual observer whose coma diameter, mag estimate and tail length data are particularly sensitive to sky condition, the situation has become serious in recent years with the appalling deterioration of our skies due to light pollution. Furthermore, the visual observer cannot fight back with larger apertures or more sophisticated technology as there is no substitute for using a small low power instrument in good skies if one is to perceive the fullest extent of coma and obtain the best magnitude data. At the time of the Halley return I could reach cometary objects of mag 13½ with the 0.3m reflector at Wrington; a few years on, I am struggling to reach mag 12. Observers in this situation - most of us I suspect - will need to make every effort to shield their instruments from light interference and where possible, transport portable equipment to darker sites. Large Dobsonians (eg a 0.5m) can open up new possibilities for tracking very faint small objects and possibly recording coma structure in some of the brighter comets. I would encourage experiments with such apertures although I am doubtful of their suitability for collecting realistic mv and coma size data for objects brighter than mag 12. I would welcome readers comments and views on the subject of 'light pollution and the visual comet observer' and in particular, any thoughts on how we might minimise the difficulties.

IN BRIEF:

Cambridge meeting - This joint meeting which involved the BAA Comet, Asteroid and Remote Planets and Meteor Sections was a great success and we thank Jonathan Shanklin for organising the event. A report will appear in the Journal.

'Prospects in 1989' paper - For completeness, Harold Ridley has asked me to mention Comet Shoemaker-Holt-Rodriquez (1988h) which passed perihelion in June but was omitted in his paper. The comet reached mag 11½ in early June for our colleagues in the southern hemisphere.

Exhibition meeting - I apologise for not representing the Section at this year's Exhibition. Unfortunately, I was unable to attend due to a serious fire at work a few days prior to the event. We will make a special effort in 1990!

OBSERVERS AND TELESCOPES:

Comet hunting - Roy Panther (of 1980u fame) provides the following details of searches from Walgrave, Northampton:

1986	total 73.2h	(77 nights)	
1987	53.7h	(62 nights)	
1988	46.2h	(63 nights)	Well done Roy!

COMET NEWS:

The following objects have received preliminary designations so far this year:

1989a Yanaka (11m)
b Helin-Roman-Crockett (15.5m)
c Bradfield (12m)
d P/Russell 3 (20m)
e Shoemaker (13m)
f Shoemaker (16m)
g P/Pons-Winnecke (20.5m)
1989h P/Clark (20m)
i Parker-Hartley (16.5m)
j Shoemaker-Holt (13m)
k P/West-Hartley (17.5m)
l P/du Toit-Neujmin-Delporte (18.5m)
m SMM 8 (0m)
n P/Gehrels 2 (19m)

P/Brorsen-Metcalf: Unfortunately, this comet is conspicuous by its absence from the above list although it has been poorly placed for recovery of late.

P/Schwassman-Wachmann 1: An ephemeris from an orbit by T Kobayashi is attached for this object to encourage observers to monitor for outbursts. Any positive sightings should be communicated to the Director without delay while summaries of negative results should be sent to Peter Stanley (8 Emberwood, Maiden Lane, Langley Green, Nr Crawley, West Sussex) who has offered to collate the statistics.

P/Gunn: Observers abroad have recently noted this comet at mag 12-13. An ephemeris is attached.

2060 Chiron: On April 10, Meech and Belton recorded a coma around Chiron with the KPNO 4m at the CCD prime focus. The long suspected cometary nature of this object is now confirmed. (IAUC4770)

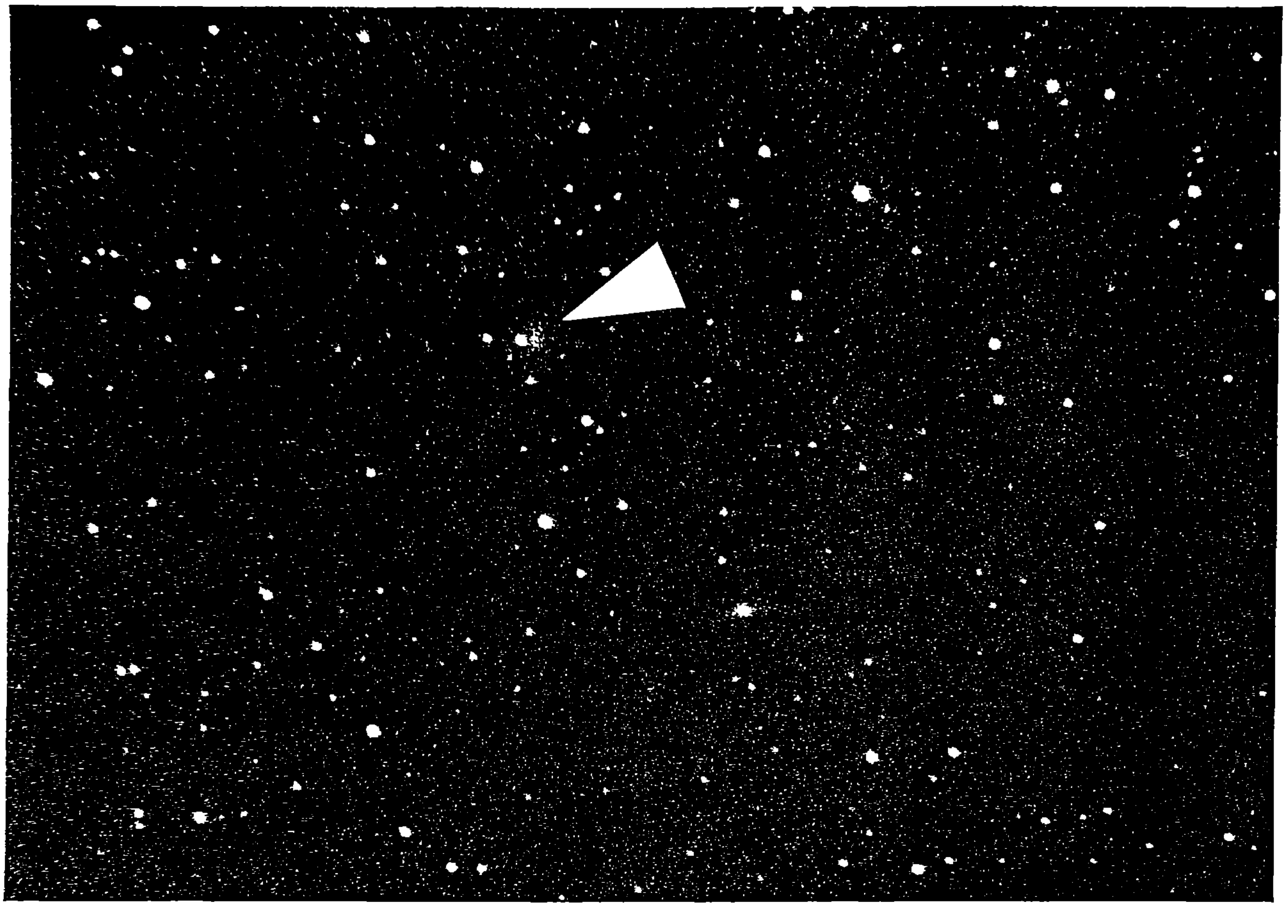
BAA results: (see attached photos)

A) Comet Helin-Roman-Crockett (1989b), 1989 Jan 28.868. A 20m exposure taken by Martin Mobberley (Cockfield, Bury St Edmunds) with a 0.3m f/5 reflector. The coma is estimated to be mpg = 14½ and 0'.8 dia. The elliptical object just below centre is NGC2577.

B) Comet P/Gunn, May 16.156. A CCD image with red filter obtained by Mark Kidger with the 1m JKT on La Palma. The field is 2'.2 X 3'.5.

Acknowledgement: The software for the ephemeris calculations was kindly provided by Stan Milbourn.

A



B

P/Schwassmann-Wachmann 1

T 1989 Oct 26.72550 TDT.   Epoch 1989 Nov 10.0

Peri 49°.89710   e 0.0446630
Node 312.12290 -1950.0   a 6.0415948 A.U.
Inc 9.36730   n 0.06637075
q 5.7717590 A.U.   P 14.850 yrs

DATE	R.A. (1950.0)		Dec.		△	r	Rv	Elong
1989	h	m	°	'			°	°
Jun 10	23	56.12	+ 5	56.8	5.916	5.776	271.1	77.1
Jun 11	23	56.48	+ 6	0.7	5.901	5.776	271.5	78.0
Jun 12	23	56.82	+ 6	4.5	5.886	5.775	271.9	78.8
Jun 13	23	57.16	+ 6	8.3	5.870	5.775	272.3	79.7
Jun 14	23	57.48	+ 6	12.0	5.855	5.775	272.7	80.5
Jun 15	23	57.80	+ 6	15.7	5.839	5.775	273.1	81.4
Jun 16	23	58.12	+ 6	19.3	5.824	5.775	273.6	82.2
Jun 17	23	58.42	+ 6	22.9	5.809	5.775	274.0	83.1
Jun 18	23	58.71	+ 6	26.5	5.793	5.775	274.4	84.0
Jun 19	23	59.00	+ 6	30.0	5.778	5.775	274.9	84.8
Jun 20	23	59.27	+ 6	33.5	5.762	5.775	275.3	85.7
Jun 21	23	59.54	+ 6	36.9	5.746	5.775	275.7	86.5
Jun 22	23	59.80	+ 6	40.2	5.731	5.775	276.1	87.4
Jun 23	0	0.05	+ 6	43.5	5.715	5.775	276.6	88.3
Jun 24	0	0.29	+ 6	46.5	5.700	5.775	277.0	89.2
Jun 25	0	0.52	+ 6	50.0	5.684	5.775	277.5	90.0
Jun 26	0	0.74	+ 6	53.2	5.669	5.775	277.9	90.9
Jun 27	0	0.95	+ 6	56.3	5.653	5.775	278.3	91.8
Jun 28	0	1.15	+ 6	59.3	5.637	5.775	278.8	92.7
Jun 29	0	1.35	+ 7	2.3	5.622	5.775	279.2	93.5
Jun 30	0	1.53	+ 7	5.3	5.606	5.775	279.7	94.4
Jul 1	0	1.71	+ 7	8.2	5.591	5.775	280.1	95.3
Jul 2	0	1.87	+ 7	11.0	5.575	5.774	280.6	96.2
Jul 3	0	2.02	+ 7	13.8	5.560	5.774	281.0	97.1
Jul 4	0	2.17	+ 7	16.5	5.544	5.774	281.4	98.0
Jul 5	0	2.30	+ 7	19.2	5.529	5.774	281.9	98.9
Jul 6	0	2.43	+ 7	21.8	5.514	5.774	282.3	99.8
Jul 7	0	2.54	+ 7	24.3	5.498	5.774	282.8	100.7
Jul 8	0	2.65	+ 7	26.8	5.483	5.774	283.2	101.6
Jul 9	0	2.74	+ 7	29.2	5.468	5.774	283.7	102.5
Jul 10	0	2.82	+ 7	31.6	5.453	5.774	284.1	103.4
Jul 11	0	2.90	+ 7	33.9	5.438	5.774	284.5	104.3
Jul 12	0	2.96	+ 7	36.1	5.423	5.774	285.0	105.3
Jul 13	0	3.02	+ 7	38.3	5.408	5.774	285.4	106.2
Jul 14	0	3.06	+ 7	40.4	5.393	5.774	285.9	107.1
Jul 15	0	3.09	+ 7	42.5	5.378	5.774	286.3	108.0
Jul 16	0	3.12	+ 7	44.5	5.363	5.774	286.8	109.0
Jul 17	0	3.13	+ 7	46.4	5.349	5.774	287.2	109.9
Jul 18	0	3.13	+ 7	48.2	5.334	5.774	287.6	110.8
Jul 19	0	3.12	+ 7	50.0	5.320	5.774	288.1	111.7
Jul 20	0	3.10	+ 7	51.8	5.305	5.774	288.5	112.7
Jul 21	0	3.07	+ 7	53.4	5.291	5.774	289.0	113.6
Jul 22	0	3.04	+ 7	55.0	5.277	5.774	289.4	114.6
Jul 23	0	2.99	+ 7	56.5	5.263	5.774	289.8	115.5
Jul 24	0	2.93	+ 7	58.0	5.249	5.774	290.3	116.5
Jul 25	0	2.86	+ 7	59.4	5.235	5.774	290.7	117.4

Jul 26	0	2.78	+ 8	0.7	5.221	5.773	291.1	118.4
Jul 27	0	2.68	+ 8	1.9	5.208	5.773	291.6	119.3
Jul 28	0	2.58	+ 8	3.1	5.194	5.773	292.0	120.3
Jul 29	0	2.47	+ 8	4.2	5.181	5.773	292.4	121.2
Jul 30	0	2.35	+ 8	5.3	5.168	5.773	292.9	122.2
Jul 31	0	2.22	+ 8	6.2	5.155	5.773	293.3	123.2
Aug 1	0	2.07	+ 8	7.1	5.142	5.773	293.8	124.1
Aug 2	0	1.92	+ 8	7.9	5.129	5.773	294.2	125.1
Aug 3	0	1.76	+ 8	8.7	5.117	5.773	294.6	126.1
Aug 4	0	1.59	+ 8	9.4	5.105	5.773	295.1	127.1
Aug 5	0	1.40	+ 8	10.0	5.092	5.773	295.5	128.1
Aug 6	0	1.21	+ 8	10.5	5.080	5.773	296.0	129.0
Aug 7	0	1.01	+ 8	11.0	5.068	5.773	296.4	130.0
Aug 8	0	0.80	+ 8	11.3	5.057	5.773	296.9	131.0
Aug 9	0	0.58	+ 8	11.7	5.045	5.773	297.3	132.0
Aug 10	0	0.35	+ 8	11.9	5.034	5.773	297.8	133.0
Aug 11	0	0.11	+ 8	12.1	5.023	5.773	298.3	134.0
Aug 12	23	59.86	+ 8	12.2	5.012	5.773	298.7	135.0
Aug 13	23	59.60	+ 8	12.2	5.001	5.773	299.2	136.0
Aug 14	23	59.33	+ 8	12.1	4.991	5.773	299.7	137.0
Aug 15	23	59.06	+ 8	12.0	4.981	5.773	300.2	138.0
Aug 16	23	58.77	+ 8	11.8	4.971	5.773	300.7	139.0
Aug 17	23	58.48	+ 8	11.6	4.961	5.773	301.2	140.0
Aug 18	23	58.18	+ 8	11.2	4.951	5.773	301.7	141.0
Aug 19	23	57.87	+ 8	10.8	4.942	5.773	302.2	142.0
Aug 20	23	57.55	+ 8	10.4	4.932	5.773	302.8	143.0
Aug 21	23	57.22	+ 8	9.8	4.923	5.773	303.3	144.0
Aug 22	23	56.89	+ 8	9.2	4.915	5.773	303.9	145.0
Aug 23	23	56.55	+ 8	8.5	4.906	5.773	304.5	146.0
Aug 24	23	56.20	+ 8	7.8	4.898	5.773	305.1	147.0
Aug 25	23	55.85	+ 8	6.9	4.890	5.773	305.8	148.0
Aug 26	23	55.48	+ 8	6.0	4.882	5.773	306.4	149.1
Aug 27	23	55.11	+ 8	5.1	4.875	5.772	307.1	150.1
Aug 28	23	54.74	+ 8	4.1	4.868	5.772	307.9	151.1
Aug 29	23	54.36	+ 8	3.0	4.861	5.772	308.6	152.1
Aug 30	23	53.97	+ 8	1.8	4.854	5.772	309.4	153.1
Aug 31	23	53.57	+ 8	0.6	4.847	5.772	310.3	154.1
Sep 1	23	53.17	+ 7	59.3	4.841	5.772	311.2	155.1
Sep 2	23	52.77	+ 7	58.0	4.835	5.772	312.2	156.1
Sep 3	23	52.36	+ 7	56.6	4.830	5.772	313.2	157.1
Sep 4	23	51.94	+ 7	55.1	4.824	5.772	314.4	158.1
Sep 5	23	51.52	+ 7	53.6	4.819	5.772	315.6	159.1
Sep 6	23	51.10	+ 7	52.0	4.814	5.772	316.9	160.1
Sep 7	23	50.67	+ 7	50.4	4.810	5.772	318.4	161.0
Sep 8	23	50.24	+ 7	48.7	4.806	5.772	319.9	162.0
Sep 9	23	49.81	+ 7	46.9	4.802	5.772	321.7	162.9
Sep 10	23	49.37	+ 7	45.1	4.798	5.772	323.6	163.9
Sep 11	23	48.93	+ 7	43.3	4.795	5.772	325.8	164.8
Sep 12	23	48.48	+ 7	41.4	4.792	5.772	328.2	165.7
Sep 13	23	48.04	+ 7	39.4	4.789	5.772	331.0	166.6
Sep 14	23	47.59	+ 7	37.5	4.786	5.772	334.1	167.4
Sep 15	23	47.14	+ 7	35.4	4.784	5.772	337.6	168.2
Sep 16	23	46.69	+ 7	33.3	4.782	5.772	341.6	168.9
Sep 17	23	46.24	+ 7	31.2	4.781	5.772	346.1	169.6
Sep 18	23	45.79	+ 7	29.1	4.779	5.772	351.3	170.2
Sep 19	23	45.33	+ 7	26.9	4.778	5.772	357.0	170.7
Sep 20	23	44.88	+ 7	24.6	4.778	5.772	3.4	171.2
Sep 21	23	44.43	+ 7	22.4	4.777	5.772	10.4	171.5

P/Gunn

T 1989 Sep 24.97985 TDT.   Epoch 1989 Oct 1.0

Peri 196°.937781 e 0.3143992
Node 67.86766 -1950.0 a 3.6049318 A.U.
Inc 10.37247 n 0.14399868
q 2.4715441 A.U. P 6.845 yrs

DATE		R.A. (1950.0)		Dec.		△	r	Rv	Elong
1989		h	m	°	'			°	°
Jul	1	14	33.80	-13	5.8	1.840	2.527	91.5	121.6
Jul	2	14	33.96	-13	11.5	1.849	2.525	92.0	120.8
Jul	3	14	34.14	-13	17.3	1.859	2.524	92.5	119.9
Jul	4	14	34.36	-13	23.2	1.868	2.523	93.0	119.0
Jul	5	14	34.59	-13	29.1	1.877	2.522	93.5	118.1
Jul	6	14	34.86	-13	35.2	1.887	2.520	94.0	117.3
Jul	7	14	35.15	-13	41.3	1.897	2.519	94.5	116.4
Jul	8	14	35.46	-13	47.5	1.906	2.518	95.0	115.6
Jul	9	14	35.80	-13	53.7	1.916	2.517	95.5	114.7
Jul	10	14	36.17	-14	0.0	1.926	2.516	96.0	113.9
Jul	11	14	36.56	-14	6.4	1.936	2.515	96.4	113.1
Jul	12	14	36.97	-14	12.9	1.946	2.514	96.9	112.2
Jul	13	14	37.41	-14	19.5	1.956	2.513	97.4	111.4
Jul	14	14	37.88	-14	26.1	1.966	2.511	97.8	110.6
Jul	15	14	38.37	-14	32.7	1.977	2.510	98.3	109.8
Jul	16	14	38.88	-14	39.5	1.987	2.509	98.7	109.0
Jul	17	14	39.41	-14	46.2	1.997	2.508	99.2	108.2
Jul	18	14	39.97	-14	53.1	2.008	2.507	99.6	107.4
Jul	19	14	40.56	-15	0.0	2.018	2.506	100.1	106.6
Jul	20	14	41.16	-15	7.0	2.029	2.505	100.5	105.9
Jul	21	14	41.79	-15	14.0	2.040	2.504	100.9	105.1
Jul	22	14	42.44	-15	21.0	2.050	2.503	101.3	104.3
Jul	23	14	43.11	-15	28.1	2.061	2.502	101.7	103.5
Jul	24	14	43.81	-15	35.3	2.072	2.501	102.2	102.8
Jul	25	14	44.52	-15	42.5	2.083	2.500	102.6	102.0
Jul	26	14	45.26	-15	49.8	2.094	2.500	103.0	101.3
Jul	27	14	46.02	-15	57.1	2.105	2.499	103.3	100.5
Jul	28	14	46.80	-16	4.4	2.116	2.498	103.7	99.8
Jul	29	14	47.60	-16	11.8	2.127	2.497	104.1	99.1
Jul	30	14	48.43	-16	19.2	2.138	2.496	104.5	98.3
Jul	31	14	49.27	-16	26.7	2.149	2.495	104.9	97.6
Aug	1	14	50.14	-16	34.1	2.160	2.494	105.2	96.9
Aug	2	14	51.02	-16	41.7	2.171	2.494	105.6	96.2
Aug	3	14	51.93	-16	49.2	2.182	2.493	105.9	95.5
Aug	4	14	52.85	-16	56.8	2.194	2.492	106.3	94.7
Aug	5	14	53.80	-17	4.4	2.205	2.491	106.6	94.0
Aug	6	14	54.76	-17	12.1	2.216	2.490	107.0	93.3
Aug	7	14	55.75	-17	19.7	2.227	2.490	107.3	92.6
Aug	8	14	56.75	-17	27.4	2.239	2.489	107.6	92.0
Aug	9	14	57.77	-17	35.1	2.250	2.488	107.9	91.3
Aug	10	14	58.81	-17	42.8	2.261	2.488	108.3	90.6
Aug	11	14	59.87	-17	50.6	2.273	2.487	108.6	89.9
Aug	12	15	0.95	-17	58.3	2.284	2.486	108.9	89.2
Aug	13	15	2.04	-18	6.1	2.296	2.486	109.2	88.5
Aug	14	15	3.15	-18	13.9	2.307	2.485	109.5	87.9

Aug 15	15	4.28	-18	21.7	2.318	2.484	109.7	87.2
Aug 16	15	5.43	-18	29.5	2.330	2.484	110.0	86.5
Aug 17	15	6.60	-18	37.3	2.341	2.483	110.3	85.9
Aug 18	15	7.78	-18	45.1	2.352	2.482	110.6	85.2
Aug 19	15	8.97	-18	52.9	2.364	2.482	110.8	84.6
Aug 20	15	10.19	-19	0.7	2.375	2.481	111.1	83.9
Aug 21	15	11.42	-19	8.5	2.387	2.481	111.3	83.3
Aug 22	15	12.67	-19	16.3	2.398	2.480	111.6	82.6
Aug 23	15	13.93	-19	24.1	2.409	2.480	111.8	82.0
Aug 24	15	15.21	-19	31.9	2.421	2.479	112.1	81.4
Aug 25	15	16.50	-19	39.7	2.432	2.479	112.3	80.7
Aug 26	15	17.82	-19	47.5	2.444	2.478	112.5	80.1
Aug 27	15	19.14	-19	55.3	2.455	2.478	112.7	79.5
Aug 28	15	20.48	-20	3.0	2.466	2.477	112.9	78.8
Aug 29	15	21.84	-20	10.8	2.478	2.477	113.1	78.2
Aug 30	15	23.21	-20	18.5	2.489	2.477	113.3	77.6
Aug 31	15	24.60	-20	26.2	2.500	2.476	113.5	77.0
Sep 1	15	26.00	-20	33.9	2.512	2.476	113.7	76.3
Sep 2	15	27.42	-20	41.6	2.523	2.476	113.9	75.7
Sep 3	15	28.85	-20	49.3	2.534	2.475	114.1	75.1
Sep 4	15	30.29	-20	56.9	2.545	2.475	114.2	74.5
Sep 5	15	31.75	-21	4.5	2.557	2.475	114.4	73.9
Sep 6	15	33.23	-21	12.1	2.568	2.474	114.6	73.3
Sep 7	15	34.71	-21	19.7	2.579	2.474	114.7	72.7
Sep 8	15	36.21	-21	27.2	2.590	2.474	114.9	72.1
Sep 9	15	37.73	-21	34.7	2.601	2.473	115.0	71.5
Sep 10	15	39.26	-21	42.2	2.612	2.473	115.1	70.9
Sep 11	15	40.80	-21	49.6	2.623	2.473	115.3	70.3
Sep 12	15	42.35	-21	57.0	2.634	2.473	115.4	69.7
Sep 13	15	43.92	-22	4.3	2.646	2.473	115.5	69.1
Sep 14	15	45.49	-22	11.7	2.656	2.472	115.6	68.5
Sep 15	15	47.09	-22	18.9	2.667	2.472	115.7	67.9
Sep 16	15	48.69	-22	26.2	2.678	2.472	115.8	67.4
Sep 17	15	50.30	-22	33.4	2.689	2.472	115.9	66.8
Sep 18	15	51.93	-22	40.5	2.700	2.472	116.0	66.2
Sep 19	15	53.57	-22	47.6	2.711	2.472	116.1	65.6
Sep 20	15	55.22	-22	54.7	2.722	2.472	116.2	65.0
Sep 21	15	56.89	-23	1.7	2.732	2.472	116.2	64.5
Sep 22	15	58.56	-23	8.6	2.743	2.472	116.3	63.9
Sep 23	16	0.25	-23	15.5	2.754	2.472	116.4	63.3
Sep 24	16	1.95	-23	22.4	2.764	2.472	116.4	62.7
Sep 25	16	3.66	-23	29.2	2.775	2.472	116.5	62.2
Sep 26	16	5.38	-23	35.9	2.786	2.472	116.5	61.6
Sep 27	16	7.11	-23	42.6	2.796	2.472	116.6	61.0
Sep 28	16	8.86	-23	49.2	2.807	2.472	116.6	60.5
Sep 29	16	10.61	-23	55.7	2.817	2.472	116.6	59.9
Sep 30	16	12.38	-24	2.2	2.827	2.472	116.6	59.3
Oct 1	16	14.15	-24	8.7	2.838	2.472	116.6	58.8
Oct 2	16	15.94	-24	15.0	2.848	2.472	116.7	58.2
Oct 3	16	17.74	-24	21.3	2.858	2.472	116.7	57.7

BAA COMET SECTION NEWSLETTER

Issue Number: 3
Date 28/7/89

Director: Graham Keitch, 2 South Meadows, Wrington, Avon, BS18 7PF
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FROM THE DIRECTOR:

Comet P/Brorsen-Metcalf is with us at last! It was photographed by Helin with the Mt Palomar 0.46m Schmidt on July 4.3 and has been designated 1989o. The comet was considerably off-track and perihelion will occur some 15.6 days earlier than anticipated. Following the recovery announcement, Jekabsons (Perth) was able to locate a pre-recovery image on plates exposed on July 3.8. These initial photographic detections showed the comet to be a rather diffuse and faint object at mag 15 although subsequent visual sightings by A Hale and C Morris in the USA were more encouraging. Morris found the coma to be 5' across and mag 10.4 in his 0.5m reflector on July 7.44 and this same observer's 20X80B gave values of mag 9.6 and 9' dia a few days later on July 8.45. J Bortle (USA) saw the comet at mag 8.1 with 10X50B on July 13.32 which indicates quite a rapid brightening.

Harold Ridley (our photographic coordinator) obtained a successful result with his 17cm lens at Eastfield Observatory on July 12.05. Harold describes the photographic coma as being very faint and diffuse with a small central condensation. This 30 minute exposure was secured in good conditions with the comet at a low altitude. I was unable to locate the object around this time with my 20X80B from Wrington due to low altitude and twilight although George Alcock (Peterborough) succeeded with his 25X105B a few days later on July 15.05. George confirms that visually, the comet is very large and diffuse (9' dia).

Professional results from the Lick and Lowell observatories reported in IAUC 4810 (July 13) indicate a high gas to dust ratio. The molecular emissions due to CN, C_3, CH, C_2 and NH_2 are particularly strong while the dust continuum is relatively weak. This partly accounts for the comet's diffuse appearance. A paper by Rob van de Weg in the Dutch Comet Section Newsletter speculates that a significant 15° plasma tail should be in evidence by the first week of September when the mag 4 (?) comet should provide good opportunities for photographers. The dust tail will be less dramatic and should be more easily seen later that month. Rob draws attention to the fact that any deviations in the direction of the plasma feature from the orbital plane should be particularly evident during the first week of August when the earth passes the orbital plane of the comet although anti-tails are not anticipated. According to Harold Ridley, a September perihelion passage is generally less favourable than one occurring in October. On the plus side however, it will enable us to observe more of the post-perihelion phase when we might expect the comet to be more active.

A daily ephemeris is provided although the magnitudes are probably a little pessimistic.

OTHER NEWS IN BRIEF

The P/Schwassmann-Wachmann 1 ephemeris published in the last Newsletter was very timely as news has just reached me of another outburst! Observers in Japan and USA recorded the comet at mag 11-13 during the first two weeks of July. Did any of our members succeed in recording anything? I would like our photographers and large instrument users to keep a close watch on this one please.

Two more discoveries have been made of late as follows:

- 1989p P/Lovas 1 was recovered by T Seki (Japan) on July 7 at mag 17
- 1989q SMM9 was discovered by the Solar Max Mission spacecraft at mag -2 on July 8.6.

The latest news on P/Brorsen-Metcalf:

Observation by the Director from Wrington - 1989 July 27.10UT

Mag 7.0 in 10X50B (AAVSO), coma at least 8' dia. Mag 7.2 in 20X80B (AAVSO), basically circular diffuse disc at least 6' dia with tiny weak central condensation, DC2-3. Several narrow tails and spikes suspected. Crescent moon nearby but comet quite easily seen.

P/Brorsen-Metcalf (1989o)

T 1989 Sep 11.93950 TDT.

Epoch 1989 Oct 1.0ET

Peri 129°.62560 }
Node 310.87610 } -1950.0
Inc 19.33060 }
q 0.4787444 A.U.

e 0.9719700
a 17.0797160 A.U.
n 0.01396314
P 70.586 yrs

DATE	R.A. (1950.0)		Dec.		△	r	Rv	Elong	Mag₁
1989	h	m	°	′			°	°	
Jul 8	0	36.60	+13	35.3	0.998	1.443	285.4	91.5	+9.6
Jul 9	0	40.28	+14	17.9	0.978	1.427	286.1	91.3	+9.5
Jul 10	0	44.11	+15	1.7	0.958	1.411	286.8	91.1	+9.4
Jul 11	0	48.07	+15	46.8	0.939	1.395	287.5	90.9	+9.3
Jul 12	0	52.19	+16	33.3	0.920	1.378	288.2	90.6	+9.2
Jul 13	0	56.48	+17	21.2	0.901	1.362	288.9	90.3	+9.1
Jul 14	1	0.94	+18	10.4	0.883	1.346	289.6	89.9	+9.0
Jul 15	1	5.60	+19	1.0	0.865	1.329	290.3	89.5	+8.9
Jul 16	1	10.45	+19	53.1	0.848	1.313	291.0	89.1	+8.8
Jul 17	1	15.53	+20	46.5	0.831	1.296	291.8	88.6	+8.7
Jul 18	1	20.83	+21	41.3	0.814	1.280	292.5	88.0	+8.6
Jul 19	1	26.39	+22	37.4	0.798	1.263	293.3	87.4	+8.5
Jul 20	1	32.21	+23	34.9	0.782	1.246	294.0	86.7	+8.4
Jul 21	1	38.31	+24	33.5	0.767	1.230	294.8	86.0	+8.3
Jul 22	1	44.71	+25	33.3	0.753	1.213	295.5	85.2	+8.2
Jul 23	1	51.43	+26	34.0	0.739	1.196	296.3	84.4	+8.1
Jul 24	1	58.50	+27	35.6	0.726	1.179	297.0	83.5	+8.0
Jul 25	2	5.92	+28	37.9	0.713	1.163	297.8	82.5	+7.9
Jul 26	2	13.72	+29	40.5	0.701	1.146	298.6	81.5	+7.8
Jul 27	2	21.92	+30	43.2	0.690	1.129	299.3	80.4	+7.7
Jul 28	2	30.54	+31	45.8	0.680	1.112	300.1	79.3	+7.6
Jul 29	2	39.59	+32	47.9	0.670	1.095	300.9	78.1	+7.5
Jul 30	2	49.09	+33	49.0	0.661	1.078	301.6	76.8	+7.4
Jul 31	2	59.05	+34	48.7	0.653	1.061	302.4	75.5	+7.3
Aug 1	3	9.46	+35	46.5	0.646	1.043	303.1	74.1	+7.2
Aug 2	3	20.34	+36	42.0	0.640	1.026	303.9	72.7	+7.1
Aug 3	3	31.66	+37	34.5	0.635	1.009	304.6	71.2	+7.1
Aug 4	3	43.42	+38	23.5	0.631	0.992	305.3	69.7	+7.0
Aug 5	3	55.59	+39	8.6	0.627	0.975	306.0	68.2	+6.9
Aug 6	4	8.14	+39	49.2	0.625	0.958	306.7	66.7	+6.8
Aug 7	4	21.01	+40	24.8	0.624	0.940	307.4	65.1	+6.7
Aug 8	4	34.15	+40	55.0	0.624	0.923	308.0	63.5	+6.6
Aug 9	4	47.50	+41	19.4	0.625	0.906	308.7	61.9	+6.5
Aug 10	5	0.98	+41	37.9	0.627	0.889	309.3	60.3	+6.5
Aug 11	5	14.53	+41	50.3	0.629	0.872	309.9	58.7	+6.4
Aug 12	5	28.06	+41	56.5	0.633	0.855	310.5	57.1	+6.3
Aug 13	5	41.50	+41	56.6	0.638	0.837	311.0	55.5	+6.3
Aug 14	5	54.78	+41	50.7	0.645	0.820	311.5	53.9	+6.2
Aug 15	6	7.82	+41	39.2	0.652	0.803	312.0	52.4	+6.1
Aug 16	6	20.58	+41	22.2	0.659	0.787	312.5	50.9	+6.1
Aug 17	6	33.00	+41	0.2	0.668	0.770	312.9	49.5	+6.0
Aug 18	6	45.05	+40	33.5	0.678	0.753	313.2	48.1	+5.9
Aug 19	6	56.69	+40	2.6	0.689	0.737	313.6	46.7	+5.9
Aug 20	7	7.92	+39	27.9	0.701	0.720	313.9	45.4	+5.8
Aug 21	7	18.72	+38	49.8	0.713	0.704	314.1	44.1	+5.7
Aug 22	7	28.05	+38	8.8	0.726	0.688	314.3	42.8	+5.7

Aug 23	7	39.02	+37 25.1	0.741	0.672	314.5	41.6	+5.6
Aug 24	7	48.55	+36 39.2	0.755	0.657	314.6	40.5	+5.6
Aug 25	7	57.67	+35 51.3	0.771	0.641	314.7	39.4	+5.5
Aug 26	8	6.42	+35 1.8	0.787	0.627	314.7	38.3	+5.5
Aug 27	8	14.79	+34 10.8	0.804	0.612	314.7	37.3	+5.4
Aug 28	8	22.83	+33 18.6	0.822	0.598	314.6	36.3	+5.3
Aug 29	8	30.55	+32 25.4	0.840	0.584	314.5	35.3	+5.3
Aug 30	8	37.97	+31 31.2	0.859	0.571	314.3	34.4	+5.2
Aug 31	8	45.12	+30 36.3	0.878	0.559	314.1	33.5	+5.2
Sep 1	8	52.01	+29 40.7	0.898	0.547	313.8	32.7	+5.1
Sep 2	8	58.67	+28 44.5	0.919	0.536	313.5	31.9	+5.1
Sep 3	9	5.13	+27 47.8	0.940	0.526	313.1	31.1	+5.1
Sep 4	9	11.39	+26 50.7	0.961	0.516	312.7	30.3	+5.0
Sep 5	9	17.47	+25 53.2	0.983	0.508	312.3	29.5	+5.0
Sep 6	9	23.40	+24 55.3	1.005	0.500	311.8	28.8	+5.0
Sep 7	9	29.18	+23 57.2	1.027	0.494	311.2	28.1	+5.0
Sep 8	9	34.83	+22 58.8	1.050	0.488	310.6	27.4	+5.0
Sep 9	9	40.37	+22 0.3	1.072	0.484	310.0	26.7	+5.0
Sep 10	9	45.79	+21 1.7	1.095	0.481	309.3	26.0	+5.0
Sep 11	9	51.11	+20 3.0	1.118	0.479	308.6	25.4	+5.0
Sep 12	9	56.33	+19 4.4	1.141	0.479	307.8	24.8	+5.1
Sep 13	10	1.47	+18 5.9	1.164	0.479	307.0	24.1	+5.1
Sep 14	10	6.52	+17 7.7	1.187	0.481	306.1	23.6	+5.2
Sep 15	10	11.48	+16 9.7	1.210	0.485	305.2	23.0	+5.3
Sep 16	10	16.37	+15 12.1	1.232	0.489	304.3	22.4	+5.3
Sep 17	10	21.17	+14 15.0	1.255	0.494	303.3	21.9	+5.4
Sep 18	10	25.90	+13 18.4	1.277	0.501	302.3	21.4	+5.5
Sep 19	10	30.55	+12 22.5	1.299	0.509	301.2	20.9	+5.6
Sep 20	10	35.13	+11 27.2	1.321	0.517	300.1	20.5	+5.7
Sep 21	10	39.62	+10 32.6	1.342	0.527	299.0	20.0	+5.9
Sep 22	10	44.04	+ 9 38.9	1.363	0.537	297.9	19.6	+6.0
Sep 23	10	48.39	+ 8 45.9	1.384	0.548	296.7	19.3	+6.1
Sep 24	10	52.66	+ 7 53.9	1.405	0.560	295.6	18.9	+6.2
Sep 25	10	56.86	+ 7 2.7	1.426	0.573	294.4	18.6	+6.4
Sep 26	11	0.98	+ 6 12.5	1.446	0.586	293.1	18.3	+6.5
Sep 27	11	5.04	+ 5 23.2	1.466	0.600	291.9	18.1	+6.6
Sep 28	11	9.02	+ 4 34.8	1.486	0.614	290.7	17.8	+6.7
Sep 29	11	12.93	+ 3 47.3	1.505	0.628	289.5	17.6	+6.9
Sep 30	11	16.78	+ 3 0.8	1.524	0.643	288.3	17.4	+7.0
Oct 1	11	20.56	+ 2 15.3	1.543	0.658	287.1	17.3	+7.1
Oct 2	11	24.27	+ 1 30.6	1.562	0.674	285.9	17.2	+7.3
Oct 3	11	27.92	+ 0 46.9	1.581	0.690	284.7	17.1	+7.4
Oct 4	11	31.52	+ 0 4.1	1.599	0.706	283.6	17.0	+7.5
Oct 5	11	35.05	- 0 37.9	1.617	0.722	282.5	16.9	+7.6
Oct 6	11	38.52	- 1 19.0	1.635	0.738	281.4	16.9	+7.8
Oct 7	11	41.94	- 1 59.2	1.653	0.755	280.3	16.9	+7.9
Oct 8	11	45.30	- 2 38.6	1.671	0.772	279.3	16.9	+8.0
Oct 9	11	48.61	- 3 17.1	1.688	0.788	278.3	16.9	+8.1
Oct 10	11	51.87	- 3 54.9	1.706	0.805	277.4	17.0	+8.2
Oct 11	11	55.08	- 4 31.9	1.723	0.822	276.5	17.1	+8.3
Oct 12	11	58.23	- 5 8.1	1.740	0.839	275.6	17.1	+8.4
Oct 13	12	1.35	- 5 43.6	1.757	0.856	274.8	17.2	+8.5
Oct 14	12	4.41	- 6 18.4	1.773	0.873	274.0	17.4	+8.7
Oct 15	12	7.43	- 6 52.5	1.790	0.891	273.2	17.5	+8.8

$Mag_1 = 8 + 5 \log \Delta + 10 \log r$

BAA COMET SECTION NEWSLETTER

Issue Number: 4
Date 16/9/89

Director: Graham Keitch, 2 South Meadows, Wrington, Avon, BS18 7PF
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FROM THE DIRECTOR:

The past few weeks have provided comet observers with a much welcomed increased level of activity. During August, Comet P/Brorsen-Metcalf 1989o became a bright well condensed object of mag 6 and by the first week of September, the plasma tail had become a fine feature for both visual and photographic observation. Excellent photographic results have been obtained by Harold Ridley (Photographic Co-ordinator), Martin Mobberley, Denis Buczynski and others and some good visual results have been secured by George Alcock, Roy Panther, Mike Hendrie (Assistant Director), Melvyn Taylor and Peter Stanley. A very interesting set of CCD images was obtained by Mark Kidger who used the 1m JKT on La Palma on several subsequent mornings around mid August. These show changes in the tail structure near the head. These, and several other reproductions of BAA photographs appear in this issue although I am unable to do justice to the fine original quality of the images.

At the time of writing, the comet has only just been lost from view low in the eastern morning sky and some observers are still in the process of reducing their results. The good weather during August enabled me to secure a fairly long run of observations from Wrington. The comet appears to have peaked at around mag 5½ during the first few days of September when I was able to see 3 deg of tail in small binoculars. Charles Morris in the States was able to see up to 8 deg on occasions!

I have not included a detailed account of our observations of the comet in this particular issue as I shall be preparing a proper report for the Journal very soon. I would be most grateful to receive any outstanding reports as soon as possible please and I would particularly welcome details from our astrometric observers. The astrometric data has to be processed quickly for publication in the IAU Circulars and we have tended to overlook these valuable contributions in the past when preparing reports of our work sometime after the event. I would very much like to correct this to ensure that this particular field is recognised as a vital part of the Section's observing program.

The main purpose of this issue is to provide details of two recent discoveries, one of which (1989r below) may become a naked eye object in November.

NEW COMET OKAZAKI-LEVY-RUDENKO (1989r):

This comet was independently discovered by David Levy, USA (0.4m reflector) and Michael Rudenko, USA (0.15m refractor) on Aug 25 and 26. The comet was also photographed on Aug 24 by Kiyomi Okazaki, Japan and therefore carries the name of all three observers. Initial reports placed the object at mag 10-11. Over the next few days a good number of astrometric results were obtained by Jonathan Shanklin, Brian Manning and Denis Buczynski. The comet was well placed in Corona Borealis although, photographically, it appeared rather vague and diffuse according to Harold Ridley.

I observed 1989r with the 0.3m reflector at Wrington on Aug 31.93 when it was not too difficult visually at 9m.7. The coma was quite large (approx 3') and rather diffuse and I was able to glimpse it in 20X80B. On Sep 1.89, I estimated the brightness to be 9m.5 (0.3m reflector X62) and on Sep 6.89 it was 9m.3 in the large binoculars. Around this time, Mark Kidger was able to locate it with a 12 x 50B from the Canary Islands.

The comet will be at perihelion on Nov 11 when it may well reach mag 4. It is difficult to predict at this stage whether it will become a spectacular object or not. Much will depend on whether the coma remains large and diffuse. Good luck to all observers who will be helping to chart it's progress - I look forward to seeing the results. A daily ephemeris is provided in this issue to help locate it.

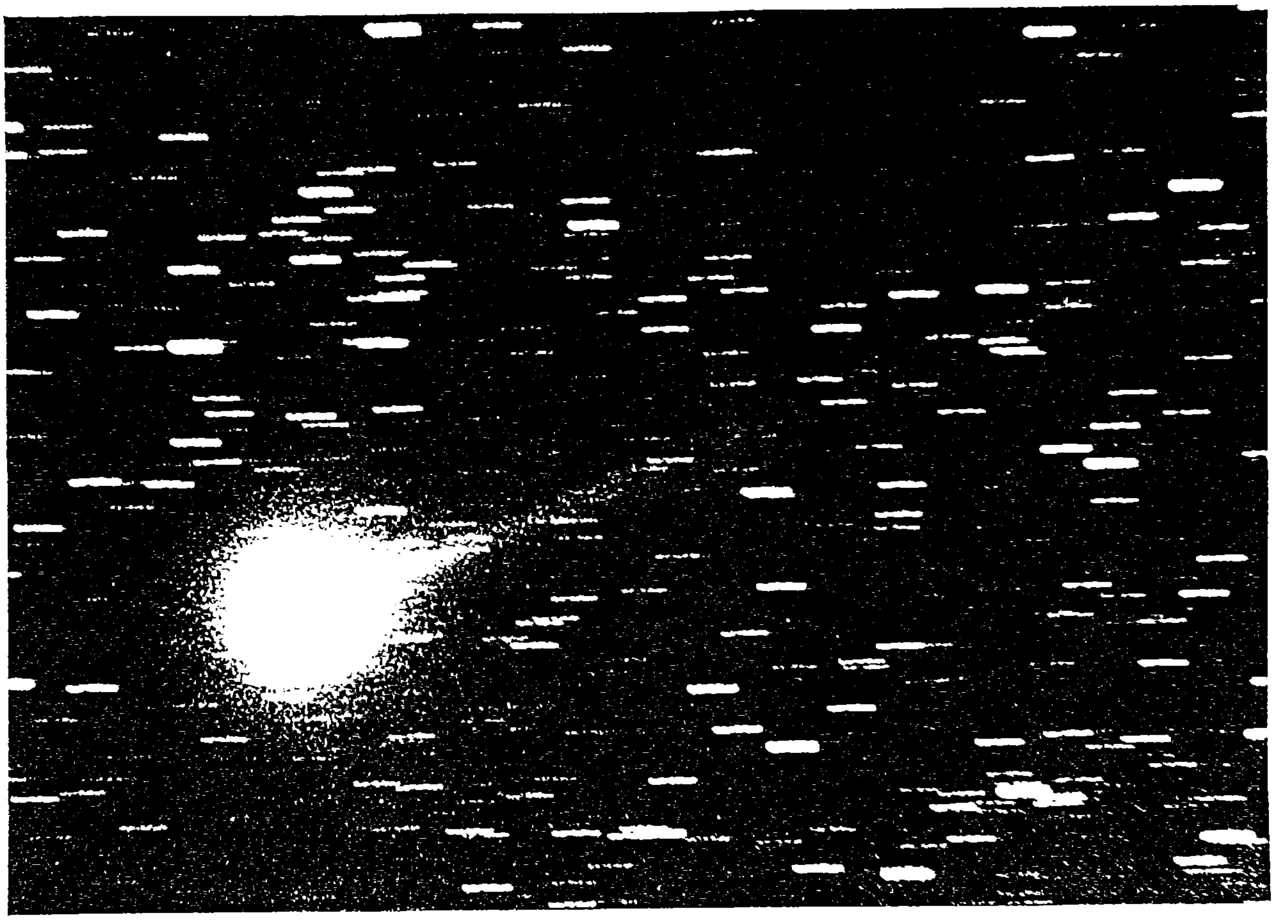
NEW COMET HELIN-ROMAN (1989s):

Eleanor Helin and Brian Roman discovered a new comet on Sep 5 with the photographic 0.46m Palomar Schmidt. They were assisted by R Crokett. The comet was first reported at mag 14 although subsequent visual sightings put it nearer mag 12-13. A daily ephemeris is provided although the comet is fading.

IMAGES OF P/BRORSEN-METCALF:

a) Aug 28. Denis Buczynski, 0.55m f/5 spec.
b) Aug 13. Martin Mobberley, 0.36m f/5 spec.
c) Aug 28. Martin Mobberley, 0.36m f/5 spec.
d) CCD images by Mark Kidger. 1m JKT, La Palma.
   top - Aug 14 V filter
   middle - Aug 15 R filter
   bottom - Aug 16 R filter

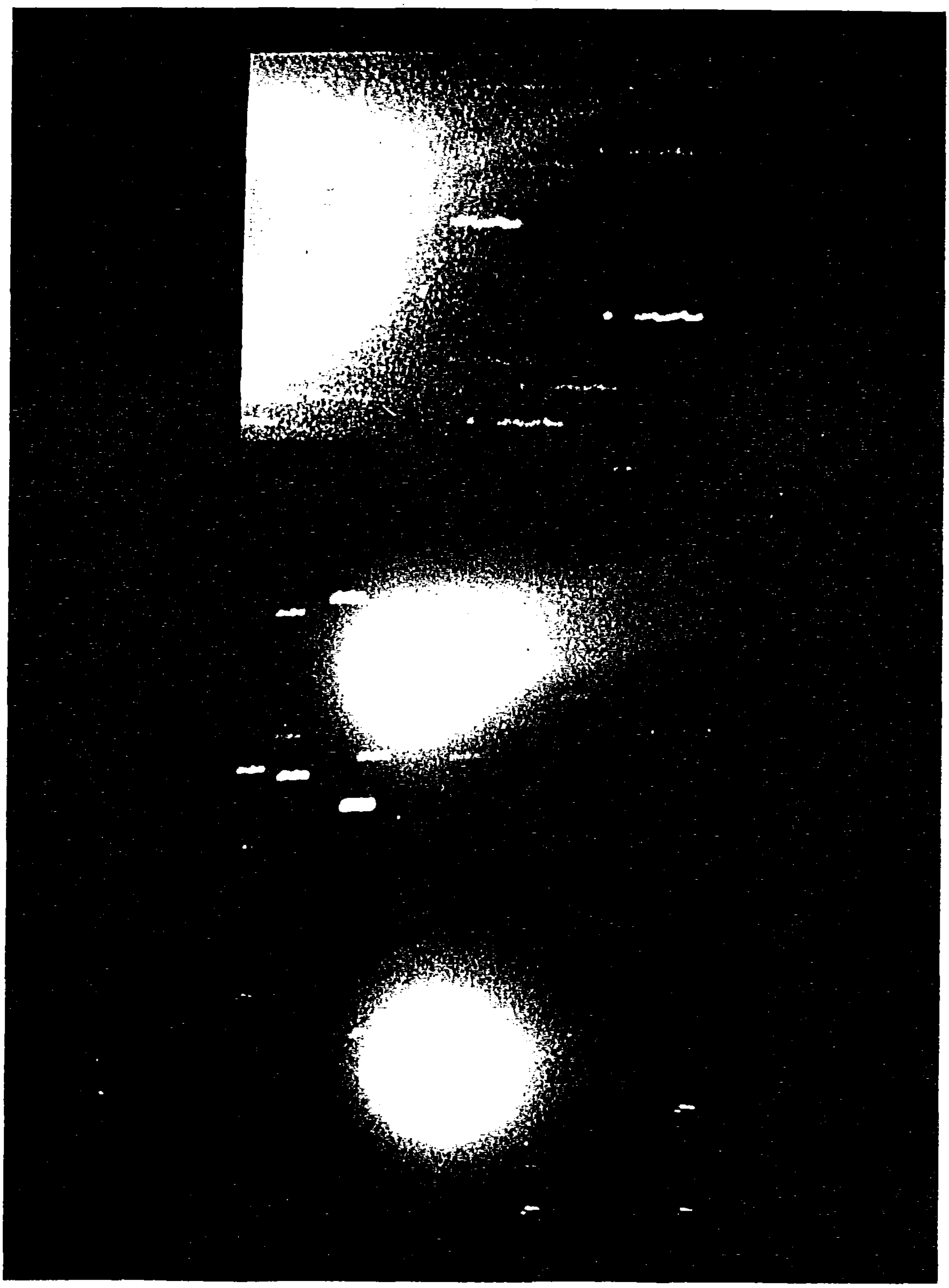
A



B

C

a



OKAZAKI-LEVY-RUDENKO 1989r

T 1989 Nov 11.82600 TDT. Peri 150°66300

Node 274.73500 -1950.0

q 0.6406000 A.U. Inc 90.04400

DATE		R.A. (1950.0)		Dec.		△	r	Rv	Elong
1989		h	m	°	'			°	°
Sep	19	14	52.65	+31	52.5	1.541	1.245	50.8	53.7
Sep	20	14	51.56	+31	47.0	1.537	1.230	50.1	53.0
Sep	21	14	50.50	+31	41.4	1.533	1.215	49.5	52.3
Sep	22	14	49.44	+31	35.9	1.528	1.200	48.7	51.7
Sep	23	14	48.39	+31	30.5	1.523	1.185	48.0	51.0
Sep	24	14	47.35	+31	25.1	1.518	1.169	47.2	50.4
Sep	25	14	46.32	+31	19.6	1.512	1.154	46.4	49.7
Sep	26	14	45.30	+31	14.3	1.506	1.139	45.6	49.1
Sep	27	14	44.28	+31	8.9	1.500	1.124	44.7	48.5
Sep	28	14	43.26	+31	3.5	1.493	1.109	43.8	48.0
Sep	29	14	42.25	+30	58.2	1.486	1.094	42.8	47.4
Sep	30	14	41.23	+30	52.8	1.479	1.079	41.9	46.9
Oct	1	14	40.21	+30	47.4	1.471	1.064	40.8	46.3
Oct	2	14	39.19	+30	42.0	1.463	1.049	39.8	45.8
Oct	3	14	38.16	+30	36.5	1.455	1.035	38.7	45.3
Oct	4	14	37.13	+30	31.0	1.446	1.020	37.5	44.8
Oct	5	14	36.08	+30	25.4	1.437	1.005	36.4	44.4
Oct	6	14	35.03	+30	19.7	1.427	0.991	35.2	43.9
Oct	7	14	33.96	+30	13.8	1.417	0.976	33.9	43.5
Oct	8	14	32.87	+30	7.9	1.407	0.962	32.6	43.1
Oct	9	14	31.77	+30	1.7	1.396	0.947	31.3	42.7
Oct	10	14	30.65	+29	55.4	1.385	0.933	29.9	42.4
Oct	11	14	29.50	+29	48.8	1.373	0.919	28.5	42.0
Oct	12	14	28.34	+29	42.0	1.361	0.905	27.1	41.7
Oct	13	14	27.14	+29	34.8	1.348	0.892	25.6	41.4
Oct	14	14	25.92	+29	27.3	1.335	0.878	24.1	41.1
Oct	15	14	24.67	+29	19.4	1.322	0.865	22.5	40.8
Oct	16	14	23.39	+29	11.0	1.308	0.851	20.9	40.6
Oct	17	14	22.07	+29	2.1	1.294	0.838	19.3	40.4
Oct	18	14	20.72	+28	52.7	1.279	0.826	17.7	40.2

HELIN-ROMAN 1989s

T 1989 Aug 20.86500 TDT. Peri 135°.48000
Node 127.92000 -1950.0
q 1.3271300 A.U. Inc 127.85000

DATE	R.A. (1950.0)		Dec.		△	r	Rv	Elong
1989	h	m	°	′			°	°
Sep 19	17	21.97	-24	22.2	1.045	1.396	114.6	85.9
Sep 20	17	20.82	-25	10.3	1.074	1.401	115.4	84.7
Sep 21	17	19.76	-25	55.8	1.103	1.405	116.2	83.5
Sep 22	17	18.78	-26	39.0	1.133	1.410	117.0	82.4
Sep 23	17	17.88	-27	20.0	1.162	1.415	117.7	81.3
Sep 24	17	17.06	-27	58.9	1.192	1.421	118.4	80.2
Sep 25	17	16.31	-28	36.1	1.221	1.426	119.1	79.1
Sep 26	17	15.63	-29	11.5	1.251	1.431	119.7	78.0
Sep 27	17	15.00	-29	45.3	1.280	1.437	120.3	77.0
Sep 28	17	14.44	-30	17.7	1.310	1.442	120.9	75.9
Sep 29	17	13.94	-30	48.7	1.339	1.448	121.4	74.9
Sep 30	17	13.49	-31	18.4	1.368	1.454	121.9	73.9
Oct 1	17	13.09	-31	46.9	1.397	1.460	122.4	72.9
Oct 2	17	12.74	-32	14.3	1.426	1.466	122.9	71.9
Oct 3	17	12.43	-32	40.6	1.455	1.473	123.4	70.9
Oct 4	17	12.17	-33	6.0	1.484	1.479	123.8	70.0
Oct 5	17	11.95	-33	30.5	1.513	1.485	124.3	69.0
Oct 6	17	11.78	-33	54.2	1.542	1.492	124.7	68.1
Oct 7	17	11.64	-34	17.0	1.570	1.499	125.1	67.2
Oct 8	17	11.53	-34	39.1	1.598	1.505	125.5	66.2
Oct 9	17	11.46	-35	0.6	1.627	1.512	125.9	65.3
Oct 10	17	11.43	-35	21.3	1.655	1.519	126.3	64.4
Oct 11	17	11.43	-35	41.5	1.682	1.526	126.7	63.5
Oct 12	17	11.46	-36	1.1	1.710	1.533	127.1	62.6
Oct 13	17	11.52	-36	20.1	1.737	1.541	127.4	61.8
Oct 14	17	11.60	-36	38.6	1.765	1.548	127.8	60.9
Oct 15	17	11.72	-36	56.6	1.792	1.555	128.2	60.0
Oct 16	17	11.86	-37	14.2	1.819	1.563	128.5	59.2
Oct 17	17	12.02	-37	31.4	1.845	1.571	128.8	58.3
Oct 18	17	12.22	-37	48.1	1.872	1.578	129.2	57.5

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June 19, 1995

Librarian
British Antartic Survey
Halley Bay Station
c/o Jonathan Shanklin
11 City Road
Cambridge CB1 1DP UNITED KINGDOM

Dear Librarian:

During the appearance of Halley's Comet in 1985 and 1986, the ***International Halley Watch*** coordinated programs with the goal of obtaining an extensive historical record. One aspect of this record is The International Halley Watch Atlas of Large-Scale Phenomena.

Approximately 4000 copies of the Atlas have been printed. Archival quality materials were used throughout. Of these, 3750 were machine-bound. To obtain the highest level of reasonably achievable archival quality, 250 copies were hand-bound. We are distributing these copies to libraries with some measure of environmental control and controlled access. These are the Research Libraries, Observatory Libraries, NASA Libraries, and selected libraries around the world. A copy for your library is enclosed.

Please note: Because of the archival quality of these volumes, use of ink stamps and glues in the volumes should be held to a minimum.

We would appreciate verification of receipt of the Atlas and welcome comments on the project.

Yours Sincerely,

John Brandt

John C. Brandt

for
John C. Brandt
Malcolm B. Niedner, Jr., and
Jürgen Rahe

Discipline Specialists for Large-Scale Phenomena
The International Halley Watch.

SMITHSONIAN ASTROPHYSICAL OBSERVATORY

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FAX 617-495-7231 BMARSDEN@CFA.HARVARD.EDU Phone 617–495–7244

1995 September 12

Mr. S. W. Milbourn
15 Cam Green
Cam
Dursley
Glos. GL11 5HL
England

Dear Stan,

Thanks for your note of September 6. I suppose that to take 88P/Howell all the way back to 1955 will require some small nongravitational terms, but I think it may still be some time in the future before they are become necessary for predictions. This is basically a nice, well-behaved comet.

Nikhilas Jonathan Marsden (2.86 kg) duly arrived on August 23 at 12:22 UT. The Delta T correction to the original prediction was +3 days, although some thought (about nongravitational forces, perhaps) temporarily worsened the prediction a couple of months ago. The spelling of his first name in part acknowledges his mother's Indian heritage, and it can of course be conveniently Nicknamed. Nancy and I shall go and visit him for ten days in October. My son (Jonathan) transmitted the first image (when Nick was less than a day old) by e-mail from southern California, so I could see him on my computer screen in colour. The wonders of the Internet!

With kind regards,
Yours sincerely,

Brian G. Marsden

SMITHSONIAN INSTITUTION
ASTROPHYSICAL OBSERVATORY
60 GARDEN STREET CAMBRIDGE, MASSACHUSETTS 02138
TELEPHONE 617 495-7000

1984 January 5

Mr. S. W. Milbourn
Brookhill Road
Copthorne Bank
Crawley, West Sussex RH10 3QJ
England

Dear Stan,

I was able to do the computations on P/Wild 1 rather more quickly than I had anticipated, and I report the results here. First, on taking the elements as printed in the Comet Catalogue for epoch 1960 Mar. 7.0 (2437000.5) and running forward to epoch 1973 July 17.0 (2441880.5), I obtained the following (equinox 1950.0 of course):

T	1960 03 17.3625000	1973 07 02.8444432
Peri.	166.7361000	167.9464006
Node	359.0181000	358.2012544
Incl.	19.6889000	19.8906119
q	1.926958000	1.980511097
e	0.654545000	0.647087086
Epoch	2437000.5	2441880.5

This 1973 perihelion time is thus 0.0021 day later than printed in the Catalogue, a difference that is certainly due to the rounding of the 1960 values. I know this because I found my full-precision figures, and I submitted those at the starting epoch 2437000.5 to the same new computation, with the result:

T	1960 03 17.3625393	1973 07 02.8422958
Peri.	166.7361235	167.9464210
Node	359.0180667	358.2012242
Incl.	19.6889317	19.8906426
q	1.926958454	1.980511490
e	0.654544819	0.647086904
Epoch	2437000.5	2441880.5

This 1973 perihelion time is 0.0000057 day later than my earlier high-precision value, and it is probably reasonable to attribute this slight discordance to the fact that these high-precision 1960 starting values were <u>themselves</u> rounded from the values that came out directly when I did the differential correction in 1977 and which were the ones I immediately ran forward at that time in order to produce 1973 elements; the other elements agree to the last figure quoted here.

I should also explain that I have done these new computations twice, using different computers and completely independent programs. On the VAX I used the fixed-step (actually 1.6 days) integration program originally written by J. Schubart and modified by K. Aksnes for the CDC-6400 computer at my behest to allow input and output in orbital elements as well as the differential-correction procedure (which was of course not used this time); the program was subsequently modified for the VAX, and since the CDC computer has a single-precision wordlength of about 14 figures as opposed to the 16-figure double-precision of the VAX, it is possible that the 0.0000057 discordance is due in part to this, the VAX presumably being "more accurate". I then used on the IBM-PC (the computation took almost six hours overnight!) the completely-variable-time-step program written for that machine by E. Everhart (following his method described in Celestial Mechanics in 1974), as modified by me to include perturbations by all the planets and input and output in the form of orbital elements; this program was written in the "Supersoft" double-precision FORTRAN, and I find it extremely encouraging that there is ABSOLUTELY NO DIFFERENCE (to the high precision I have quoted here) between the computations on the two machines!

So I don't understand why you are finding discordances as large as 0.02-0.03 day. Is it possible that you are having trouble with the BASIC double precision, particularly on trigonometric functions? It might therefore be useful if I list here the position and velocity components (x, y and z equatorial, equinox 1950.0, left-hand column position in AU, right-hand column velocity in AU per 40 days) I had that corresponded to the two computations (the figure after the letter D is the power of 10):

Low-precision starting values:

2437000.50000			
-.18235452466683D	1	-.18788717910191D	0
.46790193599897D	0	-.44347321372576D	0
.42391871730978D	0	-.41694644907874D	0
2441880.50000			
-.19690494717465D	1	-.10718361208754D	0
.19872902168793D	0	-.44828222923871D	0
.15854366987317D	0	-.42441785123588D	0

High-precision starting values:

2437000.50000			
-.18235454244428D	1	-.18788733676433D	0
.46790263486077D	0	-.44347283511223D	0
.42391933488700D	0	-.41694660711980D	0
2441880.50000			
-.19690555652665D	1	-.10717729192233D	0
.19870541898262D	0	-.44828255358847D	0
.15852097467982D	0	-.42441854431445D	0

Finally, I should say that I used in my computations the "old" (i.e., IAU 1976) values for the masses of the perturbing planets. Both my programs actually integrate the orbits of the planets simultaneously with the comet, so I give on a separate sheet the corresponding position and velocity components for the planets at the two epochs (the first three lines referring to Mercury, the last three to Pluto).

With kind regards,
Yours sincerely,

Brian G. Marsden

Planetary position and velocity components

Position		Velocity	
2437000.50000			
-.31070462338566D	0	-.75054846955848D	0
.13193754524682D	0	-.86513869483613D	0
.10258149926360D	0	-.38616633095062D	0
.11959304473646D	0	.79257347886427D	0
-.65138895555328D	0	.13693258463240D	0
-.30106774983521D	0	.11637919809435D	-1
-.96424094077525D	0	-.17430932809550D	0
.21571752755417D	0	-.61560124881550D	0
.93550555981086D	-1	-.26696094431137D	0
.37106870641768D	0	.56233231738815D	0
-.12466788775437D	1	.18132985340335D	0
-.58220870558112D	0	.68126928763821D	-1
-.90942362724241D	0	.29422332380998D	0
-.47990728052741D	1	-.31961466746724D	-1
-.20365851394555D	1	-.20904374848019D	-1
.19706879474338D	1	.20683341735962D	0
-.90859829925734D	1	.43144839542098D	-1
-.38422063803924D	1	.89035603079708D	-2
-.13932562330793D	2	-.10372280330076D	0
.10932244126737D	2	-.11637850599757D	0
.49871937141104D	1	-.49532145550320D	-1
-.24109263789913D	2	.75705379923615D	-1
-.17235586790729D	2	-.91054647722206D	-1
-.64536134462420D	1	-.39206722207390D	-1
-.29868450249673D	2	-.23353989653967D	-1
.10013918670125D	2	-.12058843821216D	0
.12213456810533D	2	-.30919972359504D	-1
2441880.50000			
.13214835522220D	0	.85050337010815D	0
-.37379915851906D	0	.37767166710847D	0
-.21375537731076D	0	.11489302375658D	0
-.71834022498993D	0	-.31811089544984D	-1
.54889077873591D	-2	-.74124501572077D	0
.47841584087900D	-1	-.33202352249950D	0
.41257241585545D	0	.61767749419830D	0
-.85218841957404D	0	.25408214820098D	0
-.36953301169114D	0	.11017414344938D	0
.11862718692576D	1	.30887949939199D	0
-.63183717734526D	0	.48316662819841D	0
-.32185165138910D	0	.21349593334203D	0
.29748175373972D	1	.24189321737256D	0
-.37783391494005D	1	.17718397398679D	0
-.16936198938225D	1	.70099648424022D	-1
.79035244864495D	0	-.23420073832061D	0
.83139844928040D	1	.14182822704429D	-1
.34036065726629D	1	.15997885427209D	-1
-.17073307973696D	2	.57653865942257D	-1
-.63853213965647D	1	-.13993932040602D	0
-.25565550603401D	1	-.62133180905660D	-1
-.12308038944687D	2	.11412301935702D	0
-.25739620339602D	2	-.45330924985029D	-1
-.10234210043371D	2	-.21437332591716D	-1
-.29711205369946D	2	.28540038404399D	-1
-.51690562413870D	1	-.12407620629901D	0
.73716196871771D	1	-.47773968416315D	-1

COMET WILD 1

T 1973 Jul 2.8426239 TDT.	Epoch 1973 Jul 17.0 TDT.
Peri 167.9464326	e .647086804
Node 358.2012137 -1950.0	a 5.611896098 A.U.
Inc 19.8906467	n .074137791
q 1.980512188 A.U.	P 13.294 yrs

RUN

COMET WILD 1

T 1973 Jul 2.8426202 E.T.	Epoch 1973 Jul 17.0 E.T.
Peri 167.9464323¦	e 0.647086809
Node 358.2012140¦-1950.0	a 5.611896087 A.U.
Inc 19.8906466¦	n° 0.074137791
q 1.980512158 A.U.	P 13.294 yrs

Comet P/Wild (1)

1960

1	1960 Mar 26.9938	10ʰ	37ᵐ	38ˢ.94	+14°	43′	27″.4	Bayne (Lab)		
X 2	Apr 5.0983	10	33	53.30	+11	58	06.9	"		
3	6.1028	10	33	39.58	+11	39	55.9	"		
4	13.8247	10	33	06.18	+09	19	51.1	"		
4	21.8497	10	34	41.47	+06	57	08.7	"		
5	16.19639	10	33	20.96	+08	37	18.7	USNO Flagstaff	1633.0	-349 -2444
6	16.21381	10	33	21.06	+08	37	01.0	"		
7	21.24846	10	34	29.88	+07	07	44.4	"		
8	21.25816	10	34	30.04	+07	07	34.7	"		
10	25.21590	10	35	58.57	+05	58	33.9	"		
11	25.22698	10	35	58.84	+05	58	22.0	"		
12	May 1.28873	10	39	08.81	+04	16	44.8	"		
13	1.29704	10	39	09.07	+04	14	36.8	"		
14	16.18765	10	50	55.60	+00	11	03.0	"		
15	16.21604	10	50	57.19	+00	10	35.6	"		
16	Jun 21.19760	11	35	16.73	-08	44	59.4	"		
17	22.19185	11	36	43.39	-08	58	58.2	"		
18	27.19284	11	44	05.29	-10	08	33.9	"		

1973

1	1973 Jan 8.30561	06	37	29.20	+53	40	30.2	Kitt Peak	163336	-362 -2224
2	Feb 4.31667	06	11	15.72	+51	08	16.8	Catalina	163706	-360 -227
3	4.36042	06	11	14.48	+51	07	53.6	"		
4	Mar 26.12153	06	40	50.72	+41	34	33.0	Kitt Peak		
5	26.14456	06	40	52.64	+41	34	15.7	"		
6	Apr 27.14236	07	36	38.11	+34	31	17.9	"		
7	27.16597	07	36	40.83	+34	30	57.8	"		
8	Jun 5.16667	08	57	13.52	+24	20	30.0	"		
9	5.18912	08	57	16.34	+24	20	06.7	"		

Marsden Elements

1960 T 1960 Nov 17.3625 Epoch 1960 Mar 7.0
ω 166.7361 e 0.654646
Ω 359.0181 a 5.578 0290
i 19.6889
q 1.926958 P 13.2?? Σ 105.3

1973 T 1973 Jul 2.8423 Epoch 1973 July 17.0
ω 167.9464 e 0.647 087
Ω 358.2012 a 5.6118958
i 18.8966
q 1.980 511 P 13.3??

SMITHSONIAN ASTROPHYSICAL OBSERVATORY

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1996 April 9

Mr. S. W. Milbourn
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Dear Stan,

Thanks for your 37P/Forbes prediction. I suppose that the 1974 problem might indeed be due to the 1990 Jupiter encounter. The effect was really quite dramatic. But I think your 1999 prediction should be pretty good anyway. Good luck with the meteors.

I'm asking Syuichi to update his earlier results on 52P/Harrington-Abell and 60P/Tsuchinshan 2. Otherwise we are now pretty much set, I think.

It is time we had spring. The night before last it snowed, and we are expecting even more snow tonight and much of tomorrow.

With kind regards,
Yours sincerely,

Brian G. Marsden

Pomfret Lodge,
Hulcote,
Towcester,
Northants.
NN12 7HT
Telephone/Fax: 01327 359515

31st March 1996

Dear Stan,

Further to our recent telephone conversation and your request for information relating to the meteor orbit program. Please accept my apologies for the delay in replying. I have been tied up over the past two weeks decorating the bathroom, which was deemed necessary by my wife in advance of a two week visit from a French exchange student who is staying with us. Fortunately I managed to get the job done just in time and can now concentrate on interesting things once again!

I have enclosed some information relating to a doubly photographed Leonid meteor photographed by Mike Maunder and me on the night of 1995 November 17-18. I hope the information is self-explanatory, but of course, please let me know if there is anything that is unclear. I have enclosed a couple of charts showing the path of the meteor from each site for information. The positions I have given you are not quite as precise as they would be in a *real* situation as we normally measure negatives using a Zeiss two-axis machine and use an astrometric reduction program on the X-Y co-ordinates. In this instance I used my PC planetarium program, which obviously will not be as precise, but is **much** quicker to use.

The apparent radiant for the meteor can be assumed to be RA 10h 16m Dec +22° 20" (2000.0), which is the mean of the plot I got using 8 different trails, using Harold Ridley's method. Ideally, our program would compute this information from the measured positions, and make the necessary corrections for zenith attraction. The information relating to the duration of the trail relates to the rotating shutters we are using at the moment; again ideally this should be 'user-defined' in the program as we will shortly be changing the rotating shutters to a more constant drive, with a different speed and this will obviously affect the duration of the photographed segments. As yet I am unsure as to the precise details.....

The only information missing at present are the co-ordinates for the Woking site, but I will send these on as soon as they are available.

I hope you have some success with your endeavours, and thank you once again for your help.

Yours sincerely,

Steve Evans

Pomfret Lodge,
Hulcote,
Towcester,
Northants.
NN12 7HT

Telephone/Fax: 01327 359515

3rd June 1996

Dear Stan,

Thank you for your telephone call of last night. I am of course, sorry to hear that you have run into problems with the reduction program, but I hope you will be able to sort them out eventually. Needless to say I will offer whatever assistance I can , although unfortunately I can do little with the maths! I understand that you will have to move on to other things, but this is probably not a bad thing as stepping back may make the problem easier to solve. In any event, please accept my thanks for the time you have invested thus far.

As promised, I have enclosed a book lent by Howard Miles, which <u>may</u> be of assistance, although it looks to be quite involved to me. I have remembered that quite a few years ago Harold Ridley gave me book entitled "Photographic Techniques in Meteor Astronomy" by a Russian author, Katasev. I remember that this gave the basis for the equations that the Russians used in their programmes of meteor photography, and seemed to me to be much simpler than those used by the Americans. I lent the book to George Spalding some time back, who used it to write a computer program for radiant determination (!) , and remember him saying that the maths was straightforward. Unfortunately the book was never returned, and George seems now to have no involvement in astronomy and I have lost contact. A copy of the book may be available in the RAS Library.

I am planning to attend the Exhibition Meeting this year, and will look forward to the opportunity to meet you there, if you get the chance to come.

Yours sincerely,

Steve Evans

Pomfret Lodge,
Hulcote,
Towcester,
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29th February 1996

Dear Stan,

Mike Maunder and I are currently engaged in a programme of multiple station meteor photography, designed to produce orbital information for bright meteors. We have made a lot of progress recently with regard to securing observations, but we are severely hampered in our ability to reduce the observations. I have approached Gordon Taylor and Howard Miles for assistance, and although both Gordon and Howard were interested, the common objection of not having access to the necessary equations to allow reduction software to be written was raised. Your name was mentioned by both as someone who may have an understanding of the principles involved and the required expertise to write a program for a PC. The text below is that sent to Gordon and Howard:

For some years now the Meteor Section photographic effort has concentrated on producing activity profiles and radiant determinations for the major showers from the observations of individual observers; you will probably have seen Section reports in the Journal. The radiant determinations have been performed by a graphic method, whereby the photographed meteor trails are measured for position and subsequently plotted on large scale gnomonic charts. The radiant is then determined from eye inspection of the trail intersections. This method was developed by the late Harold Ridley, and is still capable of producing reliable results, but is very time consuming and subjective. Section work on orbit determinations from triangulation of meteors photographed from more than one location has not progressed in recent years for a number of reasons, which are outlined below, with a result that we have been unable to fully exploit the potential of photographic methods in our studies.

The problems associated with multiple station observations and subsequent reduction have been (in no particular order of importance):

a) A lack of observers with the necessary enthusiasm to carry out the work,
b) Problems associated with obtaining simultaneous exposure on identical equipment at more than one site,
c) Problems associated with determining the appearance times for photographed meteors to a level of accuracy sufficient for high quality results, and
d) My inability to both comprehend the mathematics involved in reduction procedures and write a computer reduction program to speed up the process.

Over recent months, various solutions to a number of the above objections have presented themselves, to such an extent that observations of sufficient quality to allow orbit determinations are now possible; Mike Maunder and I are both sufficiently motivated to make the observations on a routine basis, and we have overcome the problem of simultaneous exposure by the use of a number of Canon T70 cameras, which can be programmed to make a set number of fixed length exposures over a given time interval. We are using identical lenses and film and are covering three triangulation centres with the matched pairs. The problem of determining exact appearance times for photographed meteors has been solved by the co-operation of a number of observers operating image intensified video systems covering the triangulation centres; a time/date generator imprints time information on the video tape from which an appearance time accurate to 0.1 second can be derived.

Work over recent months has been somewhat limited, but some success was achieved with the Leonids last November and several multiply photographed events await analysis. Despite the progress on the observational front, we are still left with the major problem of how to derive orbits, which is where we seek assistance. Ideally what we require is a computer program into which we enter the required information (site co-ordinates, event times, RA/Dec. co-ordinates of various points on the meteor trail etc....) from which data on atmospheric heights; velocity, radiant and orbital elements are computed. This sort of information was produced regularly by the professionals some years back, but there are no longer any professional observation programmes, although a professional interest in the results still exists, as confirmed by Professor Williams at a recent Meteor Section meeting. To compliment the multiple station work, it would be very useful for the program to be able to compute radiants from numbers of meteor trails photographed from individual stations only, in this way we could still produce useful results even if one station were clouded out, but saving on the time involved in the graphic reduction procedure.

I have enclosed a copy of a paper by Whipple and Jacchia detailing some of the results from the Harvard programme, which I hope may be of assistance as background information. We would especially like to emulate the results produced by Harvard, accepting of course that our equipment is inferior and that the results will not be quite as precise.

Although Mike and I will probably provide most of the observational material, this is a collaborative project within the Meteor Section and has the enthusiastic support of Neil Bone. Results will be published in the Journal, either as stand-alone papers or incorporated with results from other observational methods on specific showers, as is current Section practise.

Naturally we hope that you will be able to assist, but will of course fully understand if this is not possible. If you can help you will obviously have other queries and of course, I will offer as much assistance as I can. I hope to hear from you soon.

Yours sincerely,

Steve Evans

The British Astronomical Associa'

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BAA Founded in 1890

Please reply to:

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1994 August 29

Dear Stan,

Thanks for your letter and sorry for the delay in replying; it prompted me to get various ephemeris programs running under the new starlink unix system, which has taken a little while. The ICQ uses the following parameters, where m_1 = H1 + 5 log d + K1 log r:

Comet	H1	K1
Pons-Winnecke	10	15
Denning-Fujikawa	15	15
Comas-Sola	6.5	20
Parker-Hartley	5.5	15
Kopff	3.0	26
Spacewatch	15.5?	10?
Machholz	13	12
IRAS	9.5	10
Tritton	12.5	15

The rest are as you have them. I've run them all through on my ephemeris program and find that only Churyumov-Gerasimenko (Nov 95 - Feb 96), Kopff (Apr 96 - Aug 96, or Oct 96 for non UK observers), Gunn (Apr 96 - Sep 96 for non UK observers only), Shoemaker-Holt 2 (Dec 96 - Mar 97) and Machholz (Sep 96 for non UK observers only) get bright enough at a reasonable elongation for observation. It might be worth including de Vico which may return in 1996, if it comes back as predicted it could be visible from July to September. We should also include P/Schwassmann-Wachmann 1 as it reaches 12^m during outbursts. — 1994 Feb 2(13/105

I've never received any observations of comets fainter than 13^m and I would suggest using this as an upper limit for giving ephemerides. In part this change is offset by the fact that many of the m_1 magnitudes are several magnitudes brighter than m_2 magnitudes.

Errata · [illegible] 1991

Cornel [illegible] Delete 'GT' before residue [illegible] 0.47)
My, [illegible] + before 100

Chron[illegible] 1995/6 not 1996.

De Jure [illegible] n = 0.7847135 not 0.7847175

Lamm Fung [illegible] 15 hr not 10 hr.
q = 0.7901857 not 2.79357

Sound [illegible] 2.71 not 6.41

Shepherd Hill [illegible] 2227 an clause

Iran 181 [illegible] 72.7 not 727

Nelson [illegible] 1 Nov not Oct
Sd [illegible] 91 Delete [illegible] 10h 45m
Do 222 an clause

ing element files for the short-period and current perturbed long-period comets at 200-day intervals back into the past. For minor planets we go back to 1899, for comets (because of the changing nongravitational forces) only to 1979. (This is why we stupidly missed the 1931 identification of 84P/Giclas, although, at the time, we had not in fact developed this 200-day facility for comet orbits at all.)

I think I mentioned in April that Nancy and I were expecting a grandchild in August. We're still waiting, but it has been established that it will be a boy...

With kind regards,
Yours sincerely,

Brian G. Marsden

15 Cam Green,
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1996 October 3

Dear Jonathan,

Thank you for your letter of September 23. I think I am becoming a little dense in my old age as I cannot see why transferring the comets to the Journal from the Handbook would result in a wider readership of the Handbook. I would have thought that more copies of the Handbook are purchased by non-members than those buying the Journal.

My present course of action is to include elements of all comets coming to perihelion in any given year irrespective of the possible brightness and just producing ephemerides for those likely to reach a magnitude bright enough for visual observation.

I think the changes you suggest would require sanction from both the Director of the Comet Section and of Council.

I am sorry to be such a stick-in-the-mud and it is probably time for me to let a younger and more adaptable person take over. Some years ago Neville Goodman, Gordon Taylor and I met to discuss the future as we are all in our 70's and it was decided that each of us should try to find a successor. I have not managed it yet so if you have any suitable candidate in mind I would be very pleased to hear of him/her.

Best wishes,

Stan Milbourn

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✓ ack 7/10/96

Please reply to:

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1996 September 23

Dear Stan,

I agree that because most comets are observed near perihelion it does not really matter if you use the elements for the epoch of perihelion or the epoch of date. There are some exceptions to this and I would quote 29P/Schwassmann-Wachmann 1 as a prime example which needs elements for the epoch of opposition to be published. My feeling is that if we are to promote the Handbook to a wider audience it should be a handbook for observers rather than the Handbook of facts and figures needed by the BAA Sections. Could I therefore suggest that it might be more appropriate to publish the details of the orbit computations in the Journal ? This would liberate some space in the Handbook and would also help with the shortage of papers for the Journal. Due credit to the computor of the orbit could then be given and it would also be possible to publish elements for all comets that have favourable oppositions, even if they are unlikely to become visible to the average amateur.

Hale-Bopp has slowed down a little over the past couple of months and is now brightening as -1.5 and 9.3, or even a little more slowly. What seems to be happening is that the comet brightens rapidly for a short while, then more slowly for a longer period of time. We are currently in one of the slow spells, but I think it will still peak at between Saturn and Jupiter in brightness.

Best wishes,

Jonathan

Jonathan Shanklin

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1996 October 5

Dear Stan,

against an open door (!)

As Director of the Comet Section, my main concern is to have the information needed by Section members included in the Handbook. I would also like information included which may encourage others to observe comets. I wanted a finder chart included for comet Kopff in the 1996 Handbook, but this was not forthcoming as there was insufficient space. I have had to press fairly hard to get an ephemeris for Hale-Bopp included in the 1997 Handbook. My suggestions for change will result in increased space and thereby allow room for material such as this, which will encourage observations. Details of the computation of an orbit is not needed to observe a comet and is therefore more properly published in the Journal, particularly as the Journal is short of papers at the moment.

!

Looking at the broader requirements for observers who are perhaps not yet Members of the Association, we need to broaden the appeal of the Handbook. In order to catch this wider market we need to expand and change its contents. Some steps have been taken to improve its image, but in terms of content it still lags behind the Canadian Observers Handbook. I am trying to make helpful suggestions and am pleased that some have been adopted; I look forward to some of the other suggestions being adopted in the future.

Best wishes,

Jonathan

Jonathan Shanklin

PS I'll put a note re your looking for a successor in the next newsletter.

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6/9/95

1995 August 28

Dear Stan,

I enclose a copy of the latest ICQ listing of comet magnitude parameters and an equivalent one for comets recently observed by the BAA. Predicting magnitudes is such a chancy business that I don't think it really matters which you use, but if you use the ICQ ones we must make due acknowledgement as they are not officially for publication (but all can be deduced from the circulars and ICQ Handbook). I also enclose my current set of elements (mostly taken from IAUC and the IAU comet catalogues) which give recent magnitude parameters just before the comet name; these are either from BAA observations or the ICQ Handbook. Hale-Bopp is currently brightening as -2 and 10, and this seems relatively consistent over the present range of r.

I also enclose my planning list till the year 2000 for comets that should be brighter than 13^m. This doesn't include Tsuchinshan 1, Klemola or Takamizawa - possibly a combination of slightly different magnitudes and unfavourable observing circumstances.

I would like to suggest a change of philosophy for the ephemerides in the Handbook in view of the recent outbursts of several periodic comets and the suggestion that any of them could outburst at any time. I virtually never receive visual observations from BAA Members of comets fainter than 12^m and those members likely to observe them are able to generate their own ephemerides or obtain them from other sources. Many Members do have CCD cameras and could potentially attempt imaging of some of the fainter comets, if they have accurate elements for the present epoch. I therefore suggest that we only give ephemerides when comets are likely to be brighter than 11th or 12th magnitude, but give elements for the epoch of opposition for any comets expected to be brighter than around 17th or 18th magnitude. Full ephemerides using the Handbook elements can be published in the Circulars should any of the fainter comets outburst or return brighter than expected. The 1997 ICQ Handbook lists 54 comets, but only about 35 of these would meet the above criteria, and I think that they could be included within the present space if the presentation format was changed a little. What are your thoughts ?

Your observations of Hale-Bopp are only useless if you don't send them to me! Many observers systematically estimate differently to the mean magnitude and I can correct for this in the analysis. Albert Jones and Melvyn Taylor are two examples. The problems arise when an observer sees what everyone else is recording and then forces his observations to agree (and I do have one or two of those as well).

The comet is still on course for around -2 next year. Interesting activity is continuing with a northwards pointing fan of material and a faint eastward pointing tail about 1.5° long.

We discussed some of the lessons to be learnt from observing a bright comet at the section meeting on June 8th. A full report of the meeting will be in the November newsletter and an abbreviated report will appear in the Journal. The lessons will certainly need to be applied to Hale-Bopp! I participated in a professional meeting on asteroids, comets and meteors at Versailles in early July and have written a report for the Journal and November newsletter.

The light curve for comet Kopff is still a little indeterminate, but seems to be 7.5 + 5 log d + 10 log r. It is now fading, but seems a little more condensed than earlier in the year. Interestingly observations from the ISO spacecraft show that the trail discovered by IRAS has faded by a factor of two. Comet Brewington is observable in the evening sky at 8.5 mag, and it should fade quite rapidly, though so far is showing no signs of doing so. Comet NEAT is a little brighter than expected at 11 mag and comet 57P/du Toit-Neujmin-Delporte is reported in outburst at 12 mag. A new comet, 1996 Q1 Tabur, is visible at 10^m in the early morning and should brighten rapidly, becoming a faint naked eye object later in the autumn.

Best wishes,

Jonathan Shanklin

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1992 October 31

Mr. S. W. Milbourn
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Dear Stan,

Many thanks for your note of October 17 and results on P/Churyumov-Gerasimenko. My guess is that you have stretched the nongravitational forces on this about as far as they will go, and that with the 1996 observations it will be necessary to break things down and link a smaller number of apparitions together. For several comets three apparitions are all we can link with a fixed A1 and A2, but I think that the four are all right in this case and I shall certainly plan to use your result when we put the 1996 predictions in the MPCs around next May.

Yes, do go ahead with FORTRAN. I don't think you'll have much trouble with it, but it does enable one to dispose of some of the bad habits that usually come from programming in BASIC.

What with the (4015) identification with P/Wilson-Harrington, 1992 QB1 (which I think is in an eccentric orbit but near aphelion), the recovery of P/Swift-Tuttle, and now the close encounter promised for P/Swift-Tuttle next time, things have been pretty hectic around here recently. There seems to have a continuous onslaught from the press since mid-August!

With kind regards,
Yours sincerely,

Brian G. Marsden