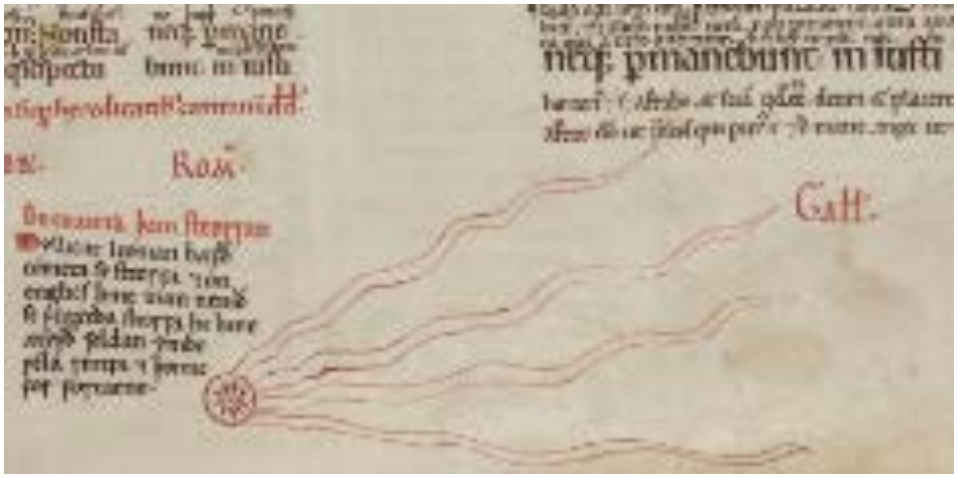


Halley's Comet as depicted in the Tripartitum Psalter Eadwini (The Canterbury Salter cir.1150 acknowledgements to Trinity College Cambridge, (licensed under Creative Commons)[1]

THE COMET'S TALE

Comet Section – British Astronomical Association

Journal – Number 36 2017 October

britastro.org/comet

In memoriam - C/1995 01 1997 March 08 0355-0453 1.2m f.1 f/7 Zeiss Triplet 10"x8" hyperred 4415- Glyn Marsh

Table of Contents

1 From the Director – Nick James

It has been a while since the last issue of the Comet's Tale but that is entirely my fault and I hope that it will appear more regularly in the future. Our newsletter editor, Janice McClean, has done an excellent job on this edition and I hope you all enjoy reading it. I would also like to thank the members of the section committee and all our observers for their support during the session.

There have been no particularly bright comets visible this year but a few rose to near naked-eye visibility. Among these were the returns of periodic comets 2P/Encke, 41P/Tuttle-Giacobini-Kresak and 45P/Honda-Mrkos-Pajdusakova, the unexpectedly bright C/2015 ER_{61} (PANSTARRS) and the short-lived new discovery C/2017 E4 (Lovejoy). The most observed object was C/2015 V2 (Johnson) which reached perihelion in 2017 June but which was well placed throughout much of the winter and spring and which reached 8th magnitude in May. In addition to these brighter objects our observers have kept many other comets under observation and outbursts have been detected in a number of objects including the perennially active 29P/Schwassmann–Wachmann. Richard Miles continues to lead our 29P monitoring project and, as the comet comes north, he is gearing up for an increase in observations.

Denis Buczynski continues to manage our Section's online image archive. At the last count, this archive now stands at a total of 17,713 images. Of these 3,146 images were added in the last year and a total of 189 comets were imaged or drawn by contributors. Images were included from a total of 85 different observers with the most prolific being: Alfons Diepvens (627), Peter Carson (478), Erik Bryssinck (439), Mike Olason (336), Alexander Baranski (246), Denis Buczynski (240), Nick James (105) and Tony Angel (78). The archive is available here:

http://www.britastro.org/cometobs/

We had a successful section meeting in Northampton on June 17 and a report of this has appeared in the August Journal. The meeting was well attended and it covered a wide range of subjects. It was also our first meeting to make use of Skype to allow a speaker (Padma Yanamandra-Fisher) to present a talk from the west coast of the US. The meeting was recorded although we had some problems with recording equipment which has slowed progress on getting items uploaded. Most of the talks are now available online here:

https://www.youtube.com/playlist?list=PLzBTybazXT40groFEC3zg4uVLFFGdApQL

We plan to hold the next meeting in the Spring of 2019. More details will be distributed as soon as we have them. I know that it is currently a long way off but if you have any ideas regarding topics for inclusion please let me know.

I have now taken over the section hard-copy archive from Jonathan Shanklin. Most of this was transferred in a Northampton car park after the section meeting and it filled most of the space in my Mondeo! We

have started to index and scan the material and some of this has already been uploaded to the Comet Section website. The archive contains many old comet photos and drawings which will gradually be made available online over the coming year.

Between 1973 February and 1987 February, the Comet Section produced 26 issues of a Newsletter called Istimirant Stella. These were edited by Mike Hendrie, Andy Stephens and Stan Milbourn. All of these issues are now available here:

https://britastro.org/node/10769

It is an interesting read and shows how different things were 40 years ago. Look out for John Bortle's guide to comet hunting and descriptions of Comet West from 1975 along with many other interesting notes and observations. There are quite a few familiar names in these issues.

Comet observations (both visual and electronic) continue to be submitted via the online Comet Observations database (COBS), although many observations are sent directly to the visual observations co-ordinator, Jonathan Shanklin. Jonathan has continued to analyse quantitative data submitted by visual and now, increasingly, CCD observers. He reformats the observations into the format that Guy Hurst uses for publication in The Astronomer. Jonathan also maintains his highly informative comet observations and analysis website and has again assisted me by providing the comet material for the 2018 Handbook and the comet prospects.

A completely revised version of the Comet Observing Guide was released earlier this year. I'd like to thank the section committee who have helped me with this task and I hope that the new version will be of use to both novice and advanced observers. Our intention is to keep this up to date with fairly regular updates. You can find the Guide here:

https://britastro.org/node/6817

Please let me know if you spot any errors or feel that we should include information on other topics.

The Section has continued to develop the comphot comet photometry software and testing continues with a number of observers. The latest version adds the ability to produce ICQ formatted output records which should simplify the submission of data to COBS. You can download the latest version from:

https://britastro.org/node/11124

If you are a new user of comphot please contact me before submitting any data to COBS.

Roger Dymock, our outreach and mentoring coordinator has asked to step down from that role since he wants to concentrate on exoplanet work. I would like to thank Roger for the support he has given me over the past few years. He has been one of the few people from the Section who has been submitting total comet magnitudes estimated using images from remote telescopes. This is a complex and difficult subject and Roger is one of the few people who have taken this on, helping others with his knowledge.

Roger also maintained the Project Alcock website which contained notes and guides

on many different aspects of practical comet observing and imaging. This site is no longer active but I hope, with Roger's agreement, to move some of the articles to the main comet section website over the next few months.

I'm sure that we all wish Roger well with his exoplanet work and hope that comets will still be on his target list every now and again. If anyone would like to take up the outreach and mentoring role please contact me directly.

As you will have seen from the front cover, my great friend and comet observer Glyn Marsh died suddenly in August. I heard the news from Denis Buczynski while I was in the US for the eclipse and found it very difficult to believe. Glyn was a great personal friend and a very accomplished observer. I remember my visits to Preston and, more recently, the Isle of Man where Glyn and Christine always made me feel very welcome. Many will also remember Glyn's demonstration of how to make a comet given at the section meeting in 2015. He was so dedicated to the task that he even bought a small camping fridge to keep the nucleus cold on its journey from the Isle of Man. In 1996 Glyn was instrumental in the success of a trip that Martin Mobberley, Glyn and myself arranged to observe C/1996 B2 (Hyakutake) from the clear skies of Mt. Teide, Tenerife and he helped me in many areas since then. I will really miss him as a friend and as an observer, as I am sure do all that knew him.

It is also sad to report that our only living British visual comet discoverer, Roy Panther, died in October 2016. Roy was the discoverer of comet C/1980 Y2 (1980u). The discovery was made visually using a 0.20m, f/4 Newtonian at 1850 UT on Christmas day 1980 when the comet was a 9th magnitude object near M56. The discovery was confirmed that evening by Mike Hendrie and George Alcock and it was Roy's first success after 601 hours of searching.

Let us hope that soon we have a new comet in the sky that we can all observe and in doing so pay our respects to these two great observers.

Nick James – Section Director

2 Obituary for Dr. Glyn Marsh – Denis Buczynski

On August 18 2017, our friend and colleague Glyn Marsh passed away at the age of 63 on the Isle of Man, his chosen home for the past few years. Glyn retired from his professional career as a chemical corrosion scientist working in the nuclear

industry for BNFL. He, and his wife Christine, moved to the Isle of Man, primarily to enjoy a more relaxed pace of life and to observe comets and other astronomical objects and events in the darker skies there.

Glyn will be long remembered as a very modest but extremely capable amateur astronomer, who observed whenever conditions allowed. He will be particularly remembered for his expertise in telescope repair and restoration. He immersed himself into the fabric of the astronomical societies he joined (The BAA, Preston and District AS and the Isle of Man AS) and was a valuable contributing member of each.

He was a veteran comet observer and film photographer and he excelled at this difficult skill. His photographs of Comet Hale-Bopp and Hyakutake taken in the mid 1990's using astrograph lenses and large format film (10x8 inches) were amongst the best and most detailed taken in the UK.

PADAS Member Dr. Glyn Marsh MSc, a fine Astrophotographer shown here with two of his photographs of comet Hale-Bopp - The comet of the Century!

He was a great friend to all and freely offered his help, advice and expertise to anyone who asked. As a regular attendee at meetings he was always to be seen in deep conversations with observers discussing instruments and events. A recent outstanding memory of him came at the BAA Comet Section meeting at Northampton in 2015 when in front of a fascinated audience he constructed a comet nucleus from frozen raw materials which showed structure and composition including out-gassing. Anyone who saw the demonstration will never forget it, (including the very strong associated smell).

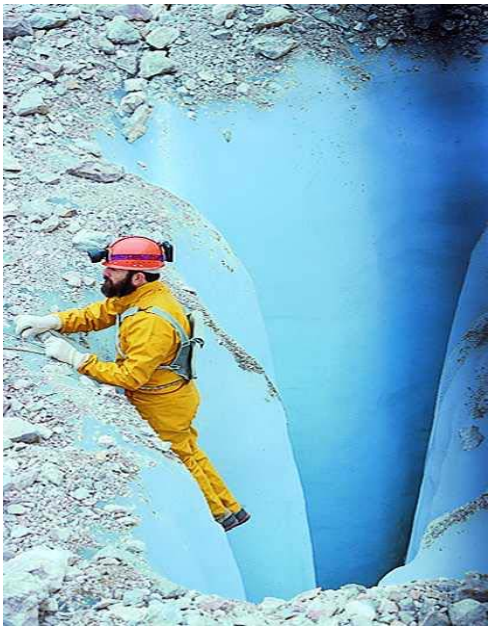
Dr Glyn Marsh making his famous comet at the Northampton Comet Section Meeting 2015

He had equipped himself with an impressive personal observatory at his Manx home. This comprised of older instruments as well as the most modern technology and telescopes. He was in the middle of a complete restoration of the historic Mond/Cooke astrograph telescope which he had rescued from destruction in the late 1980's from the Norman Lockyer Observatory in Sidmouth. He had generously agreed with the same observatory to return the restored instrument to them at his own cost. He

showed this generosity to all who asked and he will be truly missed by all the good friends he made in the astronomical community over the 40 year period he was involved with it.

Denis Buczynski - Secretary Comet Section

3 Interview with Juan José González Suárez by Claudio Pra – Expanded version, from 'Cieli Dolomiti' by kind permission of the interviewee.



JJ Gonzalez descending an icehole in the JouNegro Glacier in Picos Europa 1995

I cannot remember at what age astronomy became a life-long passion. I was born in 1952 in Avilés, an historical and beautiful old town renowned as an industrial city and seaport in Asturias, North Spain. As a boy, I grew up in a semi-rural environment, with plenty of natural landscape, sea and sometimes (weather permitting) dark skies full of stars. I made my first rudimentary telescope and took some photographic images of stars and galaxies in the night sky. I was inspired to become a scientist. I choose Physics, earning a master's degree in Astrophysics at Universidad Complutense (Madrid) in 1976.

After finishing my degree my ambition was to become a professional astronomer, in a mountain observatory, but this was then impossible in my country. At that time, the now famous great observatories of Spain were not even built, so positions in professional astronomy were few and far between. I took the decision to return home and work as a physics teacher in Asturias, surrounded by my high mountains under a clear night sky. In the next forty years I dedicated my life to my main passions; astronomy, physics, and Asturias' mountain-related studies (karstic caves - speleology, and glaciology). Now all I need are my mountains for feeling alive

and observing comets, for feeling the science of the night sky in my blood.

Cantabrian Mountains in the sunrise

1) What led you to observe comets and how much time do you dedicate to this passion?

Comets are intrinsically of major scientific importance. As Dan Green said, "observations of comets by amateurs are essential to the progress of cometary astronomy". Fred Whipple said, "observing comets has broad effects in science, besides giving the observer personal pleasure". For me, this pleasure increases greatly when visually observing from the Cantabrian Mountains in my homeland. High mountains and comets have interesting aspects in common. Some mountain tops are the best places for observing. The ice that feeds the mountain glaciers is also present in the nucleus of comets. The cometary ice that orbits in the blackness of space also sleeps inside the dark depths of mountain caves. We can enjoy ourselves, observing the comets from mountains, and we can also study the ice. I observe every available clear night, weather permitting. In a fruitful year, 2010, I observed approximately 50 nights.

2) Do you feel surpassed by modern CCD technology when making visual estimates?

Not at all. CCD and visual data are complementary, not exclusive. We continue a long observing tradition, adding our data to the historical records. I am an old-style comet observer, trying to make the observations in the best possible way, under the best available conditions, providing useful data. I work hard looking for higher and better observing sites, trying to observe as much coma diameter as possible, especially for very gaseous comets with low DC. Dan Green said, "the human eye is a remarkable detector, superior to any artificial light-detection instrument in terms of dynamic range of spectrum and light intensity combined".

3) For how long a period do you usually observe?

The duration of an observing session depends on several factors, such as the phase of the Moon, weather, distance I need to travel etc. A typical observing session involves prior home preparation of charts for each observable comet with suitable comparison stars with good photometry (Tycho-2, APASS,) then checking the star-field in the DSS images (especially for the faint comets), consulting weather forecasts and Meteosat images, and choosing the observing site. Then I usually spend one to three hours of round trip travel by car (100 - 300 km). I observe during all the available dark hours. Then there is the time spent afterwards reducing the data and sending to the ICQ and other sites. My most "profitable" session was the night from 21.86 to 22.20 UT March 2009, when I could observe and estimate 20 comets.

4) Which binoculars and telescope do you use?

Besides the classical binoculars; 7x50, 10x50, 11x80 and 25x100, for the brighter comets, my workhorse is a 20cm Meade SCT LX-200 GPS. It is a good compromise between aperture and weight for mountain observing sessions. As a rule, to observe as much coma diameter as possible, it is important to work at low magnification (normally 50 to 150x) with the telescope.

JJ Gonzalez plus 20cm SCT in the morning light at Puerto Aralia - -1530 metres high

5) Your observing site seems to be near ideal. Can you give us a description?

I work hard looking for the highest and best observing sites. My local knowledge of the Cantabrian mountains (Asturias and Leon) helps me to seek the best locations for atmospheric conditions each session. The Cordillera culminates in a rugged karst massif, Los Picos de Europa, at 2651 m. I have observed from 2500 m in Picos, but the normal sites accessible by road are located below 2000 m.

In Asturias, on the northern slope of the range, the weather is normally cloudy. Besides, we have a light pollution problem in the heavily populated central area with 800,000 inhabitants. Mainly I seek the better weather on the southern slope of the range at Leon, where the Alto del Castro is located at 1720 m. It has with a near 360-degree unobstructed horizon and a summit accessible by a narrow road when snow-free, normally between April and November. Its position near the dividing range provides a dark and very clear sky down to the horizon, especially to the east and west along the direction of the ridge, very useful for twilight observations.

Depending on the weather, I use other good mountain observing sites in the 1000 - 1800 m range.

6) Have you attempted the discovery of a new comet?

The search for new comets is not a priority for me. I can only dedicate a little time to it before the morning twilight, after finishing an observing session. My main work is to provide as good data as possible of the observable comets.

7) Can you tell us some interesting facts about comet observations that have impressed you?

Firstly - Comet Barnard. It was discovered in 1889 by the inspiring and legendary visual observer Edward Emerson Barnard. The first elliptical orbit provided an orbital period of 128 years. In 1972 Marsden and Sekanina computed a revised orbit giving the period as 145±10 years. This comet was accidentally recovered in CCD images of the LINEAR project on 2006 June 23, becoming 177P/Barnard, for which Marsden determined a period close to 120 years. I made one of the first visual observations following recovery:

2006 July 7.07 UT: m1=13.2, Dia.=0.7', DC=3, 20 cm SCT (133x) (Alto del Castro, 1720 m, Leon, Spain Mountain location, very clear sky. Limiting stellar magnitude: 15.5. Motion checked during a 60-min period. Comparison stars taken from Henden photometry near RY Ser.

This short report can't express my emotional feelings when observing in the eyepiece the same object that Barnard observed a century ago.[2]

Secondly - C/2006 P1 (McNaught): From 2006 October to 2007 January, I devoted much time and effort to the follow-up of

this great comet. These are my last two naked eye observations:

2007 Jan. 12.73 UT (day of perihelion): m1= -3.2:, DC=9, Tail: 1 deg. in PA 35 deg, naked eye (Alto del Castro, 1720 m, Leon, Spain) 25x100B: Dia.=0.7', DC=8/. Mountain location, very clear sky. Strong zodiacal light visible after the end of twilight. Magnitude estimate corrected for atmospheric extinction with ICQ winter table (comparison object: Venus). Alt. 3 deg. Solar elongation: 7 deg. The comet remained visible for 35 minutes until it set.*

Jan. 14.71 UT: m1= -6:, DC=8, Tail: 1.5 deg. in PA 50 deg, naked eye Colunga, alt. 20 m, Asturias, N. Spain. Comet observed from near sea level, just before sunset; magnitude estimate corrected for atmospheric extinction.*

Again, my short report of Jan. 14 cannot express the emotion involved. In Kronk's words, "The comet was at its brightest on January 13 and 14. Observers typically estimated the brightness as -5 to -6 and many were able to easily spot the comet in broad daylight just by blocking the sun with their hand". But very unfortunately, in the Cantabrian Mountains we had high clouds on January 13 and 14.

On the morning of Jan. 14, after checking Meteosat images, I took the decision to travel by car along the valleys and mountain passes of the Cordillera, seeking any available window in the clouds that could allow me to observe C/2006 P1 near the Sun.

Finally, after 500 km, I gave up. The clouds were solid. Sometime before sunset, I was coming back home along the coastal highway, looking quietly at the west horizon. And then, suddenly and unexpectedly, the clouds let me see the comet before sunset. It was a superb vision. I was shocked and speechless for some time!

Quickly, I left the highway and made a visual magnitude estimate: -6. After this very special day, the comet moved into the skies of the Southern Hemisphere, but the spectacle wasn't finished yet for us northern observers since, unexpectedly, we could see the end of the enormous dusty tail even though the head was below the horizon:

Jan. 19.79 UT: Tail observation: Several striae were observed with naked eye after the end of evening nautical twilight, between Jan. 19.77 and 19.84 UT, extending up into the cone of zodiacal light. At the end of astronomical twilight (Jan. 19.79) four brightest striae were clearly visible between PA 20 deg and PA 50 deg, measuring about 0.5 to 1 deg in width, the longer one spanning more than 22 deg up from the horizon in PA 30 deg. (Alto del Castro, 1720 m, Leon, Spain)

(more details on C/2006 P1 at http://www.cometography.com/lcomets/2006p1.html).

My usual observing site – Alto del Castro at 1720 m. just after sunrise

8) You were the first to identify the remains of C/2010 X1 (Elenin) post-perihelion, at a time when CCD images did not register anything, but subsequently they confirmed your observation. What are your impressions about this experience?

There were two independent and nearly simultaneous visual observations, from Mieczyslaw Paradowski in Poland and myself:

Likely remnant of Comet C2010 X1 Elenin. Data 22/10/2011 from 07:35 UT New Mexico with systema gras 020 R Ligustri. (CAST) Italy, apo 106/530 ccd STL8300C 6x300sec field 116'x87'

C/2010 X1:

2011 Oct. 9.13 UT: m1=12.0, Dia.=2.8', DC=1, 20 cm reflector (71x), Mieczyslaw Paradowski, Dabrowa, Poland. Comet alt. 22 deg. Nearby field stars checked in DSS.

2011 Oct. 9.20 UT: m1=10.7, Dia.=6', DC=1/, Tail: 0.2 deg. in PA 310 deg, 20 cm SCT (77x), Juan Jose Gonzalez (Alto del Castro, alt. 1720 m., Leon, N. Spain). The coma appears large and very diffuse, without central condensation. Observation made from mountain location under very good seeing conditions. Nearby field stars checked in DSS. Zodiacal light. Altitude: 23 deg.

I made two more observations, on Oct. 21 and Oct. 30, giving complementary data:

Oct. 21.00 UT: m1=10.2, Dia.=7', DC=1/, Tail: 0.4 deg. in PA 310 deg, 20 cm SCT (77x), Juan Jose Gonzalez (Alto del Castro, alt. 1720 m.) The comet's remnant appears visually like a very diffuse tail-like morphology, observable for 0.4 deg along the major axis, showing two near-circular areas of similar brightness with a slightly higher degree of condensation and 7' of diameter. One of these areas, with geometric centre located approximately at R.A.=8h00m.5, Decl.=+28o26'.0 (Oct. 21.00 UT), was close to the ephemeris position. The other area's centre was located at R.A.=7h59m.5, Decl.=+28o34'.5. The motion of both areas was followed for 40 minutes, being consistent with the ephemeris. Observation made before moonrise, from mountain location with very good seeing, under slightly better conditions than twelve days ago (Oct.9). Nearby field stars checked in DSS. Altitude: 16 deg.

The first CCD images came from Giovanni Sostero, Ernesto Guido and Nick Howes on Oct. 21.38 UT.

From CBET 2876: " ... The amount of the dust ejecta in the cloud of C/2010 X1 cannot be determined because of the lack of photometry. A very crude estimate of the total cross-sectional area of the dust particles is only provided by the visual magnitude 10.2 that was estimated by J. J. Gonzalez on Oct. 21; the result is about 480 km^2. The mass of the cloud comes out to be on the order of 10^{12} grams."

Between the first date observing date, Oct. 9 and Nov. 6, there were more visual confirmations and CCD images of the comet's remnant but great debates took place on the international mailing list Comets-ml in which I have been directly involved.

There have been some sceptical and experienced people on both sides, visual and nonvisual (CCD) observers, but the main question (positive visual observations of the remnant) seems settled now. As an illustration; after some negative attempts, the initially very sceptical but experienced Alan Hale could observe the remnant on the last days of October and first days of November, posting some comments on his site and Comets-ml:

"Over this past week I have successfully obtained three observations of the

remnant dust stream of this comet, but this is extremely faint, appearing as nothing more than a slight brightening of the background sky; these have been some of the most difficult cometary observations I have ever made."

This C/2010 X1 "conflict" should teach us all some important conclusions, depending on our initial position towards the issue. From my own perspective, the experience and debate has been very positive, clarifying the importance of visual observations. CCD and visual data are complementary, not exclusive.

(An interesting recent scientific paper is, DISAPPEARANCE OF COMET C/2010 X1 (ELENIN)...", Jing Li and David Jewitt, 2015 The Astronomical Journal, Volume 149, Number 4, in:

http://iopscience.iop.org/article/10.1088/0004-6256/149/4/133/meta)

Last, my cometary website:

www.perihelio.org

(These are busy times, and I can't update the site as I would like ...).

Juan José González Suárez

4 Teamworking: Discovery of fragment of comet C/2015 ER61 (PANSTARRS) - Erik Bryssinck and Franz-Josef (Josch) Hambsch

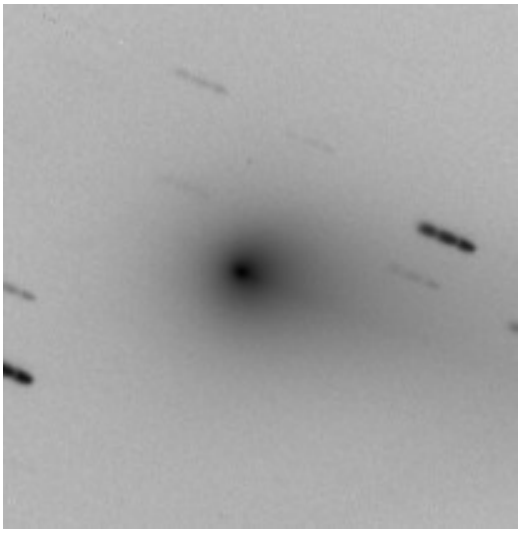
Bright comets are beautiful objects for both visual observers and astrophotographers. They reward the observer with their unpredictable magnitudes, but this also causes difficulties. Then there is the excitement of possibly witnessing a split of the comet nucleus. Josch Hambsch and I recently saw a split as first observers. We used Josch's Remote Observatory Atacama Desert (ROAD) near San Pedro de Atacama in Chile. Mainly we select comets where we expect magnitude fluctuations, comets that pass the Earth and comets that show a sudden brightness jump. One of the reasons for a brightness jump may be the splitting of the comet into two or more parts. We decided to follow the 73P comet this year, which previously has been detected splitting. Unfortunately it became too weak for Josch's setup, so instead we selected the C/2015 ER61 (PANSTARRS) comet as having the best potential. This comet subsequently showed a magnitude jump of no less than 2 magnitudes on 2017 April 4.

Comet C/2015 ER61 (PANSTARRS) was discovered on 2015 March 15, by the

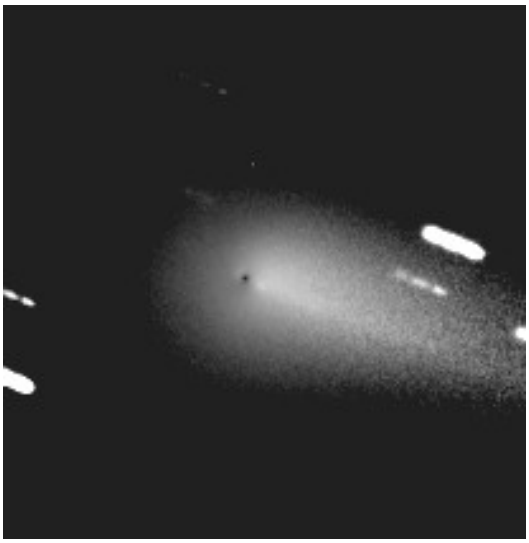
PANSTARRS 1 telescope. Initially catalogued as an asteroid, it had a magnitude of 21.5 whilst at a distance of 8.44 astronomical units from the sun. By 2016 January, this asteroid was magnitude 20. By 2016 February 1, CBET No. 4249 reported that typical comet properties were observed for this object for several weeks. On 2016 March 28, the asteroid approached near to Jupiter at a distance of 0.925 astronomical units. This close approach changed the orbit so that the aphelion moved in from 1430 AU to ~ 1200 AU. By 2017 January 17, magnitude 13 was noted, and by 2017 April, this now comet-catalogued object reached magnitude 8.5. On April 4, Juan José González Suárez was the first to report that brightness had suddenly increased by > 1 magnitude and 24 hours later it was observed at magnitude 6.5. With such a sudden brightness jump, it is not always possible to find out what was the cause. It may be a kind of eruption of trapped volatile gases. Due to the temperature rise, the internal pressure becomes so high that the crust breaks out and suddenly ejects gases like a geyser, bringing dust and particles along to the coma. The sunlight does the rest and illuminates these particles; the comet then reflects much more light so that we can observe this eruption.

This phenomenon was the reason we decided to follow this comet for a while. As it is clear almost every night in Chile, it is possible to gather data on a daily basis. We started with our observations on May 17, 2017. What was immediately noticeable with this comet was the more oval form of the central condensation around the comet core. Difficult to observe, but with some digital processing filters in the software, the phenomena can be enhanced.

On the images of May 29, 2017 (see below) there appeared to be some sort of growth, close to the comet core. The central condensation was extended and using a digital filter for comet morphology (RWM - radial weighted model, we thought that there was a fragmentation. But it was difficult to distinguish from the images.

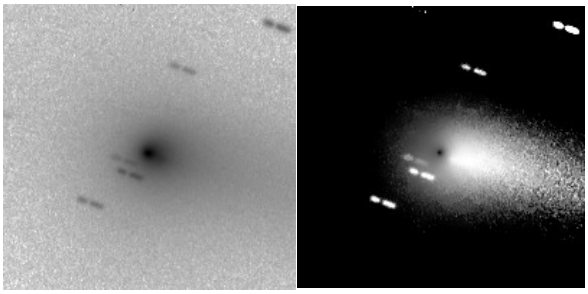


The negative image of the central condensation of C / 2015 ER61



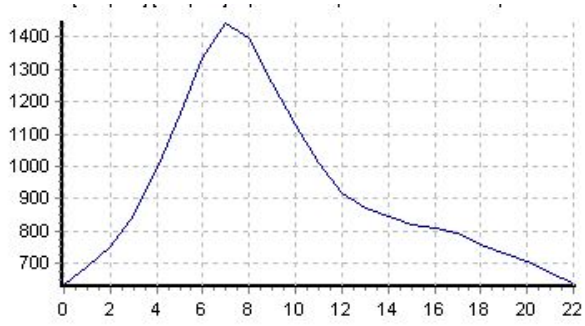
The same Central Condensation but with RWM Filter (Pictures May 29, 2017) image info (with RWM filter): The black dot in the center of the coma is the photometric center. Highlight the light point right next to the photometric center approximately at 4 o'clock

But here was something happening! We had technical problems, and also suffered from internal reflections caused by Venus which was near the comet in the sky and was disturbing our observations. On our recordings of 13th June, suddenly a clearly visible light blob appeared. Did we have fragmentation? As the Minor Planet Centre (MPC) prescribes one must have at least two days of observations before reporting a new or unknown object. There must be another observer who observes independently.

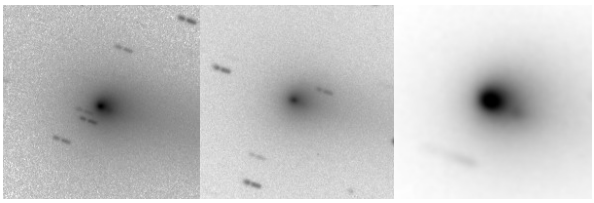


Comet C/2015 ER61 on June 13, 2017

We see here that the initial elongated central condensation shows a dip and thus shows an interruption, which clearly indicates a fragmentation. The fragment was clearly discovered.



Comet C/2015 ER61 profile cross-section of the central condensation direction of the fragment. The x-axis shows the number of pixels. Around pixel 7 is the ADU maximum of the comet core. Around pixel 16 is the maximum of the fragment. To calculate the distance in arc seconds: 16 - 7 = 9 pixels at a pixel resolution of 1.384 arc. seconds/pixel of our optical system gives it a distance of 12.4 arc seconds with a 243 ° position angle. All of these data I measured with Astroart 6.0. Digital processing filters are also plug-ins in Astroart, (developed by the late Martino Nicolini who unfortunately died in 2015 at the early age of 54,)



Comet C / 2015 ER61 (PANSTARRS) June 13, June 14 and June 16, 2017 (3x enlarged)

After these observations and confirmations, it was time to make the report and send it to CBAT (Central Bureau of Astronomical Telegrams) and MPC (Minor Planet Centre).

From the core and the fragment, the astrometric positions were measured as accurately as possible using Astrometrica. No easy task because the distance to the comet core is just over 10 arc seconds, the fragment is in the middle of the comet tail and is much weaker than the comet core. It eventually succeeded and I sent an observation report to the Minor Planet Centre. Next we needed a confirmation from another observer. We contacted Emmanuel Jehin (TRAPPIST telescopes) and Alain Maury (SpaceObs). Because of bad weather in Australia, most of those working with remote iTelescopes.net were not able give a confirmation - the comet was only visible from the southern hemisphere just before sunrise. Emmanuel Jehin was traveling to La Silla and Paranal in Chile to commission and first light a new telescope, but unfortunately he also had bad weather. We received a first positive

confirmation from Alain Maury on June 17th.

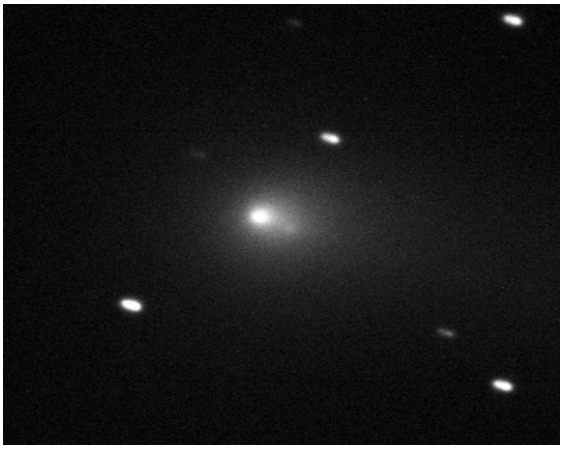
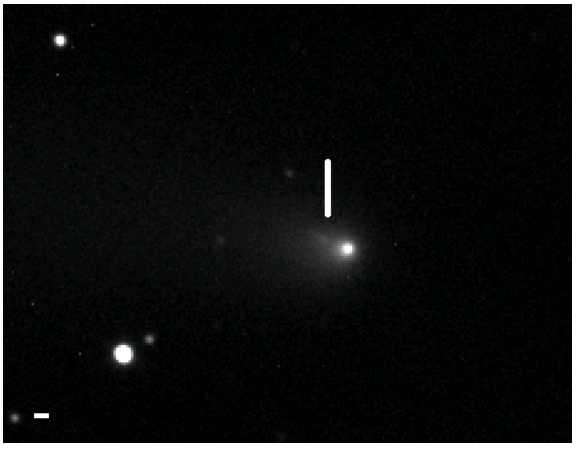


Photo: Alain Maury - Spaceobs - Chile

Confirmation image by Alain Maury of SpaceObs in Chile. Fragment clearly visible right below the central condensation of the comet C/2015 ER61 (approximately 4 hours) at a distance of approximately 14 arcsec. With the 0.5-m f/5 RILA telescope and total exposure of 22 min.

What a relief! Especially after so much excitement and tension. Later on June 19, we also received confirmation from Emmanuel Jehin, and he could now clearly see the fragment with the TRAPPIST telescope and a further confirmation on June 17 with the new EUROPA 1m telescope.



Fragment C / 2015 ER61 (PANSTARRS) with the 0.6-m TRAPPIST telescope in La Silla on June 19, 2017.

There was 1x 60 sec. using an I-band filter (photo: Emmanuel Jehin)

The TENAGRA II 0.41-m Newtonian telescope (MPC station 926) also detected this fragment on 2017 June 18. Tenagra Observatories is a commercial organisation that leases telescope time to universities, astronomers and amateur astronomers. An MPEC 2017-M09: COMET C/2015 ER61-B (PANSTARRS) was published promptly after this independent confirmation (the first 11 positions are our observations). On June 24, a CBET 4409 was issued with the official recognition of fragment C/2015 ER61 (PANSTARRS) and it was named C/2015 ER61-b (PANSTARRS).

Such exciting days! I cannot describe how interesting and beautiful it was to follow this evolution. Comets are and remain for me, wonderful objects to observe, and there is always something new to experience. It was also especially rewarding that we were the first to observe this fragment. A nice anecdote is the fact that the confirmation image was taken by Alain Maury with the new 0.5-m f / 5 Rila telescope of Josch Hambsch (BE) and Karel Teuwen (BE), which is still in construction. Whether the perceived eruption of April 4 is the root cause of the fragmentation is still being investigated. Presumably, the reason is due to the gravity interaction with Jupiter and the subsequent orbit change, but more likely by the approach of the sun after the orbit change. But we leave this mystery to the specialists. Different astrometric measurements are required to accurately capture the beginning of the fragmentation. An interesting subject for professional astronomers.

The Authors:

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Franz-Josef Hambsch, Mol, Belgium - principally a variable star observer for AAVSO

Erik Bryssinck

5 Confessions of a non-scientific Comet observer - Owen Brazell

20 inch iced up after a nights work looking for Comets in Devon

Despite having observed comets for over 40 years I have always looked at them for the purposes of pleasure rather than science. That maybe a heretical thing to say in an organisation so focused on science as the BAA, however time and other considerations have meant that I never really had a scientific focus when doing my astronomical observing, hence my main interests are in deep sky observing. My drawing skills are also so poor that I was forced to take Latin O Level rather than Art so drawing comets was not an option either. However over time I have had the opportunity to observe many comets visually using telescopes perhaps somewhat larger than the normal run.

My current telescopes are a 15" and a 22" inch Dobsonian. The method of finding comets has also changed since my first comet observation of C/1975h Kobayashi-Berger-Milon in 1975, hunting with a 2" refactor using a BAA circular chart for identification. The identification and notification of comets has also changed rapidly now and in most cases apart from using Jonathan Shanklin's yearly comet roundup in the Journal almost all information on comets that I use now comes from the internet from forums such as comets-ml. The methodology of finding them has changed as well. The days when you either had to get an ephemeris and then plot it using pencil on your star chart, or if you were really advanced, print out a

rough computer star chart showing where it was meant to have gone.

Although most comet imagers use computers to drive their telescopes to the required location this has not been so desirable with visual observing because it is not possible to darken screens from laptops or tablets sufficiently to keep one's eyes dark adaption in the field. This is a challenge now with many more people hooking up their phones and tablets to their telescopes using Bluetooth or wireless to find things using programs like SkySafari which reads comet elements and allows one to plot positions and drive a telescope to them. These all require some kind of Wireless or Bluetooth adapter at the telescope end to transmit positions from encoders to the device.

The 20 inch in action in Devon

Traditionally when doing visual astronomy and a telescope that had GoTo, one had to calculate the position of the comet at a desired time, usually 0UT for the night in question unless it was really fast moving, and add it in to your handset or DSC. This was particularly true of older DSC types such as the Sky Commander and NGCMax, or any Tangent instrument derived box. The Sky Commander, to be fair, allowed you to upload positions to a user area but it was clumsy.

All of this changed however with the advent of more powerful devices such as the Argo Navis from Wildcard Innovations and the Nexus DSC from AstroDevices (both Australian companies interestingly). These devices were perhaps more properly known as digital telescope computers (DTC's) rather than DSC's. Both these devices will take comet orbital elements and compute positions on the fly. The methods of getting the elements in to the device varies between the two. The Nexus requires you to download the elements file from the MPC site and then edit it to show only those objects you may be interested in (otherwise you will get hundreds of observable comets). Copy this onto a MicroSD card and then put that in the device (this works for asteroids as well). The Argo Navis will take the elements in a specialised form and this can be transferred into the device using a serial cable either using their own program, which is very crude, or you can connect it to other planning programs such as SkyTools and Deep Space Planner and load only those elements you want.

The one issue with the Argo Navis is that it only allows 10 sets of comet elements at a time, but it would be unlikely that there would be more than 10 comets that one would be chasing visually at any given time anyway. SkyTools does upload its own comet elements every month (or more often if something interesting such as C/2017 O1 (ASAS-SN1) appears mid-month). The owner also recalculates the g and h parameters to match what has come in from his visual observers (although some of these have to be taken with a pinch of salt). The planning programs also will provide charts, including eyepiece views

for confirmation and indications of the comets best time for visibility, so you know how early you have to get up in the morning.

Admittedly this can be done as well with older software such as Guide or the BAA Computing Section website but being able to customise for your site and instrumentation is a real advantage. I find that even older no longer supported software such as DeepSky 2000 has the advantage of being able to load elements and make quick charts which are suitable to get a rough idea where a comet is. Disappointingly as MPC does change formats and URL's software like Guide which used to be the main GoTo software for charting moving bodies, no longer downloads elements as consistently as it used to, although the workaround is there to download the file from the MPC yourself and to load it takes a few more steps.

With the elements loaded the systems are usually fairly accurate when trying to locate comets (or anything else), although not always. For reasons I never understood when observing 41P earlier this year the co-ordinates were always off in both my Argo Navis and a colleague's by almost 1.5 degrees. For other comets on the same night they were spot on so you cannot always rely on the device. It can also be worth taking paper charts just in case the system lets you down. All of these DSC's rely on encoders and they can fail either by slippage or mud getting in cables (an all too common occurrence when you have to trek to a field to observe rather than nice dry observatory). It can be very difficult if not impossible to replace encoder cables on a telescope in the dark and cold if something like this happens.

What this technology does is allow you to go after much fainter comets than you would perhaps have done if you would have had to star hop, as there is a greater probability of finding them. You are also fairly sure that if you do not see it in or near the field then it is not currently visible.

The other advantage now is the selection of telescopes and tools for observing comets. The software I have briefly mentioned but now with wide field eyepieces and tools like the Swan band filters (currently only available I believe from Lumicon) makes it easier to both find the objects and observe sometimes subtle details. Eyepieces are always a religious subject amongst visual observers in terms of field and contrast but there is no doubt that the existence of wide field and hyperwide (100 degree) field quality eyepieces have made a difference when viewing objects using undriven telescopes. I have a comet Swan band filter (well two actually, 1.25 and 2" versions) and these can be useful on certain comets, mostly those with a strong gas component. I will try using the filter on any comet I observe, just in case, to see what difference it makes to the views. It was fun for instance watching the early halo around Holmes (17P) with a 130mm refractor with the Swan band as it grew, although the views later from a dark site in Devon with a 50cm telescope of the same comet without a filter were not far short of photographic.

It can be useful to have a range of sizes of telescopes to use when observing comets as well, both from the portability aspect and, if we do get a large comet, for the field of view. The smaller telescope for instance can also give panoramic views of comets with deep space objects such as M31 and PanSTARRS a few years back. I must admit

that I have been tempted to add a DSLR to this telescope (a triplet APO) but the hassle of setting up a portable telescope and getting it tracking and imaging were more than I could face. I did plan at one time to set up an observatory with this telescope and a camera in it but it never happened.

The advantages of these systems can be seen from a recent trip that I made to La Palma with Andrew Robertson where, amongst the many deep sky objects that we had primarily gone to see, we also managed to see three comets C/2015 V2 (Johnson), 71P/Clark and C/2015 ER61 (PANSTARRS). Although the first and last would have been good to find without the DSC's because they were quite bright, 71P/Clark was a much more challenging object to find both in its location low in Scorpius and its size. It looked more like a small faint globular cluster than a comet. I guess the question going to be asked by most people is why spend so much time tracking down comets if you are not going to make scientific observations. Well, there is always the fun of watching comets evolve and being able to find them.

A sunny day at Kelling Heath Star Party - and my Obsession 22 inch with Andrew Robertson's 24inch at Kelling Heath 2016 (and both much admired by the Editor)

At one Kelling Star Party a few years back Andrew and I probably made some of the few visual observations of ISON with large telescopes from the UK. Admittedly he beat me too it by 5 minutes because I was using too high a power eyepiece. That was also an important lesson to learn. It is useful to have a selection of eyepieces to hand when observing comets as it is not always the one you think that will recover it that actually is the easiest to find it in. This is perhaps as true for deep sky objects as well.

The higher quality of mirrors in today's premium Dobsonian telescopes means that in general I tend to use higher powers by default (in the range 150 – 200x) than perhaps used to be the case when large amateur telescopes were just thought of as flux collectors. It is also fun to track comets over a long period as they move around. We can all remember Hale-Bopp but I remember tracking C/2014 E2 Jacques for almost a year until it finally disappeared into the Milky Way. We also had fun when 225P outburst and became so large that it filled the field of the lowest power eyepiece that I had, which had over a degree field.

It can be fun tracking comets over a number of returns as well. I remember first seeing 21P just before the Halley apparition in 1985 and thought that it looked like a proper comet, unlike Halley, which was always a disappointment from the UK. That apparition, with a small tail, is one that I have followed at a number of apparitions since. I remember trying to track a comet from the original site of the Equinox star party at Thetford in Norfolk and getting annoyed because there was an aurora in the way.

It is true that it is becoming more challenging to find and observe comets visually from the UK what with the increasing light pollution and the inclement weather and given their propensity to appear in the morning skies. This is particularly difficult as despite all these dark sky reserves being setup in the UK in general they only measure the night sky brightness at the zenith and in most cases these places still suffer from strong light pollution low down where you would look for comets, perhaps time for the IDA to relook at how they measure sky brightness here before the whole thing becomes a mockery. I can see the advantage of having an automated imaging setup so you just plug it in and ask it to observe whilst you sleep or sit in a nice warm room.

There have been occasions when we have tried the impossible when observing comets. I remember trying to see SL9 just before impact with Steven O'Meara and others using a 36" telescope from the Texas Star party, a frightening experience being up an 18 foot ladder even on hard ground trying to move the telescope. We failed anyway. When we have had brightish comets the fact that they can be seen with binoculars can also be an advantage.

The Author and his fine caravan

Over the years I have had to travel a lot with work and being able to take binoculars has meant I have been able to keep track of comets even when not at home. This year, so far, the comet tally stands at the following 5 comets 45P, 41P 71P, C/2015 U2 and C/2015 ER61. An attempt to find C/2017 E4 Lovejoy earlier in the year ended with a telescope broken on the ground, one of the challenges of trying to go out at three in the morning and drive to a site and setup. It is sometimes a challenge to confirm what has been seen and it is useful after the event to go and check images taken near the time of observation.

Often we can see subtle effects that are over exposed on images. I do not look at images before going out as it can influence what you think you can see, something known all too well by deep sky observers. It is possible to fool yourself into seeing objects that are not there because of seeing conditions or thinking they are there. Unfortunately recently, comets have not been that useful in outreach events as most people expect a tail and something dramatic and a round fuzzy blob does not really grab attention. This can also happen with other less experienced astronomers as well. Seeing subtle features in tails can be hard and takes practice, much as any aspect of visual observing, and many people do not have the time or inclination to do this anymore. This was true with both Hale-Bopp and Hyakutake where there was a lot of detail that could be seen in the coma with jets on the way in, particularly with large telescopes, even in those days I was using a 50cm telescope.

Unfortunately one of the things I have failed to do over the years is keep a log of

all the comets I have seen, although I expect it is well over 50 and probably nearer 100. My first experience of astronomy was in fact trying to see Comet Ikeya-Seki in 1965 from Toronto and although I was very young it was this that got me into astronomy. Unfortunately we failed to see it on that occasion and it would be another 10 years before I found my first one.

Owen Brazell

6 Observing Halley from Tenerife - Richard Jones

Figure 1

The apparition of the notorious comet C/1973 E1 Kohoutek first inspired Denis Buczynski and me in 1974. This, as the media had us believe, would be the comet of the century; able to be seen in daylight with a tail 100 degrees long. What a let-down! It hardly made naked eye visibility. I was so frustrated at not being able to find it, night after night, that I nearly gave up. Then one clear January night, in icy conditions, I took a five-minute exposure of where the comet was supposed to be, (see Fig 1) and sure enough I had captured it, in the sodium light polluted skies over

Chester. This was my first "bagged" comet. That one photograph ignited my continuing interest in photographing the sky.

In the summer of 1985, my excitement was building for the return of what I have always considered to be a very British comet, Halley's. I made up my mind to bag that one too. I decided to go to Tenerife, which I hoped would prove an accessible place where good transparency could be guaranteed.

My plan to do a dummy run there, in November 1985, to check out all my equipment and to find the optimum site to set it up, got off to a shaky start. I had booked my flight from Manchester. To cover all eventualities, I had packed my Orange Celestron C-8 OTA, a tracking mount, with electronic controller, guiding eyepiece and tripod, two cameras, medium format and 35mm SLR, several lenses, and different types of negative and positive film. I was well in excess of the 20K baggage allowance even before factoring in a change of clothes and a toothbrush! It was with delight and relief that I welcomed the words from their customer service team, "Sir, we at Britannia Airways do not have a limit on baggage". I chose to ignore their proviso that in the event of the aircraft being overweight on the day my gear would come off first.

On Friday 8th November I was off to photograph Halley's comet from one of the best viewing places in the world. I arrived in Tenerife (South) and hired a cheap car for a week, which would also double as my 12-volt power supply to drive the Celestron C-8 electronics. My accommodation was at sea level in Playa de las Americas but as it was still early in the morning, I took a quick drive up to the Mount Teide National Park to check out the route and the roads. In those pre- EU investment days of 1985/6 the mountain roads were very narrow and dangerous with steep drops on either side. I realised going up there at night was going to be a challenge.

At breakfast on my first morning, I noticed heavy cloud had moved in to cover the top of Mount Teide. I took a drive up there. It was like driving in a pea souper. The only clear spot was right at the peak, officially off limits to the public, with no flat ground and at 12,000ft., and very little oxygen. See figure 2 below.

Figure 2

Disappointment loomed, especially as day after day there were no signs of a break in the weather. I began to think this is all going to end in tears, going home without a single sky photo. On the night before flying home, I went one last time up to the mountain. Storm or no storm I wasn't going home empty handed. I set up my equipment in high winds and clung on. After a gruelling hour, I got a break in the clouds and managed to guide a five-minute exposure, of Halley inbound, See below fig 3.0 the green, in middle of picture.

Figure 3

I didn't feel too bad; at least I had one image to take home! As we know, clear nights in UK are few and far between. My next opportunity came in January 1986. This particular afternoon, it had snowed and after the snow, the skies suddenly cleared. I quickly loaded everything into the car, including a snow shovel, drove out and set up on a farmer's driveway somewhere south of Chester. I was just about to take my first exposure, when a booming voice came out of the darkness, "What the 'Bl..dy' hell do you think you are doing!". There stood the farmer with his shotgun over his arm. I politely explained that I was an astronomer trying to photograph Halley's comet. His belligerent mood changed in an instant. He asked if he could bring his children to see the comet through the telescope. I replied, “Of course you can, but give me 15mins to get a photo" (Halley in January was setting close after sunset). He came back as arranged, with his three children and they all saw the comet through the Celestron C-8 eyepiece. We all felt good about the encounter.

My next planned comet photographing expedition was to Mount Teide again. This was going to be the main show and the days ticked by as I kept my fingers crossed for better weather in April. This time the weather was good, really good, so my expectations were high. However, instead of clouds hampering me, there were other obstacles to overcome. It was not possible to get accommodation in the national park itself (except at the expensive Parador Hotel) so I had to make nightly trips up the mountain. I was unprepared for the sheer fatigue and exhaustion resulting from the driving task, staying up most of every night and getting far too little daytime sleep. On one occasion, I fell asleep at the wheel but, luckily, came too just before the car was about to career over the edge. It seriously shook me, so I continued the journey with the heater off and the window down, singing loudly to keep myself awake.

Finding the optimum site proved challenging. My first images were taken in the car park across the road from the Parador Hotel. This proved not to be a good location as it was popular with too many young couples wanting to park up, and there were problems with headlights. I next tried the road leading up to the cable car ride. This too proved problematic as the road was so steeply sloping that it was very awkward to polar align my Celestron mount - a chore that would have to done every night.

Figure 4

My final place of set up was at the Mount Teide Observatory (Instituto de Astrofisica IAC) towards the North end of the island.

See fig 4.0 above. In those days, there was no security on the main gate so I drove straight up to the 2.5m IR Telescope and asked Rodriguez, who appeared to be in charge of it, if I could set up next to his dome for my imaging. He asked me various questions on Cosmology and seemingly satisfied with my answers, gave me permission. This proved to be the perfect location, very high and very dark and where most of my images were taken. Fig 5 below shows sunrise from above the clouds there.

Figure 5

In those pre-digital days, I used the following equipment for my imaging: A Celestron C-8, used purely as a guiding platform to physically hold the cameras; 35mm Minolta SRT-101 and a medium format Pentagon Six. (I lost a 12-image roll of exposed film, taking the film out of that camera). I used 50mm f2.8, 180mm f2.8, 300mm f4, 500mm f5.6 lenses and films: Tri-X Neg 400ASA, Fujichrome 100ASA, Fujichrome 400ASA and 3M1000 ASA positive.

All the images can be viewed in the BAA Archive under 1P_1985 & 1P_1986

Two images of special note are included here: the original image and its photo amplified version. See figures 6 and 7.

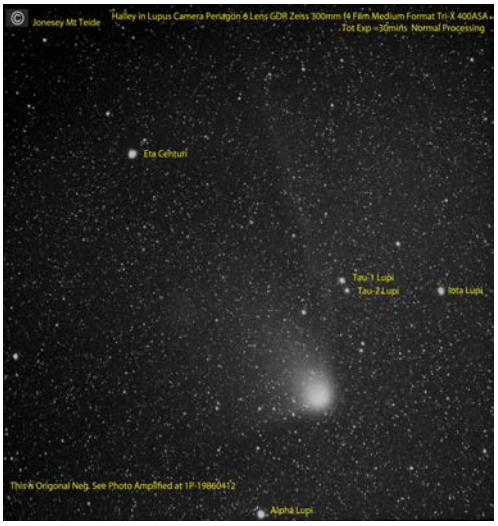


Figure 6

Figure 7

David Malin, of the AAT fame in Australia, made a valuable contribution to Astronomical Science by amplifying weak negatives to bring out extra detail in the thin areas of the negative. I used a slightly different method, supplied by a photo engineer at Kodak London and outlined in fig 7.0 above. I was thrilled when I received the photo amplified negative, as it showed I had caught a tail disconnection event that I had not noticed on the original.

According to the science, this event occurs when the tail of a comet passes through a

solar system interplanetary magnetic field line reversal. The plasma tail (blue) contains electrons and ions, which are strongly affected by magnetic fields (as in the beam of an oscilloscope, deflected by electro-magnets). The sudden reversal causes the tail to disconnect. It is sometimes popularly called the "broken leg effect". It doesn't affect the dust tail as the dust is not ionised.

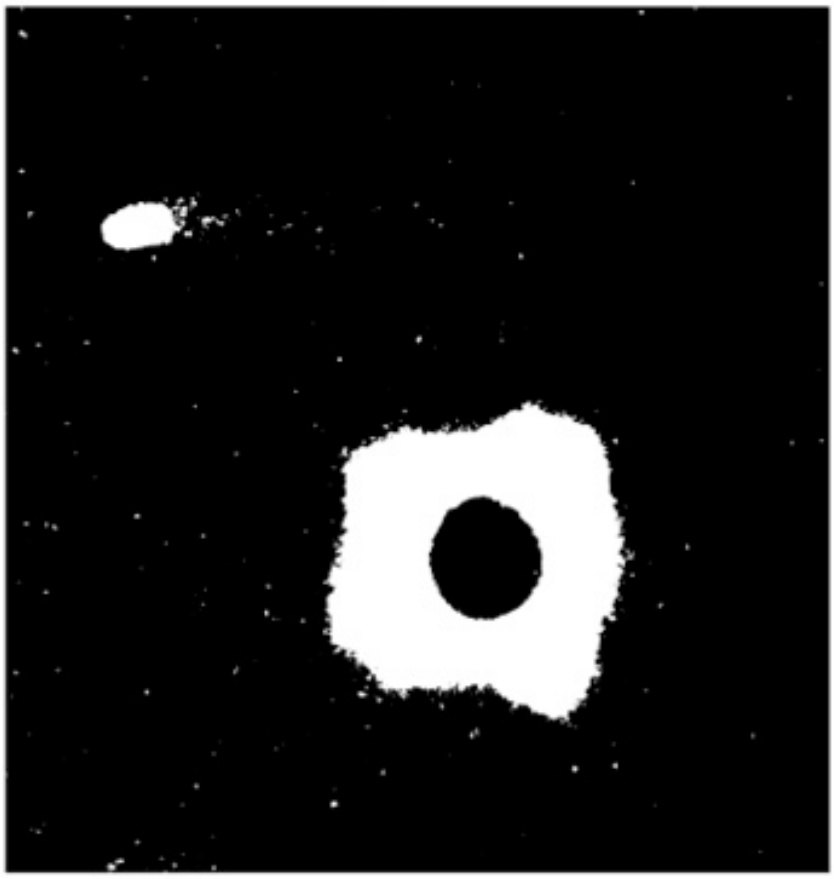
The expedition ended with one potentially alarming incident before boarding the flight home. When going through security at Tenerife airport, everything had to be X-Rayed. I began to protest whereupon three guards with guns converged on me. I explained about photographing Halley. Luckily for me, the Spanish were well informed about the Comet, and my films and equipment stayed intact and were allowed through. Was it worth all the effort and expense? You bet it was, I won't be around in 2062 when Halley next graces our skies, so securing those 20 images from Tenerife was, for me, an unrepeatable and unforgettable experience. "A once in a life time."

Richard T.Jones I.Eng

jonesey404@gmail.com

7 From the Archives

The Eclipse Comet of 1948 – Nick James – Section Director

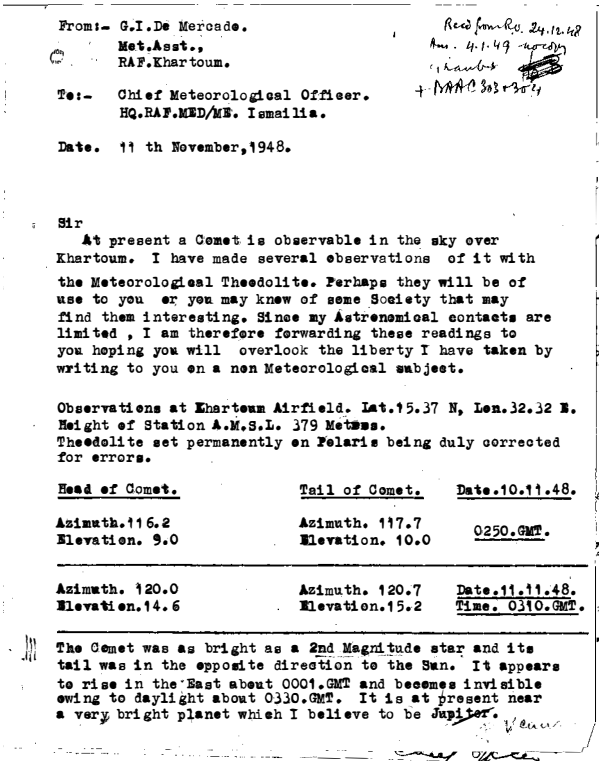


This is the famous photograph of comet C/1948 V1 taken from an RAF aircraft over Kenya during the total eclipse of 1948 Nov 1

The Comet Section archive contains a lot of interesting material and our objective is to get much of it scanned, indexed and online over the next few years. I have been gradually sifting through the material and I came across this interesting correspondence concerning the eclipse comet of 1948.

The comet was discovered during the total eclipse of 1948 November 1 which was visible on a track starting in the then Belgian Congo and which crossed Nairobi, Kenya before heading out over the Indian Ocean and ending up south of Australia. The comet was seen by many people but it was also photographed during totality

from an RAF aircraft flying at 13,000 ft. over Kenya.



From:- G.I.De Mercade.
Met.Asst.,
RAF.Khartoum.

Rec'd from R.O. 24.12.48
Ans. 4.1.49

To:- Chief Meteorological Officer.
HQ.RAF.MED/ME. Ismailia.

Date. 11 th November,1948.

Sir

At present a Comet is observable in the sky over Khartoum. I have made several observations of it with the Meteorological Theodolite. Perhaps they will be of use to you or you may know of some Society that may find them interesting. Since my Astronomical contacts are limited , I am therefore forwarding these readings to you hoping you will overlook the liberty I have taken by writing to you on a non Meteorological subject.

Observations at Khartoum Airfield. Lat.15.37 N, Lon.32.32 E.
Height of Station A.M.S.L. 379 Metres.
Theodolite set permanently on Polaris being duly corrected for errors.

Head of Comet.	Tail of Comet.	Date.10.11.48.
Azimuth.116.2 Elevation. 9.0	Azimuth. 117.7 Elevation. 10.0	0250.GMT.
Azimuth. 120.0 Elevation.14.6	Azimuth. 120.7 Elevation.15.2	Date.11.11.48. Time. 0310.GMT.

The Comet was as bright as a 2nd Magnitude star and its tail was in the opposite direction to the Sun. It appears to rise in the East about 0001.GMT and becomes invisible owing to daylight about 0330.GMT. It is at present near a very bright planet which I believe to be Jupiter.

The comet's designation at the time was 1948l and the modern designation is C/1948 V1.

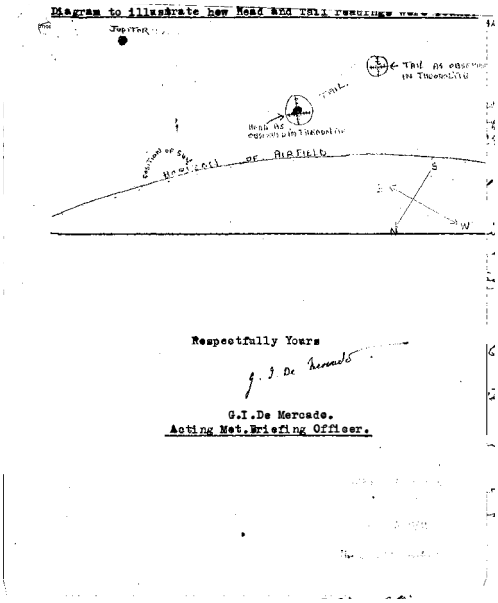


Diagram to illustrate how Head and Tail [illegible]

Jupiter

Tail as observed in Theodolite

Head as observed in Theodolite

Horizon

Centre of Sun

Met. Office at Airfield

S

E

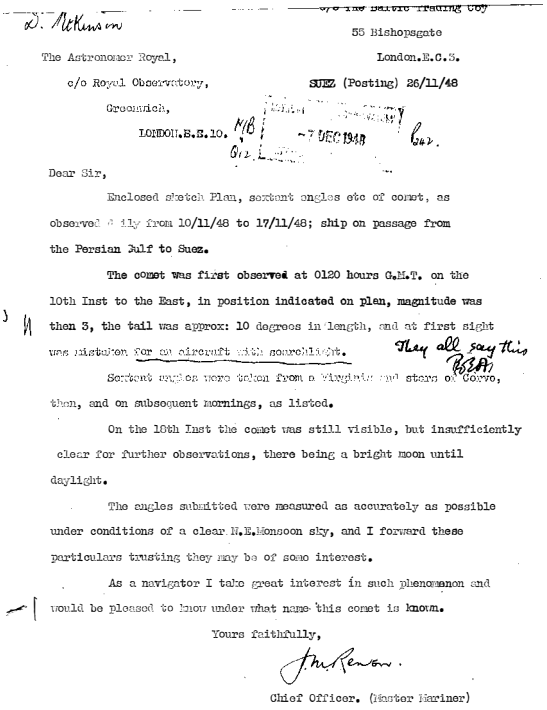
W

N

Respectfully Yours

G.I.De Mercade.
Acting Met.Briefing Officer.

Some details of the RAF photograph were described by Robert d'Escourt Atkinson at a BAA meeting held on November 24 at Burlington House (JBAA 59,2).



D. McKenzie

c/o The Darric Trading Coy
55 Bishopsgate
London.E.C.2.

The Astronomer Royal,
c/o Royal Observatory,
Greenwich,
LONDON.S.E.10.

SUEZ (Posting) 26/11/48

MB
Gr 2
7 DEC 1948

Dear Sir,

Enclosed sketch Plan, sextant angles etc of comet, as observed daily from 10/11/48 to 17/11/48; ship on passage from the Persian Gulf to Suez.

The comet was first observed at 0120 hours G.M.T. on the 10th Inst to the East, in position indicated on plan, magnitude was then 3, the tail was approx: 10 degrees in length, and at first sight was mistaken for an aircraft with navigation lights.

They all say this

Sextant angles were taken from a Virginis and stern of Corvo, then, and on subsequent mornings, as listed.

On the 10th Inst the comet was still visible, but insufficiently clear for further observations, there being a bright moon until daylight.

The angles submitted were measured as accurately as possible under conditions of a clear N.E.Monsoon sky, and I forward these particulars trusting they may be of some interest.

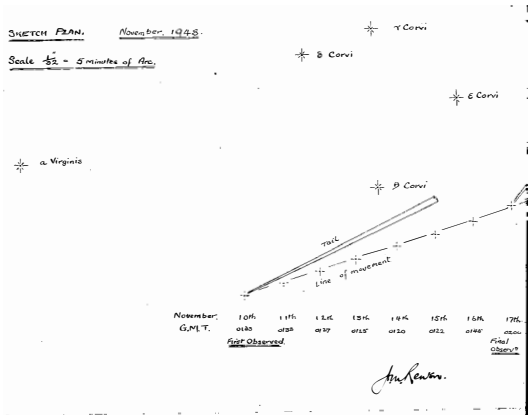
As a navigator I take great interest in such phenomenon and would be pleased to know under what name this comet is known.

Yours faithfully,

J.M. Kenzie.

Chief Officer. (Master Mariner)

Unfortunately it only seems to have survived as very poor reproductions (see the example here). I was therefore rather excited when I came across a folder of correspondence marked 1948. Sadly there was no print but there was some interesting correspondence between Merton and several others including Atkinson covering the period after the eclipse when the comet was a bright morning object moving south through Hydra. Some examples are reproduced here.



SKETCH PLAN. November 1948.

Scale ½ - 5 minutes of Arc.

γ Corvi

β Corvi

ε Corvi

α Virginis

δ Corvi

Tail

Line of movement

November G.M.T. 10th 0120 First Observed. 11th 0120 12th 0130 13th 0115 14th 0120 15th 0122 16th 0140 17th 0200 Final Observn.

J.M. Kenzie.

I'm still hoping that I'll come across a high quality print of the RAF image somewhere buried in the archive but no luck yet.

Nick James - Section Director

Comet Observers of the Past – Histories Contributions and Achievements

Director's Note - This section introduces historical perspectives on comet discoveries, their role in general society and in politics. I hope you enjoy it and also feel free to contribute.

8 Comet 38P Stephen-Oterma, The Discoverers, and a "New" search and discovery telescope (1930's) – by Denis Buczynski

This periodic comet returns to perihelion in November 2018. It was first discovered in 1867, then subsequently lost. Upon re-discovery 77 years later it was seen to have many interesting aspects for astronomers, observatories and instruments.

Although the comet was first named after E.J. Stephen of Marseille Observatory in France, it was actually discovered on Jan 22 1867 by J.E. Coggia, an 18 year old assistant at the same observatory. A few days later on Jan 24 E.J. Stephen was able to make confirmatory observations, and crucially provided accurate positions and motion. When these results were announced to the astronomical world, Stephen, the Observatory Director, was credited with the discovery and thereby his name was attached to the comet. It was observed until March 1867 and astronomers in America were able to compute an orbit with a period of approximately 40 years. This meant that the comet was in a Halley-type orbit and predictions of its return were for the years between 1902 and 1912. However, the comet was not recovered during this predicted return period and it was considered to be lost.

In 1942, during World War 2, the Finnish astronomer Liisi Oterma discovered a comet using a newly-invented type of wide field reflecting telescope. This turned out to be the return of Comet 38P, which is now named Stephen-Oterma. The career and life (1915-2001) of this astronomer is a fascinating one and worthy of description.

Her career was closely associated with another more famous Finnish astronomer, Yrjö Väisälä.

Oterma in her younger years

In 1924 Väisälä was involved in optical design. He had independently invented the same telescope configuration as Bernhard Schmidt, but recognised that the curved focal surface was a limitation of the system, and abandoned publication of his invention. However when Schmidt published the detail of his system in 1935, Väisälä returned to his own design and improved it by placing a field flattener close to the focal surface. This design became known as a Väisälä camera. Until these fast wide-field cameras were invented, asteroid and comet photographic discoveries had been made using triplet lens systems operating in the range of f/4 - f/6. The discoveries in the years from 1900 to 1930 were dominated by astronomers employing lens systems such as those by Zeiss which were used by Max Wolf at Heidelberg, and the Harvard Observatories' Metcalf cameras. The Cooke/Taylor lenses were the last improvement of the lens design. The attraction of the new reflecting cameras was the short focus, large aperture and subsequent fast speed, around f/2. This meant that large deep fields could be recorded in relatively short exposures. These types of instruments were ideal for survey work.

Liisi Oterma studied mathematics and astronomy at the University of Turku in Finland under Professor Väisälä, and when he established an observatory in the early 1930's for the University at Iso-Heikkilä he appointed his very bright and capable student as his observing assistant. During the early years of the observatory, Väisälä and Oterma made the optics for the observatory telescope.

Väisälä and Oterma producing optics at Turku

This comprised a primary mirror with a focal length of 1031 mm. The spherical primary mirror diameter was 600 mm, and it was on a German-type equatorial mount. It used a 120mm diameter doubly convex field-flattening lens 3mm in front of the focal plane, which gave it a 6.7 degree diameter field of view on 120x120 mm film plates. This provided a scale of 200 arc-seconds per mm. Oterma was particularly expert in optical work and together she and Väisälä made large optics for

observatories around the world. They produced the mirror for the Uppsala Schmidt telescope which was originally located at Mount Stromlo in Australia and was used to take the first images of Sputnik in 1957. It was then relocated and installed at Coonabarabran also in Australia and was used by Rob McNaught to make his comet discoveries.

Oterma and Väisälä (top right) at the Turku Observatory

Using the new Väisälä 500/600/1031 camera from 1935 the Turku Observatory search programme was very successful and discovered more than 800 asteroids and 7 comets. Oterma was deeply involved in this search programme and despite the very cold winter conditions at the Finnish observatory remained diligent in her work. She discovered around 200 asteroids and 3 comets during this period. She also found time to complete her Master's degree in 1938. She was proficient at the calculation of orbits and computed orbits for her own discoveries, including the periodic comets associated with her name.

In 1955 Oterma published her dissertation, not on minor planets but on telescope optics. It described methods for optimizing the use of large telescopes. The dissertation received the highest marks, and Oterma became Doctrix Prima at the degree ceremony at Turku University, held in the same year. She was the first female Ph.D. at their Faculty of Sciences and also the first woman in Finland to achieve a Ph.D. degree in astronomy. In 1956, the Finnish alliance of business and professional women chose her as their "Woman of the Year". In 1959 she became a Doctor of Astronomy and in 1962 Acting Professor of Astronomy at Turku University, and then Professor in 1965. After Yrjö Väisälä's death in 1971, she also served as Director of the Astronomical-Optical Research Institute at Turku University until 1975. She retired in 1978.

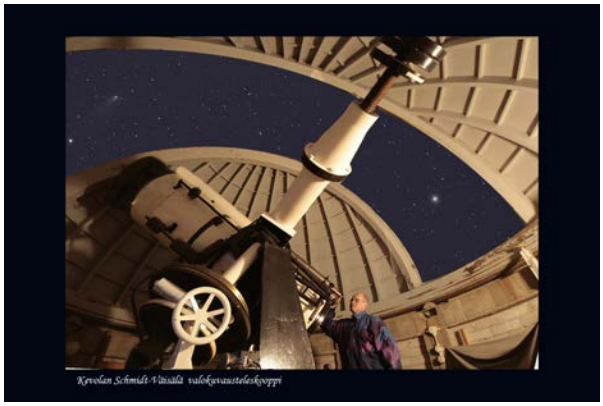
She had the reputation of being a reticent and unpretentious person. She featured in an article "Comet Oterma" in the magazine Kansan Kuvalehti in 1950, which described her scientific reputation. It relates that an Italian astronomer, who met Oterma in 1948 at an international astronomical congress in Switzerland, told her that he had thought that she would be an old man with a long beard.

Professor Anders Reiz from the observatory of Copenhagen who knew about Oterma's interest in languages said that she "keeps silent in eleven languages". Oterma's proficiency in languages included German, English, Spanish, Italian, Hungarian, Esperanto and French. She chose to write her dissertation in French. As a person interested in languages, it was natural for her to conclude her inauguration lecture with thoughts about whether there were other sentient beings in the universe with whom humans could exchange messages. "The nearest planet

with beings who might be interested in communicating with us would be located within a distance of 300 light years. If our neighbour civilisations have developed, say, a few hundred years further than us, they have probably sent us messages. We only need to listen."

Oterma's comets were discovered during the Second World War and communications between observatories were severely disrupted and delayed. It was therefore important that the orbits for these comets were computed in-house so that the possibility of their being lost was reduced. Indeed her first comet C/1942 C2 was only observed at Turku.

Her two periodic comets were important discoveries. Comet 38P turned out to be the return of the 1867 1 Comet Stephen. The disrupted communications meant that this comet was independently discovered by two separate observatories in Georgia and Uzbekistan. The link with Comet Stephen 1867 1 was made by Fred Whipple in 1942 and he established the period as being around 38 years. Her Comet 39P turned out to be unusual in that it was found to have had its orbit affected by close encounters with Jupiter. In a 1962 paper by Brian Marsden entitled "Violent Changes in the Orbit of Comet Oterma" he outlined these effects. Since then its orbit has been described as a quasi Hilda type comet and now as a Chiron type comet. At its next perihelion in 2023 it is likely to be as faint as magnitude 22.



The 50cm Väisälä camera/telescope at Turku Observatory

The 2018 apparition of Comet 38P is thus described by Jon Shanklin, "It should come within visual range in September as it brightens rapidly on its way to the November perihelion. It will be at its brightest in November, when it is in the late evening sky and remains well placed into 2019."

So as we turn our telescopes towards this famous returning comet, we can recall the observers of the past who made important observations and remember the very impressive Liisi Oterma, her extraordinary career, and her immense contribution to Comet science.

In this article I have relied heavily on internet sources and give links to relevant articles below. Much detail was extracted from Iva Isaksson's biography of Liisi Oterma.

http://cometography.com/pcomets/039p.html

http://cometography.com/pcomets/038p.html

http://adsabs.harvard.edu/full/1962ASPL....8..375M

https://en.wikipedia.org/wiki/38P/Stephan%E2%80%93Oterma

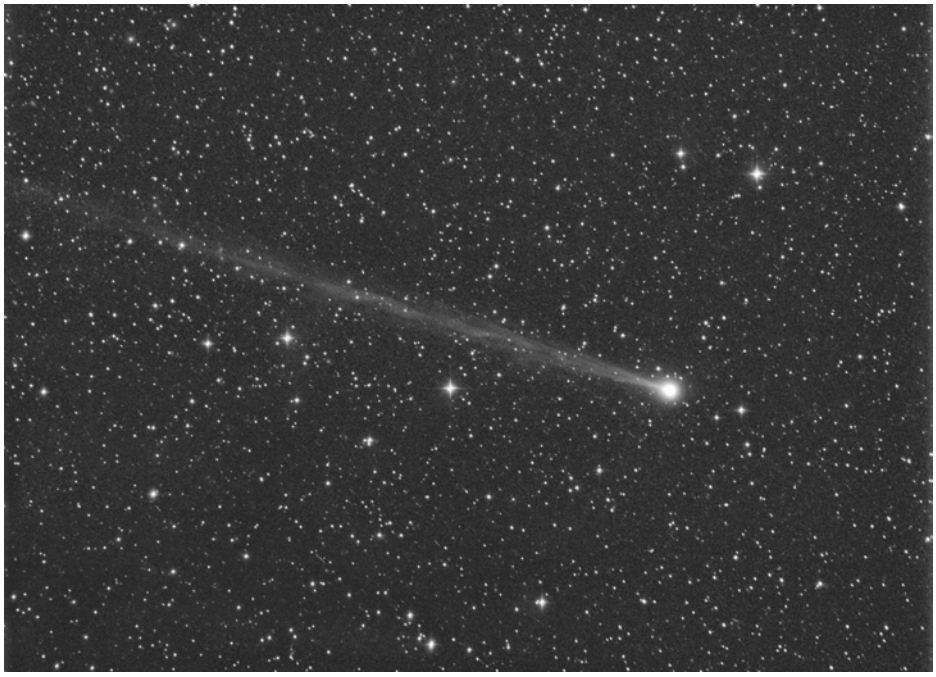
http://www.helsinki.fi/akka-info/tiedenaiset/english/oterma.html

www.zmailer.org/m/ursa/oterma-thesis.pdf

https://en.wikipedia.org/wiki/Yrj%C3%B6_V%C3%A4is%C3%A4l%C3%A4

Denis Buczynski – Comet Secretary

9 Memories of Comet Honda-Mrkos-Pajdusakova (1974-f) with thoughts of its splendid 2016-2017 return as Comet 45P – P. Clay Sherrod



Comet 45p 2016 Dec 22 Michael Jaeger

As Comet Honda-Mrkos-Pajdusakova (45P) streaked across our nighttime skies last winter, displaying a beautiful green coma and long linear tail several degrees to the northeast, I was inspired to go into the Arkansas Sky Observatories' Archives of bound research documents and find my records of observing this comet in 1974 and 1975. Barely visible visually in our skies prior to the remarkable Comet West (1975n) in 1975, comet 45P. Comet Honda-Mrkos-Pajdusakova was discovered

long before I first observed it in 1974, and had been missed or very unfavourably placed for observation since its original discovery in 1948 by three comet hunters, M. Honda, A. Mrkos, and L. Pajdusakova, each spotting the comet independently.

Thus this interloper was named after all three, who simultaneously found this comet at magnitude 9 as a very faint "smudge" of light, quite diffuse and without a nucleus or tail. The comet in that year rapidly faded to magnitude 13 and was not seen again until 1954 when it reached magnitude 8.4 only for a very short period of time.

With its orbital period of only 5.3 years, we would think that this comet would be easily visible at each pass, but this is certainly not the case; it was not visible in 1959 because of the geometry of the Earth-Sun-Comet orientation, but it was observed very sparingly in subsequent passages. It was not until the winter of 1974-75 that the comet would become favourable for observations in evening skies. By that time there were many more observers, both amateur and professional, who were taking a keen interest in the nature of comets.

In 1974-75, we had just seen the passage of "The Comet of the Century," Comet Kohoutek 1973-f, regrettably deemed to be the brightest comet perhaps ever seen in modern times. The world awaited this comet with eager anticipation and thousands of small telescopes were sold to an unsuspecting public hoping to catch this media-frenzied celestial visitor. When the comet was first discovered by Czech astronomer Lubos Kohoutek, it was so far away in our solar system, yet so intrinsically bright, that Dr. Brian Marsden of the Harvard-Smithsonian Astrophysical Observatory properly surmised that by the time the comet would come into the Earth' vicinity, it would be incredibly bright and thus the comet mania grew.

But soon we realized that Comet Kohoutek was going to be the fizzle of the century and many of both the general public and the astronomical community was discouraged from the realm of comet exploration.

But the early 1970's brought an incredible influx of bright and exciting comets, most of them ignored, under-observed or missed entirely by the apathy of the Kohoutek-burned human race. I must admit, that comet 1974-f was not amongst those exciting comets. But at the time I was hooked on comet observing and Dr. Marsden had become my mentor to continue to monitor all that I could. A phone call one evening at the observatory from Marsden was all that I needed to immediately turn our modest telescopes in search of Comet Honda-Mrkos-Pajdusakova. Our first attempts to locate the comet, all done visually at that time, were unsuccessful; the now-veteran comet observer John Bortle was the first to spot it in his 12-inch Newtonian on November 15 at a faint magnitude less than 12.5; his next effort on December 4 saw the comet had brightened to a still-dim magnitude 10.4.

By December 10, 1974, using the Comet Searching six-inch f/5 wide field refractor, the comet was spotted at Arkansas Sky Observatories by volunteers Jim Henry and John Evans and myself. It appeared as nothing more in the low power field than a smudge of diffuse glow, but we had picked up the comet nonetheless and reported it as we did all comets to the SAO/International Astronomical Union's Central Bureau of Astronomical Telegrams (CBAT) as a very faint extended diffuse object only three arc-minutes across and magnitude 10.8 visually.

1974 CBATs

CENTRAL BUREAU FOR ASTRONOMICAL TELEGRAMS
INTERNATIONAL ASTRONOMICAL UNION

POSTAL ADDRESS: CENTRAL BUREAU FOR ASTRONOMICAL TELEGRAMS, SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS. 02138, USA
CABLE ADDRESS: SATELLITES, NEWYORK - WESTERN UNION: RAPID SATELLITE CAMBMASS

COMET BENNETT (1974h)

Mr. J. C. Bennett, Pretoria, provides the following total magnitude estimates, obtained with a 12-cm telescope: Nov. 13.1 UT, 9; 14.1, 8.5; 15.1, 8.3; 18.1, > 10; 22.1, > 11 (not found). The following ephemeris continues that on IAUC 2725. There are no known observations after Nov. 25, so the magnitudes are uncertain.

1974/75 ET	α_{1950}	δ_{1950}	Δ	r	m_1
Dec. 20	$22^h35^m.46$	-14°38!2			
21	22 36.49	-12 26.5	0.589	0.936	10.6
22	22 37.38	-10 29.0			
23	22 38.15	- 8 43.7	0.657	0.950	10.9
24	22 38.84	- 7 08.9			
25	22 39.44	- 5 43.2	0.727	0.966	11.2
26	22 39.98	- 4 25.4			
27	22 40.48	- 3 14.4	0.796	0.982	11.4
28	22 40.92	- 2 09.4			
29	22 41.34	- 1 09.7	0.867	1.000	11.7
Jan. 3	22 43.04	+ 2 49.2			
8	22 44.46	+ 5 41.3	1.213	1.099	12.8
13	22 45.81	+ 7 53.8			
18	22 47.19	+ 9 41.2	1.538	1.212	13.8
23	22 48.64	+11 12.2			
28	22 50.16	+12 32.0	1.833	1.334	14.6
Feb. 2	22 51.76	+13 44.3			
7	22 53.43	+14 51.4	2.098	1.461	15.3
12	22 55.14	+15 55.0			
17	22 56.89	+16 56.1	2.329	1.590	15.9

PERIODIC COMET HONDA-MRKOS-PAJDUŠÁKOVÁ (1974f)

Mr. T. Seki, Kochi Observatory, Geisei Station, provides the following precise position. The comet is very diffuse, without condensation. The magnitude estimate is with a 40-cm reflector, 57 ×.

1974 UT	α_{1950}	δ_{1950}	m_1
Dec. 3.40104	$19^h33^m52^s.6$	-13°49'44"	10.5

Mr. C. Sherrod, North Little Rock, Arkansas, estimated the magnitude on Dec. 10.01 UT to be about 11.0 (15-cm f/5 refractor).

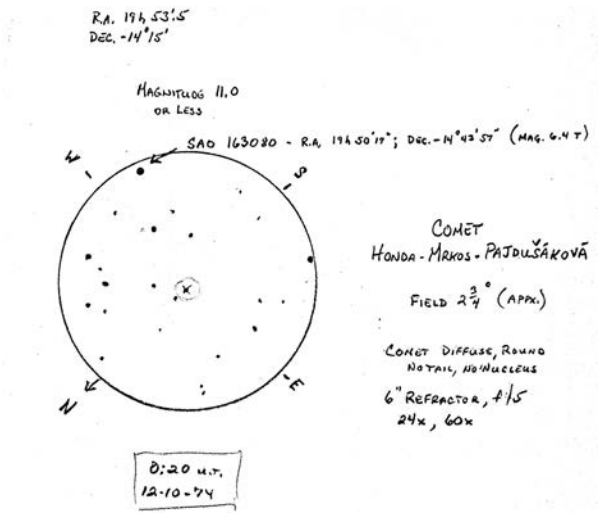
1974 December 13 Brian G. Marsden

The IAU/CBAT Telegram that was distributed (mailed) Dec. 13, 1974

Although photography was available to us at the Edgehill facility (to later be designated Harvard MPC ObsCode H43), the practice at the time was to record physical parameters and morphology visually. The following is my report to Dr. Marsden, Mr. Dennis Milan of both Sky and Telescope magazine and the Comet Recorder for the Association of Lunar and Planetary Observers, and to Daniel Green (now the director of the CBAT) who edited The Comet out of North Carolina.

"I searched on November 28, December 2,3,4,5,8,9 and tonight (Dec. 9) photographed the exact area where the comet should be reaching stellar magnitude 13 with the 6-inch at prime focus.... stars of 12th and 13th magnitude were quite obvious on 10 to 15 minute exposures.

"Tonight the comet was finally spotted with some difficulty.... transparency was excellent (6th mag. stars visible to the naked eye) and seeing good. At 23.5x in the 6" the comet was at first not visible, however with 60x it was quite obvious using averted vision. No tail was visible, nor did it show any nuclear condensation [nucleus]. It appeared as a borderless diffuse glow approximately 3 arc minutes diameter.... the comet being only about 12 degrees above the trees in the distance.... enclosed is a quick drawing....."



45P 1974 Not a work of art, but a quick sketch done 43 years ago at the telescope

And now, 43 years later much has changed in the world of astronomy and otherwise. Comet 1974-f is once again in my evening skies, but now as Comet 45P Honda-Mrkos-Pajdusakova. After 70 years of always being noted as a diffuse glow with no central condensation, the remarkable Comet 45P as shown in photographer Michael Jager's outstanding photo at top has been an object well worth monitoring and watching for these old eyes after five decades.

Today, with modern CCD cameras, digital computerisation processing of images, and precision telescopes only dreamed of in 1974, we are able to capture what were once called faint diffuse objects with the clarity and splendour that they truly possess. Much has changed, not only in the equipment that we use, but also in our understanding of these comets, visitors from the depths of our solar system of

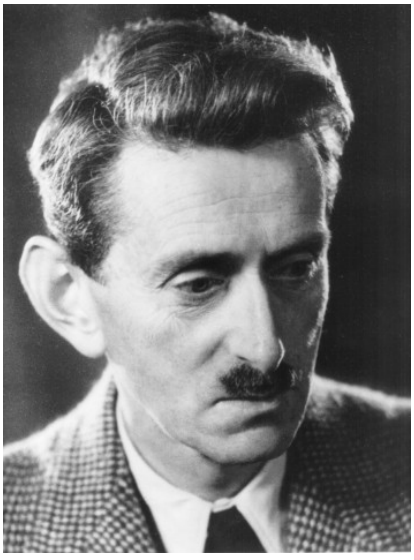
which we are still hanging onto uncertainties and some mysteries of their nature and origins.

P Clay Sherrod

10 Editor's Whimsy – The Comet Stone

Whilst scratching my head to write something entertaining and somehow connected to comets, I was delving into my photo archives, trying vainly to create order out of chaos, when I pulled out my image of the Comet Stone…

Archeoastronomy[3] is a growing science. One of the first to write about megalithic circles, alignments and standing stones was Alexander Thom (1894-1985).



Alexander Thom

He was an engineer (Forth Bridge and flying boats, Brasenose College Oxford) and is known for his theory of the megalithic yard (.83metres), which he suggested was a standard prehistoric measurement. Considered a little off piste occasionally, he spent his weekends dragging his family around ancient sites and suggested that several circles/eggs/ovoids were built as astronomical complexes to predict eclipses via nineteen year cycles. Thom went on to identify numerous solar and stellar alignments at stone circles. He proposed that the prehistoric peoples of Britain must have used a solar method of keeping calendar. He suggested a year based on sixteen months; four with twenty two days, eleven with twenty three days and one with twenty four. "We do not know how sophisticated prehistoric man's calendar was, but the interesting thing is that he obtained declinations very close to those we have obtained as ideal"[4]

More recent research is indicating how international sites may be linked. [5] Hampered with no written records a lot of

what is postulated is speculation. Stones last a long time. But it would also appear that in the milder southern regions of the British Isles, there were also many circles but made of wood. And plotting all sites has, with the help of aerial photography led to a better understanding of how they are positioned and just how common they were.

After having feasted on Mr Thom's writings I embarked, last spring, on a long-planned trip to the Orkney Islands. I have always enjoyed visiting these enigmatic sites since I was a girl. I was born in Northern Ireland and the whole of Ireland is rich in these remains, many now known to be older than Stonehenge.

Stones of Stenness, Orkney

I planned a day to tour the Stones of Stenness, Skara Brae and the Ring of Brodgar. The Ring of Brodgar is believed to have been built around 2500bc, but the centre of the Ring has never been fully excavated. Stenness and Brodgar are positioned along a narrow isthmus. Both are part of a 970 sq. kilometre area containing over 80 megalithic tombs, 250 round barrows, mounded earthen burial sites, and 100 short cists, stone-lined graves. Within an area of four kilometres in length and one kilometre width are the three henges, Bookan, Brodgar and Stenness. There are also many 'outliers', standing stones, such as the Odin and the subject of this article, the Comet Stone, on a, possibly, ceremonial route between Stenness and Brodgar, and multiple passage tombs, including Maes Howe.

The RIng of Brodgar, Orkney

On approaching the Ring of Brodgar I was diverted by a small signpost to the Comet stone itself. It stands about 140 metres to the east of the Ring, a lonesome monolith. It is about 1.75 metres tall, and has no markings on it.

Image courtesy of Orkneyjar.com

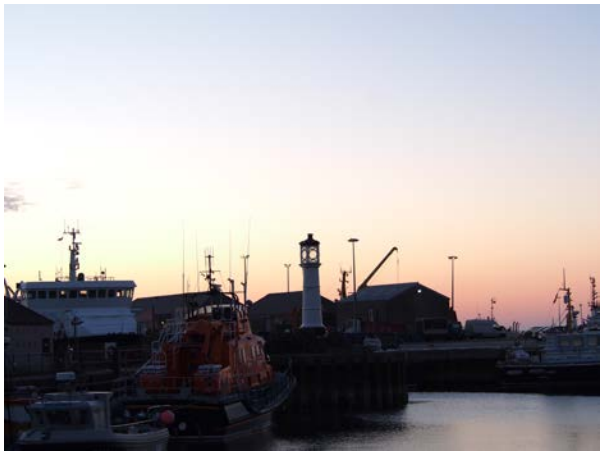
There are rooted remains of two other stones beside it, but they are not easily visible in the overgrown ground on which it stands. Perhaps they formed a table like dolmen grave.

What is known is that the name Comet Stone is a relatively later addition, probably around the 19th century, and that fanciful suggestions that it actually represented a known comet in orbit around the Ring are, alas, just that – fanciful. In the past the Ring had been called the Temple of the Sun. The Stones of Stenness were considered to be the Temple of the Moon, due to their crescent layout - although that may have been due to the antics of a farmer who blew a few of them up in order to plough a straight furrow in his land. Fortunately some enlightened neighbours stopped him before he destroyed them all.

One well known local of the period, George Marwick, recorded that he had heard others refer to it as the Ulie Stone, meaning oil stone. It was a tradition then to salute the stone, as was often was done in rural areas, and these stones were 'anointed' with oil, beeswax or honey. This was to placate the elves that inhabited the area around them. The Comet stone also had a story attached to it that it was the remains of a petrified fiddler.[6]

In Northern Ireland standing stones were often to be found painted red, white and blue or green, white and gold depending on the politics of the local leprechauns….

If you get the chance I cannot recommend enough a trip to this beautiful area of the British Isles. But do read up on your Alexander Thom first, just to add to the interest.



The harbour at Kirkwall, Orkney

[1] *The term archaeoastronomy was first used by Elizabeth Chesley Baity (at the suggestion of Euan MacKie) in 1973,[15] but as a topic of study it may be much older, depending on how archaeoastronomy is defined. Clive Ruggles[16] says that Heinrich Nissen, working in the mid-nineteenth century was arguably the first archaeoastronomer. Rolf Sinclair[17] says that Norman Lockyer, working in the late 19th and early 20th centuries, could be called the 'father of archaeoastronomy.' Euan MacKie[18] would place the origin even later, stating: "...the genesis and modern flowering of archaeoastronomy must surely lie in the work of Alexander Thom in Britain between the 1930s and the 1970s. Wikipedia*

[1] Alexander *Thom (1 August 1967). Megalithic Sites in Britain. Oxford Univ Pr on Demand. pp. 107–. ISBN 978-0-19-813148-9. Retrieved 4 June 2011*

[1] http://www.independent.co.uk/news/science/archaeology/stone-circles-secrets-research-callanish-stenness-scotland-orkney-gail-higginbottom-a7201096.html

[1] *http://orkneyjar.com/history/monoliths/cometstone.htm*

Janice McClean - Editor, Comet's Tale and Newsletter

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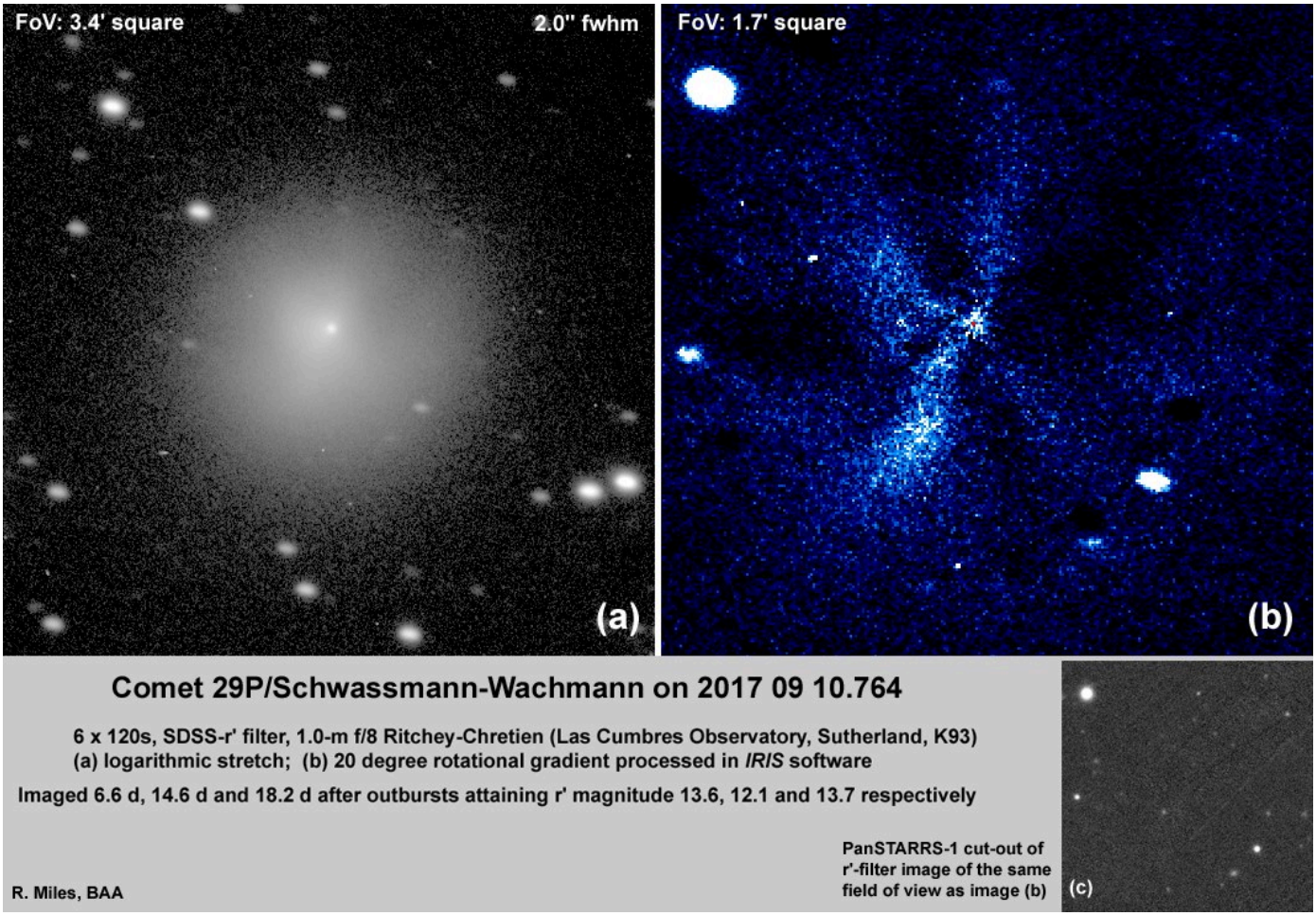
14 Picture Gallery

2p_201703326_grhemann.

Comet 29p 2017 Richard Miles



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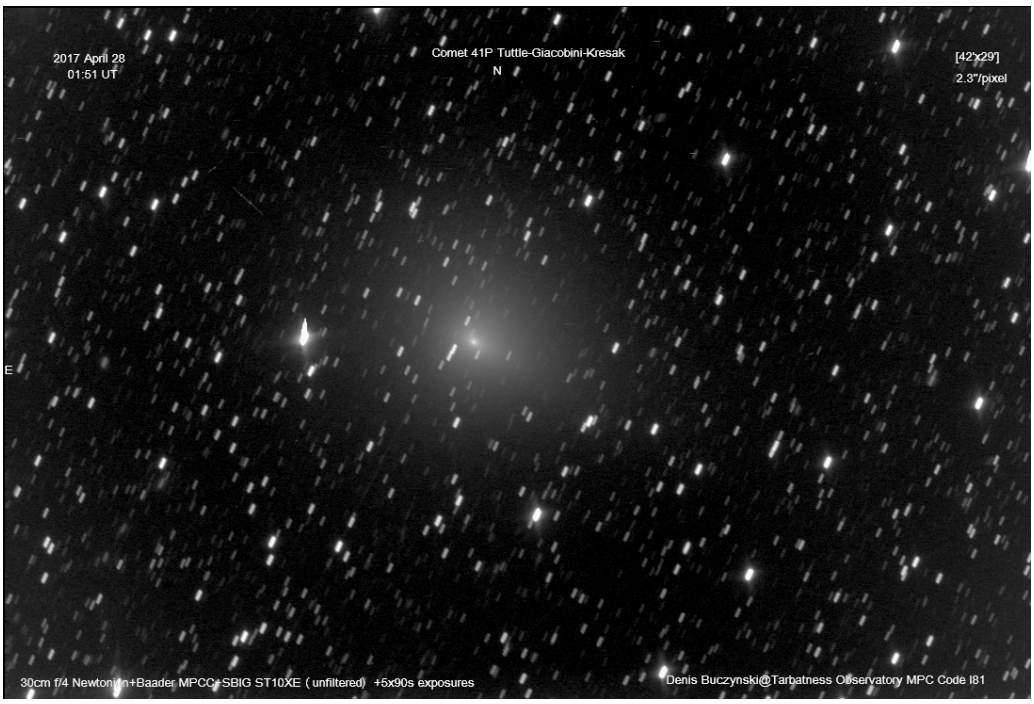

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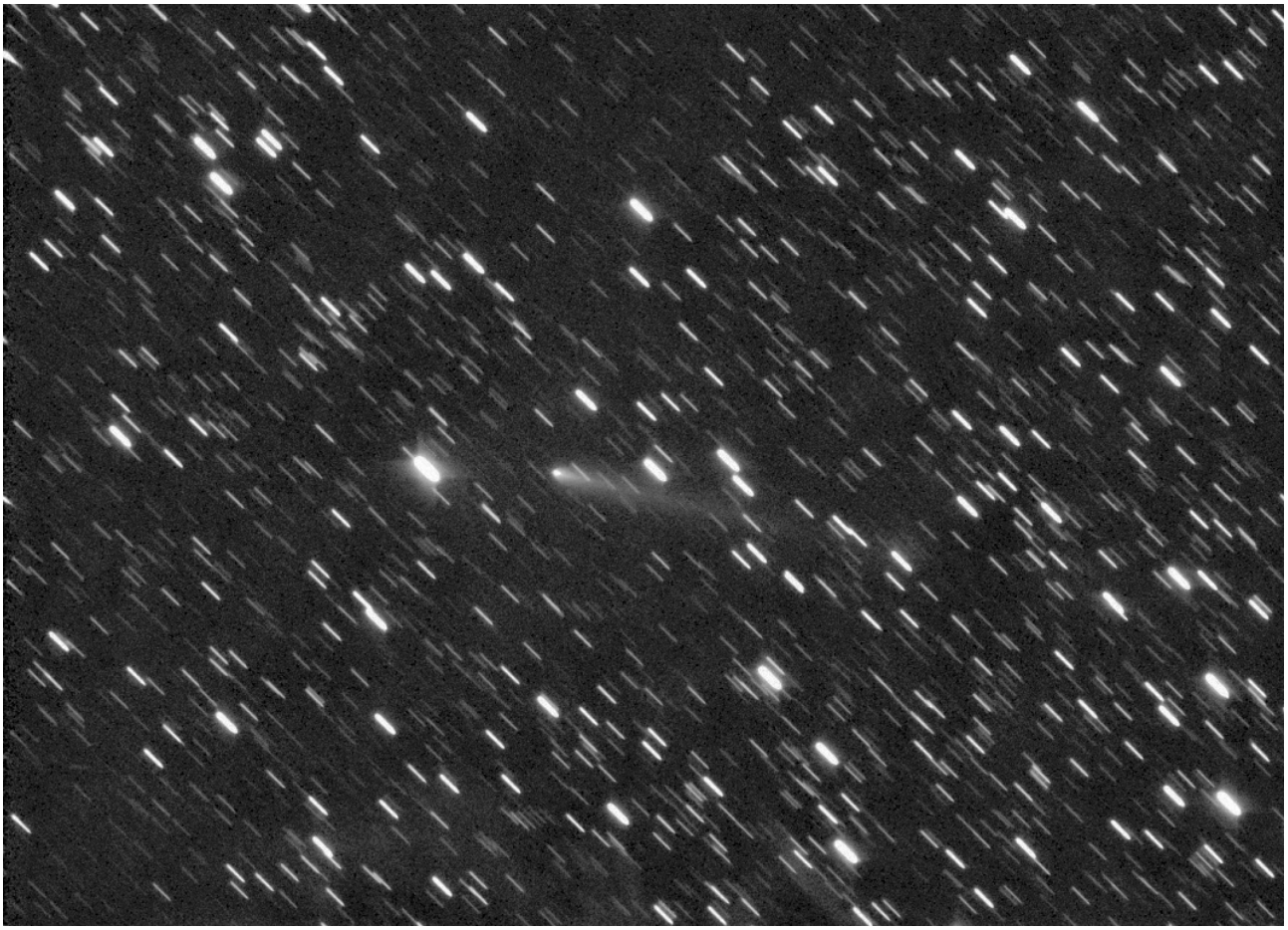

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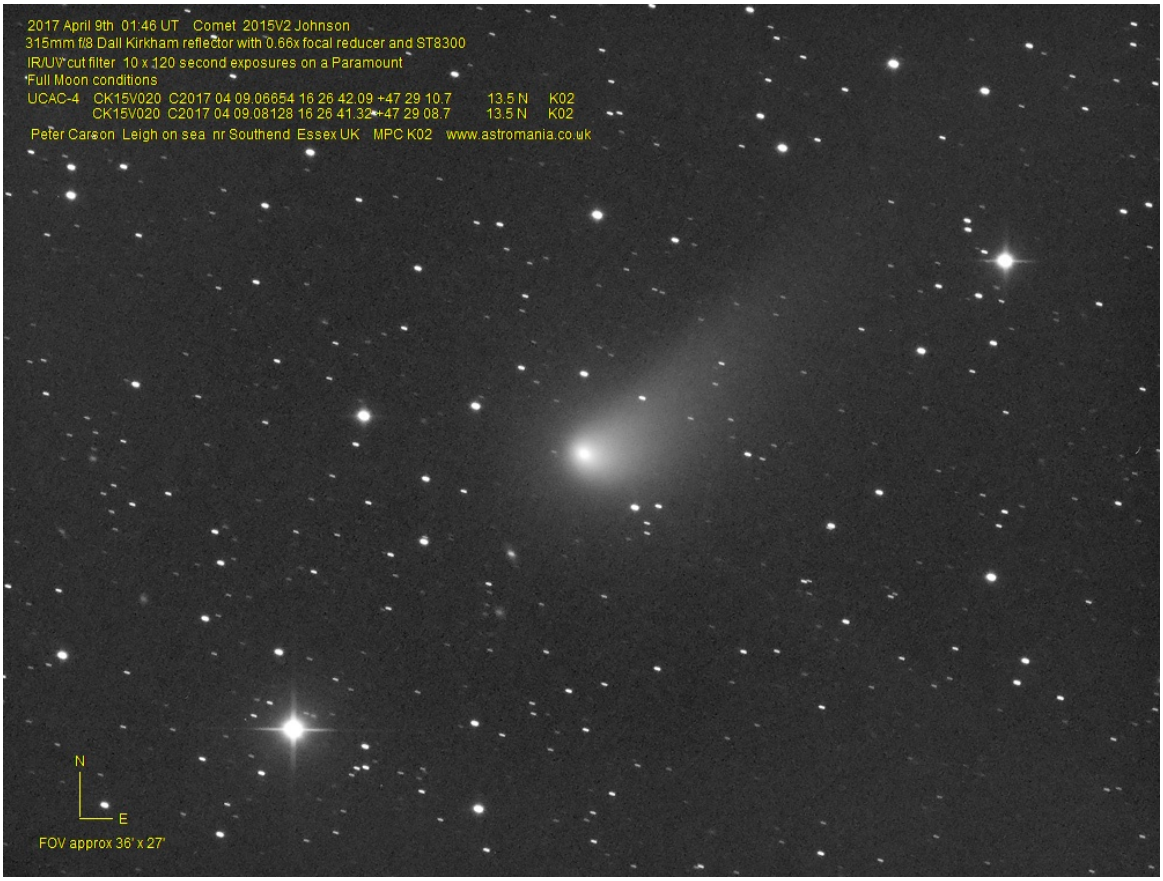


2015v220170518_2134_mjaeger

2017o1_20171002_dpeach

2017_20171002_grhemann

2017o1_20171015_rligustri

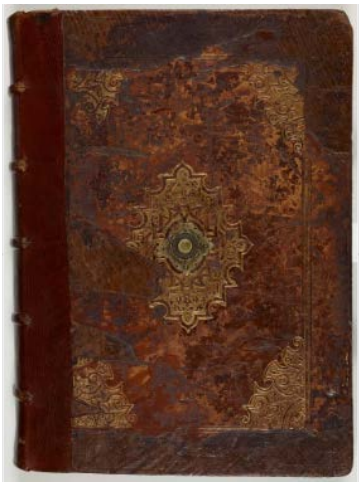
41

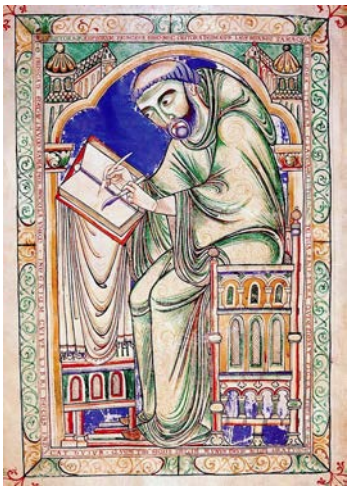
[1] Endnote - **The Eadwine Psalter**

https://en.wikipedia.org/wiki/Eadwine_Psalter

https://commons.wikimedia.org/wiki/Category:Eadwine_psalter_-_Trinity_College_Cambridge_Library_R.17.1

The book is a trilingual, glossed psalterium triplex made in Christ Church, Canterbury, in the mid-twelfth century. It contains a calendar, triple Metrical Psalms 90:15-95:2, canticles, two continuous commentaries, two prognostications, a marginal image of Halley's Comet (recorded in 1147), a diagrammatic representation of Christ Church's waterworks, and a full page visual memorialisation of Eadwine. At least 13 scribes appear to have been employed in the construction of this manuscript.





The dating of the manuscript has been much discussed, mainly on stylistic grounds (regarding both the script and the illustrations), within the broad range 1130–1170. On folio 10 there is a marginal drawing of a comet, with a note in Old English (in which it is a "hairy star") that it is an augury; following the comet of 1066 the English evidently took comets seriously. This was thought to relate to the appearance of Halley's Comet in 1145, but another of 14 May 1147 is recorded in the Christ Church Annals, and the 1145 one is not. There were further comets recorded in 1165 and 1167, so the evidence from astronomy has not settled the question. Such a large undertaking would have taken many years to complete; the Anglo-Catalan Psalter was left unfinished in England, like many other ambitious manuscript projects.

(Thanks to Wikipedia and to the free library reproductions of Trinity College, Cambridge). The book is stunning - do follow the links above and take a peak.

The Editor