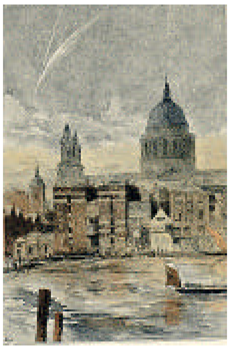

THE COMET'S TALE

Newsletter of the Comet Section of the British Astronomical Association

Volume 12, No 1 (Issue 23), 2005 April

The George Alcock Memorial Plaque

Photo J Boyce Ellingham

The name of George Alcock (1912 – 2000) is legendary amongst amateur astronomers, but his interests were wide ranging, covering the fields of archaeology, church architecture, geology, meteorology and natural history in addition to astronomy. A full biography of this wonderful Peterborough school teacher was written by Kay Williams with the title "Under an English Heaven. The Life of George Alcock" published by Genesis Publications Ltd. 1996. ISBN 0-904351 556

He left a significant legacy to the British Astronomical Association and this has been used to commemorate his name in two ways. Annual "George Alcock memorial lectures" are given, where the speaker talks about some aspect of George's life. The first lecture was given by Brian Marsden and related to his cometary observations. Last year Bill Livingston gave a lecture on meteorological phenomena seen from Kitt Peak in a joint meeting between the BAA and the Royal Meteorological Society.

In parallel with these inaugural lectures, David Tucker, the BAA treasurer, was commissioning a memorial plaque, which was to be installed in Peterborough cathedral, a site that George had visited many times. Getting permission to install the plaque was a complex process, and the cathedral authorities had to be satisfied that it would be suitable for the ancient foundation.

The plaque was designed and carved by Ronald Parsons. A comet, with background star field, is engraved at the top of the plaque. It was transposed from a copy of one of George's drawings. A nova is engraved at the lower end of the plaque. Two pointers have been cut into the slate to identify the nova, and have been highlighted with red paint. The stars in the background fields have been engraved and laid in with 'leaf' of the rare metal palladium, which shines like silver but does not tarnish.

The plaque was unveiled on 2005 April 19 in a moving ceremony, in front of a congregation of around 100. The proceedings commenced with an address from the Dean of the Cathedral, the very Reverend Michael Bunker, followed by the BAA President, Tom Boles. He handed over to Professor Sir Martin Rees, the Astronomer Royal to carry out the unveiling.

Sir Martin unveils the plaque

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The Section newsletter is now free to all BAA Members who make contributions to the work of the Section. The cost for other postal subscribers is £5 for two years, extended to three years for those who contribute to the work of the Section in any way, for example by submitting observations or articles. **Renewals should be sent to the Director and cheques made payable to the BAA.** Those due to renew should receive a reminder with this mailing. You can also download the newsletter (in colour) from the Section web page.

Section News from the Director

Dear Section member,

The unveiling of the plaque to George Alcock in Peterborough Cathedral was a memorable event. The last plaque in the cathedral dedicated to a person was unveiled over a decade ago, and Sir Martin had only unveiled a couple of other plaques to astronomers or buildings. Amongst the on lookers were some of George's family, his friends, former pupils and astronomical colleagues. One day, perhaps, someone will follow in his footsteps and inspire another generation in natural history, meteorology, architecture and astronomy.

CCDs can't yet rival the visual acuity of George Alcock, but they are rapidly become the dominant force in amateur astronomy. I was somewhat surprised when my last roll of Kodachrome film was returned with a note saying please could I send the next one to Switzerland for developing. Clearly digital cameras are driving out the traditional photographic techniques, and I must admit that my digital SLR easily outdoes the astronomical photographs taken with my old camera and slide film, and I can see the results in seconds. I hope the meeting that many of you are at today will help improve and standardise your observations, and the next issue of the newsletter will contain detailed reports for those that weren't able to make it. Thanks are due to Nick James for organising the speakers, and generating what I hope will be a lively debate on techniques.

I've received the sad news of the death of Michiel Bester, at the age of 87. Mike discovered six comets from South Africa (1946 U1, 1947 F1, 1947 K1, 1947 S1, 1948 W1 and 1959 O1). 1947 S1 was well observed in the spring of 1948, but I don't have records for any of the others in the Section archives. There is more information about South African comet discoveries on the web at

Tom Boles and Professor Sir Martin Rees http://www.saao.ac.za/assa/2003 MNSSA..62..170C.pdf

I am pleased to announce the award of the final Keedy Award to Jeremy Shears. Jeremy has spent much time abroad working with Shell, and has only recently returned to the UK. He has taken up CCD imaging of comets, and has achieved excellent results in a very short space of time. Thanks are due to David Keedy for his long running support of the Comet Section, in particular through the Keedy Award.

The big event coming up is the encounter of Deep Impact with 9P/Tempel. Hopefully NASA will have been able to solve the focus problem with their camera (now where have I heard that before?) and we will get even more stunning images than those recently returned from the surface of Titan. Amateur observations may play a part in determining exactly what happens as it is amateur observations that will be used to compare the light curve at this return with those of previous returns. We will be getting detailed reports from the professionals in September, when the Division of Planetary Sciences meeting is held in Cambridge. The BAA has organised the "Out of London meeting" to take place just before this, and lectures will be held in the Institute of Astronomy and at the Cavendish Laboratory, whilst accommodation is at Fitzwilliam College. Speakers include Mike A'Hearn who is a PI for the mission, and other well known planetary scientists such as Ron Greeley, Caroline Porco, Steven Squyres and John Zarnecki.

An interesting discovery is that some of the SOHO "sunskirting" comets of the Marsden and allied Kracht groups are periodic, and are also linked to 96P/Machholz and the delta Aquarid, Quadrantid and daytime Arietid meteors. Zdenek Sekanina and Paul Chodas demonstrate that a whole spectrum of orbits of fragments can be generated from the breakup of a parent comet over 1000 years ago. Hopefully SOHO will continue long enough to detect more fragments before its successors are in orbit and help improve our understanding of the possible dangers associated with this stream of objects, which clearly do hit the earth. Brian Marsden has predicted a return of several fragments in late April and mid May, and if these are seen, I suggest that the parent comet is named "Marsden".

Geoffrey Johnstone has a set of the IHW Halley archive volumes, which he no longer wants. If anyone would like to have these please let me know and I'll arrange for them to be sent to you. I automatically e-mail several members of the Section the sets of comet elements for popular planetarium programs from the CBAT web page whenever they are updated. If you would like to receive them this way please let me know- you can of course get them yourself from the CBAT web page.

Since the last newsletter observations or contributions have been received from the following BAA members: Peter Birtwhistle, Roger Dymock, Massimo Giuntoli, Werner Hasubick, Guy Hurst, Nick James, Geoffrey Johnstone, Martin Mobberley, Gabriel Oksa, Jonathan Shanklin, Jeremy Shears, Cliff Turk, Alex Vincent, and also from: Jose Aguiar, Alexandre Amorim, Alexander Baransky, Nicolas Biver, Jose Carvajal, Stephen Getliffe, JJ Gonzalez, Michael Jager, Andreas Kammerer, Heinz Kerner, Carlos Labordena, Martin Lehky, Rolando Ligustri, Michael Mattiazzo, Maciej Reszelski, Juan San Juan, Pepe Manteca, Jose Martinez, Stuart Rae, Walter Robledo, Tony Scarmato, and Seiichi Yoshida (apologies for any errors or omissions). Without these contributions it would be impossible to produce the comprehensive light curves that appear in each issue of *The Comet's Tale*. Observations from groups that currently do not send observations to the BAA would be much appreciated as they make a valuable addition to the analyses.

Comets under observation were: 9P/Tempel, 29P/Schwassmann-Wachmann, 32P/Comas Sola, 49P/Arend-Rigaux, 56P/Slaughter-Burnham, 62P/Tsuchinshan, 69P/Taylor, 78P/Gehrels, 121P/Shoemaker-Holt, 141P/Machholz, 162P/Siding Spring, 164P/Christensen, 2001 Q4 (NEAT), 2002 T7 (LINEAR), 2003 K4 (LINEAR), 2003 T4 (LINEAR), 2003 WT42 (LINEAR), 2004 B1 (LINEAR), 2004 Q1 (Tucker), 2004 Q2 (Machholz), 2004 T1 (P/LINEAR-NEAT), 2004 U1 (LINEAR), 2004 V13 (SWAN) and 2005 A1 (LINEAR).

It seems that most people want to keep receiving the newsletter in printed, low resolution, black & white form, rather than download the colour pdf for themselves to print out. Do let me know if you are willing to take up this option, as it does help to reduce the costs of printing and postage, particularly for overseas readers. At some point in the future we may move to an electronic only version of the newsletter, but we aren't quite there yet.

Jonathan Shanklin

Tales from the Past

This section gives a few excerpts from past RAS Monthly Notices and BAA Journals.

150 Years Ago: There was a notice of the discovery of a new comet (1855 I) in Hydra by M Winnecke in January. It was described as a faint granulous nebula. The editor laments "The weather has hitherto been very unfavourable for observing this comet in England." *[There are several confusing points here – Winnecke's initials are F. A. T., so the M is Monsieur although he was German. In addition the modern designation of 1854 Y1 (Winnecke-Dien), supercedes an earlier designation of 1854 V. These designations show that the 1855 I referred to the discovery order not as in the last century the perihelion order. The present designation of 1854 Y1 also shows that Winnecke was not the first observer, and in fact nor was Dien, as it had been reported by Colla as an observation of 1854 R1 in December].* Of interest to me, there is an obituary for Captain Francis Rawdon Moira Crozier, who in 1839 had commanded the *Terror* on a voyage of research to the Antarctic Ocean. In March 1845 he sailed on a fresh attempt to explore the north-west passage. The editor concludes "He has not since been heard of!". The report to the 35th AGM notes that four comets had appeared during the year.

100 Years Ago: A letter from David Smart stated that 2P/Encke would pass 3,763,100 miles *[0.041 AU]* from Mercury on 1905 January 10 *[modern calculations give 0.053 AU. Its next close approach is on 2013 November 18, when it passes at 0.025 AU.]*. The notes suggested that the comet would be an easy object in December, possibly visible to the naked eye, but that it was too near the Sun for observation in January. There was further discussion of the comet at the November meeting, following a paper by Mr W T Lynn, which traced the history of the comet from its first sighting by Mechain in 1786 to the most recent observations. He tried to account for the variable retardation of its perihelion by approaches to Mercury, but Crommelin commented that the retardation was probably not due to the planet. It was noted that the comet had been disappointingly faint in November. A later extract from Monthly Notices notes that if P/Encke was of meteoritic constitution the acceleration of its mean motion could not be accounted for by radiation pressure. A note on tail formation in comets suggested that the tail matter was produced from the nucleus and lost by the action of the solar repulsive force. In the comet notes in January there are details of Chas Lane Poor's calculations, "aided in his computations by several ladies, members of the computing staff at Columbia University", which showed that Brook's comet had passed only 55,000 miles (90,000 km) from the surface of Jupiter on 1886 July 20. It was probable that this caused the splitting of the comet. A letter in February answered the question on how Palitzch had recovered Halley's comet – with an 8 foot (2.4m) focus telescope and not with the naked eye, although he was a keen naked eye observer.

50 Years Ago: Comet notes for October finds no comets within visual range, but records observations of two comets by Albert Jones. An astronomical anagram asks "I was one, I split into two, then I became lost" (6,5). Mr Ryves giving the observing notes at the December meeting laments that the Nautical Almanac, on which the BAA Handbook was based, used to cost 2/6 (12.5p) and had gone up to 25 shillings (£1.25). He didn't think much of a 1000% increase and hoped that the people who made the Almanac had had their salaries and pensions increased by the same percentage. At the January meeting Patrick Moore gave some examples of "Astromania or Science Friction" – cuttings from newspapers. A bright comet, 1947 X1, had been discovered at the Cape, and the *Mail* reporter went up to 18,000' (5,500m) in a Lancaster bomber to have a look at it. His article on 1947 December 23 was headed 'Comet 1947n Blazes for Five Minutes' and read: 'The comet shone a bright orange, sitting like a new farthing balanced on the edge of a fleecy white cloud-bank through which the aircraft had soared.' Other people supported him. A police constable, described by the *Daily Mail* as 'an amateur astronomer', reported that 'the comet was in the west and had a halo. It looked like a bright fuzzy ball.' The paper of his home town, East Grinstead, printed a letter from a man who had seen it looking 'like a large golden star, surrounded by a golden aura'. Sadly comet 1947 X1 was never visible to the naked eye from England, showing clearly what a lively imagination can do.

The George Alcock Memorial Plaque

Continued from Page 1.

The Dean and other members of the congregation

As an astronomer George Alcock was best known for discovery, both of comets and novae, but he started off by simply observing shooting stars with no equipment other than paper and pencil to record his observations. Some of these records were valuable in helping calibrate work being carried out with the great radio telescope at Jodrell Bank. When it seemed apparent that modern techniques were going to render such amateur observations of little use, he decided to try and discover comets.

The great west front of Peterborough Cathedral

George Alcock's discoveries:

Comet designation	***Discovery date & time***	**Magnitude**
Alcock (1959 Q1)	August 25 21:00	10
Alcock (1959 Q2)	August 30 03:20	6
Alcock (1963 F1)	March 19 03:00	8
Alcock (1965 S2)	September 26 21:15	10
IRAS-Araki-Alcock (1983 H1)	May 3 22:00	6
Nova designation	***Discovery date***	**Magnitude**
Nova Delphini 1967 (HR Del)	July 8 22:35	5.0
Nova Vulpeculae 1968 (LV Vul)	April 15 03:30	5.6
Nova Scuti 1970 (V368 Sct)	July 31 21:50	6.9
Nova Vulpeculae 1976 (NQ Vul)	October 21 18:20	6.5
RS Ophiuchi 1985 outburst (RS Oph)	January 30 05:20	5.9
Nova Herculis 1991 (V838 Her)	March 25 04:35	5.4

As we know, this is easier said than done, as most comets are very faint and can only be seen with big binoculars or a telescope under dark skies. In the 1950s the little village of Farcet near Peterborough, where George lived, did have dark skies, but today light pollution from the city is a huge problem for local amateurs. George used very large binoculars for his discoveries and his meteorological knowledge allowed him to make the best use of our short spells of suitable weather. Success didn't come easily and it took 560 nights observing spread over six and a half years before he found one. Astonishingly he found the next one only four nights later! In all he found five comets, his last being discovered in 1983 whilst observing through a special plate glass window in his house. This comet passed very close to the Earth and was widely observed.

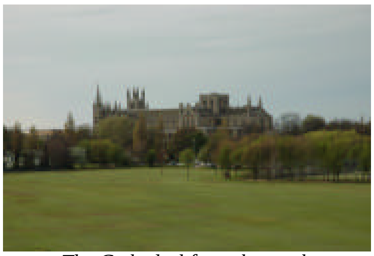
The comet illustrated on the memorial plaque is C/1955 L1 (Mrkos). This comet was discovered by Anton Mrkos in Czechoslovakia on 1955 June 12, and George first observed it on June 15, noting that it had a 1° long tail. The drawing is unfortunately not dated, but was possibly made on 1955 June 18. George was also one of the last to observe it, spotting it in his 10cm refractor in mid August.

In 1955 George decided to hunt for novae as well as for comets. These exploding stars usually appear in the Milky Way but are extremely difficult to spot in such crowded star fields. George memorised large areas by remembering star patterns and, after the discovery of three novae between 1967 and 1970, he was again sweeping the heavens on the night of October 21, 1976 using binoculars. In a star grouping, nicknamed 'The Coathanger' in the constellation of Vulpecula, he spotted an extra star which had distorted the usual pattern. Investigation by professional astronomers confirmed it was a nova. He went on to find others in 1985 and 1991. Dr. Brian Marsden (Smithsonian Astrophysical Observatory, USA) has commented that "these successful visual searches for novae using only binoculars, his eyes, his memory and skies often none too clear, represent a spectacular achievement that is unique in the annals of astronomy".

NQVul in Coathanger 1976 Oct 21: Harold Ridley 21.08UT start. 30m exp. Ilford Ortho plate. 500mm f5.6 Aviar lens. Nova mag 6.6

The nova illustrated on the memorial plaque is George's 1976 discovery of Nova Vulpecula in the Coathanger. The sketch is after a photograph taken by Harold Ridley just a few hours after the discovery.

Ronald Parsons, who created the plaque, is a designer and letter cutter whose work may be seen in churches and civic buildings throughout this country and abroad.



The Cathedral from the south

Peterborough Cathedral is a Norman foundation, and was started in 1118, although work on it has continued over the centuries. The fan-vaulted ceiling in the ante-chapel in which the plaque is situated was a prototype for that in King's College.

A eulogy for George Alcock, written by Martin Mobberley, appeared in the BAA Comet Section Newsletter for 2001 April. This is available on the Internet at http://www.ast.cam.ac.uk/~jds/tail15.pdf

A pamphlet that was prepared for the unveiling is available on the Section web page, or you can purchase a printed version from the BAA sales desk.

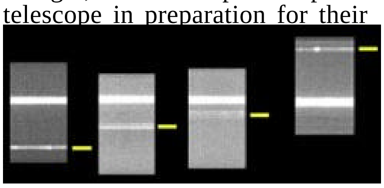
Professional Tales

Many of the scientific magazines have articles about comets in them and this regular feature is intended to help you find the ones you've missed. If you find others let me know and I'll put them in the next issue so that everyone can look them up.

One-in-a-trillion comet - Discovering a comet in a spectrograph's slit is the astronomical equivalent of a hole in one, Matthew Kenworthy, *University of Arizona's Steward Observatory.*

These days, automated search programs discover most new comets. The rest go to keen-eyed amateurs, whose photographic memories and wide-angle binocular views lend themselves to spotting these cosmic vagabonds. But even astronomers can win the lottery sometimes — or at least catch a comet by pure chance.

On September 22, Sandhya Rao and Dave Turnshek, both of the University of Pittsburgh, were taking spectra of a bright star just after twilight at the MMT Observatory's 6.5-meter telescope in southern Arizona. This, they thought, would help set up the telescope in preparation for their



Time-lapsed spectra show the movement of the probable comet along the spectrograph's slit. MMT Observatory

The spectrograph has an effective field of view only 2" wide by 2' long. Because that's some 100,000 times smaller in area than a typical pair of binoculars, they didn't expect the object to reappear on the next exposure. Much to their surprise, another exposure confirmed the mysterious object's existence; it had perceptibly moved closer to the star's position.

A quick check revealed that both new spectra were identical, and that the team was seeing a new object moving at a rate of 2.2' per hour along the spectrograph's slit. Further exposures confirmed the motion of this interloper, but its spectrum remained a mystery. A back-of-the-envelope calculation showed the object's apparent motion limited it to the solar system, but what could it be?

A comet or an asteroid seemed to be the most likely possibilities, and an analysis of the object's spectrum identified it as a previously undiscovered 16th-magnitude comet. With time pressing, the astronomers moved onto their next target star, but despite calls to other telescopes in the hopes of capturing a confirming image, the object has not been observed again to date.

The Kuiper Belt and the Solar System's Comet Disk, Brett Gladman, Science, 307, 71 (2005 January 07)
Our planetary system is embedded in a small-body disk of asteroids and comets, vestigial remnants of the original planetesimal population that formed the planets. Once formed, those planets dispersed most of the remaining small bodies. Outside of Neptune, this process has left our Kuiper belt and built the Oort cloud, as well as emplacing comets into several other identifiable structures. The orbits in these structures indicate that our outer solar system's comet disk was shaped by a variety of different physical processes, which teach us about how the giant planets formed. Recent work has shown that the scattered disk is the most likely source of short-period comets. Moreover, a growing body of evidence indicates that the sculpting of the Kuiper belt region may have involved large-scale planetary migration, the presence of other rogue planetary objects in the disk, and/or the close passage of other stars in the Sun's birth cluster.

Origin of the Marsden and Kracht Groups of Sunskirting Comets. 1. Association with Comet 96P/Machholz and its Interplanetary Complex. *Zdenek Sekanina & Paul Chodas.* JPL Preprint.

Of the three major groups of comets, approaching the Sun to between 6 and 12 solar radii and discovered with the coronagraphs onboard the *Solar and Heliospheric Observatory*, we investigate the Marsden and Kracht groups. We call these comets "sunskirters" to distinguish them from the Kreutz system sungrazers. Our objective is to understand the origin, history, and orbital evolution of the two groups. The tendency for their members to arrive at perihelion in pairs or clusters is a result of recent fragmentation, which is illustrated on tow specific pairs. As high-generation fragments of more massive precursor objects, most of the Marsden and Kracht group comets are probably less than 10 years old. Although the two groups and the associated meteoroid swarms, such as the Daytime Arietids and Southern delta Aquarids, appear as separate populations of the Machholz complex, our orbit integrations suggest that they all are parts of a single, essentially continuous population that extends from comet 96P/Machholz in the longitude of the node for more than 160°. Large numbers of massive first-generation fragments of their common progenitor with comet 96P, which were the initial direct ancestors of this population, are called the first precursors. Nearly 60,000 orbit integration runs were made in our search for their birth scenarios. We found that these objects separated from the progenitor comet before AD 950 and, as sources of continuing activity, pursued an orbital evolution very different from that of the comet. Unlike 96P, all first precursors of this low-inclination population experienced a sequence of encounters with Jupiter within 0.5 AU, starting in AF 1059 or earlier and continuing for centuries. In the process, they split into smaller pieces in a fashion reminiscent of "cascading" fragmentation of the Kreutz system. The indirect (mainly Jovian) perturbations control the motions of both 96P and the low-inclination population, but the dynamical evolution of the latter has been markedly accelerated by Jupiter during close encounters, so that its present-day orbital changes are similar to those the comet will undergo centuries from now. Precursors of the Southern delta Aquarids of the 1950s passed through the Marsden group stage around 1700 and through the Kracht group stage in the 1780s. The Daytime Arietids appear to be related most directly to the Marsden group comets, which can closely approach Earth around June 12, the time of the stream's peak activity.

THE CAMBRIDGE-CONFERENCE NETWORK (CCNet)

The following abstracts are taken from the CCNet, which is a scholarly electronic network devoted to catastrophism, but which includes much information on comets. To subscribe, contact the moderator Benny J Peiser at <b.j.peiser@livjm.ac.uk>. The electronic archive of the CCNet can be found at http://abob.libs.uga.edu/bobk/cccmenu.html

Unseen comets may raise impact risk for earth *Mark Peplow*, © Nature Publishing Group 2004

Thousands of dark objects could be hiding in our Solar System.

The Solar System could be teeming with almost invisible comets, according to some astronomers' calculations. If they are right, such extra comets would significantly increase the risk of a catastrophic impact with Earth. These objects have never been observed, but the astronomers argue that 'dark comets' provide a likely explanation for an astronomical puzzle: we can only see a tiny fraction of the comets that theory predicts.

Astronomers think that many comets come from the Oort cloud, a field of billions of icy objects that lies up to 100,000 times farther away from the Sun than the Earth does and marks the outer boundary of our Solar System. The icy objects are sometimes driven towards the Sun by gravitational tides generated by the shifting masses of stars in our Galaxy. When this happens they become comets, orbiting the Sun every 20 to 200 years on paths that lie at an angle to the planets' orbits. Given the size of the Oort cloud, astronomers have calculated that there should be about 3,000 comets in these orbits, 400 times more than are actually observed.

The common explanation for this discrepancy is that the comets quickly disintegrate into smaller lumps after just one or two orbits, says Bill Napier, a recently retired astronomer who worked at the Armagh Observatory, Northern Ireland. But his mathematical model now suggests that, if this were true, the debris should cause many more major meteorite showers on Earth than we see, perhaps up to 30 every year.

In a paper to be published in the Monthly Notices of the Royal Astronomical Society (1), Napier concludes that the predicted comets are out there after all; we just cannot see them.

Little fluffy clouds

Napier worked with Chandra Wickramasinghe, an astronomer at Cardiff University in Wales, to explain the comets' invisibility. Wickramasinghe has suggested that Sedna, the most distant body identified in our Solar System, could have an orbiting twin that is dark, fluffy and made of tarry carbon compounds (see "Sedna 'has invisible moon'" [the latest studies suggest it doesn't]). As Sedna may be a member of the Oort cloud, Napier thinks that other members of the cloud could be equally dark. Once ejected, the tarry comets would simply suck up visible light, he says, remaining cloaked in darkness. "Photons go in, but they don't come out."

"It's an intriguing possibility," says Alan Fitzsimmons, an astrophysicist at Queen's University of Belfast in Northern Ireland. "But while we have seen dark objects before, Bill is proposing something much, much darker than anything we've ever detected." NASA's Stardust probe, which is bringing back samples of dust from the comet 81P/Wild, lends some support to Napier's idea. In June this year it reported finding lots of tarry carbon compounds spraying from the comet(2).

Infrared challenge

The dark comets would present a major challenge to astronomers searching the skies for objects that might collide with the Earth. "They're so black you can't see the damn things," says Napier. "These things will just come out of the dark and hit you with no warning. It looks as if we're dealing with a substantial impact hazard that people haven't clicked into yet."

However, although they reflect almost no visible light, the dark comets should give out a tiny glow of heat, visible as infrared radiation. The infrared Spitzer Space Telescope, which has been operating from Earth orbit for just over a year, has not seen any dark comets. But this could be because it focuses on very small, distant parts of the sky, says Napier. Fitzsimmons disagrees, saying that if these objects existed in the numbers proposed by Napier, either Spitzer or near-Earth object surveys such as Spacewatch, based at the University of Arizona in Tucson, would have picked them up by now.

A new space telescope might provide the answer. Earlier this month, NASA announced that it would launch an orbiting infrared telescope called the Wide-field Infrared Survey Explorer (WISE) in 2008, which will map much wider areas of the sky. Given enough time, it should be able to detect the dark comets, says Napier.

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Kissel J., Krueger F. R., Silen J. & Clark B. C. Science, 304. 1774 - 1776 (2004).

Extreme albedo comets and the impact hazard, *W.M. Napier, J.T. Wickramasinghe and N.C.Wickramasinghe*, Monthly Notices of the Royal Astronomical Society (2004).

Dynamical balance arguments which involve the capture of long-period comets from the Oort cloud imply that there should be >1000 times more Halley-type objects than are actually observed. If the active comets rapidly become dormant, with albedos comparable to those of known cometary surfaces, hundreds of such bodies should by now have been detected, whereas in fact only a few have been found. If on the other hand they disintegrate to dust, we show here that the debris would create a bright, near-spherical zodiacal cloud and >15-30 strong annual meteor showers, also contrary to the observations.

Here we demonstrate that the surfaces of inactive comets, if composed of loose, fluffy organic material like cometary meteoroids, develop reflectivities that are vanishingly small in visible light. The near-Earth objects may therefore be dominated by a population of fast, multi-kilometre bodies too dark to be seen with current NEO surveys. Deflection strategies that assume decades or centuries of warning before impact are inapplicable to this hazard.

Solar storms smack a comet, *Tariq Malik*, © Space.com 2004

Astronomers have pieced together what appears to be the first direct evidence that solar storms can wreak havoc with comets, destroying the ion tails of icy wanderers in a collision of highly charged particles. But the effect is not permanent and may serve as a marker for scientists trying to track solar storms known as coronal mass ejections (CMEs) as they blow out into space. "What we have now is sort of a new tool of tracking these ejections," said Geraint Jones, co-investigator of the comet study and a researcher at NASA's Jet Propulsion Laboratory. "It's like dropping paint into a flowing river of water."

The ion tails of comets constantly stream away from the Sun, pushed back by solar wind blowing at about 400 kilometres per second. But the charged particles of CMEs, among the worst of solar storms, can slam into a comet's ion tail at about 1,000 kilometres per second, causing kinks, scalloped patterns or disrupting the tail altogether, Jones' research found. "We're still far from having a full understanding of what's going on [with CMEs]," Jones said. But by watching comet tail behavior, researchers could learn more about changes in CME structure and speed as they move through space, researchers added.

"When [CMEs] move outward we know there's a lot of change, but that's it," explained Douglas Biesecker, a physicist with the Space Environment Center at the National Oceanic and Atmospheric Administration (NOAA). "It would be a little more useful if there were a lot more comets out there." The study, conducted by Jones and his colleague John Brandt at the University of New Mexico, appeared in the online version of the journal Geophysical Research Letters and will appear in the journal's upcoming print edition.

Comet distortion

At the heart of Jones' study is the comet 153P/Ikeya-Zhang, which passed through the inner solar system during spring 2002. Jones and Brandt were able to identify specific interactions between CMEs and Ikeya-Zhang's ion tail by combining data from the sun-watching NASA/European Space Agency SOHO spacecraft and observations collected by amateur astronomers. CME events recorded by SOHO instruments on March 2, March 9-10 and April 17 appear to have slammed into Ikeya-Zhang's ion tail each about a day or so after leaving the Sun. None of the CMEs distorted the comet's tail for more than an hour.

"On their own, the images were fascinating," Jones said. "But it was only when we put them all together that we saw how the changes were occurring that we realized what was happening." Past observations had suggested that CMEs belched from the Sun could impact a comet's ion tail, including some stunning images taken by the SOHO spacecraft last year.

During February 2003, SOHO caught the comet C/2002 V1 NEAT swing by the Sun during a CME event, which researchers believed caused a kink in the icy wanderer's tail. The catch was a fortunate one, since NEAT's orbit brought it close to the Sun in astronomical terms, about one-tenth the distance between the Earth and the star or 0.1 astronomical unit (AU). One AU is about 93 million miles (150 million kilometers). But Ikeya-Zhang's closest approach was about five times farther out at 0.51 AU at a distance where sun-watching spacecraft like SOHO can't see.

"Our studies have been limited in the past because we're limited to observations from spacecraft that are just measuring what the solar activity is near the Sun," Jones said. Some instruments, such as the Solar Mass Ejection Imager aboard the Coriolis spacecraft in Earth orbit and the planned STEREO observatories are seeking a wider view on CMEs, Biesecker added.

Amateur assets

Part of the success behind the Jones-Brandt study is due to the readily available network of amateur astronomers from around the world, which heeded an open call for observations when Ikeya-Zhang swung past the Sun. "Without the amateur astronomers, this research would not have been possible," Jones said. "It's a great example of how amateur astronomers and professionals can work together." Jones hopes that cooperation will be repeated with a pair of comets that were observed earlier this year. "They have more telescope time to themselves than we have sometimes as professional astronomers," said Biesecker of amateur skywatchers.

Comet Prospects for 2005

My apologies for omitting this information from the last edition of the Comet's Tale, as there was insufficient space. I have slightly edited the original (published in the BAA Journal) to reflect discoveries since last October.

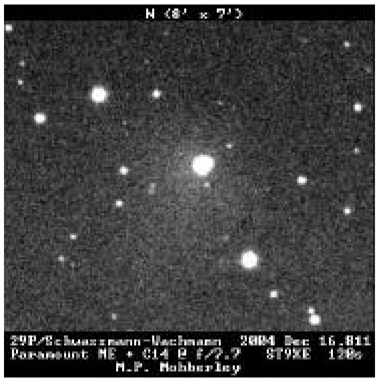
2005 sees the possible return of 27 periodic comets. None are particularly bright, but several are like to come within range of visual observation with moderate apertures. Three long period comets have been visible in binoculars. 2003 K4 (LINEAR) faded from 7th magnitude after its perihelion in October 2004, though the light curve through perihelion was somewhat anomalous. 2003 T4 (LINEAR) reached 8th magnitude in the spring, rather fainter than expected six months ago. 2004 Q2 (Machholz) was a naked eye object. Several other long-period comets discovered in previous years are still visible.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter periodic comets, which are often ignored. This would make a useful project for CCD observers. As an example 51P/Harrington was observed to fragment in 2001. Ephemerides for new and currently observable comets are published in the *Circulars*, Comet Section Newsletters and on the Section, CBAT and Seiichi Yoshida's web pages. Complete ephemerides and magnitude parameters for all comets predicted to be brighter than about 21^m are given in the International Comet Quarterly Handbook; details of subscription to the ICQ are available from the comet section Director. The updated section booklet on comet observing is available from the BAA office or the Director.

9P/Tempel was first observed in 1867, but was lost between 1879 and 1967 following an encounter with Jupiter in 1881, which increased the perihelion distance from 1.8 to 2.1 AU. Further encounters in 1941 and 1953 put q back to 1.5 AU and calculations by Brian Marsden allowed Elizabeth Roemer to recover it in 1967. Alternate returns are favourable, but an encounter with Jupiter in 2024 will once again increase the perihelion distance to 1.8 AU. The 2000 return was an unfavourable one and no observations were reported. It is an important comet to observe, as it is the target for the Deep Impact mission. It came within visual range in early March, when it was visible in the morning sky in Virgo and it remains in the constellation until July. It should be at its best in May and June, when it may reach 10^{th} magnitude in the evening sky, but it heads south as it fades and UK observers will loose it after mid-summer, although elsewhere it should remain visible until October. The impactor of the Deep Impact spacecraft is expected to hit the comet on July 4^{th} with a variety of possible outcomes. Observers who want to witness the event should head south of around 50°N because the object will be rather too low from the UK unless there is a spectacular outburst.

21P/Giacobini-Zinner is the parent comet of the October Draconid meteors. On this occasion we pass just inside the comet's orbit 92 days after the comet, with any shower taking place on October 8.7. The comet was first discovered by Michael Giacobini at Nice observatory in December 1900 and was thought to have a period of 6.8 years. The next two returns were expected to be difficult to observe, but in October 1913, Ernst Zinner, of Bamberg, Germany, discovered a comet whilst observing variable stars in Scutum. This turned out to be the same comet, but the period had been incorrectly determined and was actually 6.5 years. The comet was missed at three unfavourable returns, so the 1998 return was the thirteenth apparition of the comet. This is another mediocre apparition and the closest the comet will get to the Earth is 1.42 AU. It will come within visual range in 2005 March, but is not well placed for the UK until April, when it may be 12^{th} magnitude. It is a morning object, and draws back into the Sun, so that we will lose it again in May, by which time it may have brightened to 10^{th} magnitude. For most of this period it is in Pegasus.

29P/Schwassmann-Wachmann is an annual comet that has frequent outbursts and seems to be more often active than not at the moment, though it rarely gets brighter than 12^m. Initially in Pisces, it spends most of the year in Aries, reaching opposition at the end of October. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. It is quite well placed this year and UK based observers should be able to follow it during January and February, when it is in Pisces and throughout the second half of the year when it is in Aries.



37P/Forbes was discovered by A F I Forbes during a visual search with a 20-cm reflector at Hermanus, South Africa on 1929 August 1 at a favourable opposition. It has undergone several encounters with Jupiter, most recently to within 0.38 AU in 1990 and 0.58 AU in 2001. These have pushed out the perihelion distance a little, however this will be the best opposition for the next 50 years. It may come within visual range in 2005 April, but is a southern hemisphere object throughout the apparition, reaching its best (12^{th} magnitude) in June and July as it passes from Lupus to Scorpius.

62P/Tsuchinshan The comet was discovered at Purple Mountain Observatory, Nanking, China in 1965, following a close approach to Jupiter in 1960, which reduced the perihelion distance from 2 to 1.5 AU. Another encounter in 2020 will reduce it further to 1.3 AU giving an excellent apparition in 2023/24. The inclination is decreasing, combined with a rapid regression of the node and rotation of the orbital plane. Unusually, the comet's name derives from that of the observatory rather than those of the discoverers. At a good apparition such as in 1985 it can reach 11^m and as the perihelion distance will continue to decrease future returns may be even better. At the last return the comet was recorded at around 13^{th} magnitude and this time it did a magnitude better. It was at perihelion at the end of 2004 and has slowly faded from 12^{th} magnitude.

69P/Taylor A series of Jupiter encounters in the 19^{th} century reduced the perihelion distance from 3.1 to 1.6 AU and led to its discovery by Clement Taylor, with a 0.25-m reflector from

Herschel View, Cape Town South Africa, in November 1915. It was quite bright, 9th magnitude at best, and shortly after perihelion, in 1916 February, E E Barnard found a double nucleus, each with a short tail. The secondary nucleus became brighter than the primary, but then rapidly faded and the primary also faded more rapidly than expected. The comet was then lost until 1977, when new orbital computations led to the recovery of the 'B' component by Charles Kowal with the Palomar Schmidt. The 'A' component was not found. The comet has had several encounters with Jupiter, the closest recent one being in 1925, and had very close (0.06 AU) encounters in 1807 and 1854. The comet was not expected to be brighter than 15th magnitude at its last return, however it was discovered at around 12.5 in mid January 1998. The observations suggest that it suffered two outbursts. This made it difficult to predict the likely brightness at this return. In early 2005 it was 15th magnitude and therefore seems unlikely to be within range. It is in Leo Minor and reaches the border with Leo Major by the end of June, when it slips into the twilight.

78P/Gehrels Tom Gehrels discovered this comet at Palomar in 1973. Its perihelion distance is slowly decreasing and is currently around the lowest for 200 years. The eccentricity is slowly increasing, with a marked jump in both following a moderately close approach to Jupiter in 1995. This return is extremely favourable, with the comet reaching opposition and perihelion within a fortnight of each other. At the last return the comet reached 12th magnitude and this time round it peaked at 10th magnitude in mid November. By 2005 it was past its best, and it faded from 11th magnitude, reaching 13th magnitude and becoming low in the evening twilight in April.

95P/Chiron is an unusual comet in that it is also asteroid 2060. It will reach around 18^{m} when at opposition in July in Sagittarius. CCD V magnitudes of Chiron would be of particular interest as observations show that its absolute magnitude varies erratically; it is currently around 6. It began an outburst in 2000/01 though it is likely to be fading again in 2005. It was at perihelion in 1996 when it was 8.5 AU from the Sun and will be nearly 19 AU from the Sun at aphelion in around 40 year's time.

101P/Chernykh was discovered by Nikolaj Chernykh at the Crimean Astrophysical Observatory whilst scanning routine minor planet survey plates taken on 1977 August 19 and 22. It was a fairly bright object of 14th magnitude and at its best, at the end of September, it reached 12.5. The succeeding return was a little better, and this one is better again. The comet is an unusual one in playing celestial billiards with both Jupiter and Saturn and has made a number of approaches to both planets, most recently passing 0.35 AU from Jupiter in 1980, which reduced the period to 14 years. It comes into visual range in 2005 May, and reaches its brightest in the autumn, when it may get to 10th magnitude. It parallels the ecliptic, running from Aquarius into Pisces and remains visible into 2006.

121P/Shoemaker-Holt was discovered by Carolyn and Eugene Shoemaker and Henry Holt with the Palomar 0.46-m Schmidt on 1989 March 9 and at its brightest reached around 13th magnitude. It made a moderately close approach to Jupiter in 1984 and does not approach closer to the Earth than 1.7 AU. With a period of just over 8 years, circumstances do not change much from apparition to apparition so a similar performance was expected for the 2004 – 2005 apparition. The few observations received however suggest that it was 15th magnitude.

161P/Hartley-IRAS John Davies and Simon Green of Leicester University reported the discovery of a fast moving object by IRAS (the Infra-Red Astronomy Satellite) on 1983 November 11. On being asked to confirm the object, Ken Russell of the UK Schmidt Telescope Unit reported that Malcolm Hartley had discovered a comet on a plate taken 6 days earlier, that was probably the same object, but due to moonlight it wasn't captured on a confirming plate until November 23. The comet has a retrograde orbit (just) with a period of 21.5 years, and 2005 is its first return since discovery. It reached 10th magnitude in 1984 January and should attain a similar magnitude this time round. It emerges sufficiently far from the Sun for observation from the UK in 2005 June, by which time it is nearing its brightest. Moving north from Andromeda, it rapidly becomes circumpolar, passing some 9° from the pole in July. It slowly fades and we should be able to follow it until September, by which time it has crossed into Canes Venatici. On its way out from perihelion at its next return it will pass fairly close to Jupiter in 2028, an encounter that will reduce the perihelion distance to 1.22 AU.

Three long period comets are likely to be binocular objects or better, and there are several fainter objects that should be within view during 2005. **C/2001 Q4 (NEAT)** was discovered at Palomar on 2001 August 24.40 when it was nearly three years from perihelion and over 10 AU from the Sun. It was a bright object in May 2004, but faded from 12th magnitude during the first quarter of the year. **C/2002 T7 (LINEAR)** was also a bright object in May 2004 and was 14th magnitude at the beginning of the year. **C/2004 L1 (LINEAR)** may get to 13th magnitude.

Three of the brighter comets of the year were discovered by LINEAR. **C/2003 K4 (LINEAR)** faded from 7th magnitude at the beginning of the year and will remain in view until the summer, at least for southern hemisphere observers. It was however, not as bright as expected as it passed through the SOHO LASCO C3 field. **C/2003 T4 (LINEAR)** brightened from 10th magnitude at the beginning of the year and was at its brightest, around 8th magnitude, in March and April. It rapidly headed south and will be observable from the Southern Hemisphere until the autumn. Discovered at the beginning of 2005, **C/2005 A1 (LINEAR)** brightened rapidly and reached 8th magnitude. It is expected to fade equally rapidly in May. The brightest expected comet for the year is **C/2004 Q2 (Machholz)**. This was excellently placed for observation in the January evening sky, when it was 4th magnitude. Starting the year in Taurus it rapidly moved north, passing some 5° from the pole in March. It remains well placed, and could be a binocular object until May, by which time it has reached Ursa Major.

Several other periodic comets are at perihelion during 2005, however they are unlikely to become brighter than 13th magnitude or are poorly placed. 32P/Comas Sola, 49P/Arend-Rigaux and 60P/Tsuchinshan do not get brighter than 13th magnitude. 10P/Tempel, 141P/Machholz, P/1998 W1 (Spahr) and P/1998 X1 (ODAS) have unfavourable returns. 56P/Slaughter-Burnham, 72P/Denning-Fujikawa, 91P/Russell, 105P/Singer Brewster, 107P/Wilson-Harrington, 117P/Helin-Roman-Alu, 119P/Parker-Hartley, 129P/Shoemaker-Levy, 138P/Shoemaker-Levy, P/1998 W2 (Hergenrother) and P/2000 G1 (LINEAR) are intrinsically faint or distant comets and will not come within visual range. Ephemerides for these can be found on the CBAT WWW pages. 3D/Biela, D/1884 O1, D/1886 K1 and D/1892 T1 have not been seen since the 19th century and their likely perihelion dates and magnitudes are extremely uncertain.

Looking ahead to 2006, the main component of 73P/Schwassmann-Wachmann will pass 0.08 AU from the Earth, with closest approach on May 12 at 19:52. Exactly how bright it will get is anybody's guess as it fragmented in 1995, but it could be visible to the naked eye. Other fragments pass from May 13 to 17 at distances between 0.052 to 0.074 AU. Although 45P/Honda-Mrkos-Pajdusakova may reach 9th magnitude, it won't be seen as it is too close to the Sun. At its next return in 2011 it will pass 0.06 AU from the Earth. Next best in 2006 is 4P/Faye, which may reach 10th magnitude in the autumn.

Comets reaching perihelion in 2005

Comet	T	q	P	N	H_1	K_1	Peak mag
2004 F3 (P/NEAT)	Jan 4.3	4.31	8.04	0	9.0	10.0	15
2004 WR9 (P/LINEAR)	Jan 11.5	1.92	14.9	0	14.5	10.0	17
56P/Slaughter-Burnham	Jan 15.0	2.54	11.5	4	8.0	15.0	16
2004 Q2 (Machholz)	Jan 24.9	1.21			6.1	7.5	4
163P/NEAT	Jan 31.3	1.92	7.01	2	14.5	10.0	18
3D/Biela	Feb 1.5	0.80	6.54	6	8.0	15.0	?
10P/Tempel	Feb 15.0	1.43	5.38	20	9.0	12.5	13
49P/Arend-Rigaux	Feb 24.6	1.37	6.61	8	11.3	11.0	14
141P/Machholz (A)	Feb 27.8	0.75	5.23	2	13.4	29.8	11 ?
2004 V5 (P/LINEAR-Hill)	Feb 28.5	4.41	22.4	0	8.0	10.0	17
141P/Machholz (D)	Mar 2.5	0.75	5.23	2	13.4	29.8	11 ?
2004 RG113 (LINEAR)	Mar 3.7	1.94			13.0	10.0	16
2005 E1 (P/Tubbiolo)	Mar 9.8	4.44	19.5	0	10.0	10.0	19
2004 L1 (LINEAR)	Mar 30.1	2.05			10.0	10.0	13
32P/Comas Sola	Apr 1.3	1.83	8.78	9	6.5	20.0	13
2003 T4 (LINEAR)	Apr 3.6	0.85			6.0	10.0	8
2005 A1 (LINEAR)	Apr 10.2	0.91			8.2	17.3	8
1998 X1 (P/ODAS)	May 2.5	1.98	6.78	1	10.5	15.0	17
1892 T1 (D/Barnard)	May 3.2	1.56	7.02	1	8.0	15.0	?
119P/Parker-Hartley	May 24.3	3.04	8.89	2	9.0	8.0	15
1886 K1 (D/Brooks)	May 30.8	1.88	6.67	1	8.0	15.0	?
129P/Shoemaker-Levy	Jun 4.7	2.81	7.23	2	11.0	10.0	17
2004 X3 (LINEAR)	Jun 17.2	4.40			8.5	10.0	18
72P/Denning-Fujikawa	Jun 20.0	0.80	9.08	2	15.5	25.0	14
161P/Hartley-IRAS	Jun 20.8	1.28	21.5	1	8.0	10.0	10
91P/Russell	Jun 26.8	2.60	7.67	3	7.5	15.0	15
21P/Giacobini-Zinner	Jul 2.8	1.04	6.62	13	8.5	10.6	10
2004 K1 (Catalina)	Jul 5.2	3.40			7.0	10.0	14
9P/Tempel	Jul 5.3	1.51	5.52	10	5.4	25.0	10
2000 G1 (P/LINEAR)	Jul 13.9	1.00	5.34	1	19.5	5.0	21
138P/Shoemaker-Levy	Jul 19.9	1.71	6.91	2	15.0	10.0	19
107P/Wilson-Harrington	Jul 10.7	0.99	4.29	6	15.0	5.0	15
37P/Forbes	Aug 1.7	1.57	6.35	9	10.5	10.0	12
2005 GF8 (P/LONEOS)	Aug 11.7	2.82	14.0	0	11.5	10.0	18
2004 VR8 (P/LONEOS)	Sep 2.5	2.38	10.7	0	10.0	10.0	16
1998 W1 (P/Spahr)	Sep 3.4	1.73	6.62	1	10.2	15.0	15

105P/Singer Brewster	Sep 11.3	2.04	6.45	3	12.5	15.0	19
1884 O1 (D/Barnard)	Sep 20.8	1.33	5.46	1	11.5	15.0	?
1998 W2 (P/Hergenrother)	Nov 2.2	1.43	6.92	1	14.5	10.0	15
2004 L2 (LINEAR)	Nov 15.0	3.78			10.0	10.0	18
117P/Helin-Roman-Alu	Dec 19.9	3.04	8.24	2	2.5	20.0	14
60P/Tsuchinshan	Dec 24.1	1.77	6.78	6	10.5	15.0	14
101P/Chernykh	Dec 25.0	2.35	13.9	2	3.3	15.0	10

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H_1 and K_1 and the brightest magnitude are given for each comet. The brightest magnitude given for 29P is that typical of an outburst. Comet 141P/Machholz has experienced a number of fragmentations and the magnitude of the components is uncertain.

Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$

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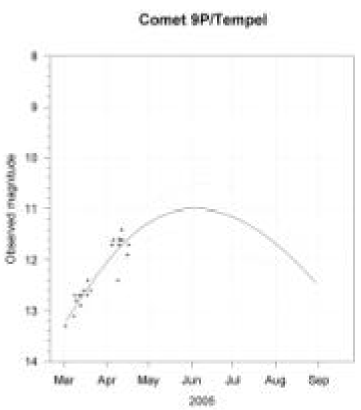
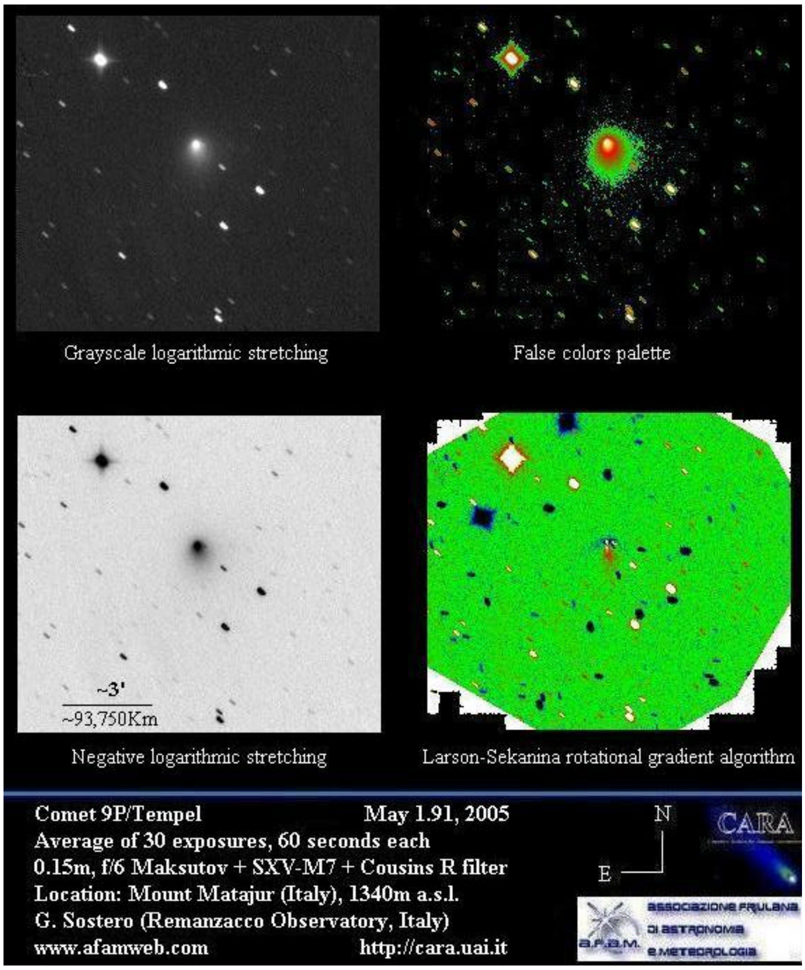
Review of comet observations for 2004 April - 2004 October

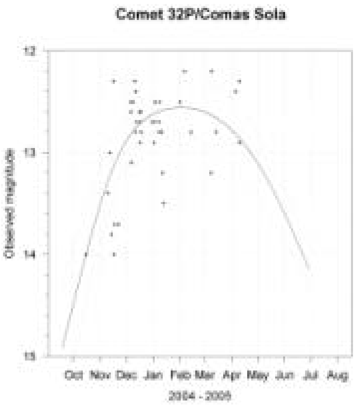
The information in this report is a synopsis of material gleaned from IAU circulars 8420 – 8522, The Astronomer (2004 October – 2005 March) and the Internet. Note that the figures quoted here are rounded off from their original published accuracy. Lightcurves for the brighter comets are from observations submitted to The Astronomer and the Director. A full report of the comets seen during the year will be published in the Journal in due course. I have used the convention of designating interesting asteroids by A/Designation [Discoverer] to clearly differentiate them from comets, though this is not the IAU convention.





9P/Tempel is the target for the Deep Impact mission and the science team has requested amateur observations. JJ Gonzalez recovered the comet in early March, at about 13th magnitude. After a lot of poor weather, I was finally able to observe the comet on 2005 April 4.9, finding it an easy object in the N'land refractor. It was mag 11.7, DC4 and diameter 0.7'. 26 observations give a preliminary light curve of $m = 8.7 + 5 \log d + 15.3 \log r$. This is a much slower rate of brightening than used by the IAU/ICQ (which give 25 log r) and implies that the comet may only reach 11th magnitude in early June. Stop press observations from early May by

Amorim, Gonzalez, Scarmato and Shanklin put the comet at between 10.6 and 11.2. The impact is scheduled to take place at 06:00 UT on July 4th, in time to give fireworks for American Independence day. Unless the impact produces an outburst of over 5 magnitudes it is unlikely to be observable from the UK, especially given the long summer twilight, which almost certainly will rule out any observations north of Manchester.

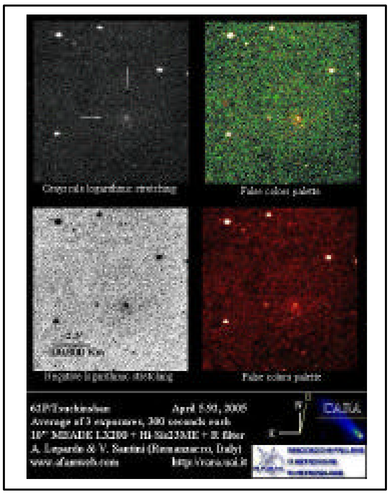


29P/Schwassmann-Wachmann This annual comet has frequent outbursts and over the past few years seems to be more often active than not, though it rarely gets brighter than 12m. It is possible that its pattern of behaviour is changing. In early 1996 it was in outburst for several months. In the first half of 1998 it was in outburst on several occasions and this also occurred in 1999. Last year it was in almost continuous activity. The randomly spaced outbursts may be due to a thermal heat wave propagating into the nucleus and triggering sublimation of CO inside the comet. This comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity.

The comet was reported in outburst in July. A second outburst was reported in mid August. Another outburst began in mid September and I estimated it at 12.1 and DC6 in the N'land refractor x185 on September 18.96 There was another outburst in mid December and it was an easy object in the N'land refractor on December 17.9. It emerges from solar conjunction into the morning sky in July and will be observable in Aries until near the end of the year, when it retrogrades back into Pisces.

32P/Comas Sola The comet was recovered by visual observers at 13th magnitude in mid November. It peaked at 12th magnitude in late January. The 36 observations received so far give an uncorrected preliminary light curve of 6.9 + 5 log d + 16.7 log r

49P/Arend-Rigaux. A few observations made in March and April suggest that it is around 13th magnitude. It is past its brightest and sinking into the evening twilight.



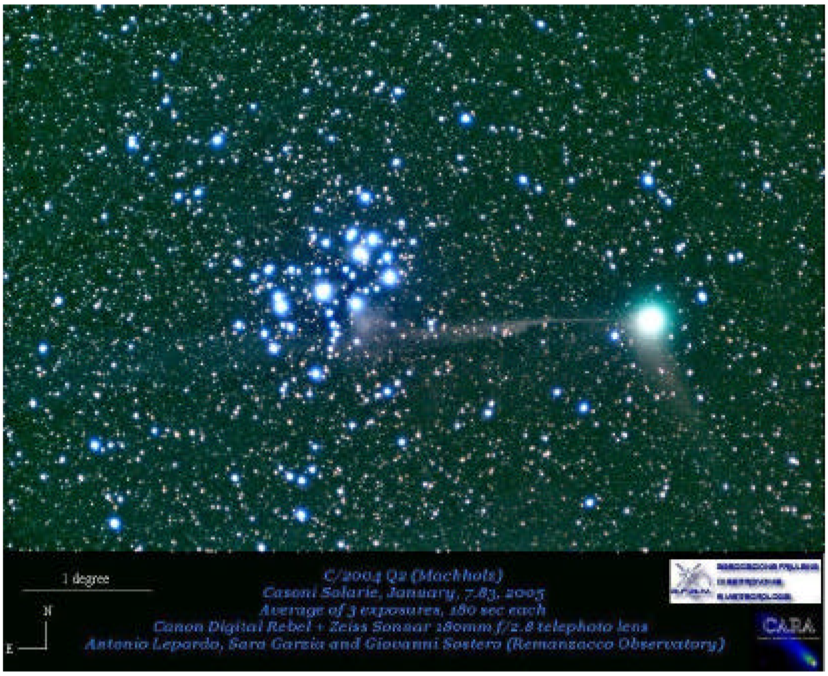
62P/Tsuchinshan was picked up as a 13th magnitude object in the October morning sky, by Michael Jager. I was barely able to see it with the N'land refactor x230 on January 21.2, although nearby galaxies of 12th magnitude were easy. It is now fading beyond visual range, but remains moderately well placed in the evening sky. The 19 observations received so far give a light curve of 8.8 + 5 log d + 19.1 log r

Observations of **78P/Gehrels** in November put it at 10 - 11 and it was visible in large binoculars. By the new Year it had faded to around 11th magnitude, and continues to fade relatively slowly, reaching 13th magnitude in April. The 111 observations received so far suggest a linear light curve of the form m = 10.4 + 5 log d + 0.0100 abs(t-T-60) but even this is not a particularly good fit,.

Donald Machholz discovered **141P/Machholz** with his 0.25-m reflector at 10m in August 1994. It proved to have multiple components, first reported by Michael Jager (Vienna, Austria). The four secondary components could all be described by the same orbit, but with perihelion delayed by up to half a day from the primary. At times there seemed to be a faint trail of material linking the components. The comet has a short period of 5.2 years with a perihelion distance of 0.75 AU and aphelion just inside the orbit of Jupiter. The orbit has been slowly evolving, with progressive changes occurring about every 50 years, thanks to approaches to Jupiter. The most recent close approach was in 1982. With a relatively stable perihelion distance, which is slowly increasing, it is perhaps surprising that the comet was not discovered earlier. There was a favourable return in autumn 1978 when it might have reached 8th magnitude and very favourable returns in the autumns of 1920, 1937 and 1957 when it might have reached 6th magnitude. The fact that it was not discovered at any of these returns suggests either that the orbital evolution is slightly inaccurate, or that the absolute magnitude at the 1994 return was not typical. At present the earth passes about 0.25 AU outside the descending node and the orbital evolution will slowly decrease this distance, raising the possibility of meteor shower from the comet in a few hundred years time.

Zdenek Sekanina has published a paper on the 'Multiple fragmentation of comet Machholz 2 (P/1994 P1)' in Astronomy and Astrophysics, v.342, p.285-299 (1999). The abstract states: *Discovered in August of 1994, periodic comet Machholz 2 consisted of five condensations, A-E, of which D later became double. They were lined up along their common heliocentric orbit (with A being the leading and brightest component) and connected by a trail of material, suggesting that the comet's nuclear fragmentation was accompanied by a copious release of large dust particles. The earliest breakup is found to have occurred in late 1987, ~ 600 days before the comet's 1989 perihelion, giving birth to fragment B and the grand precursor of A. The precursors of A and D and fragments A and C appear to have originated, respectively, ~ 5 days prior to and right at perihelion. The last breakup episode during that same return to the Sun was the separation of E, probably from* *the precursor of D, ~ 600 days after perihelion. The division of D into D_1 and D_2 is the only event analyzed in this paper that occurred one revolution later, in 1994.*

This apparition was not a good one, but Michael Jaeger was able to image the comet in the twilight, and visual observations were made by Seiichi Yoshida and Juan José González, who estimated at 11th to 12th magnitude in March and April.



Three more **Meyer Group SOHO comets,** 1996 N3, 2005 B4 and 2005 C1 were discovered with the SOHO LASCO coronographs and have not been observed elsewhere.

Six more **Marsden Group SOHO comets,** 1996 V2, 2004 V9, 2004 V10, 2004 W10, 2005 E4 and 2005 G2 were discovered with the SOHO LASCO coronographs and have not been observed elsewhere. There have been some exciting developments (see also the abstract by Sekanina and Chodas):

Brian Marsden notes on MPEC 2004-X73 [2004 December 14]
Although the orbits computed for the SOHO comets that are members of sungrazing groups other than Kreutz have hitherto necessarily been assumed to be parabolic, the low orbital inclinations and the indicated associations with meteor streams suggest that the members of the Marsden and Kracht groups, at least, are of short period (which still means that e is no smaller than 0.98). If so, it might now be the case that individual members can be recognized at more than one perihelion passage. Furthermore, the implied success in having at least one member survive perihelion passage would provide an obvious mechanism for the continued maintenance of these comet groups.

It is eminently possible that C/2004 V9 is in fact identical with C/1999 J6 (cf. MPEC 2000-F30). Since there is a well-known inconsistency between the C3 and C2 observations, only the latter (i.e., those of the 1999 comet made on May 11.46257 UT and earlier and those of the 2004 comet on Nov. 8.35423 and earlier) were used to link the objects, the resulting residuals being very comparable to those of the individual parabolic solutions. It should also be noted that the object would have passed only 0.0091 AU from the moon and 0.0087 AU from the earth on 1999 June 12.22 and 12.31 UT, respectively.

Earlier computations, by both Brian Marsden and P. Chodas, Jet Propulsion Laboratory, had suggested linkages among C2 observations of Kracht Group comets, namely, the possibility that C/1999 M3 (MPEC 2002-E18) = C/2004 L10 (MPEC 2004-O05) and that C/1999 N6 (MPEC 2002-F03) = C/2004 J4 or C/2004 J18 (MPEC 2004-M71, 2004-N05).

Comet 1999 J6 was around 7th magnitude in the LASCO C3 and faded quite rapidly. This suggests that it would probably not be brighter than 13th magnitude during its close approach. It would have been very favourably placed for northern hemisphere observers on 1999 June 11/12 and 12/13, crossing across half the sky during this time and passing some 6 degrees from the pole.

Although Marsden gives a parabolic orbit for C/2005 E4 on MPEC 2005-E87 [2005 March 15] he also notes:
Despite the parabolic orbit solutions, it seems quite likely that C/2005 E4 is identical with C/1999 N5 (cf. MPEC 2002-F03). He gives a tentative linkage of just the C2 observations (which in the case of C/1999 N5 are those made on July 11.56347 UT and earlier), which has a period of 5.66 years and perihelion at 0.0492 AU.

In support of the proposed identification, as well as of the proposed identification C/1999 J6 = 2004 V9 (cf. MPEC 2004-X73), the respective orbits have been run back one further revolution (to Epoch 1993 Nov. 29.0 TT). The tabulation shows in particular the remarkable agreement of the perihelion times T (as well as of the perihelion distances q). Indeed, this circumstance shows, not only that C/1999 J6 and C/1999 N5 probably separated from each other around that perihelion passage (the remaining slight discordances being understandable on account of the poor quality of even the C2 observations), but also that the splitting scenario discussed here and on MPEC 2004-X73 is in fact likely to be essentially correct. The comets passed 1.3-1.4 AU from Jupiter in May 1996.

Three further faint members of this related group of comets (C/1999 P6, C/1999 P8, C/1999 P9: cf. MPEC 2002-F43) were observed during 1999 Aug. 5-15; and C/1999 U2 (MPEC 1999-U29), one of the brighter original prototypes (with C/1999 J6, cf. MPEC 2002-C28), was observed on 1999 Oct. 25. Although neither the chance of survival nor the specific manner in which these members evolved from the original parent body is known, it seems likely that C/1999 U2, at least, will be reobserved on its next return to perihelion, presumably during the next few months. If this comet indeed separated from C/1999 J6 and C/1999 N5 near perihelion around 1993 Nov. 20-22, it should have a period (now) of 5.95 years (i.e., near 2:1 mean-motion resonance with Jupiter) and return to perihelion within a few days of 2005 Oct. 8.

Rainer Kracht notes that 1996 V2 may be an earlier return of 2002 V5. The Marsden-group comet C/2005 G2 presumably has an orbital period of 5-6 years, but it appears not to be a return of one of C/1999 P6, 1999 P8, 1999 P9 or 1999 U2 (MPEC 2002-F43, 1999-U29). The C2 data for C/2005 G2 do fit well with the observations of C/1999 P8 (all being C2), but the current C3 data show a systematic R.A. departure increasing from 1 to 4 arcmin. [MPEC 2005-G94, 2005 April 15]

Brian Marsden further predicts on MPEC 2005-H24 [2005 April 22]: Further to the statement at the end of MPEC 2005-G94, it should be noted that the best fit of C/2005 G2 to earlier comets is to C/1999 N5, the resulting orbital solution uses C2 observations alone, although the C3 observations do not show any systematic departure above 1 arcmin.

On MPEC 2005-E87, C/1999 N5 was linked (with comparable residuals) to C/2005 E4. It therefore seems plausible that C/2005 G2 separated from C/2005 E4 around the time of the C/1999 N5 perihelion passage, in much the same manner that C/1999 N5 may have separated from C/1999 J6 around a mutual Nov. 1993 perihelion passage. If C/1999 P6 (cf. MPEC 2002-F43) also separated at that 1993 perihelion passage, it should return (if it has survived) within a few days of 2005 Apr. 28 (likewise for C/1999 P8 and P9 around 2005 May 18).

Karl Battams has put together a family tree to show the suspected relationship between the various fragments. He notes:

Recent linkages of members the Marsden-group of 'sunskirting' comets indicate a fascinating evolution of the system. To best illustrate the linkages between the objects, a Marsden-group "family tree" has been constructed.

It is important to note that the links between these objects are not certain. There is ambiguity in almost all of the SOHO comet orbit determinations. However, the scenario laid out below is very probably correct.

```
      -------------------------------- C/1993 ?? -----------------------------
      |             |              |                 |                         |
 C/1999 P6?    C/1999 P8?     C/1999 P9?       ---C/1999 N5---          ---C/1999 J6---
      |             |              |            |            |          |             |
 D/2005 ??      C/2005 ??      C/2005 ??    C/2005 E4    C/2005 G2   C/2004 V9   C/2004 V10
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It is not know if C/1999 P6, P8 or P9 have survived. If they have, and their origins are as shown above, then they will likey reappear around April 28, 2005 (for C/1999 P6) and May 18, 2005 (for C/1999 P8 and P9) (c.f. MPEC 2005-H24)

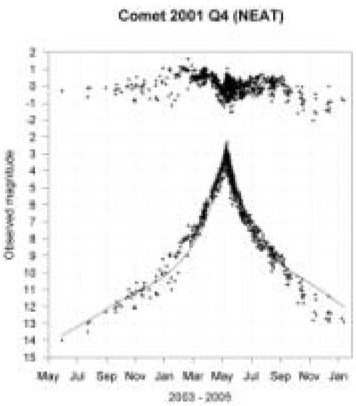
SOHO Kreutz group comets: 1997 E2, 1997 J6, 1998 U7, 2004 S2, 2004 S3, 2004 S4, 2004 T4, 2004 T5, 2004 T6, 2004 T7, 2004 T8, 2004 U4, 2004 U5, 2004 U6, 2004 U7, 2004 U8, 2004 U9, 2004 U10, 2004 U11, 2004 U12, 2004 V6, 2004 V7, 2004 V8, 2004 V11, 2004 V12, 2004 V14, 2004 V15, 2004 W1, 2004 W2, 2004 W3, 2004 W4, 2004 W5, 2004 W6, 2004 W7, 2004 W8, 2004 W9, 2004 W11, 2004 X4, 2004 X5, 2004 X6, 2004 X8, 2004 X9, 2004 X10, 2004 X11, 2004 Y2, 2004 Y3, 2004 Y5, 2004 Y6, 2004 Y7, 2004 Y8, 2004 Y9, 2004 Y11, 2004 Y12, 1997 E2, 2005 A2, 2005 A3, 2005 A4, 2005 A5, 2005 B2, 2005 B3, 2005 C2, 2005 C3, 2005 E3, 2005 E4, 2005 E5, 2005 E6, 2005 E7, 2005 E8, 2005 E9 2005 F1 and 2005 F2 were discovered with the SOHO LASCO coronographs and have not been observed elsewhere. Some of these comets show no tail at all and it is possible that some supposed observations of Vulcan were actually tiny Kreutz group comets.

1995 O1 (Hale-Bopp) A. Rivkin and R. Binzel, Massachusetts Institute of Technology, report that images of C/1995 O1 obtained on Jan. 8 with the Magellan Observatory's Clay 6.5-m telescope (+ SDSS g', r', and i' filters) show a tail at least 8".5 long (through g' and r' filters) and the following coma magnitudes in a 4".2 aperture: g' = 20.73, r' = 20.33, i' = 20.06. [IAUC 8479, 2005 February 7]

1996 R3 Lagerkvist The comet was finally named in November 2004, following detective work by Maik Meyer, which allowed an improved orbit to be determined.

1997 B4 (SOHO), 1997 V7 (SOHO) were non-group comets discovered by Rainer Kracht in archival C3 images in March 2005. Orbital elements are on MPEC 2005-F31 [2005 March 21] and Brian Marsden notes that the orbits, although uncertain, appear to be retrograde.

2000 V4 (SOHO) appears to be related to C/2001 T5 (MPEC 2001-V10). This was pointed out by R. Kracht prior to the derivation of the positions and orbit computation. [MPEC 2005-G93, 2005 April 15]



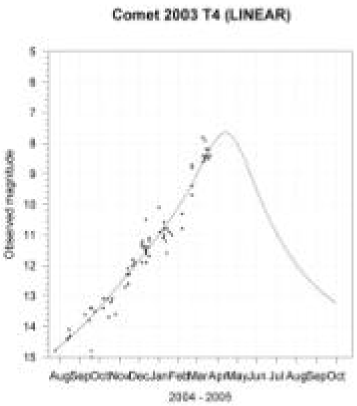
2001 Q4 (NEAT) continued to fade and was last reported in early February when it was still 13th magnitude. Its location in the northern part of the sky may have made observation difficult for many observers. 1044 observations give a preliminary uncorrected light curve of 5.7 + 5 log d + 6.6 log r though it was about 1.5 magnitudes fainter than indicated by the mean curve in January.

2003 K4 (LINEAR) passed through the SOHO LASCO fields as a 7th magnitude object from 2004 September 27 to 2004 October 13, rather fainter than was expected. Alexandre Amorim recovered it at 7.3 in 20x80B on October 26.11. The orbital plane crossing was on October 11.7 according to calculations by Akimasa Nakamura. Andrew Pearce reported detecting an anti-tail on November 13.80, when the comet was 7.2 in 20x80B. The comet remained fainter than expected, but fading only very slowly until 2005 January, when it seemed to resume fading on the previous light curve. 550 observations received so far give a preliminary light curve, of m = 4.0 + 5 log d + 11.1 log r, though this does not fit the observations made close to conjunction very well.

2003 T4 (LINEAR). By November the comet was becoming easier to see, and had brightened to 12.5. Very few observers appeared to be attempting it, possibly because it was most easily seen from higher northern latitudes and was only visible in the northern sky. I observed it on December 11, estimating it at 10.5 in my 0.33-m Dobsonian reflector. On January 21.2 it was 11.0 in the N'land refractor x185. After several attempts at observation in the following month that were thwarted by cloud, I finally observed it again on February 20.2 estimating it at 9.7 in the N'land x105 and 9.4 in 20x80B. It was another month before I saw it another time, by when it had brightened to 8.7 in 25x100B.

Seiichi Yoshida notes that images taken by Giovanni Sostero on November 21 show a dust trail 3.5' long. It is very unusual for non periodic comets to show a trail. Giovanni Sostero has also noted that the comet appears very red.
61 observations received so far give a preliminary light curve of m = 7.8 + 5 log d + 6.6 log r

Brian Marsden notes on MPEC 2005-F35 [2005 March 22] that the orbit has non-gravitational parameters A1 = +18.66 +/- 0.22, A2 = -3.55 +/- 0.16.

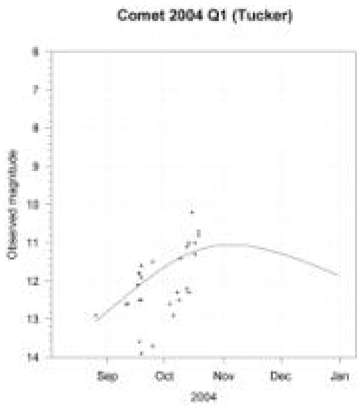


2003 WY25 (P/Blanpain-Catalina) was initially identified as an asteroid, of 18th magnitude, discovered by the Catalina Sky Survey on 2003 November 22.15. It is in a 5.3 year orbit, with perihelion at 1.00 AU and an eccentricity of 0.67. It reached perihelion in mid December. [MPEC 2003-W41, 2003 November 22, 28-day orbit] I noted that the orbit was typical of a Jupiter family comet, and that it can approach Jupiter to within 0.2 AU, approaching it to 0.4 AU in 1995. It is also a PHA, approaching earth to 0.005 AU at the ascending node. It approached the Earth to 0.025 AU in mid December, when it reached 15th mag.

My suggestion that it could be a Jupiter family comet, proved to be the case. M Micheli (Italy) and Peter Jenniskens both suggested an identity with the lost periodic comet Blanpain (D/1819 W1), and Brian Marsden has now conclusively linked the asteroid with the comet. Harold Ridley has also tentatively linked the comet with the Phoenicid meteor shower of 1956 December 5. [IAUC 8485, 2005 February 13]

At discovery comet Blanpain was around 6.5, with a coma of 6 - 7 ' diameter. It was observed for 59 days. Although Vsekhsvyatskij gives an absolute magnitude of 8.5, this doesn't fit the ephemeris very well and 10.5 is more likely.
The original orbit for comet Blanpain appears to have been relatively good, however the period was around a month out. Since its discovery apparition it made a further 34 returns prior to its recovery as an asteroid in 2003. Perihelion distance has varied between 0.87 and 1.04 AU, and it passed 0.31 AU from Jupiter in 1995. There were close approaches to the Earth at the discovery in 1819 (0.11 AU in October before discovery), 1866 (0.08 AU in November), 1919 (0.06 AU in November/December). It will make future close approaches in 2020 (0.09 AU in January) and 2035 (0.09 AU in November). [Orbits calculated by Kenji Muraoka and myself]

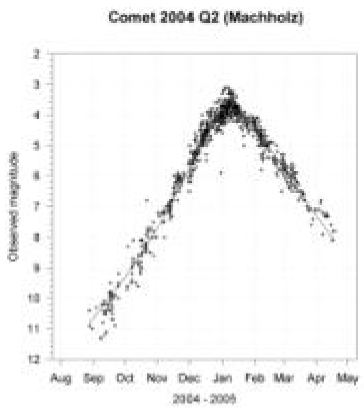
A/2004 PA44 [NEAT] This unusual asteroid as an orbit with perihelion at 3.43 AU, aphelion at 24.9 AU and a period of 53 years. Its orbit crosses those of Jupiter, Saturn and Uranus, but has not made any recent close approaches. [MPEC 2005-A10, 2005 January 5]



2004 Q1 (Tucker) reached its brightest, at around 10.5 in early November. By the New Year it had faded a little, but few observations have been received since mid January. Those that have come in suggest that it faded relatively slowly and was around 12th magnitude in early April. 108 observations received so far suggest a preliminary light curve of m = 1.5 + 5 log d + 27.5 log r

Brian Marsden notes on MPEC 2004-U30 [2004 October 23] that the "original" and "future" barycentric values of 1/a are +0.005264 and +0.005985 (+/- 0.000010) AU^{-1}, respectively. The original value suggests that this is not a "new" comet from the Oort cloud.

I was able to observe **2004 Q2 (Machholz)** in 20x80B from outside Cambridge on November 14.1, estimating it at 7.3. A few nights later David Seargent reported that it was just visible to the naked eye from really dark sites at 6.2. By mid December it was widely visible to the naked eye, and had brightened to around 4.5. In early January it became very well placed for observation and reached its brightest at around 3.5. By mid February it had faded to 5th magnitude, but was still a naked eye object. In early May it was about 8.5. It is slowly fading, but remains well placed for northern hemisphere observers. 940 observations received so far suggest a preliminary light curve of m = 5.1 + 5 log d + 10.4 log r

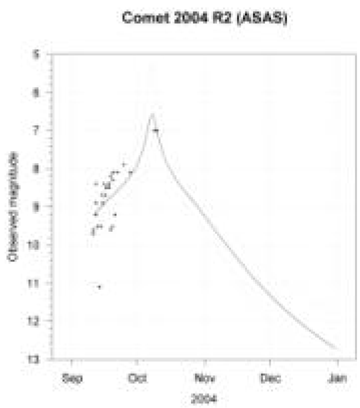


Brian Marsden notes on MPEC 2004-U31 [2004 October 23] that The "original" and "future" barycentric values of 1/a are +0.000404 and +0.001856 (+/- 0.000015) AU^-1, respectively. The original value suggests that this is probably not a "new" comet from the Oort cloud.

No post perihelion observations of **2004 R2 (ASAS)** were reported and it seems likely that it didn't survive perihelion. The 18 observations received so far suggest a preliminary light curve of m = 10.1 + 5 log d + 8.2 log r up to perihelion.

2004 RG113 (LINEAR) A 19th magnitude cometary object found by LINEAR on November 20.44 has been linked to an asteroid originally found by LINEAR on September 6.40. The orbit turns out to be nearly parabolic with perihelion in early March 2005, when the object could be 16th magnitude. This was LINEAR's 150th cometary discovery.

Brian Marsden notes on MPEC 2004-Y10 [2004 December 18] that the "original" and "future" barycentric values of 1/a are +0.001764 and +0.002993 (+/- 0.000017) AU^-1, respectively. showing that the comet is not a "new" one.



2004 TU12 (162P/Siding Spring) Details of an asteroid in a cometary type orbit were published on MPEC 2004-T55 on October 11. I had identified this as one to add to the web pages, but had not checked the orbital details, when on November 12, Juan Lacruz posted details on the comet mailing list that it showed a tail in images taken on November 12.8. This was followed by an IAUC, which identified the object as a comet on the basis of CCD images taken with the 0.36-m reflector at Las Campanas by Gianluca Masi, F. Mallia and R.Wilcox on November 12.0. Interestingly previous images that they had taken showed no tail. Subsequent images show the tail fading and becoming detached from the central condensation. This raises the question as to whether the object is a true comet, or an asteroid that suffered an impact. Seiichi Yoshida, however points out that the tail position angle doesn't lie in the orbital plane, suggesting that it is a normal tail, albeit very linear.

The 14th magnitude object was discovered by Rob McNaught during the Siding Spring Survey on October 10.55. It will fade. It has been linked to objects seen in 1990 (by the Palomar Sky Survey), 2000 (by LINEAR and LONEOS) and by ESO, AMOS and NEAT in following years, so the orbit is secure and it was numbered 162. It has a period of 5.32 years, with perihelion at 1.23 AU and was at perihelion on November 10.

2004 U1 (LINEAR) An asteroidal object reported by LINEAR on October 19.42 was shown to have a faint coma and tail, by amongst others Peter Birtwhistle. 19th magnitude at discovery, the object reached perihelion in early December at 2.66 AU at 17th magnitude. CCD observations showed that it outburst to 13th magnitude and became well condensed, so was observed visually in December and January. The outburst took place some time between November 22 and 27.

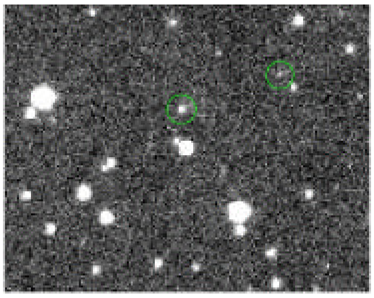
Brian Marsden notes on MPEC 2004-Y11 [2004 December 18] that the "original" and "future" barycentric values of 1/a are +0.000712 and +0.001041 (+/- 0.000038) AU^{-1}, respectively, showing that the comet is probably not a "new" one.

2004 V1 (P/Skiff) Brian Skiff discovered an 18th magnitude comet on LONEOS images taken with the 0.59-m Schmidt on November 4.08. Prediscovery LINEAR images show that it was approaching perihelion at 1.42 AU in early December and had a period of 10.0 years.

2004 V2 (161P/Hartley-IRAS) Rob McNaught recovered comet P/Hartley-IRAS (1983v=2004 V2) with the Siding Spring 1-m reflector. The comet was 4.8 days behind the prediction in the 2004 ICQ Handbook. At 19th magnitude it was a little fainter than might be expected. It should become observable to UK observers in June.

2004 V3 (P/Siding Spring) Rob McNaught discovered another comet, of 19th magnitude, during the Siding Spring Survey on November 3.40. It is in a periodic orbit of around 19 years and was at perihelion at 3.9 AU in mid November. It will fade as its distance from Earth increases.

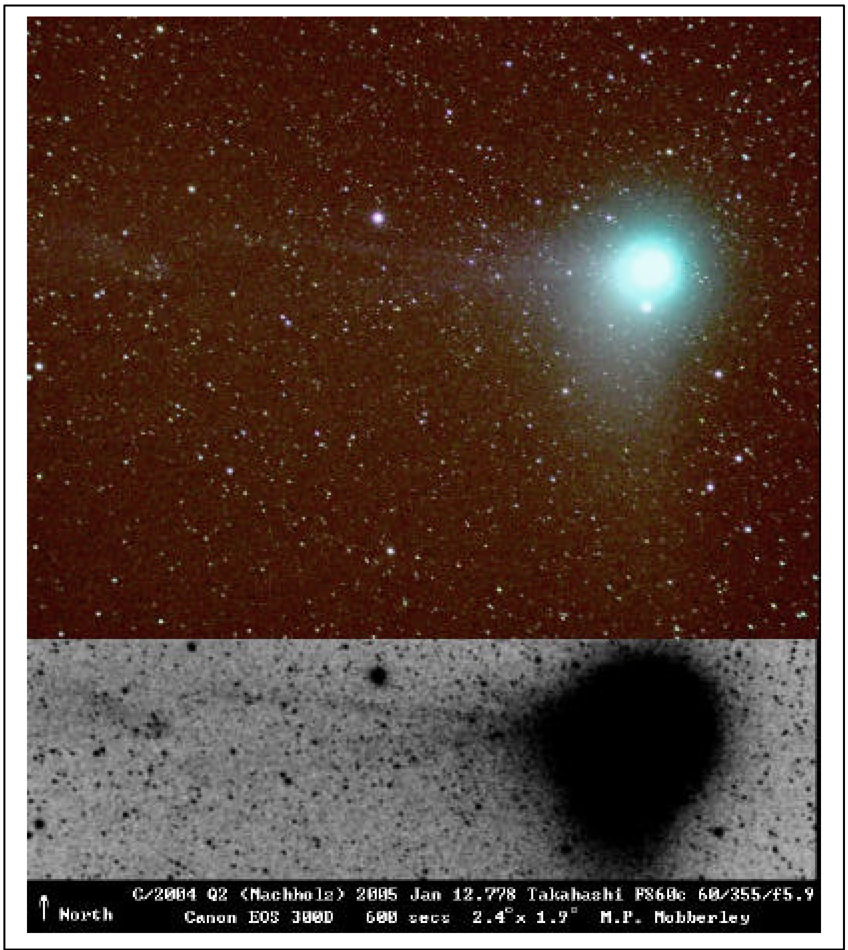
2004 V4 (163P/NEAT) NEAT discovered a 19th magnitude comet on November 5.45. The initial orbit put perihelion at 1.27 AU in early March 2005, however calculations by Maik Meyer suggested that it was a periodic comet near perihelion at 2.0 AU. Subsequent published orbits confirmed this, with perihelion in late January at 1.92 AU and a period of 7.01 years. Maik Meyer found images of the comet on Palomar DSS plates from 1990 and 1991, and NEAT images from 1997. This gave a secure orbit and lead to the comet being numbered 163.



Discovery frame of 2004 V5 from the CSS Schmidt

2004 V5 (P/LINEAR-Hill) = 2003 YM159 The Catalina Sky Survey reported the observation of two cometary objects on frames taken on November 10.5. These were linked to an asteroidal object detected by LINEAR in October, and then to an asteroid found by LINEAR last December. The brighter of the two cometary objects links to the asteroid and is the primary component. The orbit is elliptical with a period of 22.4 years and perihelion at 4.4 AU in February 2005. The comet was originally named LINEAR-Catalina, however Brian Marsden notes on MPEC 2004-V79 *Consultation with the IAU Committee on Small-Body Nomenclature has yielded the decision to introduce for this comet (cf. IAUC 8433, MPEC 2004-V52) the new principal designation P/2004 V5 and to replace the name LINEAR-Catalina with LINEAR-Hill. The components A and B are defined as before, The orbital elements and ephemeris refer to component A. Component B will pass perihelion 0.23 day after component A.* The latest orbit has component B passing perihelion 0.23 days before component A. Rik Hill is a BAA Member.

2004 V13 (SWAN) An object reported by Michael Mattiazzo to the CBAT on November 30, that he had detected in SWAN images taken between November 9 and November 25, has appeared as a



6th magnitude object with tail in the LASCO C3 field. John Sachs and Heiner Otterstedt reported a non group comet on the SOHO web page on December 16 and Sebastian Hoenig then computed the first orbit from the preliminary SWAN and LASCO observations. The orbital elements show that it reached perihelion on December 21 at 0.18 AU when it was around 5th magnitude. It was observed from the ground on December 26 and 30 by Kenji Kadota, but was fainter than expected at 10th magnitude. It was 12th magnitude in early January. A few observations were reported in early January.

2004 VR8 (P/LONEOS) An apparently asteroidal 18th magnitude object discovered by LONEOS on November 3.35 and shown in the list of unusual asteroids, was found to be cometary by other observers. It will reach perihelion at 2.38 AU in early September 2005 and has a period of 10.7 years. It may reach 16th magnitude towards the end of 2005.

2004 WR9 (P/LINEAR) An apparently asteroidal object of 17th magnitude discovered on November 22.32 that had been on the NEOCP for several days was confirmed as a comet by Peter Birtwhistle and Carl Hergenrother. It is in a 15 year orbit with perihelion at 1.9 AU in mid January. It is now fading.

2004 X1 (P/LINEAR) LINEAR reported the discovery of an apparent 19th magnitude comet with tail on December 7.08, which was confirmed by other observers. The astrometry shows a low inclination orbit with perihelion at 0.78 AU in early November. This was subsequently confirmed as being of short period, with periodicity 4.9 years. It will fade from 17th magnitude.

2004 X2 (LINEAR) An apparently asteroidal 19th magnitude object found by LINEAR on December 8.47 was shown to have a cometary appearance by other observers. The observations show that it was at perihelion in 2004 August at 3.8 AU. It will remain near its current brightness for a few months.

2004 X3 (LINEAR) Another apparently asteroidal object found by LINEAR has been shown to be cometary. Discovered on December 15.46, the 20th magnitude object is expected to reach perihelion at 4.4 AU in 2005 June.

Brian Marsden notes on MPEC 2005-D12 [2005 February 21] that the "original" and "future" barycentric values of 1/a are +0.000006 and -0.000647 (+/- 0.000042) AU^-1, respectively, showing that the comet is a "new" one from the Oort cloud.

2004 X7 (SOHO) was a non group SOHO comet discovered by Rainer Kracht on December 8 in LASCO C2 frames from the same day. Details appeared on IAUC 8466, 2005 January 17.

A/2004 XA131 [Catalina] This asteroid was on the NEO confirmation page for some 10 days on account of its orbit. It reaches perihelion at 2.91 AU in 2005 September and has a period of 8.45 years. It can approach closely to Jupiter and did so in 1918. It is a good candidate for an extinct comet.

2004 Y1 (164P/Christensen) A comet was found by Eric Christensen on December 21.47 during the course of the Catalina Sky Survey. Prediscovery images from LINEAR allowed the computation of a preliminary orbit, which showed that it was in a 6.9 year orbit with perihelion at 1.65 AU in 2004 June. Currently 16th magnitude, it is expected to fade. Further images from the 1997 return, taken in 1998 by NEAT and LONEOS allowed the comet to be numbered 164.

2004 Y4 (SOHO) was a non group SOHO comet discovered by Heiner Otterstedt on December 24 in LASCO C3 frames from the same day. It reached magnitude 5-6 on December 26, but showed no tail. Details appeared on IAUC 8469, 2005 January 19.

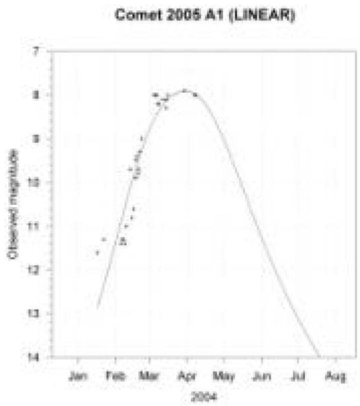
2004 Y10 (SOHO) was a non group SOHO comet discovered by Tony Hoffman on December 28 in LASCO C2 frames from the same day. Details appeared on IAUC 8475 [2005 February 2].

A/2004 YY23 [Catalina] Another possibly interesting asteroid, with a period of 7.7 years and perihelion at 1.14 AU in late December. It can approach Jupiter within 1 AU.

A/2004 YZ23 [Siding Spring] Another possibly interesting asteroid, with a period of 5.9 years and perihelion at 0.99 AU in 2005 April. Its high inclination of 54 degrees does however keep it a long way from Jupiter.

A/2004 YH32 [Siding Spring] This interesting asteroid has a period of 26 years and perihelion at 3.53 AU in 2005 August. Although its orbit crosses both that of Jupiter and Saturn its high inclination of 79 degrees keeps it over 2 AU away from the large planets.

A/2004 YJ35 [LINEAR] Another interesting asteroid in a decidedly cometary orbit. It was discovered by LINEAR on December 31.07 and remained on the NEOCP for two weeks as there were conflicting reports on whether it showed cometary characteristics or not. It reaches perihelion at 1.78 AU in early March and has a nominal period of 3400 years, with an inclination of 52 degrees. At aphelion it is 450 AU from the Sun.



2005 A1 (LINEAR). LINEAR discovered a new 15th magnitude comet on January 13.48. It reached perihelion at 0.91 AU in mid April, and whilst it was around 8th magnitude it was at high southern declination. It might become visible to UK observers at 13th magnitude in late July.

An observation by Juan José González Suárez, observing with a 20cm SCT x100 on January 17.25 suggested that it was 11.5, significantly brighter than the LINEAR discovery magnitude. By early February southern observers were estimating it at 10th magnitude, with an estimate of 9th magnitude by mid February. By early March most observers were reporting it at 8th magnitude. The 30 observations received so far suggest a preliminary light curve of m = 8.2 + 5 log d + 17.3 log r

Brian Marsden notes on MPEC 2005-F36 [2005 March 22] that the "original" and "future" barycentric values of 1/a are +0.000333 and -0.000255 (+/- 0.000029) AU^-1, respectively. The "original" value suggests that this is not a "new" comet.

A/2005 AB [Catalina] is another possibly interesting asteroid, of 18th magnitude, discovered by the Catalina Sky Survey on January 1.43. It has a period of 5.7 years and perihelion at 1.18 AU in late March. [MPEC 2005-A05, 2005 January 3, 1.5-day orbit]. It can approach Jupiter within 0.4 AU. Further observations show it is an Amor type, and is a binary.

2005 B1 (Christensen). Eric Christensen discovered a distant 17th magnitude comet near perihelion during the Catalina Sky Survey on January 16.46. It was linked to asteroid 2004 FS101 and this allowed an improved orbit to be calculated. The comet reaches perihelion at 3.20 AU in late February 2006, when it may be 14th magnitude. It will be at high northern declination, but at lower culmination, so that there will be evening and morning observing windows.

Brian Marsden notes on MPEC 2005-B25 [2005 January 18] that the "original" and "future" barycentric values of 1/a are -0.000128 and +0.000100 (+/- 0.000097) AU^-1, respectively. The "original" value suggests that this is a "new" comet.

A/2005 BY1 [Steward] This asteroid, of 20th magnitude, was discovered at the Steward Observatory on January 18.16. It has a period of 5.5 years and perihelion at 0.97 AU in mid June. [MPEC 2005-B27, 2005 January 19, 1-month orbit]. There have been no recent approaches to Jupiter.

2005 C4 (SOHO) was a non-group comet discovered by Rainer Kracht in C2 images on February 13. Orbital elements on MPEC 2005-F32 [2005 March 21] give perihelion at 0.0391 AU on February 13.3.

2005 D1 (SOHO) was a non-group comet discovered by Hua Su and Xing Gao in C2 images on February 23. Orbital elements on MPEC 2005-E01 give perihelion at 0.0468 AU on February 23.6, with an inclination of 122 degrees, however Brian Marsden notes that an inclination near 90 degrees and a smaller perihelion is equally possible.

2005 E1 (P/Tubbiolo). A F Tubbiolo discovered a 21st magnitude comet on Spacewatch images taken on March 3.26. Further astrometric observations allowed an improved orbit to be calculated by Hirohisa Sato, and this suggested that the comet is in a distant periodic orbit, and is near perihelion. These calculations were confirmed by Brian Marsden on MPEC 2005-F27 [2005 March 22]

2005 E2 (McNaught) Rob McNaught discovered a 16th magnitude comet on March 12.75 with the 0.5m Uppsala Schmidt, during the course of the Siding Spring Survey. It is expected to reach perihelion at 1.52 AU in late February 2006, when it could reach 9th magnitude. It should become visible to UK observers in December and will remain visible at 9 - 10 magnitude until 2006 April, when it enters solar conjunction.

A/2005 EO70 [LINEAR] This asteroid, of 19th magnitude, was discovered by LINEAR on March 8.42. It has a period of 6.1 years and perihelion at 1.09 AU in mid April. [MPEC 2005-E52, 2005 March 10, 2-day orbit]. It can approach to 0.4 AU from Jupiter and 0.15 AU from Earth. Such an orbit is similar to those of Jupiter family comets.

A/2005 EW169 [Mt Lemon] This asteroid, of 20th magnitude, was discovered by E J Christensen during the Mt Lemon Survey with the 1.5-m reflector on March 11.37. It has a period of 5.1 years and perihelion was at 1.03 AU in mid November 2004. [MPEC 2005-E80, 2005 March 14, 2-day orbit]. It can approach to 0.5 AU from Jupiter and is a potentially hazardous asteroid approaching to 0.016 AU from Earth at the ascending node. Such an orbit is similar to those of Jupiter family comets.

Comet C/2004 Q2 (Machholz) - 2005 05 03
Image 15×60 sec, taken with 25 cm Newton F/4.8
and CCD StarLight Express SXL8 bin 1×1;
Start sequence 19:01:36 UT.
Field 22'×22'; Resolution 2.6×2.6 arcsec/pixel
Observer: Toni Scarmato, Calabria, Italy

A/2005 EL173 [LONEOS] This asteroid, discovered by LONEOS on March 8 is in a retrograde orbit.[MPEC 2005-F48, 2005 March 29] The MPC are classifying it as a cubewano or scattered disc object. Perihelion is at 3.9 AU in 2007 March according to the latest orbit [MPEC 2005-G25]. It has a period of 57,000 years. Aphelion is at 3000 AU. There have been no recent close approaches to Jupiter or Saturn. The orbit is typical of a long period comet and the object may show activity as it nears perihelion.

2005 G1 (LINEAR) LINEAR discovered another comet, of 19th magnitude, on April 1.39. It is predicted to reach perihelion at 5.0 AU early in February 2006.

2005 GF8 (P/LONEOS) An 18th magnitude asteroid discovered by LONEOS on April 2.43 was found to show a coma by amongst others, Peter Birtwhistle. The object has perihelion at 2.8 AU in mid August and has a period of 14 years.

A/2005 GF81 [Mt Lemon] This asteroid, of 20th magnitude, was discovered by A Grauer during the Mt Lemon Survey with the 1.5-m reflector on April 9.19. It has a period of 5.5 years and perihelion is at 1.08 AU in mid June 2005. [MPEC 2005-G72, 2005 April 11, 2-day orbit]. It can approach to 0.4 AU from Jupiter and 0.1 AU from Earth. Such an orbit is similar to those of Jupiter family comets, although it is classed as an Amor asteroid.

2005 H1 (LINEAR) LINEAR discovered another comet, of 19th magnitude, on April 30.32. It was at perihelion at 5.1 AU in late February.

A/2005 HL3 [Siding Spring] This asteroid, of 17th magnitude, was discovered on April 19 with the 0.5m Uppsala Schmidt. Perihelion is at 1.88 AU in early May, and the period is around 30 years. [MPEC 2005-H19, 2005 April 21]. Aphelion is at 18 AU. There have been no recent close approaches to Jupiter or Saturn.

A/2005 HC4 [LONEOS] has perihelion at 0.0574 AU [MPEC 2005-J03, 2005 May 1]. It will pass through the SOHO coronagraph field in June, although its predicted magnitude is only 15.

For the latest information on discoveries and the brightness of comets see the Section www page: http://www.ast.cam.ac.uk/~jds or the CBAT headlines page at http://cfa-www.harvard.edu/cfa/ps/Headlines.html

The Comet's Tale is produced by Jonathan Shanklin, with thanks to the British Antarctic Survey and the Institute of Astronomy, Cambridge for the use of computing facilities. In this issue I have had to separate some light curves and illustrations from their natural place in the text in order to optimise space. E&OE.