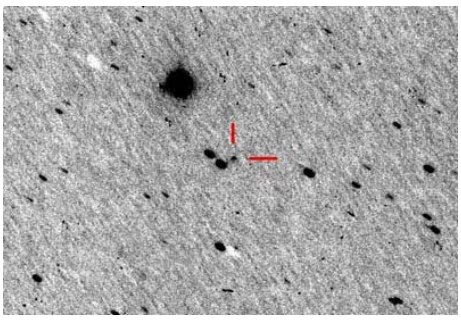
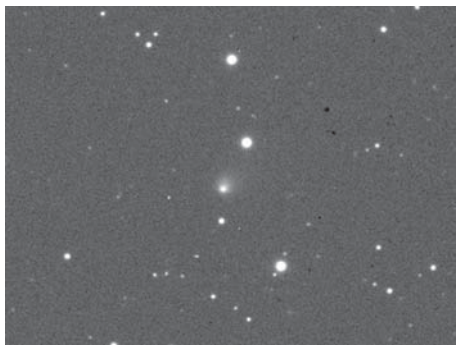
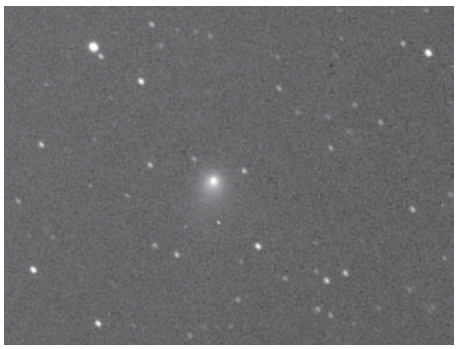
Comet C/2009P1 Garradd: the long view



Confirmation image taken 2009 August 15.5 by E. Guido *et al.*, 0.35mm SCT, 20×60s at Grove Creek Observatory, IAU Code E16.



Taken on 2010 Oct 10.6 by A. Novichonok & D. Chestnov. 150mm f/7.3 OG+STL6303 CCD, 1×300s at Tzec-Maun Observatory, IAU Code D96.



Taken on 2011 April 6.82 by A. Novichonok & D. Chestnov. 150mm f/7.3 OG +STL6303 CCD, 4×120s at Tzec-Maun Observatory.

Gordon Garradd discovered comet C/2009P1 on 2009 August 13 using the Uppsala Southern Schmidt telescope in Australia. It has been observed for 28 months to date. It passed through perihelion on 2011 December 23 and has continued to brighten. This note presents an illustrated account of its appearance as it moved north, and describes the observing prospects for the coming months.

Discovery

During the course of his survey work using the Uppsala Southern Schmidt telescope at Siding Spring in Australia, Gordon Garradd discovered the 13th comet to be given his name. At that time it was an 18th magnitude object in the constellation of Phoenix near to Alpha Phoenix (Ankaa). Perihelion was soon computed to be on 2011 Dec 23.68 at a solar distance of 1.551 AU. The comet would be best placed for northern hemisphere observers near perihelion, situated in Hercules. Its peak brightness was likely to be around magnitude 7 or 8, possibly even bordering on naked eye visibility in late February/early March 2012 when it was closest to the Earth at 1.27 AU. The comet is probably an intrinsically bright comet and not a first time visitor from the Oort Cloud, and it is a pity that it does not come closer to the Sun or Earth otherwise we could be witnessing one of the Great Comets.

Discoverer Gordon Garradd (right) with Rob McNaught at Siding Spring Observatory in Australia.

Observations and evolution

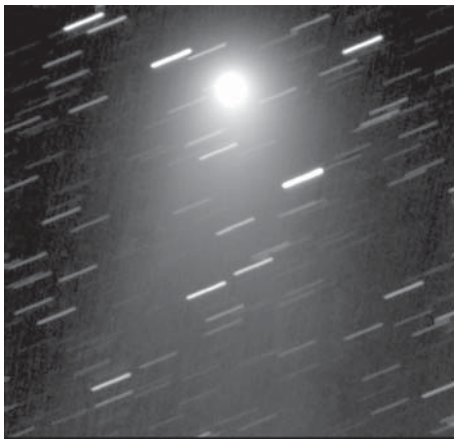
After discovery the comet was observed to brighten slowly as it moved through the southern skies. After conjunction with the Sun in 2010 March it reappeared and was observed visually at mag 13 in 2010 August. It continued its northerly track throughout 2010 and emerged from conjunction with the Sun for the second time to become visible in Aquarius. It was then reported visually at mag 10 in 2011 April/May. Throughout 2011 the comet tracked further north and west into Pegasus, Delphinus, Sagitta and Hercules and its brightness increased to mag 7 as it approached perihelion passage. During its third conjunction with the Sun, this time over 40° north of it, in 2011 December, the comet became visible both as an early evening and an early morning object.

Taken on 2011 July 7 by Michael Jäger.

Development and morphology

The comet was described by Garradd as a tailless object with an approximately circular coma of diameter 15". By 2010 June, Rob McNaught at Siding Spring reported the following observation: 'Images show it at mag 15.6. It is strongly condensed with a coma 0'.3 and tail of ~0'.4 in PA ~140°.'

Between 2010 June and 2011 August the comet brightened to magnitude 7.5 and the coma increased in diameter to around 8 arcminutes. Visually there were no reports of any tail development until late 2011 August when dust tail lengths of 0.5° were seen. Images showed tail features as early as 2011 April/June when separate dust and gas tails began to be generated by the comet. The further development of the tail features, now over 1° in length, including the obvious widening in PA of the different streams, dominated the view in deep images taken by observers around the world. The coma continued to be seen as a circular glow of around 10 arc minutes diameter surrounding the central condensation which, close to perihelion, approached naked eye visibility.



Taken on 2011 July 30.9 by Martin Mobberley. 355mm SCT +ST9XME CCD, 30×60s at Cockfield Observatory, Suffolk, IAU Code 480.

Taken on 2011 August 2 by Michael Jäger.

Taken on 2011 Nov 15 by Rolando Ligustri. 106mm f/5.3 OG +ST8003 CCD, 6×30s remotely with GRAS 020, New Mexico.

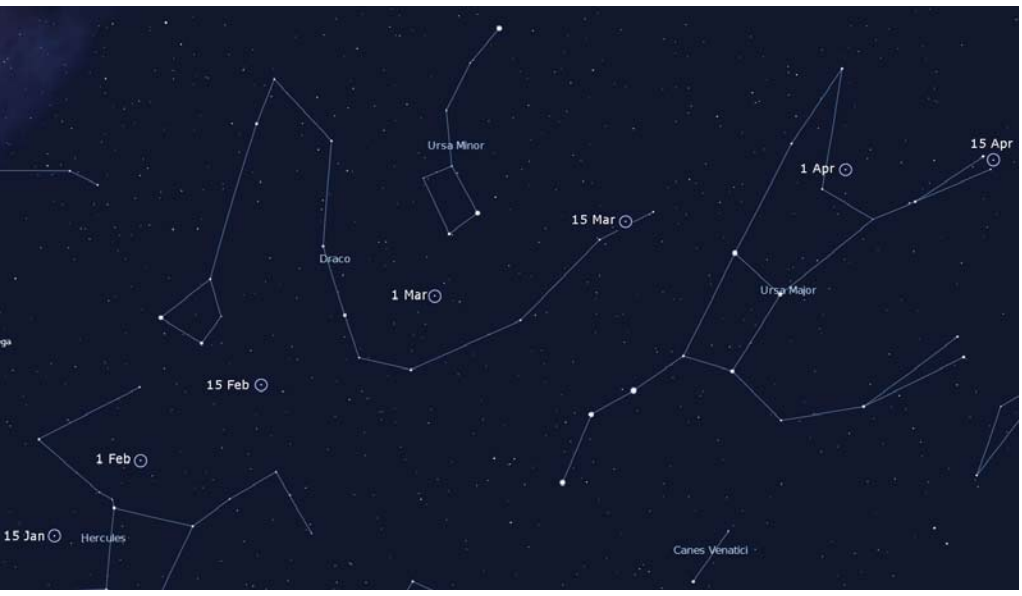
Post perihelion observing

After perihelion and solar conjunction in 2011 December the comet became circumpolar for northern hemisphere observers in 2012 February as it entered Draco at a declination of 50°. In February and March it should be visible as an easy binocular object, especially for those who are prepared to observe in the pre-dawn hours when it will be highest in the sky. During March its declination climbs to more than 70°N before it travels southwards through Lynx and Cancer from April onwards. (See chart below). It is in conjunction with the Sun for the fourth time in 2012 August and emerges again in Hydra in 2012 October. The comet will then be as faint as mag 13, and observations made around this time will probably be the last opportunity for amateurs to image it. The last time we were able to observe a fairly bright comet for so long (four solar conjunctions) was the brilliant C/1995 O1 Hale–Bopp during 1995–1998.

With a few months left of this apparition, observers should take the opportunity to observe this comet while it is still bright. Garradd holds much of interest for those observers who are prepared to work in the pre-dawn skies. To quote the famous comet discoverer George Alcock, 'you will never see comets lying in bed'.

The Comet Section is keen to receive observations whether they are visual brightness estimates, detailed drawings, or deep narrow or wide field CCD images. Your observations can be reported via the special e-mail address **cometobs @britastro.org.**

Passing the open cluster Collinder 399 (the 'Coathanger'). Taken on 2011 September 03.16 by Martin Mobberley. 106mm F/5.3 OG+ST8003 CCD, 1×240s remotely with GRAS 020, New Mexico.



The path of comet Garradd across the northern sky in 2012 February and March. *Stellarium*.

Denis Buczynski & Nick James,
Comet Section

For a comprehensive pictorial record of the appearance of this comet the reader is recommended to view the images at the following websites:
BAA Gallery: **http://tinyurl.com/7xu2vb7**
Seiichi Yoshida comet pages: **http://aerith.net/comet/catalog/2009P1/2009P1.html**

By the end of December the following had submitted observations directly to the Comet Section: James Abbott, Essex; Denis Buczynski, Portmahomack, Scotland; Roger Dymock, Hants.; Maurice Gavin, Surrey; Stephen Getliffe, Cambridge; Ernesto Guido, Italy; Martin Mobberley, Suffolk; Nick James, Chelmsford; Gordon McLeod, Wick, Scotland; Richard Miles, Dorset; Stewart Moore, Essex; Graham Relf, Tyne & Wear; David Storey, Isle of Man; Jonathan Shanklin, Cambridge; Melvyn Taylor, Wakefield; John Vetterlein, Orkney.

Taken on 2011 Nov 16 by Denis Buczynski. 355mm SCT F/6, FLI Maxcam CM9 CCD, 1×240s, Tarbatness Observatory, IAU Code I81

Two open clusters in Cancer

Cancer, the mythical crab that attacked Hercules in his fight with Hydra the water snake, is an inconspicuous zodiacal constellation. Luckily however it is sandwiched between the bright stars Procyon, Regulus and Pollux, which gives the observer from less than pristine skies some chance of finding it. In fact Cancer is unusual in that its brightest deep sky object, the open cluster M44, has an integrated magnitude that is brighter than any of the stars within the constellation, and often M44 is the only part of Cancer that can be seen with the naked eye.

There are two open clusters in Cancer and both have Messier designations. The already mentioned M44 is the largest, covering over 1° of sky, while the smaller M67 only covers around 25'. Looks can be deceptive though as M67, which lies at a distance of 2,600 light years, is actually five times further away than M44 and has a true diameter twice that of its more famous brother.

M67: *Andrea Tasselli*

With any naked eye deep sky object it is impossible to speculate who first observed it but M44, or Praesepe to give it its Latin name, has been known since antiquity. According to Ronald Stoyan in his excellent *Atlas of Messier Objects* (Cambridge University Press, 2008) the first mention of Praesepe dates back to Aratus in 260BC, while Hipparcos spoke of it as a small cloud in 130BC.

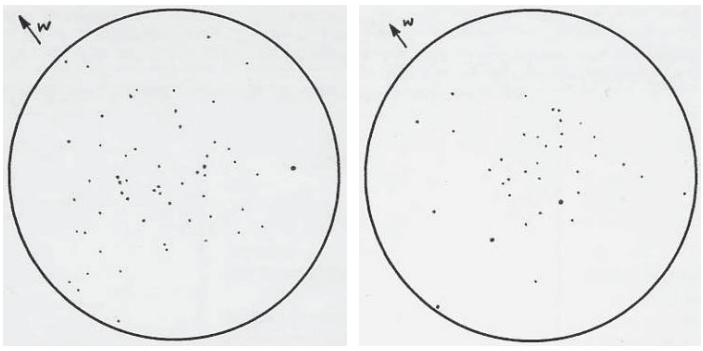
The first person to realise that Praesepe was more than just a nebulous patch was Galileo, who resolved it into a mass of stars during his pioneering telescopic survey in 1609. Although Galileo counted around 40 stars the cluster is now thought to contain closer to 300, many of them doubles and triples. Also of interest in the cluster is TX Cancri, a variable dwarf eclipsing binary.

M44 lies just under 2° north of delta Cancri, the magnitude 3.9 star that forms the body of the three- legged spider shape that is Cancer, at RA 8h 40m and Dec +19° 38' (2000.0). Probably the best visual views of the cluster are through binoculars, when the mass of stars can be seen concentrated and slightly elongated north–south against the rather empty background sky. If the seeing is at all unsteady the stars will sparkle, making the cluster's other name of the Beehive seem particularly relevant (and slightly more romantic than the 'exhalation of piled up corpses' by which the cluster was known in ancient China).

Cancer lies near the ecliptic, so M44 is often visited by passing planets. In 2010 Mars paid a visit, completely changing the appearance of the cluster. The visit was captured by BAA members Nick James and Peter Hudson and Nick's image, photographed from his observatory in Chelmsford, Essex using a Megrez 72 refractor and Canon EOS 10D camera is shown here. Total image time was 20min and the field size is 2×3°.

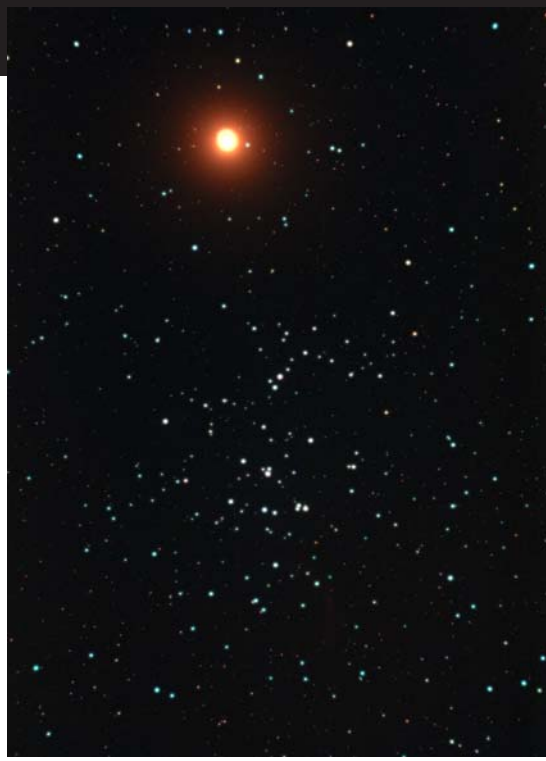
Cancer's other cluster, M67, lies towards the south of the constellation and although some observers claim it can be seen with the naked eye, with a listed magnitude of 6.9 this seems highly unlikely from UK skies. Like many objects with a Messier designation it was discovered before Messier himself observed it and is generally attributed to the German astronomer Johann Gottfried Kohler around 1779, with Messier making an independent discovery the following year. It is an old cluster, in fact one of the oldest known, with an estimated age of between 4 and 5 billion years. That it has survived so long without being gravitationally torn apart is probably due to its extreme distance from the galactic plane. It contains a large variety of stars, from highly evolved red giants to white dwarfs and blue stragglers. Lying at RA 8h 52m and Dec +11° 46' it is around 1½° west of mag 4.3 alpha Cancri.

Andrea Tasselli's RGB image, taken through a 200mm Mak–Cass and SXV-H9 combination from Lincoln, shows some of these star colours, while Cliff Meredith's image through an 80mm f/6 refractor fitted with a Canon 300D camera from Prestwich, Manchester gives a good impression of how the cluster appears visually. Cliff imaged M67 and M44 at the same scale and the results reproduced here show the clear difference in apparent size between the two clusters.



Drawings by Simon Johnson. Left, M44; right, M67.

Open clusters have always been popular visual targets and Simon Johnson observed them both from Plymouth using a 10-inch (254mm) f/4.7 reflector (M67) and 80mm f/5 refractor (M44). Visual observers of open clusters often comment on the shapes or patterns that stars appear to make through the eyepiece that are not seen in images. In the case of M44 Simon thought the outer stars gave a distinct impression of a top hat. If after enjoying these clusters you would like a more serious challenge then there are many 15th magnitude background galaxies lying in the field of M44.



M44 with Mars, 2010 April 16: *Nick James*

M44: *Cliff Meredith*

M67 to same scale: *Cliff Meredith*

Stewart L. Moore, *Director, Deep Sky Section*

The lunar eclipse of 2011 December 10

In the UK the Moon rose at around 15:52 in the final stages of the eclipse, with the penumbral phase lasting until 17:30. This image was taken from South Wales by Martin Griffiths at 16:13UT with a Canon D10 DSLR on a 100mm Vixen refractor.

In Saudi Arabia the eclipse (below, with a Meade ETX 125.5) began at 18:00 local time. Abdu Arishi sent these photos from Qara'awi secondary school, Jazan.