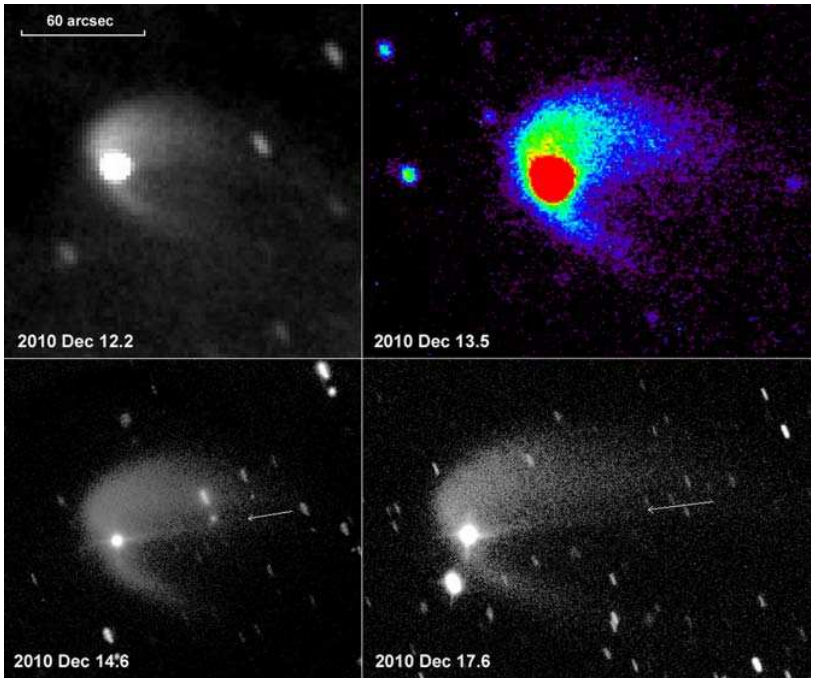
*Asteroids & Remote Planets Section*

# A possible collision involving the large main-belt asteroid (596) Scheila

On 2010 December 11.5, Steve Larson of the Lunar and Planetary Laboratory, University of Arizona, observing with the 0.68m f/1.8 Schmidt telescope of the Catalina Sky Survey, found that the minor planet (596) Scheila appeared to be exhibiting comet-like behaviour. This unique phenomenon is thought to be the result of a high-speed collision between Scheila (diameter ~113km) and a much smaller object, possibly some 10–100 metres across, orbiting in the outer regions of the Main Belt. The discovery was reported in Central Bureau Electronic Telegram no.2583 issued by the IAU on December 12.

When asteroids were first discovered in the early 1800s, Schröter and Herschel initially reported that Ceres and Pallas were surrounded by a nebulosity which was subject to frequent changes, but their observations are now known to have been erroneous. Indeed precious little evidence for the existence of nebulosity or coma associated with minor planets can be found in the historical literature. In a 1931 article by N. T. Bobrovnikoff in the *Publications of the Astronomical Society of the Pacific* entitled 'The Origin of Asteroids', the question of nebulosities around asteroids is addressed. He reports that J. Comas Sola mentions in a 1928 publication that (224) Oceana and (182) Elsa were observed by him surrounded by a nebulosity, but follow-up observations with large apertures at Lick and Yerkes observatories failed to confirm these observations. Bobrovnikoff also reported that a well-known astronomer had told him that images on two plates showed asteroid (899) Jokaste with a halo of 3–5 arcseconds.

BAA member Peter Birtwhistle obtained images of (596) Schiela from Great Shefford Observatory between December 12.18–12.20 showing the presence of a large arc to the north and smaller arc to the south (see Figure). Eric Watkins also obtained follow-up images the next night using the remote telescope facility at Sierra Stars in N. America. His image is shown in false colour to bring out details in the coma. Finally higher resolution images were taken on December 14 and 17 using the Faulkes Telescope North in Hawaii and have been reproduced to the same scale. Analysis of the expansion of the coma and its fading indicates that dust and debris have been ejected from the asteroid at speeds of typically 50–70 km/s, with traces of material moving at up to three times this speed. Extrapolating the expansion backwards in time suggests that the original collision/outburst took place around 2010 December 1–3.




**Minor planet (596) Schiela and associated coma, 2010 December.**

**Dec 12.2:** 74×20s, unfiltered, 0.40m f/6 Schmidt–Cass, linear stretch. *P. Birtwhistle, Great Shefford Observatory.*

**Dec 13.5:** 10×60s, unfiltered, 0.61m f/10 Cass (Sierra Stars), linear stretch/false colour. *E. Watkins.*

**Dec 14.6:** 6×120s, Sloan-r' filter, 2.00m f/10 Ritchey–Chrétien (Faulkes Telescope North), log stretch. *Friesland School, Nottingham; Observatory Science Centre, Herstmonceux.*

**Dec 17.6:** 11×60s, Faulkes Telescope North (as above), log stretch. *Nick Howes.*

*N.B. Arrows mark the direction of a linear 'tail' directed in p.a. 279°, roughly the anti-solar direction, similar to an ion tail of a comet.*

It should be pointed out that minor planet Scheila is very unusual in that, based on its spectral reflectance characteristics, it belongs to a relatively rare class of asteroid, the T-type. This asteroid type is considered to be amongst the most primitive and to be akin to comets, having a very low albedo (Scheila= 0.038). Both T-type and the related D-type asteroids are very similar in their spectral reflectance to the porous carbonaceous Tagish Lake meteorite. These considerations do open up the possibility that some dormant comets are masquerading as 'ordinary' main belt asteroids located towards the outer edge of the Main Belt.

Looking at the high-resolution images it can be seen that there exists a rather weak straight tail emanating from Scheila in roughly the anti-solar direction. This tail may be similar to the ion tail of a comet, in that following a collision volatile materials may have been released into the vacuum of space. On the other hand no collision may have taken place and we are instead witnessing a spontaneous outburst from an otherwise dormant comet of very large dimensions. My view is that this is a collision-induced phenomenon, since statistically speaking collisions of this sort are expected to occur with a frequency of the order of 10–100 years, and that using modern technology we may very well detect other less conspicuous instances of collisions in the Main Belt.

'Ordinary' main-belt asteroids will never be quite the same again, and we should now consider initiating a Section monitoring programme of say the 1000 brightest asteroids to see whether other such events can be detected in years to come.

**Richard Miles,** *Director*