VARIABLE STARS AND VERMIN

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Asteroids have not always been popular with astronomers, particularly those involved with plate photography during the first half of the 20th Century. Many plates exposed for quite different astronomical research reasons were often found to be swarming with the short tracks of asteroids. This complicated star counts and other research to such an extent, that some German astronomers referred to them as *Kleineplanetenplage* (minor planet pest), and Walter Baade of Mt Wilson and Palomar Observatories even labelled them as *Vermin of the Skies*.

Asteroids can also be picked up visually, when they stray into areas of sky that are frequently monitored such as the fields of deep sky objects, and to a greater extent, variable stars. Being stellar and apparently stationary in appearance the visual observer can be forgiven for thinking (when they are encountered); 'have I found a nova?' This has happened to me on three occasions:

On the 31 July 1984, I did my nightly check on **RS Oph,** which was then quite active, as it led up to its last outburst some 5 months later. Approximately 1' south preceding of RS I noticed an uncharted star of magnitude 12.0. It was immediately apparent because, as with most eruptive variables, the field is looked at very frequently, and the variable star observer is trained to detect change. I contacted Denis Buczynski on the TA hotline and he took an image of the field. Denis came back to me the following day to confirm that it was the asteroid 216 Kleopatra.

Denis got another call from me nearly eight years later on 7 April 1992, when I saw a new 10.6 magnitude star 12' south following **U Gem**. Being a much brighter object than Kleopatra Denis was able to advise within an hour that it was 44 Nysa.

Finally on the 13 February 1995, I saw a new 6.9 magnitude star with binoculars, just 1 degree south following **RS Cnc**. I did not need to phone Denis this time because a quick check of the BAA Handbook revealed it to be 1 Ceres.

Both Gary Poyner and Peter Williams have advised me that they have had similar experiences with respect to unexpectedly finding asteroids whilst observing variable stars. So my experiences are by no means unique.

Because of my involvement in producing charts for the BAA ARPS (Asteroids and Remote Planets Section) I have made planned observations of asteroids making close approaches to variable stars as well.

On the 9 May 1987, asteroid 2 Pallas was inseparable in 12x50 binoculars with **SX Her**. Their combined light made the variable appear to flare from magnitude 8.4 to

7.7 just on this night. Nine days later, Pallas had moved to within 8' of **T CrB**. The appearance of the field was significantly altered with the asteroid being 2 magnitudes brighter than this famous recurrent nova.

On the 15 April 1989, asteroid 3 Juno passed 20' south following **R Leo**. R Leo was having a bright maximum at magnitude 5.6, and Juno was some 4 magnitudes fainter. A week later Juno had moved even closer to **X Leo**, which was at minimum and presumably some 7 magnitudes fainter than the asteroid.

There have been other close approaches in the last 20 years that I have missed due to cloud, notable events include:

- 129 Antigone actually occulted S Sct on the 5 June 1981
- 3 Juno passed 10' north preceding of Mira on the 20 October 1983
- 4 Vesta passed 15' south of CE Tau on the 5 December 1983
- 20 Massalia passed 45' north of V Cnc on the 11 January 1992

All of the above illustrates the frequency of asteroids approaching bright variable stars. Unlike major planets asteroids are not confined to zodiac constellations as many have highly inclined orbits. 3 Pallas for instance, is inclined at 34 degrees and can appear in constellations such as Cetus and Coma Berenices and (as we have seen) Hercules and Corona Borealis too. 6 Hebe that is inclined at 15 degrees, spent the whole of its 1980 opposition in Eridanus.

Asteroids can vary in brightness over short and long timescales, and make interesting objects for CCD observers (and in some cases visual observers too) to monitor. Most asteroids have an irregular shape, or some variability in reflectivity over their surfaces (or both), so that as they rotate the amount of light that they reflect to Earth varies. Other variations depend upon the Sun-Asteroid-Earth distances. The aspect of the asteroid is also important; this is the orientation of the spin axis as seen from the Earth. If the pole is inclined by about 90 degrees as in the case of Uranus, then variations from one opposition to the next can be significantly different.

So if you locate a suspect star whilst observing variable stars, it is most likely to be an asteroid, particularly if it is in or relatively near the zodiac. Once confirmed as an asteroid, please don't get angry at it and consider it *vermin*. Instead, I would encourage you to use the variable star sequence to hand and make a light estimate. The BAA ARPS still like to receive such observations.