Observers' Forum

Observing DW UMa – a very active variable star

SW Sextantis stars are an unofficial class of variable stars created to bring together a group of variables which have many observational similarities. They are cataclysmic variables, binary systems in which material is transferring from the secondary star to the white dwarf primary and in the process forming an accretion disc around the primary. About 50 possible or definite members of the class have so far been identified, many of which are eclipsing and have orbital periods in the 3–4 hour range. Several physical models have been proposed to explain the behaviour of SW Sex stars but so far none of these has succeeded in describing all of their observed properties. They are therefore an active topic of research among professional astronomers.

The accretion disc is believed to have a complex structure and to slowly precess with a period of 2–3 days. There has been speculation that the depth of eclipses in SW Sex stars might vary in step with precession of the accretion disc. If this turns out to be true, it will provide valuable information for those trying to develop better models. The only way to find out is to observe one of these systems intensively to look for this effect. However professional astronomers are generally not able to obtain sufficient telescope time to carry out the required observations.

For some time I have been cooperating with Dr Boris Gaensicke at Warwick University to investigate possible changes in the orbital periods of SW Sex stars. Boris asked me if it would be possible to get amateur variable star observers equipped with CCD cameras to observe a SW Sex star intensively for sufficiently long that we might be able to detect a correlation between eclipse depth and precession of the accretion disc. I knew from past experience that amateurs will respond to requests for help from professionals so I thought there was a good chance we would get support for such a campaign. We decided to target DW Ursae Majoris because it was well placed at the time for northern hemisphere observers and has a conveniently short period of 3hr 17min. Out of eclipse its average magnitude is 14.5 fading by about 1.3 magnitudes during eclipses, so it is well within the range of amateur CCD observers.

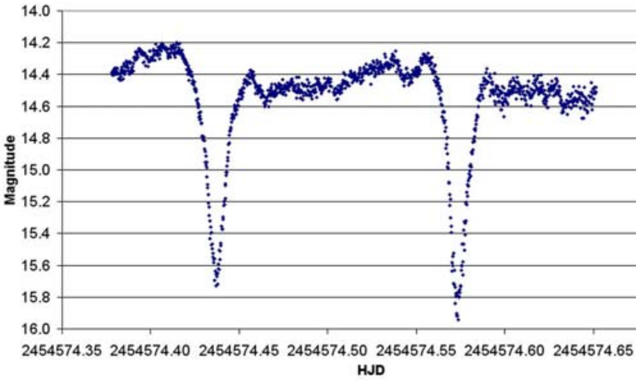


Figure 2. Light curve obtained by Ian Miller on 2008 April 17/18.

We proposed this observing campaign to the amateur variable star community at the joint AAVSO/BAAVSS meeting at Cambridge in early April this year. Our hope was that we would get observers distributed around the world to take part so that we could keep the star under as near continuous observation as possible for four weeks. We needed to start immediately as the nights were already shortening with the approach of summer. We circulated information about the campaign on various variable star email lists and Boris set up a Google group which we used to disseminate information about making and reporting observations. Observers were able to upload their results to the group and Boris provided frequent updates to participants on progress with the campaign.

We were very encouraged by the level of interest which the campaign aroused among the amateur community. In all, 26 observers in seven countries around the world took part. Over a 30-day period the star was being observed by someone, somewhere in the world for a total of 15.2 days (i.e. over 50% of the time). More than 54,000 images were taken and analysed by the observers, each image yielding one magnitude measurement. 108 of the 219 eclipses which took place during the campaign were observed sufficiently well to provide a measurement of the eclipse depth. Some eclipses were recorded by up to eight observers. The combined light curve of all the data is shown in Figure 1. Unfortunately the month we chose for the campaign coincided with a period of relatively poor weather across the UK, but four UK observers, Ian Miller, David Boyd, Roger Pickard and Jeremy Shears contributed to the campaign. Ian, based in South Wales, had the best weather and managed to observe on 11 nights. One of his light curves showing two consecutive eclipses is plotted in Figure 2. The variation in magnitude outside of the eclipses is caused by changing light output from the accretion disc.

We are now starting to analyse the data to see if we have detected the behaviour we were looking for. Initial signs are encouraging. With all this data it is likely that in due course we will be able to say much more about DW UMa and hopefully contribute to a deeper understanding of SW Sex stars in general. We are deeply grateful to all the observers who decided to observe DW UMa and contribute to the campaign. It has been an impressive demonstration of what can be achieved when amateur and professional astronomers work together.

David Boyd

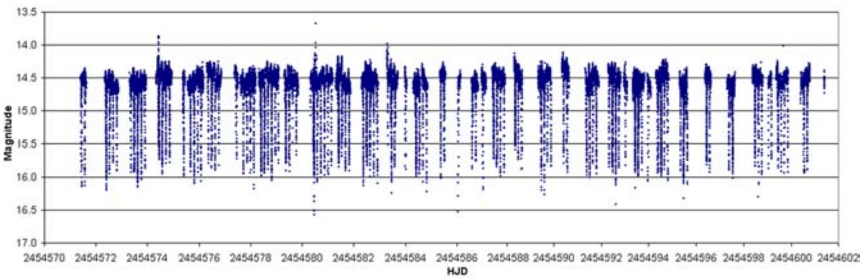
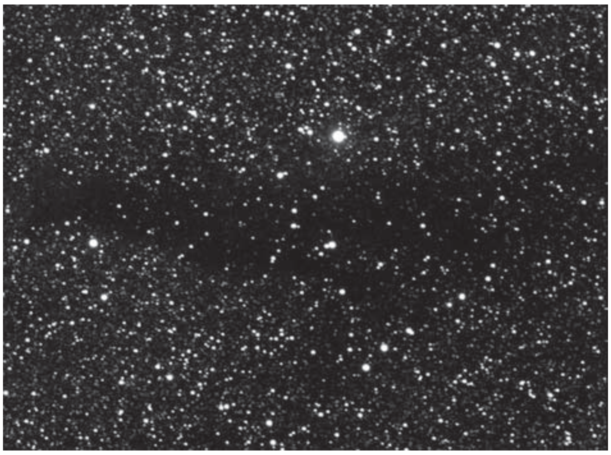
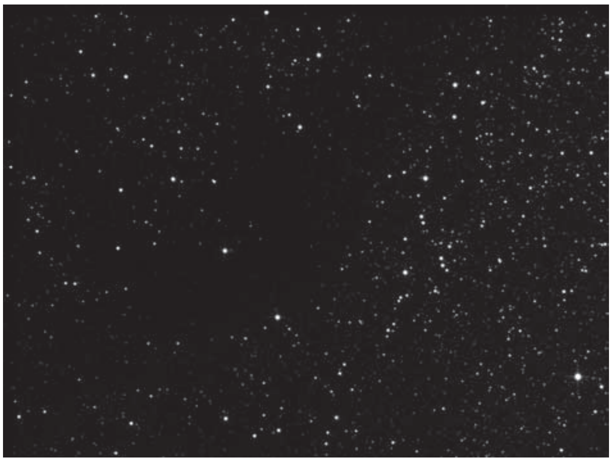
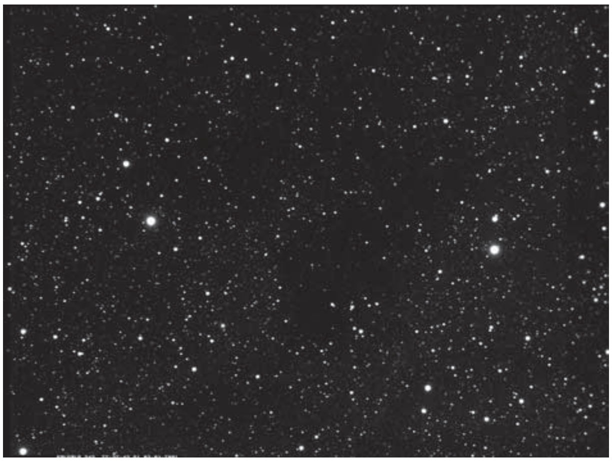


Figure 1. Combined light curve from all observers

Dark nebulae in Cygnus







Three images of Barnard's dark nebulae in Cygnus by Nick Hewitt, see text. *Top,* B145; *below*, B164; *bottom right*, B343.

Lying amongst the spiral arms of the Galaxy are numerous clouds of dust and gas. These clouds, commonly known as dark nebulae, absorb light from the stars behind and appear to observers on Earth as blank regions amongst the bright Milky Way. Well known examples are the Coalsack Nebula in the southern constellation of Crux and the Horsehead Nebula in Orion.

The great American observer Edward Emerson Barnard first became aware of these dark clouds as a young visual observer hunting for comets. With his legendary eyesight, and under the dark pollution free skies of 19th century Nashville, they were immediately obvious to him as 'holes in the heavens.' Later, when as a professional astronomer he had begun photographing the sky, he pondered again what these objects might be and for a long time was convinced they literally were holes in the sky. Another theory that he briefly considered was that bright nebulae might fade over time and become dark nebulae.

A breakthrough came in 1913 when he was photographing the summer Milky Way. As he worked he was conscious of tiny cumulus clouds scattered against the star rich regions of Sagittarius. These clouds appeared both inky black and well defined, similar in many ways to the dark patches that appeared on his photographs – although even after this it was some time before he completely rejected his 'hole in the heavens' idea. It was only following Slipher's spectroscopic work on dark nebulae that Barnard finally accepted there really was obscuring matter in space.

Barnard's magnum opus was his *Photographic Atlas of Selected Regions of the Milky Way*, published in 1927, four years after his death, and now available online at **www.library.gatech.edu/barnard**. It was from this work that around 350 Barnard dark nebulae or 'B' objects were selected and catalogued (e.g. the Horsehead Nebula is B33).

Dark nebulae are not grand showy objects and the majority are visually and photographically challenging – the small ones needing high power and the larger ones wide fields – but they are fascinating and quite different from other deep sky objects. All need extremely transparent skies – it is all too easy on some nights to think that the whole sky is one dark nebula. The nebulae are classified according to their opacity on a scale from 1 (only slightly darker than the background Milky Way) to 6 (almost black).

Although they are challenging visually, the availability of high quality small wide-field refractors allows the imager to capture many of these under-observed objects, and Cygnus, arching high overhead in the summer Milky Way, contains many fine examples. In addition, the Great Cygnus Rift, sometimes known as the Northern Coalsack, which extends to the south-west from Deneb, is itself a large dust lane and an ideal area for sweeping with wide field binoculars from a truly dark site. Three popular dark nebulae in Cygnus, imaged recently by Nick Hewitt and shown here, are B145 (RA 20h 2.8m, Dec +37° 40'), B164 (RA 21h 46.5m, Dec +51° 04') and B343 (RA 20h 13.5m, Dec +40° 16'). All were imaged from Nick's observatory in not particularly dark Northampton with his TMB 115mm f/7 refractor and Starlight Xpress SXV-H9 CCD camera. In all cases the field size is approximately 30×20arcmin, with north up and east to the left. Image time was 5×1m. B145 has a quoted size of 35'×6' and opacity of 4, B164 is 12'×5' with an opacity of 5 and B343 is 10'×5' also with an opacity of 5.

All these objects – along with other Barnard dark nebulae – are plotted on *Sky Atlas 2000.0* (Cambridge University Press/Sky Publishing 1998) and for the visual observer seeking something different there are observing reports in *The Night Sky Observer's Guide* (Willmann–Bell 1998). A good summary of Barnard and his search for the truth about dark nebulae is given in the excellent biography of him by William Sheehan, *The immortal fire within* (Cambridge University Press 1995 and recently released in paperback).

The Deep Sky Section has a programme to observe and image dark nebulae. If you would like to take part please contact the Director.

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

Robotic telescopes and the BAA – a remote observing proposal

Introduction

A significant advance in amateur astronomy in recent years has been the setting up and use of remotely operated or robotic telescopes. There are a number of advantages in this as mentioned under 'Role of the Robotic Telescope Coordinator' below (for which a volunteer is required). Access to telescopes positioned at various longitudes and in both hemispheres makes a wider range of objects available to the observer, and not necessarily in the middle of the night.

Use of such facilities need not be expensive especially when compared with the cost of setting up one's own observatory from scratch. Robotic telescopes are available to suit the beginner, SLOOH for example, and the more experienced observer *e.g.* Global Rent-A-Scope (GRAS) and the Faulkes Telescopes.

Figure 1 is typical of the images which can be obtained using the SLOOH telescope situated on Mount Teide in the Canary Islands. The image shown in Figure 2 was obtained by Martin Mobberley using a GRAS telescope located in Australia. This demonstrates that all of the sky is available to robotic telescope users and not just the hemisphere in which you are located.

An example of what can be achieved is shown by recent observations of asteroid 2008 HJ by Richard Miles using the 2-metre Faulkes South telescope. The lightcurve, Figure 3, revealed that the object has a rotation period of 42.67±0.04s, which is the shortest known rotation period of any natural body in the solar system.

The proposal given below was developed by ourselves and presented to the BAA Council on 2008 April 30. It was unanimously supported by those present and it was agreed that initially a sum of £1,200 (£100 per month) from the Ridley Grant funds should be used to support the project. It was also agreed that a Robotic Telescope Coordinator would be recruited, and that this role would be positioned within the Instruments and Imaging Section. Anyone interested in fulfilling this role should contact Richard Miles.

Here are the details of our proposal to Council.

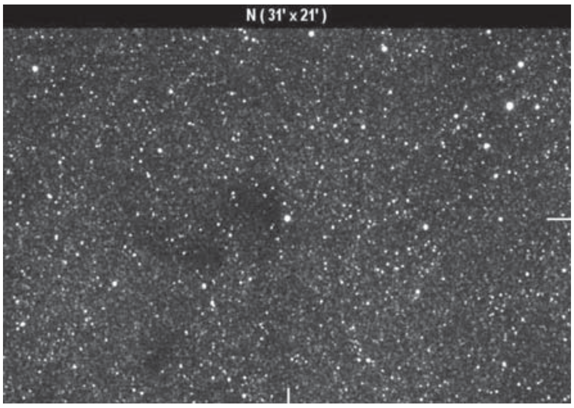


Figure 2. V5579 Sagittarii (Nova Sgr 2008) imaged by Martin Mobberley on 2008 April 19.771 UT using the 25cm f/6 Ritchie-Chrétien telescope at GRAS, Moorook, Australia (34°16'S, 140°20'E).

Background

A prime raison d'être of the BAA is 'To promote the association of observers ... for mutual help, and their organisation in the work of astronomical observation.' (Memorandum of Association, 3(b)). Unfortunately, UK-based observers particularly are often at a disadvantage because of poor weather, light pollution in towns and cities, or because of our latitude (50–56°N) which prevents access to many celestial phenomena further south, and also means that our summer nights are very short.

Facilities provided by remotely-operated telescopes have come of age in the last few years and it is suggested that the Association should investigate ways in which their utilisation can further the aims and objectives of the BAA. Activities in this area could be highlighted in a special section of the *Journal* and on the website thereby furthering the Association's aims.

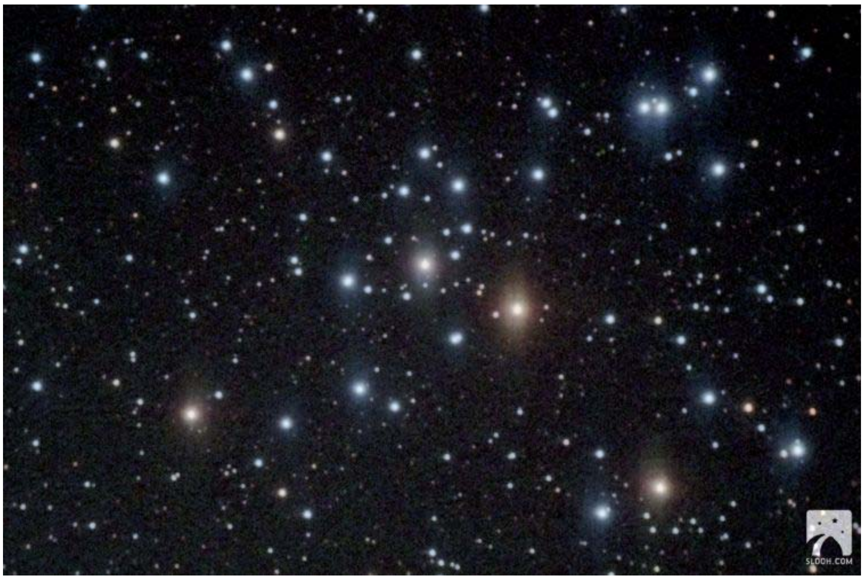


Figure 1. Image of M41, Aristotle's Cluster, obtained by SLOOH at Mt Teide, Canary Islands (28°17'N, 16°30'W).

Proposal

The proposal is to establish a new position, namely that of robotic telescope coordinator (RTC), and to set aside funds to promote an active programme of remote observation by our members, probably initially using the facilities of Global Rent-a-Scope (GRAS).

A study into available robotic facilities has been carried out by the Asteroids and Remote Planets Section mainly by Alan Cahill, the conclusion of which was that GRAS was the only organisation which potentially met observers' requirements at present. Since then several members have had positive first-hand experience of GRAS. GRAS have also upgraded their operation recently, establishing a scheme which encourages use of many of their telescopes for 'research', the telescope time costing a half or a third of that of their large-format CCD 'imaging' scopes. Observers participating in the scheme should themselves pay a significant proportion of the cost levied by GRAS, possibly amounting to 75%. Since the Association should be able to negotiate an attractive discount, this might equate to a saving to individuals of about one half.

Observing Sections expected to utilise the facility include the Variable Star Section, Comet, Asteroids and Remote Planets and the Deep Sky Section. Planet and planetary satellite observation also can be envisaged.

Role of the robotic telescope coordinator

- Review previous experience (*e.g.* that of Alan Cahill, Richard Miles and other members with experience of using robotic telescopes);
- Define and implement procedures for submitting and accepting requests for telescope time, and resolving disputes over such requests;
- Define ownership of images & data;
- Define and implement procedures for charging for time on the telescopes, including buying bulk time for the BAA including discounts, and 'subletting' that time to members (contact facility owners regarding this particular aspect);
- Promote the concept to BAA members, in particular those who are 'telescopically disadvantaged' (*e.g.* disabled, no observing site, cannot afford capital outlay, poor UK weather, light pollution), emphasising also ease of use (minimum setup time) and you keep warm!
- Communicate with members, *e.g.* via website, e-mail newsletter and workshops. Prepare a presentation for an Ordinary Meeting to further explore the concept;
- Work with Sections to assess suitability for their work, *e.g.* ARPS, Comet, Deep Sky and VSS;
- Demonstrate by own usage and that of other imagers (BAA and non-BAA) what can be done – beginners to advanced amateurs; image processing, astrometry, photometry;
- Act as mentor and liaise with other mentors to assist newcomers in the art of remote observing;
- Research any new and updated facilities for applicability for amateur and BAA use and if they may be advantageous.

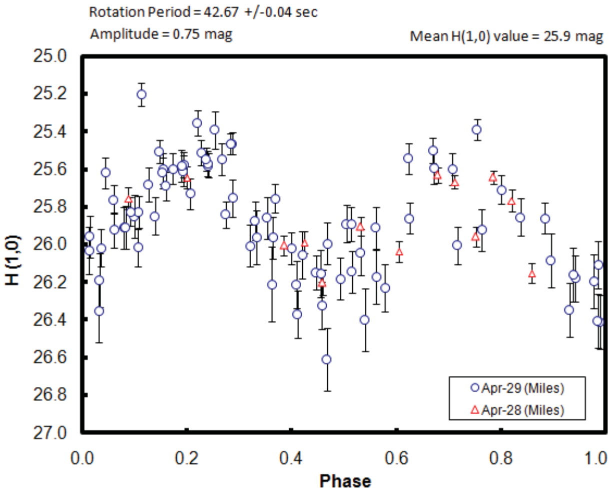


Figure 3. Lightcurve of asteroid 2008 HJ from Faulkes Telescope observations by Richard Miles.

If you are interested in serving as the BAA's first Remote Telescope Coordinator then please contact Richard Miles.

Richard Miles, *Assistant Director (Photometry), Asteroids & Remote Planets Section. [rmiles@baa.u-net.com]. Tel. 01963-364651*

Roger Dymock, *Director, Asteroids & Remote Planets Section*

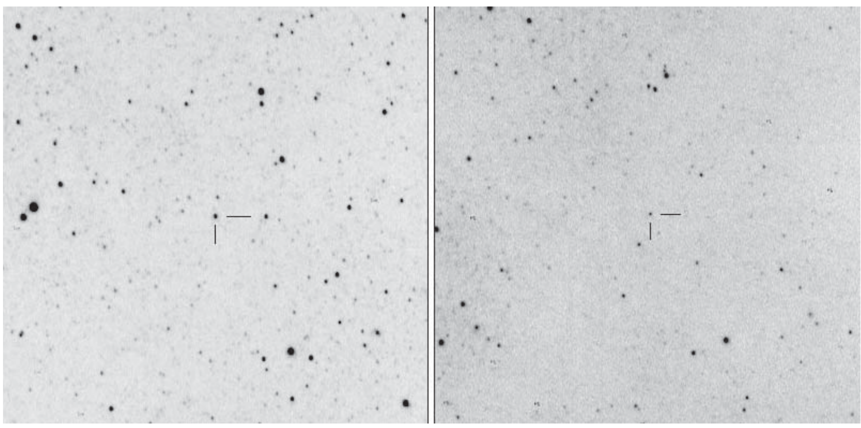
Two spring novae in Ophiuchus

Two faint novae were discovered a few degrees apart in the rich starfields of Ophiuchus by two teams of Japanese amateurs some six days apart on 2008 May 25 and May 31 respectively. The teams, lead by K. Nishiyama and F. Kabashima, used wideangle camera lenses coupled to unfiltered CCDs. Their discoveries, announced in *IAUC* 8947 and 8950, were mirrored in AAVSO *Alert Notices* 380 and 381 at **http://www.aavso.org/publications/alerts/**, where links to starcharts and observations can also be found.

Nova Oph 2008 no.1 [=V2670 Oph] is located at RA 17h39m51s, Dec –23°50'01" (J2000). Several observations published in the *IAUC* suggest the nova remained relatively constant at its discovery magnitude, remaining around ~10.2m(vis) initially but slowly fading to ~11.0m(vis] by June 10 [AAVSO data]. The writer's wide-field image shows the nova is ~20' following the faint globular cluster NGC 6401.

Nova Oph 2008 no.2 [=V2671 Oph] is located at RA 17h33m30s, Dec –27°01'16". It was discovered at 11.3m(vis) but it seemed to fade quite rapidly to 13.8m(vis) by June 10 [AAVSO data].

Although better placed from southern climes, observations from the UK proved sparse due to the novae's southern declination. A rare clear morning on June 11 permitted the writer in SW London to obtain the adjacent images of the two novae using a 90mm f/6 refractor piggybacked on an equatorial mount in 240s exposures. At the time of writing [June 12] no spectra, defining the type of either nova, had been published.



Nova Oph nos. 1 *(left)* & 2, imaged from SW London by Maurice Gavin on 2008 June 11 at approx. 02:00 UT.

Maurice Gavin, *Worcester Park Observatory, UK*

Erratum: Isle of Wight Star Party

Due to an editorial error our report of this event in the June *Journal* gave an incorrect identification for the rockets tested at the Needles site on the Isle of Wight. This site was used for Black Knight and Black Arrow static firings, not Blue Streak as stated. Apologies to readers and to the writer of the article, Dr Lucy Rogers, who was not responsible for the mistake.