British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

No 156, June 2013

Contents

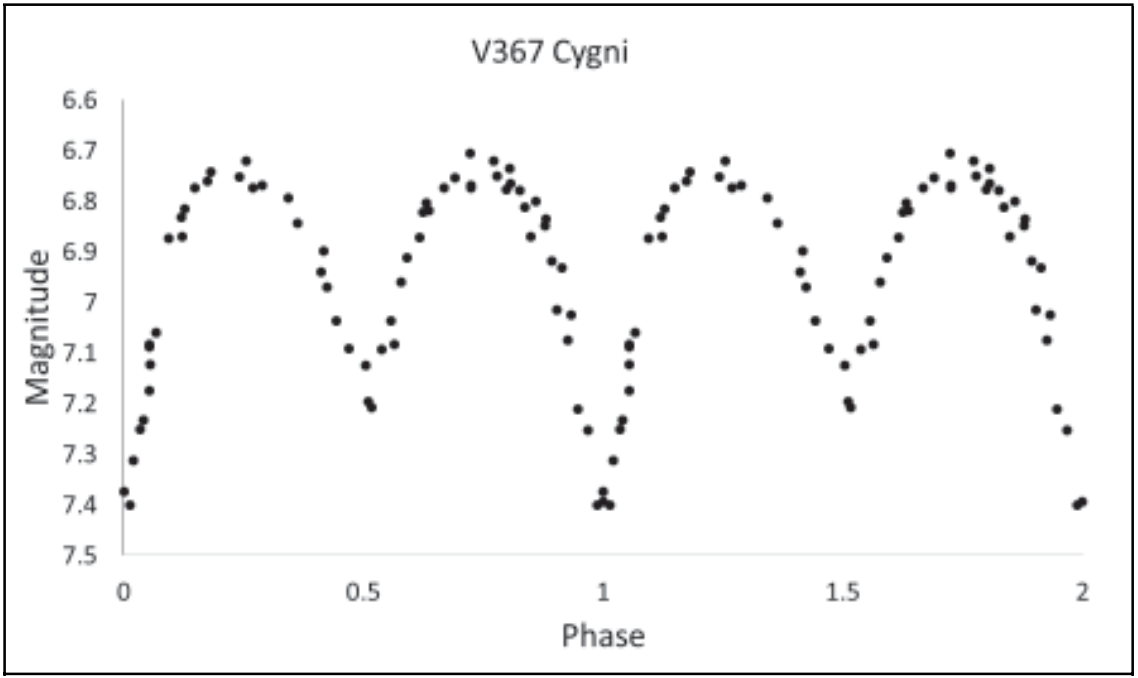
ISSN 0267-9272

Office: Burlington House, Piccadilly, London, W1J 0DU

V367 CYGNI LIGHT CURVE

DAVID CONNER

The light curve below of V367 Cygni was constructed from 65 unfiltered images taken with the Bradford Robotic Telescope Cluster Camera between 2012 July 26 and 2012 December 12. The images were analysed using AIP4WIN and Peranso. The best fit period calculated by Peranso/ ANOVA is 18.61(3) days, which compares to the GCVS value of 18.59773 days. There is a suggestion of asymmetry between the two maxima which, if real, is consistent with the interacting nature of this EB type binary system.



FROM THE DIRECTOR

ROGER PICKARD

Mike Gainsford

I am delighted to announce that at its April Meeting the BAA Council agreed that this year's Steavenson Award should go to our own Mike Gainsford.

Mike is one of the old school of amateur astronomers, quietly plying his trade without fuss or bother. To this end he has now made over 70,000 variable stars observations, but, in his own words "at 77, I feel I am unlikely to make the 100,000 mark". Indeed, this stunning total has only been achieved by a few dozen of the most dedicated observers worldwide, many of whom are no longer with us. Furthermore, with many observers switching to CCDs nowadays (myself included) it may be that we will not see many more visual observers surpassing this total.

You can read more about Mike's story on our web site at this location:
http://www.britastro.org/vssUnreconstructed%20Vis%20Observer_MG.pdf

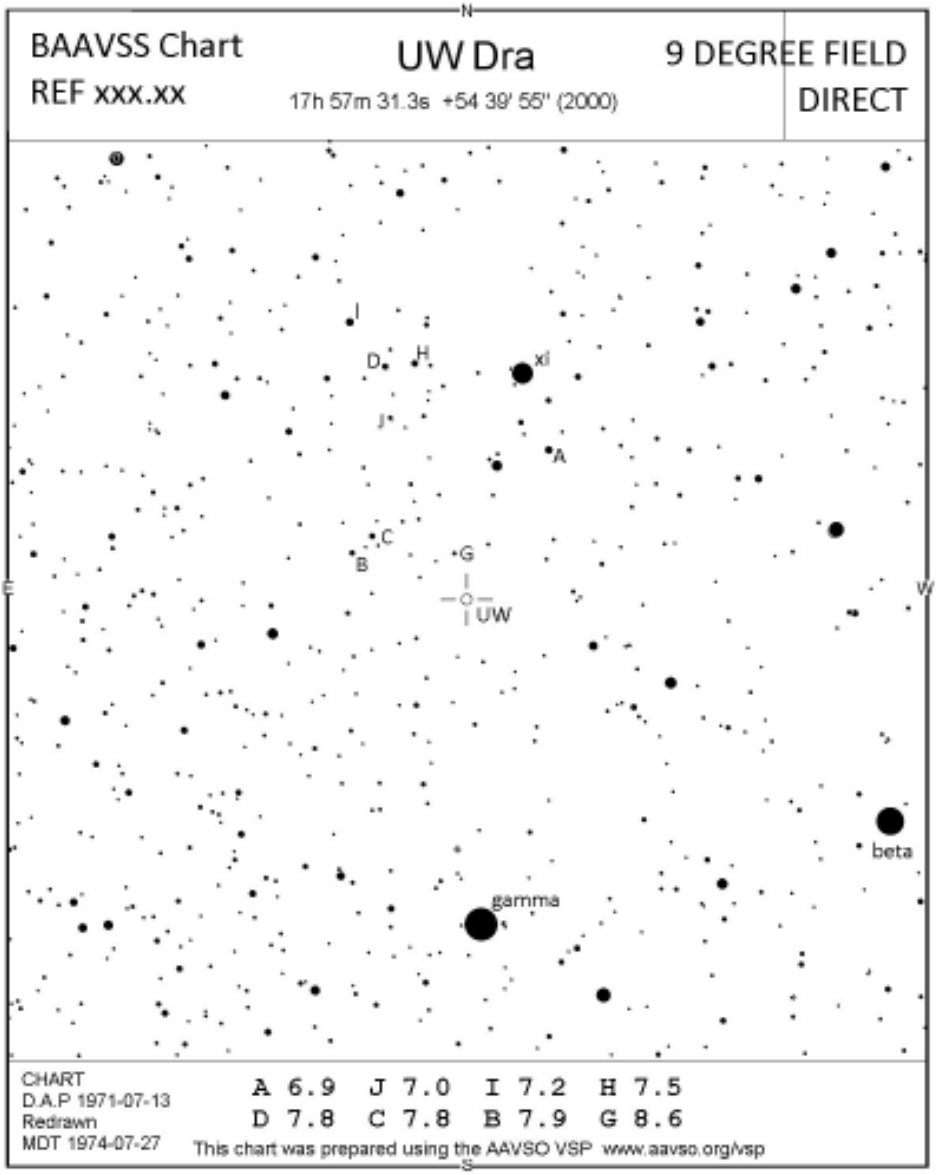
Charts

Recently, Gary Poyner suggested we should look at other ways to produce charts to help out John Toone, particularly the binocular and EB charts with old sequence listings. To this end he produced a chart using the AAVSO chart plotter. All that was needed now was for the AAVSO to agree to their chart plotter being used in this way and, of course, for John Toone to agree to it! Fortunately, the AAVSO (via Arne Henden) readily agreed to its use once they realised that it was not involving their staff in any extra work. Next, John Toone was more than happy to have some assistance and only asked for some cosmetic changes to be made.

An example of a chart produced in this format is shown on page 2, although its not quite the finished article. However, it does give an idea of the desired format. What is required now is for others to offer assistance to help producing these charts. Gary is happy to show how it can be done and can even supply the software. Please advise the Director if you feel you could help with this project.

Our youngest member

Over a pint (or two!) at the Winchester weekend Meeting, a few of us were wondering who our youngest active observer is? I wonder if anybody would care to email me if they are under 30 and especially if they are under 20, as it would be nice to have the thoughts of a young(er) observer?



An example of the desired format for new BAA charts to be made with the AAVSO chart plotter.

Anyone willing to assist in making new charts, please contact Gary Poyner:

garypoyner@blueyonder.co.uk

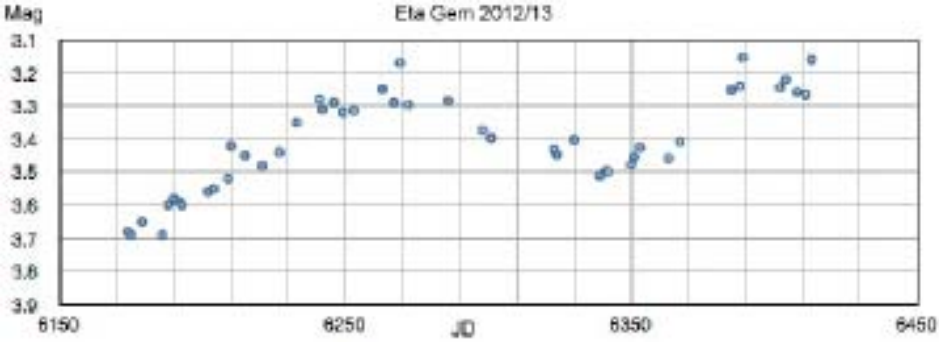
roger.pickard@sky.com

ECLIPSING BINARY NEWS - MAY 2013

DES LOUGHNEY

Eta Geminorum - 2012 Eclipse

At the time of writing, observations continue to show that the system has resumed its out of eclipse variations between about magnitude 3.15 and magnitude 3.45. The figure below shows some measurements since the end of August 2012 (about the midpoint of the eclipse).



Recent Papers in the JAAVSO regarding Eclipsing Binaries

In a recent edition of the JAAVSO there have been some interesting papers on eclipsing binaries. One was a report on 'The Visual Era of the AAVSO Eclipsing Binary Programme'. It can be downloaded as a pdf from:

< *http://www.aavso.org/sites/default/files/jaavso/v40n1/180.pdf* >.

The abstract reads:

"*The beginning of eclipsing binary minima timings by visual observers in North America is described, and the history of the AAVSO's Eclipsing Binary Committee during the era of visual observation is outlined, with particular attention to the observational programs, the production of charts and ephemerides, and the reduction and publication of the minima timings. During the period 1965–2005, AAVSO observers timed more than 17,000 minima, determined periods and light-curve types for neglected and newly discovered eclipsing binaries, and improved the light elements and corrected erroneous periods for many more*."

The other paper was on 'Eclipsing Binaries in the 21st Century - Opportunities for Amateur Astronomers'. It can be downloaded from:

< *http://www.aavso.org/sites/default/files/jaavso/v40n1/467.pdf* >.

Its abstract reads:

"*Eclipsing binaries play major roles in modern astrophysical research. These stars provide fundamental data on the masses, radii, ages, atmospheres, and interiors of stars as well as serving as test beds for stellar structure and evolution models. The study of eclipsing binaries also returns vital information about the formation and evolution of close binaries themselves. Studying the changes in their periods from the observations of eclipse timings provides insights into evolution of close binaries, mass exchange and loss, apsidal motion for eccentric systems, as well as the discovery of the low mass (unseen) third bodies. Moreover, eclipsing binaries in clusters and other galaxies can provide accurate distances to the star clusters and galaxies in which they reside. More recently observations of eclipsing exoplanet-star systems (that is, transiting exoplanets) when coupled with spectroscopy are yielding fundamental information about the frequency and the physical properties of planets orbiting other stars. For the reasons discussed above, observations of eclipsing binary systems have been popular for AAVSO observers and many papers have been published (see Williams et al. 2012, this volume). A recent example is the highly successful AAVSO's Citizen Sky Project focused on the enigmatic long-period eclipsing binary epsilon Auriga. Building on the success of the AAVSO during the last century, this paper explores the present and future prospects for research in eclipsing binaries. We focus on what can be done by AAVSO members and other amateur astronomers in the study of eclipsing binaries. Several examples of observing strategies and interesting (and scientifically valuable) projects are discussed as well as future prospects. As discussed, there are many opportunities for AAVSO members to contribute to the study of eclipsing binary stars and an increasing variety of objects to observe.*"

The whole paper is well worth reading. It has a very useful summary describing various types of EBs under the heading of 'Binary Systems as Astrophysical Laboratories'.

The opportunities that the paper is discussing are for CCD practitioners whose goal is pro-am collaboration. There is no mention of DSLR photometry. The authors clearly think that visual observations have had their day given the relative drop in the price of equipment and the development of tried methodologies.

However, it states that people are required to do 'data mining'. It describes the existing programs and forthcoming programs that will provide measurements for analysis of perhaps a million new eclipsing binaries. These binaries need to have their light curves analysed which will, no doubt, reveal a large number of very interesting systems. The possibility is intriguing to be able, on rainy nights, to 'look at' EBs in other galaxies.

I noted that there is a 'new' class of EBs which can be targets of DSLR photometry. These are EBs whose eclipse depths are changing due to orbital plane precession (due to the presence of a third body). Examples of this type of system are IU Aurigae and AH Cephei. In the next EB News I will be looking at the challenges of tackling these two particular systems.

desloughney@blueyonder.co.uk

ONLINE SUBMISSION TO THE BAA VSS DATABASE.

ANDREW WILSON

The next enhancement to the Variable Star Section online database will enable observers to submit their observations online rather than emailing them to a section officer. This will result in observations being immediately available to anyone accessing the online database. The aim is to have online submission in place by the end of 2013 if possible, and otherwise early 2014.

Observers will be able to submit their own observations by either uploading a file or by typing the observations directly into a special webpage. To keep disruption to a minimum it is expected that the existing Visual and CCD file formats will continue to be used, though it is likely that Visual files will need to be saved as 'text and tab' format.

The online upload will include many checks to validate the data, and any warnings or errors generated by these checks will be presented to the observer. This will allow the observer to resolve any issues by either correcting the uploaded data, or by correcting the original data files and then re-uploading. This will be a great improvement on the existing system which necessitates that officers get back in contact with the observer when there is something unexpected in the data.

The new web pages will also allow observers to view and amend all the observations they have ever submitted to the section. This will be a distinct benefit for the checking and correction of historic observations.

To begin with the submission of observations will be via a separate BAA VSS login, not the main BAA website login. It may be possible to unify the logins in future, but if that happens then it will be sometime after 2013. A lot of effort is going into making the new BAA VSS web pages as secure as possible so that only recognised observers can upload and edit their observations. To login you will need your existing observer id, along with a password. There will also be additional security measures within the website to ensure the observations are kept secure from potential hackers.

I should add as a final note, that although this will be a major step forward, it will not be compulsory to submit observations online. Any observers who cannot or do not wish to submit this way may continue to send observations in paper format or by email.

andyjwilson_uk@hotmail.com

EUROVS 2013 HELSINKI - APRIL 26th - 28th

JANET SIMPSON

In spite of only nine participants in person, and two more via video conference, this meeting, organised by the **Variable Star Group** of **Ursa Astronomical Association**, proved to be a great success, and I believe will be remembered long by all who attended!

Juha Ojanperä wrote:

"*The atmosphere was very warm and excited, we had also a dinner in Suomenlinna brewery restaurant!*" (This is on Suomenlinna Fortress Island, reached by a 15 minute ferry trip) "*The venue site could not have been better for the event, the meeting was organized in the Old Helsinki Observatory, which is now home for Ursa Astronomical Association and The Observatory museum of Helsinki University..... Besides the formal programme, we had lots of informal discussions. For example, we discussed about the observing programmes of each other and the instruments that people are using. Also weather and observing conditions were hot topics!*"

Do take a look at the web pages of Euro VS 2013, which show presentation slides of every lecture, and videos of all the lectures which took place in Helsinki; and more…

http://www.ursa.fi/english/eurovs-2013.html

One of the participants was from the UK - Nick Atkinson, who has written a report of the meeting, which due only to being the last submission to June's Circular, follows on page 20.

* ***** *

THE (B-V) COLOURS OF V650 ORIONIS

IAN MILLER

This paper presents photometric observations which show, possibly for the first time, that the temperature of one of the V650 Orionis candidates is changing.

History:

Little seems to be known about this cataclysmic variable in the Recurrent Objects Program [1]. Its position is uncertain and there have been no confirmed outbursts since the 'discovery' outburst in 1963. Charts drawing attention to at least two different objects have been used simultaneously for observations of 'V650 Ori' in the AAVSO and BAAVSS databases for many years.

S9560 (= V650 Ori) was reported by C Hoffmeister [2] in 1966 as a new U Gem-type variable in position 05 23.1 +09 39 (1855) with a magnitude range of 15.5p - <17.5p. He notes that S9560 was; "bright 1963 Nov 22 (3 plates), sometimes faintly visible on other plates, mostly invisible, not colored."

A more precise position, 05 31 08.25 +09 45 09.9 (2000), for V650 Ori was given by U Munari and T Zwitter [3] in 1997, when they classified it as "a faint object with nearly featureless (due to poor S/N) cool continua, similar to field G-K stars". They also measured its' (B-V) colour as 0.42 and its quiescent magnitude as 20.25V. This candidate is labelled 'mz' in Figure 1.

T Kato [4] re-measured the position of V650 Ori in 1999, as 05 31 08.77 +09 45 27.6 (2000), using the USNO-A1.0 catalog and claimed that his identification; "may be more likely (apart from the lack of corresponding description by Hoffmeister, and the relatively red color)." Kato's candidate, hereafter called V650 Ori, is now generally accepted as the one most likely to be correct and is, therefore, labelled 'V650 ORI' in Figure 1.

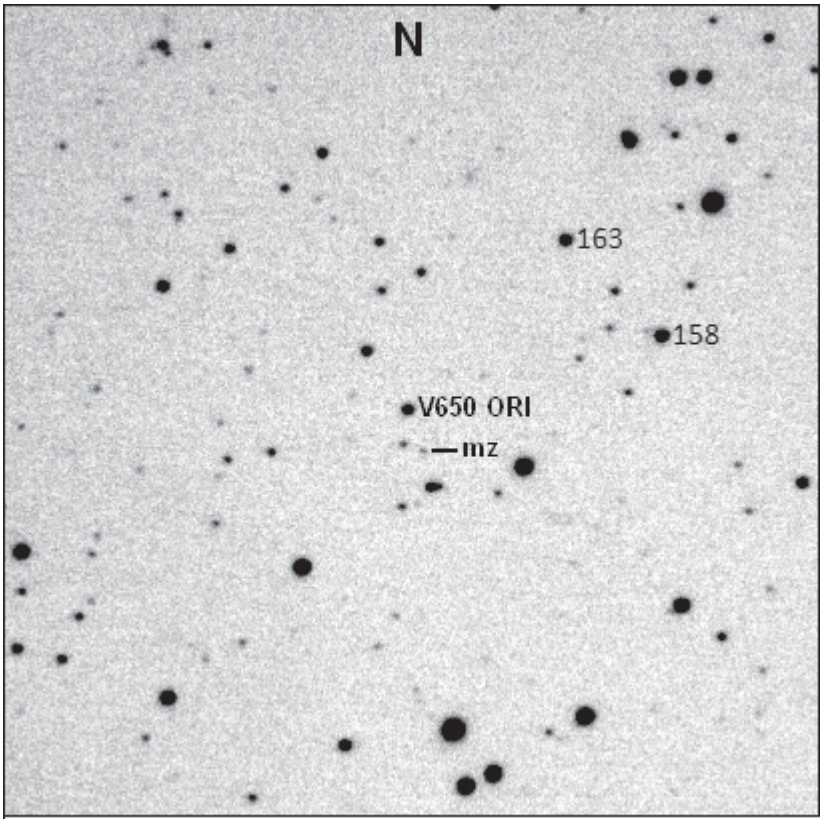


Figure 1. V band image, 2047UT March 12th 2013. Field 6′x6′

The AAVSO and BAAVSS databases have lots of negative observations of the Munari and Zwitter candidate and a scatter of positive and negative observations of V650 Ori. These positive database observations are predominantly V filtered and unfiltered CCD measurements which show that V650 Ori is varying, typically between about 16.0C and 17.0V. Gary Poyner [5] reports that the "unfiltered CCD observations appear to be brighter than V by about 0.5 mag, suggesting a reddish object".

BV Photometry:

The only major catalogues which list B and V magnitudes for V650 Ori, the NOMAD1 (Zacharias+ 2005) and the UCAC4 (Zacharias+ 2012), give differing and possibly conflicting (B-V) colour indices of 0.360 at 16.430V and 0.768 at 16.487V respectively.

To clarify the (B-V) colour of V650 Ori, BV photometry was carried out at Furzehill Observatory between February 14th and April 6th 2013. A 35cm Schmidt Cassegrain, Starlight Xpress SXVR-H16 CCD and Johnson-Cousins photometric filters were used. The comparison stars were 158 and 163 in the current AAVSO sequence and the raw data was processed with AIP4WINv2.0 [6] and the BAAVSS's CCD spreadsheet B2.02. The resulting observations are listed in Table 1 and graphically displayed in Figure 2, where the error bars are omitted to improve clarity.

Date	JD	B mag	Error	JD	V mag	Error
14/02/2013	2456338.32226	17.135	0.083	2456338.33306	16.316	0.043
14/02/2013	2456338.40476	17.177	0.087	2456338.42125	16.308	0.049
15/02/2013	2456339.37046	17.398	0.102	2456339.39048	16.465	0.054
16/02/2013	2456340.32353	17.934	0.154	2456340.33383	16.743	0.059
17/02/2013	2456341.33445	17.553	0.120	2456341.34164	16.491	0.055
27/02/2013	2456351.32188	17.471	0.140	2456351.32938	16.558	0.063
28/02/2013	2456352.36815	18.058	0.243	2456352.38271	16.729	0.085
02/03/2013	2456354.34741	17.949	0.155	2456354.36039	16.740	0.063
03/03/2013	2456355.35047	17.954	0.136	2456355.35881	16.799	0.058
04/03/2013	2456356.34454	17.824	0.198	2456356.36500	16.732	0.064
12/03/2013	2456364.34591	17.591	0.093	2456364.35877	16.567	0.035
13/03/2013	2456365.36448	18.051	0.159	2456365.37924	16.810	0.057
16/03/2013	2456368.33805	17.606	0.120	2456368.35388	16.581	0.076
17/03/2013	2456369.34519	17.444	0.121	2456369.38279	16.506	0.094
18/03/2013	2456370.34643	17.458	0.120	2456370.35747	16.488	0.053
19/03/2013	2456371.35928	17.715	0.171	2456371.38483	16.642	0.096
29/03/2013	2456381.34864	17.162	0.114	2456381.36954	16.382	0.047
31/03/2013	2456383.35522	17.352	0.107	2456383.37383	16.473	0.047
01/04/2013	2456384.37185	17.001	0.118	2456384.38720	16.218	0.044
02/04/2013	2456385.38007	17.829	0.166	2456385.38912	16.679	0.060
03/04/2013	2456386.35238	17.741	0.156	2456386.36684	16.634	0.071
04/04/2013	2456387.36164	17.676	0.141	2456387.38285	16.640	0.054
05/04/2013	2456388.35815	17.062	0.123	2456388.37169	16.283	0.043
06/04/2013	2456389.36804	17.249	0.165	2456389.39241	16.414	0.084

Table 1. The observations

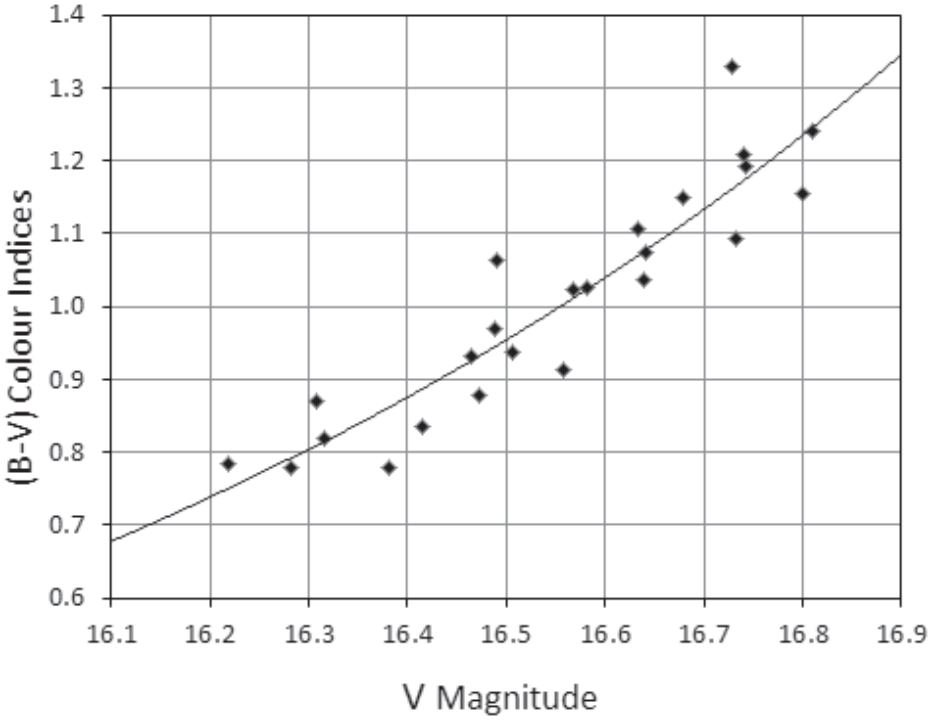


Figure 2. The colour measurements

The (B-V) colour of V650 Ori (the Kato candidate) was observed to change in a systematic way which is interpreted to mean that this object is hotter when bright and, conversely, colder when faint. It is sometimes possible to infer the orbital period (Porb) from such variations but these colour observations are too infrequent for a reliable period search.

Chris Lloyd [7] has detected and analysed flickering in several recent time-series of V650 Ori. According to Dr Lloyd, "the flickering parameters point to a probable UX UMa star and in this respect it looks similar to IX Vel." It is likely that some of the scatter found in these observations, and the differing catalogued colours, is due to this flickering.

Clearly, more observations are needed to fully establish the nature of V650 Orionis. In addition to the important monitoring for outbursts, long term behaviour, etc., a comparatively short campaign of multilongitude time series might reveal its Porb. According to B. Warner [8], the dwarf novae with longer Porb tend to be redder in colour. More multicolour photometry, if possible over a wider range of V magnitudes, might also refine and/or broaden these (few) colour measurements of this object.

Acknowledgements:

This research used the SIMBAD (operated through the Centre de Données Astronomiques, Strasbourg, France), AAVSO and BAAVSS databases.

References:

1. *http://www.garypoyner.pwp.blueyonder.co.uk/rop.html*
2. Hoffmeister, C., (1966), Astron. Nach., 289, 205.
3. Munari, U., Zwitter T., Astron. Astrophys. Suppl. Ser. 128, 277-287 (1998).
4. Kato, T., IBVS 4788 (1999).
5. Poyner, G., *http://tech.dir.groups.yahoo.com/group/baavss-alert/message/3191*
6. AIP4WIN., *http://www.willbell.com/Software%20Upgrades/index.HTM*
7. Lloyd, C., private communication, February 2013.
8. Warner, B., Cataclysmic Variable Stars, Cambridge Astrophysics Series; 28, p149.

furzehillobservatory@hotmail.com

A FAST TRANSIENT BRIGHTENING OF T-TAURI STAR DN TAU DETECTED SPECTROSCOPICALLY

Robin Leadbeater

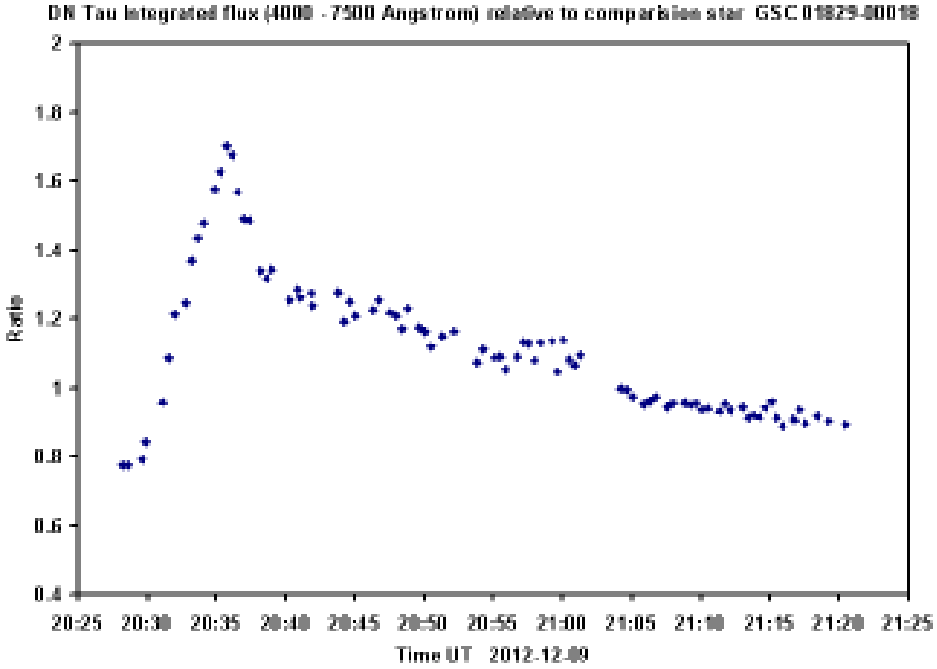
During December 2012 I recorded several series of low resolution spectra of DN Tauri at approximately 30s cadence in support of the programme on T-Tauri stars organised by Darryl Sergisson (VSSC 154 p1 Dec 2012). The equipment consisted of a Star Analyser diffraction grating mounted ahead of an ATIK 16 IC-S camera on a Celestron C11 telescope. More details of the equipment and data reduction procedure can be found here:

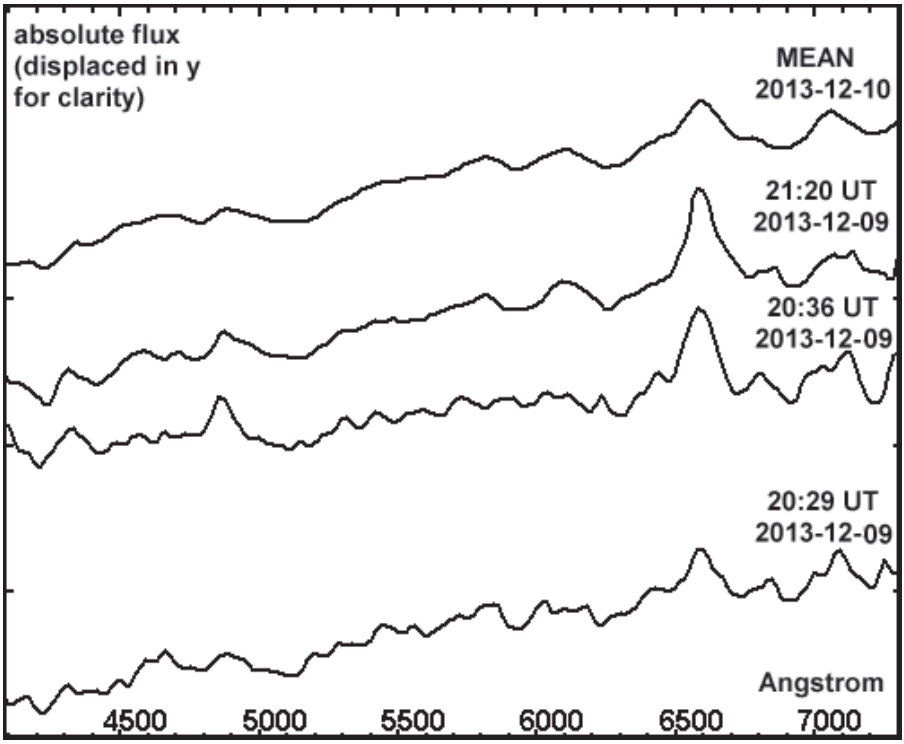
http://www.threehillsobservatory.co.uk/astro/spectra_42.htm

Measurements of DN Tauri taken on 9th December showed a remarkable rapid rise in the total flux and a corresponding large change in the spectrum continuum shape (measured relative to a reference star recorded in the same field). The change was easily detectable in the 20s exposure spectra despite the high noise levels in the individual observations (which were intended to be combined to produce a single low noise result). The total flux (from 400 to 750 nm) increased by 120% in just 6 minutes between 20:29 and 20:35 UT before gradually dropping to 25% above pre outburst levels by 21:20 UT when the series of observations ended. (Observations the following day showed flux levels and a spectrum similar to those pre outburst). The flux increase was greatest at the blue end of the spectrum. The features superimposed on the continuum (mainly Balmer emission lines and molecular absorption bands) did not change significantly, though there was sign of some excess H alpha emission at the end of the run.

The spectrum of the excess flux at maximum compared to pre outburst is a good fit to a black body curve of 10000K, compared to an approximate temperature of the DN Tauri photosphere of 3500K. These results are consistent with the appearance of a transient hot spot covering approximately 15% of the stellar disc, perhaps due to an accretion event. It is not known how frequently such events occur but this was the only significant variation seen in this star in 4 runs between 5th and 11th December 2012 and a further run on 6th February 2013 covering in total 206 minutes of observation.

robin@threehillsobservatory.co.uk


DN Tau integrated flux (4000 - 7500 Angstrom) relative to comparision star GSC 01829-00018
Ratio
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
20:25
20:30
20:35
20:40
20:45
20:50
20:55
21:00
21:05
21:10
21:15
21:20
21:25
Time UT 2012-12-09


absolute flux
(displaced in y
for clarity)
MEAN
2013-12-10
21:20 UT
2013-12-09
20:36 UT
2013-12-09
20:29 UT
2013-12-09
Angstrom
4500
5000
5500
6000
6500
7000

SIR PATRICK MOORE AND VARIABLE STARS.

JOHN TOONE

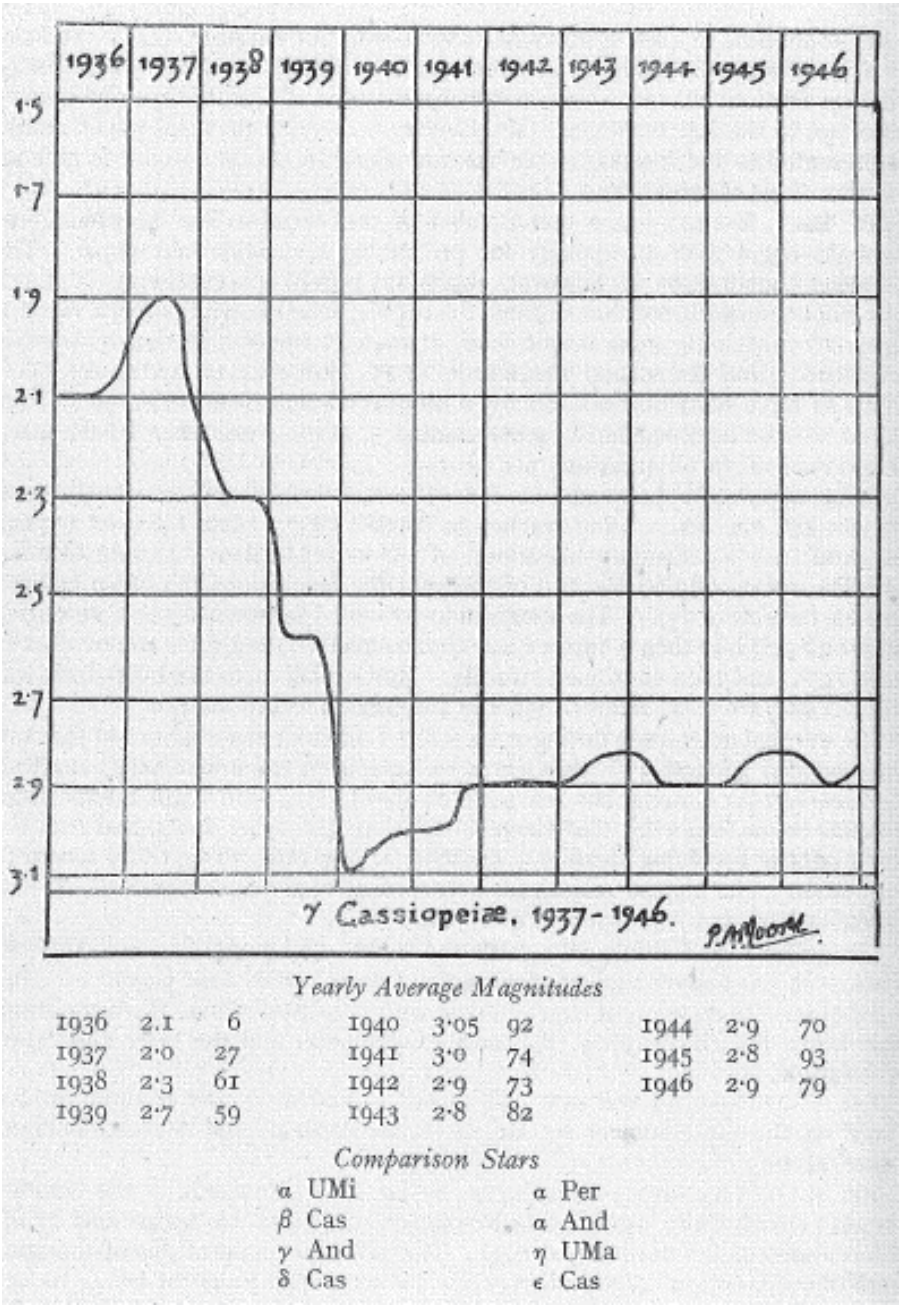
From an observational perspective Patrick Moore was certainly best known for his lunar and planetary work. However, his work on variable stars was also significant and this article is an attempt to piece together a summary of what work he actually undertook in this field throughout an observing career that spanned six decades.

The earliest record of Patrick seeing a variable star was the nova DQ Herculis at the tender age of 11. DQ Her was discovered by BAA meteor observer J. P. M. Prentice, it was well observed by members of the VSS, and rose to magnitude 1.8 in December 1934 within a month of Patrick being elected as a member of the BAA.

In 1935 Patrick began watching the stars forming the 'W' of Cassiopeia. At that time it was believed that only alpha Cas (Schedar) was variable and that the other four stars were constant. The timing was fortuitous because the famous gamma Cassiopeiae eruption commenced in late 1936 and Patrick made an independent detection of the outburst at the age of 13. Patrick then monitored gamma Cas intensely and recorded visual estimates on 716 nights between 1936 and 1946 with some of these made whilst he was on active service in the Second World War. Patrick's light curve based on yearly means(Fig.1, p.13) taken from the BAA Journal(Vol.57 [1947] p.121), gives a very good indication of the variation of gamma Cas throughout this auspicious period. Some thirty years later Patrick's observations of gamma Cas formed a key element of the BAA VSS report on gamma Cas for the years 1936-1976. According to the VSS database Patrick continued to monitor gamma Cas until December 1983 (47 years after the eruption), and he was the last person to pass away who fully witnessed the 1936/1937 eruption event. With alpha Cas Patrick was less successful but he did consider it to be occasionally variable over a very small range.

Patrick commenced systematic variable star observations for the BAA VSS in 1967 and because of the large telescopes at his disposal VSS director John S. Glasby requested that he take on some of the fainter stars on the VSS telescopic programme. Patrick responded by making over 5,000 observations of stars on the VSS telescopic programme between 1967 and 1987. His most productive year was 1968 when he submitted 944 observations and was listed as the fifth leading observer. On 22 August 1969 Patrick recorded a bright (magnitude 2.5) maximum of Mira and this was just over a month after he had covered the Apollo 11 moon landing on behalf of the BBC. However, Patrick's good series of observations of the Mira type stars R Arietis, X Aurigae, W Cassiopeiae, U Cygni, S Delphini and R Leonis came to an abrupt halt in 1974 when they were dropped from the VSS telescopic programme. Patrick did continue to observe some of the fainter eruptive variables up until the mid-1980's and in the 1970's he was the second leading observer of X Leonis and fifth leading observer of RU Pegasi. Unfortunately his 150 observations of X Leonis made during the 1970's are currently absent from the VSS database. According to the VSS database Patrick's favourite stars were HR Delphini, SS Cygni, R Coronae Borealis and U Cygni. Patrick also had good series of observations of the novae in 1967 (HR Delphini again), 1968 (LV Vulpeculae) and 1975 (V1500 Cygni) and was one of the people who George Alcock notified when he discovered HR Delphini. According to the VSS database Patrick's last telescopic observation was of U Orionis in 1987 and his last observation of a non-telescopic star was of alpha Orionis in 1994.

Continued afterFigure 1, on page 14



Yearly Average Magnitudes

1936	2.1	6	1940	3·05	92	1944	2·9	70
1937	2·0	27	1941	3·0	74	1945	2·8	93
1938	2·3	61	1942	2·9	73	1946	2·9	79
1939	2·7	59	1943	2·8	82			

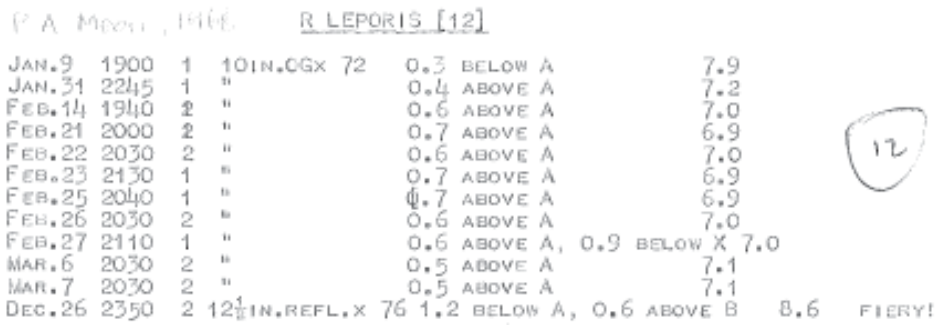
Comparison Stars

α UMi	α Per
β Cas	α And
γ And	η UMa
δ Cas	ε Cas

Figure 1: Gamma Cassiopeiae light curve 1936 - 1946.

After independant detection of the eruption of gamma Cas when Patrick was just 13 years old in late 1936, he recorded visual estimates on 716 nights between 1936 - 1946. The light curve was based on yearly means, and was published in the BAA Journal in 1947.

Patrick's preferred means of making variable star estimates was the Pogson step method and occasionally his step estimates exceeded a full magnitude, which few conventional visual observers are capable of. Patrick also used his powerful telescopes on low power for estimating what would be normally regarded as binocular variables(see Figure 2). This probably contributed to his preference for making step estimates as it would be difficult to get sufficient comparison stars in the field of view for undertaking fractional estimates. One such star of magnitude 8 that Patrick monitored with his 12.5 inch reflector was SAO106406 (one of the comparison stars for HR Del) that he considered to be variable and he made an announcement in IBVS385 in 1969. SAO106406 is now listed as NSV13242 but variability has so far not been confirmed.



R LEPORIS [12]

JAN.9	1900	1	10IN.OGx 72	0.3 BELOW A	7.9	
JAN.31	2245	1	"	0.4 ABOVE A	7.2	
FEB.14	1940	2	"	0.6 ABOVE A	7.0	
FEB.21	2000	2	"	0.7 ABOVE A	6.9	
FEB.22	2030	2	"	0.6 ABOVE A	7.0	
FEB.23	2130	1	"	0.7 ABOVE A	6.9	
FEB.25	2040	1	"	0.7 ABOVE A	6.9	
FEB.26	2030	2	"	0.6 ABOVE A	7.0	
FEB.27	2110	1	"	0.6 ABOVE A, 0.9 BELOW X	7.0	
MAR.6	2030	2	"	0.5 ABOVE A	7.1	
MAR.7	2030	2	"	0.5 ABOVE A	7.1	
DEC.26	2350	2	12½IN.REFL.x 76	1.2 BELOW A, 0.6 ABOVE B	8.6	FIERY!

Figure 2: R Leporis, a binocular variable observed with 10 inch and 12.5 inch telescopes on low power.

Aside from his observations Patrick's main contribution to the BAA VSS came in 1970 when he launched at the request of John Glasby the 'Binocular Sub-Section'. This was largely seen at the time as the BAA VSS response to the highly successful and independent Binocular Sky Society. The launch of the Binocular Sub-Section was announced in the BAA Journal and this is reproduced as Figure 3(p.15). Patrick himself started monitoring the binocular stars RY Draconis, RY Ursae Majoris and VW Ursae Majoris, and almost immediately had trouble with the sequence for RY Draconis. Before long Patrick relinquished the co-coordinating role of the Binocular Sub-Section to Brian Morell and the Sub-Section was disbanded in 1974 when the Binocular Sky Society merged with the BAA VSS. In retrospect the Binocular Sub-Section can be regarded as a forerunner to the current 'VSS Binocular Programme' that was the end product of the Binocular Sky Society merger.

In summary Patrick's variable star observations spanned the years 1936 to 1994 and reached a peak during the period 1967 to 1975 when he was regularly on TV covering the Apollo missions. Examples of light curves derived from his data during this period were published in his book 'Guide to the Stars' (Lutterworth Press 1974) and are reproduced here as Figures 4 and 5(p.16), and 6(p.17). His independent discovery of the gamma Cassiopiae eruption at an incredibly early age of 13 is not well known, and nor is his work within the BAA VSS, especially the launching and co-ordination of the Binocular Sub-Section. He fully understood the scientific value of amateur variable star work and was one of its most famous proponents.

be published and not in the form of ten-day means. The task of clearing this backlog of observations is now in progress and it is anticipated that we shall be up to date some time in 1970.

J. S. GLASBY

BINOCULAR VARIABLES

Many of the stars on the official list are within the range of modest telescopes; others (the majority) need instruments of fair aperture when near minimum. On the other hand, there are some stars which can be followed throughout with binoculars. Cases in point are W Cygni and R Scuti.

Binoculars are much more valuable than is generally recognized. There are, moreover, some 'binocular variables' which need attention. This field has not been fully exploited as yet; and the purpose of this note is to start off a Binocular Sub-Section which will report to the Director through its co-ordinator, and Mr Glasby has asked me to be the co-ordinator for the moment.

Several points must be borne in mind. Again, as with telescopic variables, the best policy is to select a limited number of stars and tackle them properly. Also, to claim that one can do useful work on a star with a very small range (say 0·2 mag.) is pretentious—at least so far as I am concerned! The list below does not pretend to be exhaustive, and no doubt we shall extend it, but it will serve as a start. Note that it excludes a few binocular stars, such as W Cygni, which are on the Section's normal list. Observations of these should go straight to the Director, as usual.

The Binocular Sub-Section list has been drawn up as follows:

VZ Camelopardalis	P Cygni	VW Ursae Majoris
μ Cephei	RY Draconis	U Delphini
W Cephei	V Eridani	EU Delphini
AR Cephei	R Lyrae	W Orionis
SS Cephei	RY Ursae Majoris	CH Cygni

plus η Geminorum, which some people can tackle with the naked eye. We can, I feel, also include the naked-eye variables β Pegasi, α Herculis, ρ Persei, α Cassiopeiae and γ Cassiopeiae.

Charts and sequences for all these stars are available, and I can send them to prospective members of the Sub-Section. It must be stressed again that this is merely an extra activity on the part of the Section, and is neither independent nor autonomous; it is something that has been arranged on the instructions of the Director.

If you are interested, please let me know, and I will send on the charts you need. I think that for the moment it will be best if observers send me their reports at the end of every month, so that we can see how things are going. Certainly there is valuable work to be done here, and it would be wrong for the B.A.A. not to tackle it.

PATRICK MOORE

Figure 3.

Figure 4.

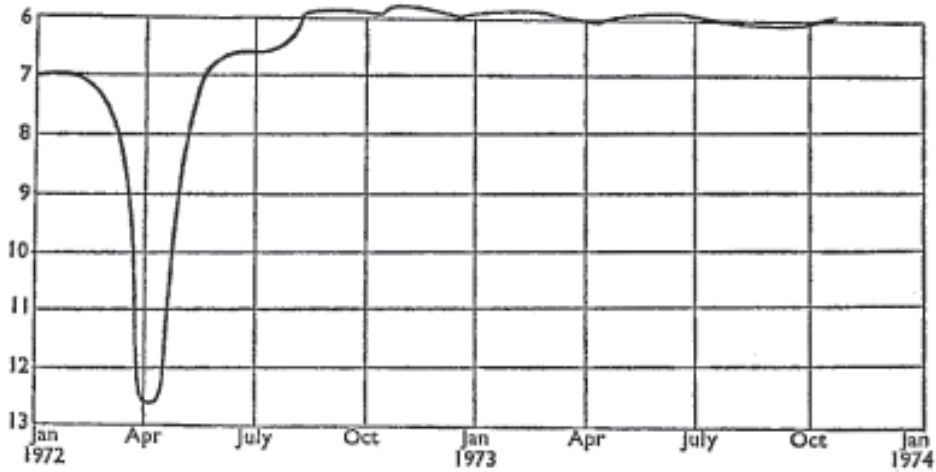


Fig. 57. Variations of R Coronæ, 1972–4, from my own observations made at Selsey. There was one principal minimum. Otherwise the star remained almost constant at the sixth magnitude.

Figure 5

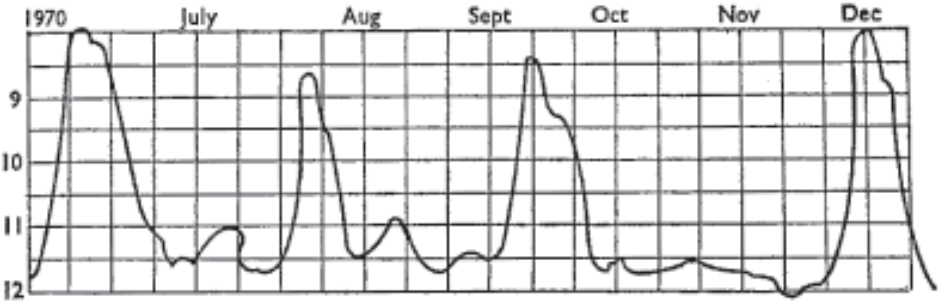


Fig. 55. Light-curve of SS Cygni in 1970, from observations made with my 12½in reflector.

As a footnote, whilst writing this article in February 2013 I was searching the VSS chart archive for legacy charts of R Leonis and out of an adjoining file a piece of paper fell out. When examined it turned out to be Patrick's observations of R Leporis from 1968 neatly typed up most probably on his famous Woodstock typewriter [Fig.2, p.14]. I checked whether these observations were in the VSS database and they were not, so I suspect that there is more to Patrick's variable star work to be revealed in the future.

Figure 6

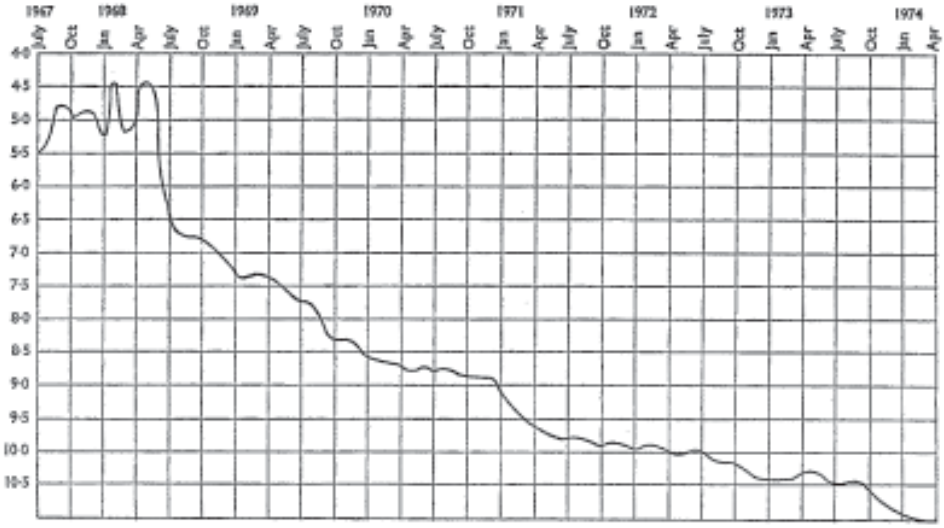


Fig. 64. Light-curve of Nova (HR) Delphini, from its discovery in 1967 up to 1974, from my own observations.

EnootnhoJ@aol.com

PATRICK MOORE DOWN-UNDER: SOME PERSONAL MEMORIES

JOHN TOONE

Like many youngsters starting out in astronomy I considered Patrick Moore to be an imposing role model and I watched his Sky at Night TV broadcasts with great interest. Patrick's influence was brought home to me sharply in July 1975 when I found a comet near chi Cygni and reported it to the local observatory in Salford. The director of the observatory Ken Irving attempted to contact Greenwich Observatory but was informed they were closed for summer recess. In exasperation Ken then rang Patrick Moore the most famous astronomer in the country who instantly advised that it was Milon's comet discovered some 12 days previously. Patrick went on to say he recommended subscribing to the BAA

Figure 1: Patrick Moore in Australia.

Circulars which would avert any similar misdirected excitement in the future. This was typical of the man, despite his celebrity status; his phone number was readily available and he would take calls from anyone on the subject of astronomy.

I have met Patrick on a number of occasions, mainly at BAA meetings or during visits to the Royal Astronomical Society Library at Burlington House. I got to know him best though when we were both on a coach tour of Australia in April 1986 when Halley's Comet was making its closest pass of the Earth. A three week drive from Sydney to Darwin through the Outback meant there was plenty of time for extensive astronomical and non-astronomical discussion.

Patrick gave a talk to the coach party on the evening before we set out from Sydney, but since most of us were jet lagged from a thirty nine hour flight, only half of the audience managed to stay awake. I had taken the C8 telescope on the trip which was one of the larger instruments available to the group and Patrick was interested to see to advantage some of the splendid sights of the southern skies. On one occasion we looked at Neptune in Sagittarius and Patrick said that with higher power we would have easily seen Triton. Unfortunately, I had only brought eyepieces I regularly used back at home for variable star work and had underestimated the superb quality of the Outback skies. We talked about visual photometry of variable stars and Patrick told me that he preferred the step method for making estimates. I advocated the fractional method and we had a discussion on the relative merits of each approach. We also talked about the Variable Star Section and Patrick mentioned that John Glasby in the late 1960's had approached him to use his telescopes at Selsey for monitoring some of the fainter telescopic programme stars. He said that today (1986) he regarded variable star work as probably the most important scientific research that amateur astronomers could undertake. I was acutely aware of that fact, but it was good to hear it directly from the man himself.

We talked a lot about cricket and politics as well as astronomy. Patrick said that he was against the ban on South Africa playing test cricket and that it had achieved absolutely nothing. I told Patrick I was an opening batsman and he said he "*could not bat for toffee*". He added however he still practised his unique form of spin bowling that had baffled many batsmen over the years and brought him hundreds of wickets playing for Selsey. Patrick claimed that John Barclay of Sussex deserved to be England captain but I said he was not a good enough player to warrant a position in the national team. Patrick retorted that good captains are indispensable especially when in the field, citing Mike Brearley as a recent example. Being an active cricket captain at the time I understood what he meant and chose not to argue further with the view of a distinguished Lord's Taverner.

Patrick was a practical joker and had extreme views on many topics but he always had logical reasons to support them and he was very open about it and I respected him for that. Patrick even told me about the time he was the target of an attempted assault by two muggers armed with knives when leaving the BBC studio in London in the late 1970's. I was shocked by this incident and asked "*were you injured?*" Patrick matter of factly replied "*no, I just decked them*". I was surprised (but not as much as the muggers I imagine) and impressed to hear that, and it seemed to me to be a Crocodile Dundee moment. Towards the end of the trip we went into a rough Outback pub in the Northern Territory which had the look of a wild-west saloon bar. The unshaven half-dressed bartender looked quizzically at this odd looking pair of Poms and asked "*what will it be*?" Conscious of the location I ordered a large (schooner) Fosters and turned to Patrick and said "*would you like the same?*" Patrick's response surprised me with "*no, sweet white wine for me"* and the bartender said "*no worries*". I was concerned that

ordering such a drink would prompt a derisory comment from the locals propping up the bar but Patrick really did not care.

Patrick fully immersed himself into all aspects of the Outback trip and asked for no special treatment. He was the first to serve up the food whenever we had a barbeque and often provided splendid entertainment for the entire party in the evening after dinner. However, it was the many personal discussions held under incredible and sometimes zodiac light hued skies that constitute the most outstanding memories for me. Patrick was indeed a star in the order of the first magnitude.

EnootnhoJ@aol.com

Figure 2.

Patrick Moore in barbeque action (including serving a VSS officer) on 8th April 1986 in the Warrumbungle National Park.

Figure 3.

EUROVS HELSINKI, 27th to 28th APRIL 2013

Nick Atkinson

Figure 1: Group photograph Photograph by Juha Ojanperä

Introduction

Hosted by URSA Astronomical Association Variable Star Group, the meeting was held at Helsinki Observatory which is a short distance from the centre of Helsinki. The observatory is run by the Helsinki University Museum, and is let to Ursa. Ursa Astronomical Association has around 17,000 members, and the variable star group is just a small part of the organisation.

Although the observatory is no longer operational it remains a show case for science and technology, displaying the structure of the solar system in a large circle. Items on display include old astronomical research instruments, of which the meridian circle and large transit instrument are still situated in their original locations. There is also a planetarium and we were treated to a demonstration during our stay. The library had a comprehensive collection but it is now underused.

A Short History of Variable Star Observing in Finland by Veikko Mäkelä

Aarre Kellomäki and others started making visual magnitude estimates in the late 1960's to the early 1970's when they collaborated, founding the MIRA group, which led to the formation of URSA Variable Star Group in 1976. During the 1970's there was already co-operation between Swedish and Norwegian observers with the establishment of SUAA.VSS (Scandinavian Union of Amateur Astronomers, Variable Star Section) from

the 1970's until early 1980's. In the years that followed until the early 1990's they worked as an unofficial coalition SVSO – Scandinavian Variable Star Observers.
SUAA and SVSO had a common program of Mira, Young and Old Semi Regulars, U Geminorum and Classical Novae. Eclipsing Binaries and Cepheid were not included. Anual reports were published from 1972 to 1994.

Computer aided data collection was ongoing from the early 1970's. At first by Olli Forsström on Nokia's main frame computers. After Olli left in the early 1980's, Veikko Mäkelä continued to record observations on micro computers. In the 1990's Veikko Mäkelä and Arto Oksanen collected all the old data together, with only the 1994 missing. Mäkelä continued the preparation of a database and put it onto the Internet The years 1972 – 1993 include ~320 000 observations of 680 stars by 216 observers.

By the 2000's, observers were communicating more widely by e-mail, had AAVSO and pro/am contacts, interests were becoming more individual, and more people reported to the AAVSO and Luostarinen's Semiregular website (URSA).

Period search from light curves with changing shapes by Jyri Lehtinen

Jyri opened by explaining that while the sky has many variable stars that have stable light curves, there where others with instability. Eclipsing binaries in particular had instabilities due to the variable period of the eclipse, and the more closely you observe semi-regulars and Miras it becomes clear that many of these do not have stable light curves. Looking at stars with photosperic spots we observe variations in both the light curve shape and moreover, they can even disappear for some time. These spotted stars are constantly evolving and do not repeat any single cycle.

A power spectrum created from computed data is a simple and common way to search for periodicity, but this assumes sinusoidal wave structure. However, due to limited data sets this may be misleading, and a better approach is Carrier wave modelling. Limited periodic data needs another approach to get good estimates, we need to pay attention to the light curve profile e.g. V711 Tauri.

Conclusion: The data behaves as well as what assumptions our models force us to make. Bad choice of modelling approach can lead to misleading results. On the other hand, successful analysis can be done using very simple ideas.

Seppo Katajainen - Observing Variable Stars Using Large Telescopes.

Seppo, who is from the University of Turko, used the Nordic Optical Telescope, ORM, La Palma, with Turpol (Turku Polarimeter), and ALFOSC (Andalusia Faint Object Spectrograph and Camera), to investigate the properties of Cataclysmic Variables (CVs). These are binary star systems in which the separation of the components is comparable to the diameter of the stars, and the red dwarf fills its Roche lobe.

The ESO (European Southern Observatory), VLT (Very Large Telescope) has also been used. FORS2: A multi mode (imaging, polarimetry, long slit and multi-object spectroscopy) optical instrument is mounted on the UT1 Cassegrain focus. UT 1 (Antu) is one of the four individual telescopes that make up the VLT. FORS2 works

in the wavelength range 330-1100 nm. - lambda/2- or lambda/4-plate in front of the Wollaston prism.

The VLT has been used in studies of UU Columbae an intermediate Polar V magnitude 18 with a spin period of 863.5 ± 0.7 s. Study of Polarimetry of magnetic CVs e.g. RX J1015.5+0904 (GG Leo) with an Orbital period is 79.88 min (close to the CV minimum orbital period).

Seppo discussed cyclotron emission, demonstrating side on view compared to face on. He illustrated this with the example of RX J1015.5+0904 B=25-30 MG orbital inclination 70 degree (+-5 deg). Most of cyclotron emission originates from one accretion region, which is located in the colatitude range 26- 30 degrees and longitudinal extension of 40 degrees.

Another example is the eclipsing magnetic CV V1309 Orionis with a 7.98 hours long period eclipsing Polar (magnetic CV) with long orbital period indicating a young system. Observations over several years were needed for tests that found this well synchronised.

Cyclotron radiation is electromagnetic radiation emitted by non-relativistic charged particles moving in a magnetic field. In a constant of B Tesla, particles of mass n and charge of q will form helical motion around the field line. This type of radiation is polarised.

Modelling of cyclotron emission in V1309 Ori B=50-60 MG orbital inclination 78 degree (+-2 deg). The cyclotron emission originates from two accretion region, which are located in the colatitude range 35 degrees and 145 degrees and longitudinal extension of 30 degrees.

So are Intermediate Polars progenitors for Polars when their orbital period is short enough, will they be synchronized?

RX J2133.7+5107 emits circularly polarized light in all UBVRI bands (up to 3%). and the Intermediate Polar IGR J17303-0601 = 1RXS J173021.5-055933 is a magnetic CV with a spin period of 128 s and circularly polarised. One of the strangest and most peculiar CV systems of all is AE Aquarii, with a Spin of the WD only 33.062 s.

Arne Henden - Late Time Observation of Novae

Arne explained via an internet link that the 61cm telescopes of the AAVSO's robotic telescope network have been used to obtain multi-wavelength photometry of many recent novae. Following the discovery of a novae, interest waned. Consequently after 100 days there was no data to detect any further activity. AAVSO request observers to continue to monster novae for longer periods.

Arto Oksanen - Recurrenct Nova T Pyxidis

Type 1a supernovae (standard candles) explode when the critical mass of the white dwarf = 1.4 solar masses. The question arises, will recurrent novae solar mass (> 1.2 solar mass) explode because they exhibit high mass transfer to the white dwarf component.

Well known recurrent novae include T Pyxides, U Scorpii and T Coronae Borealis.

Over time the white dwarf mass increases, whilst the novae outburst period decreases. However, is the mass accreted between novae events larger than the loss in outburst? To explore the question we need to look back at the better known recurrent novae. Observations were made using a PlaneWave half meter telescope and Apogee U42 camera located in Chile. Observations of the resulting light curves found significant deviations between the previous novae of T Pyxides in 1967 to the 2011 eruption.

Analysing data with Peranso software

Using a remote telescope in Chile, a Plane wave 50 cm f = 6.8, Arto obtained over 212 nights data that deviated from the 1967 T Pyxides eruption, and examination of the light curve found a periodic signal of just 1.8 hours. Arto and others sent details of their findings to the Smithsonian - NASA Astrophysics Data Systems.

A graph plot of the period orbit from 1985 to 2015 shows a straight line incremental increase in the period orbit until the 2011 eruption, which showed a relatively large increase in the period. Analysing the data showed the white dwarf component ejected 5 to 6 times more mass than it accreted.

Ongoing observations of T Pyxides, including spectrography, are continuing, and the spectra show a large peak in O111.

In Conclusion

Did the period change? ..... Yes

Did the white dwarf gain mass? ..... No

Will T Pyx go type 1A supernova? ..... No

Is T Pyx magnetic? ..... We Don't Know

What causes the optical signal? ..... We Don't Know

Why did the eruption occur? ..... We Don't Know

Why was there a difference in the light curves between outbursts? ... We Don't Know

For the future study the next outburst predicted is T Coronae Borealis.

* * *

The account of the EUROVS Helsinki meeting wil be continued in VSSC No 157.

BINOCULAR PRIORITY LIST

MELVYN TAYLOR

(Includes *XX Cam*, *Mira*, *R CrB*, and *R Hya* which are also on the telescopic programme)

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog
AQ	***And***	00 28 +35 35	8.0-8.9	SR	346d	303.01	
EG	***And***	00 45 +40 41	7.1-7.8	ZAnd		072.02	
V	***Aql***	19 04 -05 41	6.6-8.4	SRb	353d	026.04	
UU	***Aur***	06 37 +38 27	5.1-6.8	SRb	234d	230.02	
AB	***Aur***	04 56 +30 33	6.7-8.4	Ina		301.01	
V	***Boo***	14 30 +38 52	7-12	Sra	258d	037.01	
RW	***Boo***	14 41 +31 34	7.4-8.9	SRb	209d	104.01	
RX	***Boo***	14 24 +25 42	6.9-9.1	SRb	160d	219.01	
ST	***Cam***	04 51 +68 10	6.0-8.0	SRb	300d?	111.02	
XX	***Cam***	04 09 +53 22	7.3-9.7	RCB		068.01	T/B
X	***Cnc***	08 55 +17 04	5.6-7.5	SRb	195d	231.01	
RS	***Cnc***	09 11 +30 58	5.1-7.0	SRc	120d?	269.01	
V	***CVn***	13 20 +45 32	6.5-8.6	SRa	192d	214.02	
WZ	***Cas***	00 01 +60 21	6.9-8.5	SRb	186d	1982Aug16	
V465	***Cas***	01 18 +57 48	6.2-7.8	SRb	60d	233.01	
γ	***Cas***	00 57 +60 43	1.6-3.0	GCAS		064.01	
Rho	***Cas***	23 54 +57 29	4.1-6.2	SRd	320d	064.01	
W	***Cep***	22 37 +58 26	7.0-9.2	SRc		312.01	
AR	***Cep***	22 52 +85 03	7.0-7.9	SRb		1985May06	
Mu	***Cep***	21 44 +58 47	3.4-5.1	SRc	730d	112.01	
O	***Cet***	02 19 -02 59	2.0-10.1	M	332d	039.02	T/B
R	***CrB***	15 48 +28 09	5.7-14.8	RCB		041.04	T/B
W	***Cyg***	21 36 +45 22	5.0-7.6	SRb	131d	062.03	
AF	***Cyg***	19 30 +46 09	6.4-8.4	SRb	92d	232.01	
CH	***Cyg***	19 25 +50 15	5.6-10.5	ZAnd+SR	97	089.03	
U	***Del***	20 46 +18 06	5.6-7.9	SRb	110d?	228.01	
EU	***Del***	20 38 +18 16	5.8-6.9	SRb	60d	228.01	
TX	***Dra***	16 35 +60 28	6.6-8.4	SRb	78d?	106.02	
AH	***Dra***	16 48 +57 49	7.0-8.7	SRb	158d	106.02	
NQ	***Gem***	07 32 +24 30	7.4-8.0	SR+ZAnd	70d?	077.01	
X	***Her***	16 03 +47 14	6.1-7.5	SRb	95d	223.01	
SX	***Her***	16 08 +24 55	8.0-9.2	SRd	103d	113.01	
UW	***Her***	17 14 +36 22	7.0-8.8	SRb	104d	107.01	
AC	***Her***	18 30 +21 52	6.8-9.0	RVA	75d	048.03	
IQ	***Her***	18 18 +17 59	7.0-7.5	SRb	75d	048.03	
OP	***Her***	17 57 +45 21	5.9-7.2	SRb	120d	1984Apr12	
R	***Hya***	13 30 -23 17	3.5-10.9	M	389d	049.02	T/B
RX	***Lep***	05 11 -11 51	5.0-7.4	SRb	60d?	110.01	
Y	***Lyn***	07 28 +45 59	6.5-8.4	SRc	110d	229.01	
SV	***Lyn***	08 84 +36 21	6.6-7.9	SRb	70d?	108.03	
U	***Mon***	07 31 -09 47	5.9-7.9	RVB	91d	029.03	
X	***Oph***	18 38 +08 50	5.9-9.2	M	328d	099.01	
BQ	***Ori***	05 57 +22 50	6.9-8.9	SR	110d	295.01	

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog
AG	***Peg***	21 51 +12 38	6.0-9.4	Nc		094.02	
X	***Per***	03 55 +31 03	6.0-7.0	GCas+Xp		277.01	
R	***Sct***	18 48 -05 42	4.2-8.6	RVA	146d	026.04	
Y	***Tau***	05 46 +20 42	6.5-9.2	SRb	242d	295.01	
W	***Tri***	02 42 +34 31	7.5-8.8	SRc	108d	114.01	
Z	***UMa***	11 57 +57 52	6.2-9.4	SRb	196d	217.02	
ST	***UMa***	11 28 +45 11	6.0-7.6	SRb	110d?	102.02	
VY	***UMa***	10 45 +67 25	5.9-7.0	Lb		226.01	
V	***UMi***	13 39 +74 19	7.2-9.1	SRb	72d	101.02	
SS	***Vir***	12 25 +00 48	6.9-9.6	SRa	364d	097.01	
SW	***Vir***	13 14 -02 48	6.4-8.5	SRb	150d?	098.01	

Last updated 7th February 2010. To be changed, and re-updated soon. M.T.

* ***** *

ECLIPSING BINARY PREDICTIONS

DES LOUGHNEY

The following predictions, based on the latest Krakow elements, should be usable for observers throughout the British Isles. The times of mid-eclipse appear in parentheses, with the start and end times of visibility on either side. The times are hours UT, with a value greater than '24' indicating a time after midnight. 'D' indicates that the eclipse starts/ends in daylight; 'L' indicates low altitude at the start/end of the visibility, and '<<' indicates that mid eclipse occurred on an earlier date/time.

Please contact the EB secretary if you require any further explanation of the format.

The variables covered by these predictions are :

RS CVn	7.9 - 9.1V	AI Dra	7.2 - 8.2	U Sge	6.45 - 9.28V
TV Cas	7.2 - 8.2V	Z Vul	7.25 - 8.90V	RW Tau	7.98 - 11.59V
U Cep	6.8 - 9.4	Z Dra	10.8 - 14.1p	HU Tau	5.92 - 6.70V
U CrB	7.7 - 8.8V	TW Dra	8.0 - 10.5v	X Tri	8.88 - 11.27V
SW Cyg	9.24 - 11.83V	S Equ	8.0 - 10.08V	TX Uma	7.06 - 8.80V
V367 Cyg	6.7 - 7.6V	Z Per	9.7 - 12.4p	Del Lib	4.9 - 5.9
Y Psc	10.1 - 13.1	SS Cet	9.4 - 13.0	RZ Cas	6.3 - 7.9

Note that predictions for Beta Per and Lambda Tau can be found in the BAA Handbook.

For information on other eclipsing binaries see the website:
http://www.as.ap.krakow.pl/o-c/index.php3

Again please contact the EB secretary if you have any queries about the information on this site and how it should be interpreted.

July

2013 Jul 1 Mon
TW Dra.....D22(18)23
S Equ.....D22(18)23
del Lib.....D22(18)24L
Z Dra.....D22(22)25
Z Per.....L22(19)24

2013 Jul 2 Tue
TX UMa....D22(20)25
Z Vul.....D22(27)26D

2013 Jul 3 Wed
AI Dra.....D22(22)23
U Sge.....D22(22)26D
del Lib.....D22(26)24L

2013 Jul 4 Thu
RS CVn.....01(08)02D
RZ Cas.....D22(21)23
U Cep.....D22(25)26D
TV Cas....D22(26)26D
SW Cyg...D22(28)26D
Z Per.....L22(20)25
S Equ.....23(28)26D

2013 Jul 5 Fri
AI Dra 02(03)02D
TX UMa.D22(21)26D
U CrB.....D22(23)26D
Z Dra.....D22(24)26D
RZ Cas.....23(25)26D

2013 Jul 6 Sat
RW Tau....L02(02)02D
TV Cas.....D22(21)25
Y Psc.....23(28)26D

2013 Jul 7 Sun
U Sge.....02(07)02D
Z Per.....D22(22)26D
Z Vul.....D22(24)26D

2013 Jul 8 Mon
del Lib.....D22(18)24L
TX UMa.D22(23)26D
RS CVn...D22(27)26D

2013 Jul 9 Tue
RW Tau.....L01(<<)02
SW Cyg.....D22(18)24
AI Dra.....D22(22)23
U Cep.....D22(25)26D
TW Dra.....23(28)26D
Z Dra.....23(26)26D

2013 Jul 10 Wed
U Sge.....D22(17)22
RZ Cas.....D22(20)23
Z Per.....D22(23)26D
del Lib.....D22(26)24L
Y Psc.....L23(22)26D

2013 Jul 11 Thu
AI Dra.....01(03)02D
TX UMa..D22(24)26L
S Equ.....D22(25)26D
RZ Cas.....22(25)26D

2013 Jul 12 Fri
U CrB.....D22(21)26D
Z Vul.....D22(22)26D
TW Dra....D22(23)26D

2013 Jul 13 Sat
RS CVn.....D22(22)26L
Z Per.....D22(24)26D
U Sge.....D22(26)26D
TV Cas.....23(27)26D

2013 Jul 14 Sun
Z Dra.....01(04)02D
SW Cyg.....01(07)02D
U Cep.....D22(24)26D
TX UMa..D22(26)26L
V367 Cyg...22(67)26D

2013 Jul 15 Mon
SS Cet.....L02(00)02D
del Lib.....D22(17)23L
TW Dra.....D22(18)24
AI Dra.....D22(22)23
TV Cas.....D22(23)26D
V367Cyg..D22(43)26D

2013 Jul 16 Tue
U CrB.....02(08)02D
V367Cyg..D22(19)26D
RZ Cas.....D22(20)22
Z Dra.....D22(21)23
Z Per.....D22(26)26D

2013 Jul 17 Wed
RW Tau....L01(04)02D
AI Dra.....01(03)02D
V367Cyg.D22(<<)26D
TV Cas.....D22(18)22
Z Vul.....D22(20)25
del Lib.....D22(25)23L
RZ Cas.....22(24)26D
TX UMa.....23(27)26L

2013 Jul 18 Thu
SS Cet....L02(<<)02D
RS CVn.....D22(17)23
SW Cyg.D22(21)26D
S Equ.....D22(22)26D

2013 Jul 19 Fri
U CrB.....D22(18)24
U Cep....D22(24)26D
Z Per.....22(27)26D

2013 Jul 20 Sat
RW Tau..L01(<<)02D
Z Vul.....02(07)02D
U Sge.....D22(20)26
Z Dra.....D22(22)25

2013 Jul 21 Sun
TX UMa...00(05)01L
SS Cet....L02(<<)02D
X Tri.....02(05)02D
AI Dra.....D22(22)23

2013 Jul 22 Mon
Y Psc.....01(05)02D
X Tri.....02(04)02D
del Lib.....D22(17)23L
Z Vul.....D22(18)23
U CrB.....24(29)27D
Z Per.....24(29)27D

2013 Jul 23 Tue
TV Cas.....01(05)03D
X Tri.....01(04)03D
AI Dra.....01(02)03D
RZ Cas.....D21(24)26
U Sge.....23(29)27D
TW Dra.....24(29)27D

2013 Jul 24 Wed
X Tri.....00(03)03D
SS Cet....L02(<<)03D
U Cep....D21(24)27D
TV Cas...D21(24)27D
del Lib.....D21(25)23L
Z Dra.....22(24)27D
Z Vul.....24(29)27D
X Tri.....24(26)27D

2013 Jul 25 Thu
RZ Cas.....02(04)03D
S Equ.....D21(19)25
Y Psc.....L22(24)27D
X Tri.....23(25)27D

2013 Jul 26 Fri
Z Per.....01(06)03D
U CrB.....D21(16)22
TV Cas.....D21(20)24
TW Dra.D21(24)27D
X Tri.....22(25)27D

2013 Jul 27 Sat
SS Cet.....L01(<<)02
AI Dra.....D21(22)23
SW Cyg.D21(25)27D
X Tri.....L22(24)27

2013 Jul 28 Sun
RS CVn....01(07)01L
RW Tau...01(06)03D
X Tri.....L22(23)26
Z Dra.....24(26)27D

2013 Jul 29 Mon
S Equ.....00(06)03D
AI Dra.....01(02)03D
Z Per.....02(07)03D
del Lib...D21(16)22L
TW Dra...D21(19)24
RZ Cas....D21(23)26
U Cep..D21(23)27D
U CrB.....21(27)27L
Y Psc.....L21(18)22
Z Vul.....21(27)27D
X Tri.....L22(23)25

2013 Jul 30 Tue
SS Cet.....L01(<<)01
U Sge....D21(23)27D
X Tri.....L22(22)25
RW Tau.L24(25)27D

2013 Jul 31 Wed
RZ Cas....01(04)03D
Z Dra.....D21(19)22
del Lib...D21(24)22L
X Tri.....L22(21)24

August

2013 Aug 1 Thu
TV Cas.....02(06)03D
S Equ.....D21(16)22
RS CVn..D21(27)25L
X Tri.....L22(21)23

2013 Aug 2 Fri
Z Dra.....01(04)03D
AI Dra.....D21(21)23
V367Cyg.D21(57)27D
TV Cas.....22(26)27D
X Tri.....L22(20)22
RW Tau.....L24(19)24

2013 Aug 3 Sat
U Sge.....03(08)03D
U Cep.....D21(23)27D
Z Vul.....D21(25)27D
V367Cyg.D21(33)27D
X Tri.....L22(19)22

2013 Aug 4 Sun
AI Dra.....01(02)03D
HU Tau.....L01(<<)02
V367Cyg.D21(09)27D
Z Dra.....D21(21)23
TV Cas.....D21(21)25
RZ Cas.....D21(23)25
S Equ.....21(27)27D

2013 Aug 5 Mon
V367Cyg.D21(<<)27D
del Lib.....D21(16)22L
U CrB.....D21(25)26L
SW Cyg.....22(28)27D

2013 Aug 6 Tue
HU Tau.....L01(<<)03
RZ Cas.....01(03)03D
Y Psc.....02(07)03D
Z Dra.....03(05)03D
U Sge.....D21(18)23
RS CVn....D21(22)25L

2013 Aug 7 Wed
TW Dra.....00(05)03D
del Lib.....D21(24)22L

2013 Aug 8 Thu
HU Tau....L01(00)03D
AI Dra.....D21(21)23
Z Vul.....D21(22)27D
Z Dra.....D21(23)25
U Cep.....D21(23)27D

2013 Aug 9 Fri
TW Dra...D21(25)27D
Y Psc.....D21(25)27D
U Sge.....21(27)27D

2013 Aug 10 Sat
HU Tau....L01(02)03D
AI Dra.....01(02)03D
SW Cyg.....D21(18)24
RZ Cas.....D21(22)24
RW Tau....L23(26)27D

2013 Aug 11 Sun
RS CVn.....D21(17)23
S Equ.....D21(24)27D
TV Cas.....23(27)27D

2013 Aug 12 Mon
RZ Cas.....00(03)03D
HU Tau...L00(03)03D
del Lib.....D21(16)22L
TW Dra.....D21(20)25
U CrB.....D21(22)26L
Z Dra.....22(24)27

2013 Aug 13 Tue
Y Psc.....D21(19)24
Z Vul.....D21(20)25
U Cep.....D21(22)27
TV Cas.....D21(23)27
RW Tau.....L23(21)26

2013 Aug 14 Wed
HU Tau.....01(05)03D
TX UMa...D21(17)22
AI Dra.....D21(21)22
del Lib.....D21(23)21L

2013 Aug 15 Thu
SW Cyg.....02(08)03D
TW Dra.....D21(15)21
TV Cas.....D21(18)22

2013 Aug 16 Fri
AI Dra.....01(02)03
Z Vul.....02(07)03D
HU Tau.....02(06)03D
U Sge.....D20(21)27
RZ Cas.....D20(21)24
Z Dra.....24(26)27D

2013 Aug 17 Sat
TX UMa...D20(19)23
RZ Cas.....24(26)28D

2013 Aug 18 Sun
HU Tau.....03(07)04D
Z Vul.....D20(18)23
S Equ.....D20(21)26
U Cep.....D20(22)27

2013 Aug 19 Mon
del Lib.....D20(15)21L
Z Per.....D20(17)21
Z Dra.....D20(19)22
U CrB.....D20(20)25L
SW Cyg.....D20(21)28

2013 Aug 20 Tue
U Sge.....00(06)04D
TX UMa.D20(20)23L
AI Dra.....D20(21)22
Z Vul.....24(29)28D

2013 Aug 21 Wed
TV Cas.....01(05)04D
TW Dra.....01(06)04D
Z Dra.....01(04)04D
V367 Cyg...03(47)04D
del Lib.....D20(23)21L
V367Cyg.D20(47)28D
RW Tau.....23(28)28D

2013 Aug 22 Thu
AI Dra.....00(02)03
S Equ.....02(07)04D
Z Per.....D20(18)23
RZ Cas.....D20(21)23
V367Cyg.D20(23)28D
TV Cas....D20(24)28D

2013 Aug 23 Fri
X Tri.....03(06)04D
V367Cyg.D20(<<)28D
U Sge.....D20(15)21
Z Vul.....D20(16)21
Z Dra.....D20(21)23
TX UMa.D20(22)23L
U Cep.....D20(22)27
TW Dra.....21(26)28D
RZ Cas.....23(26)28D

2013 Aug 24 Sat
TX UMa....L02(<<)02
X Tri.....02(05)04D
TV Cas.....D20(20)24
Y Psc.....22(27)28D
RW Tau.....L22(23)27

2013 Aug 25 Sun
X Tri.....02(04)04D
Z Dra.....03(05)04D
S Equ.....D20(17)23
Z Per.....D20(19)24
RS CVn....D20(26)23L
Z Vul.....21(27)28D

2013 Aug 26 Mon
X Tri.....01(04)04D
del Lib.....D20(15)21L
U CrB.....D20(18)24
AI Dra.....D20(21)22
TW Dra.....D20(21)26
TX UMa..D20(23)23L
U Sge.....D20(24)27L

2013 Aug 27 Tue
X Tri.....00(03)04D
TX UMa.L02(<<)04D
Z Dra.....20(23)25
X Tri.....24(26)28D

2013 Aug 28 Wed
AI Dra.....00(02)03
RZ Cas.....D20(20)23
Z Per.....D20(21)26
Y Psc.....D20(21)25
U Cep.....D20(22)26
del Lib.....D20(23)20L
SW Cyg..D20(25)28D
S Equ.....23(28)28L
X Tri.....23(26)28D

2013 Aug 29 Thu
TW Dra.....D20(16)21
TX UMa.20(25)23L
X Tri.....22(25)27
RZ Cas.....23(25)27
U CrB.....23(29)25L

2013 Aug 30 Fri
TX UMa.L01(01)04D
TV Cas.....02(06)04D
RS CVn...D20(21)23L
Z Vul.....D20(25)28L
X Tri.....22(24)27

2013 Aug 31 Sat
RZ Cas.....03(06)04D
Z Per.....D20(22)27
X Tri.....21(23)26
TV Cas.....22(26)28D
Z Dra.....22(24)27

September

2013 Sep 1 Sun
S Equ.....D20(14)20
Y Psc.....D20(15)20
AI Dra.....D20(21)22
X Tri.....20(23)25
TX UMa....22(26)23L

2013 Sep 2 Mon
TX UMa.L01(02)04D
RW Tau.....01(06)04D
del Lib.....D20(14)20L
SW Cyg.....D20(15)21
U CrB.....D20(16)21
U Sge.....D20(19)24
U Cep.....D20(21)26
TV Cas.....D20(21)25
X Tri.....D20(22)25

2013 Sep 3 Tue
AI Dra.....00(01)03
Z Dra.....D20(18)20
RZ Cas.....D20(20)22
X Tri.....D20(21)24
Z Per.....D20(23)28D

2013 Sep 4 Wed
TW Dra.....02(07)04D
RS CVn...D20(17)23L
TV Cas.....D20(17)21
X Tri.....D20(21)23
del Lib.....D20(22)20L
Z Vul.....D20(22)28L
S Equ.....D20(25)27L
RW Tau...L22(24)28D
RZ Cas.....22(24)27
Z Dra.....24(26)28D

2013 Sep 5 Thu
TX UMa.L01(04)04D
X Tri.....D20(20)23
U CrB.....21(26)24L
U Sge.....22(28)27L
HU Tau.....L23(19)23

2013 Sep 6 Fri
RZ Cas.....03(05)04D
X Tri.....D20(19)22
Z Per.....20(25)28D
TW Dra.....21(26)28D
SW Cyg.....22(28)28D

2013 Sep 7 Sat
X Tri.....D20(19)21
Z Dra.....D20(19)22
AI Dra.....D20(21)22
U Cep.....D20(21)26
RW Tau.....L21(19)24
HU Tau.....L23(21)25

2013 Sep 8 Sun
TX UMa.L01(05)04D
TV Cas.....04(08)04D
X Tri.....D19(18)21
V367Cyg.D19(62)28D
Y Psc.....24(28)28D

2013 Sep 9 Mon
AI Dra.....00(01)03
Z Dra.....01(04)04D
del Lib.....D19(14)20L
X Tri.....D19(17)20
RZ Cas.....D19(19)22
Z Vul.....D19(20)26
TW Dra.....D19(22)27
V367Cyg.D19(38)28D
Z Per.....21(26)28D
HU Tau.....L23(22)26
TV Cas.....23(27)28D

2013 Sep 10 Tue
U Cep.....04(09)04D
V367Cyg..D19(14)28D
RZ Cas.....21(24)26

2013 Sep 11 Wed
TX UMa.....02(07)04D
V367Cyg.D19(<<)28D
SW Cyg.....D19(18)24
Z Dra.....D19(21)23
del Lib.....D19(22)20L
S Equ.....D19(22)27L
TV Cas.....D19(23)27
HU Tau.....L22(23)27

2013 Sep 12 Thu
Z Vul.....02(07)03L
RZ Cas.....02(05)04D
TW Dra.....D19(17)22
U Cep.....D19(20)25
U Sge.....D19(22)26L
Y Psc.....D19(22)27
U CrB.....D19(24)24L
Z Per.....23(27)28D

2013 Sep 13 Fri
RW Tau.....03(08)04D
Z Dra.....03(06)04D
TV Cas.....D19(18)22
AI Dra.....D19(20)22
HU Tau.....L22(25)28D

2013 Sep 14 Sat
TX UMa.....04(08)04D
Z Vul.....D19(18)23
AI Dra.....24(25)26

2013 Sep 15 Sun
U Cep.....04(08)04D
RZ Cas.....D19(19)21
Z Dra.....20(23)25
RW Tau.....22(26)28D
HU Tau.....22(26)28D

2013 Sep 16 Mon
Z Per.....00(05)04D
U Sge.....02(07)02L
SW Cyg.....(08)04D
del Lib.....D19(13)19L
Y Psc.....D19(17)21
RZ Cas.....21(23)26
Z Vul.....24(29)27L

2013 Sep 17 Tue
U Cep.....D19(20)25
HU Tau.....24(27)29D

2013 Sep 18 Wed
RZ Cas 02(04)05D
TW Dra..03(08)05D
S Equ D19(19)24
del Lib D19(21)19L
RS CVn 20(26)22L
RW Tau L21(21)25

2013 Sep 19 Thu
TV Cas 01(05)05D
Z Per 01(06)05D
Z Vul D19(16)21
U Sge D19(16)22
AI Dra D19(20)22
U CrB...D19(22)23L
Z Dra 22(25)27

2013 Sep 20 Fri
HU Tau...01(05)05D
U Cep 03(08)05D
SW Cyg...D19(22)28
TV Cas 20(24)28
TW Dra..22(27)29D
AI Dra 24(25)26

2013 Sep 21 Sat
RZ Cas D19(18)20
Z Vul 22(27)26L
S Equ 24(29)26L

2013 Sep 22 Sun
HU Tau...02(06)05D
Z Per 03(08)05D
AI Dra 04(06)05D
Z Dra D19(18)20
TV Cas D19(20)24
U Cep D19(20)25
U Sge 20(25)26L
RZ Cas 20(23)25

2013 Sep 23 Mon
RS CVn.D19(21)21L
TW Dra D19(23)28
Z Dra 24(26)29

2013 Sep 24 Tue
RZ Cas 01(03)05D
Y Psc 01(06)05D
HU Tau 04(08)05D
SS Cet 04(09)05D
X Tri 05(07)05D
Z Vul D19(14)19
TV Cas D19(15)19

2013 Sep 25 Wed
U Cep.....03(08)05D
X Tri.....04(06)05D
Z Per.....04(09)05D
S Equ.....D19(16)21
AI Dra.....19(20)21

2013 Sep 26 Thu
X Tri.....03(06)05D
TX UMa...D19(14)19
TW Dra.....D19(18)23
Z Dra.....D19(19)22
U CrB.....D19(20)23L
Z Vul.....19(25)26L
RW Tau.....23(28)29D
AI Dra.....24(25)26

2013 Sep 27 Fri
X Tri.....03(05)05D
SS Cet.....04(08)05D
RZ Cas.....D19(17)20
U Cep.....D19(20)24
V367Cyg.D19(52)29D
Y Psc.....19(24)28

2013 Sep 28 Sat
Z Dra.....02(04)05D
X Tri.....02(04)05D
TV Cas.....02(06)05D
AI Dra.....04(06)05D
RS CVn....D19(16)21L
V367Cyg.D19(28)29D
RZ Cas.....20(22)25
S Equ.....21(26)26L

2013 Sep 29 Sun
X Tri.....01(04)05D
V367Cyg.D19(04)29D
TX UMa....D19(16)21
U Sge.....D19(20)25L
SW Cyg.....19(25)29D
RW Tau.....L20(22)27
TV Cas.....22(26)29D

2013 Sep 30 Mon
RZ Cas.....00(03)05D
X Tri.....01(03)05D
U Cep.....03(07)05D
SS Cet.....03(08)05D
V367 Cyg..D19(<<)25
Z Dra.....19(21)24
X Tri.....24(26)29

CHARGES FOR SECTION PUBLICATIONS

The following charges are made for the Circulars. These cover one year (4 issues). PDF format subscriptions are £3.00 per year. Make cheques out to the BAA, and send to the Circulars editor (address on back cover); or you can now pay on-line.

	UK	Europe	Rest of World
BAA Members	£5.00	£6.00	£8.50
Non-Members	£7.00	£8.00	£10.50

Pay On-line: From the BAA home page: *http://britastro.org/baa/* , click "Shop" centre top of page, and in the panel on the right hand side click "Section Newsletters". (Could members using this method also **notify the editor**: *sim_jan@btinternet.com*, to ensure they receive their circulars.)

The charges for other publications are as follows. Make cheques out to the BAA and please enclose a large SAE with your order.

	Order From	Charge
Telescopic Charts	Chart Secretary	Free
Binocular Charts	Chart Secretary	Free
Eclipsing Binary Charts	Chart Secretary	Free
Observation Report Forms	Director or Binocular Secretary	Free
Chart Catalogue	Director	Free
Observing Guide to Variable Stars	BAA Office	£5.00
CCD Guide	BAA Office	£7.50
Binocular Booklet	Director or BAA Office	£2.50
CD-ROM of the last 3 items	BAA Office	£7.50

Charts are downloadable from the VSS web pages at
http://www.britastro.org/vss/chartcat/wfb.php

For more information, please visit our web pages at **http://www.britastro.org/vss**

CONTRIBUTING TO THE CIRCULAR

If you would like to prepare an article for consideration for publication in a Variable Star Section Circular, please read the *Notes for Authors*, published on the web pages at:
http://www.britastro.org/vss/circs.htm; reproduced in full in VSSC132 p 22, or contact the editor (details on back cover) for a pdf copy of the guidelines.

If you are unsure if the material is of a suitable level or content, then please contact the editor for advice.

The **deadline for contributions** to the next issue of VSSC (number 157) will be 7th August, 2013. All articles should be sent to the editor (details are given on the back of this issue).

Printed by RAMPrint 07973 392975

SECTION OFFICERS

Director
Roger D Pickard
3 The Birches, Shobdon, Leominster,
Herefordshire HR6 9NG
Tel: 01568 708136
Email: *roger.pickard@sky.com*

Secretary
Bob C Dryden
21 Cross Road,
Cholsey,
Oxon, OX10 9PE
Tel: 01491 652006
Email: *visual.variables@britastro.org*

Chart Secretary
John Toone
Hillside View, 17 Ashdale Road,
Cressage, Shrewsbury, SY5 6DT.
Tel: 01952 510794
Email: *EnootnhoJ@aol.com*

Binocular Secretary
Melvyn Taylor
17 Cross Lane, Wakefield,
West Yorks WF2 8DA
Tel: 01924 374651
Email: *melvyndtaylor@tiscali.co.uk*

Nova/Supernova Secretary
Guy M Hurst
16 Westminster Close, Basingstoke,
Hants, RG22 4PP
Tel and Fax: 01256 471074
Email: *Guy@tahq.demon.co.uk*

Eclipsing Binary Secretary
Des Loughney
113 Kingsknowe Road North,
Edinburgh EH14 2DQ
Tel: 0131 477 0817
Email: *desloughney@blueyonder.co.uk*

Database Secretary
Andy Wilson
12 Barnard Close, Yatton,
Bristol, BS49 4HZ
Tel: 01934 830 683
Email: *andyjwilson_uk@hotmail.com*

Recurrent Objects Co-ordinator
Gary Poyner
67 Ellerton Road, Kingstanding,
Birmingham, B44 0QE.
Tel: 07876 077855
Email: *garypoyner@blueyonder.co.uk*

Circulars Editor
Janet Simpson
Goatfield Cottage, Furnace, Inveraray,
Argyll, PA32 8XN
Tel: 01499 500234
Email: *sim_jan@btinternet.com*

Webmaster
Gary Poyner
(see above)

TELEPHONE ALERT NUMBERS

Nova and Supernova discoveries
First telephone the Nova/Supernova Secretary, Guy Hurst: 01256 471074
If only answering machine response, leave a mess-age and then try the following:
Denis Buczynski 01862 871187,
Glyn Marsh 01624 880933, or
Martin Mobberley 01284 828431.

Variable Star Alerts
Telephone Gary Poyner: 07876 077855