British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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Contents

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VARIABLE STAR SECTION DISPLAY, WINCHESTER 2012

ROGER PICKARD

FROM THE DIRECTOR

ROGER PICKARD

The on-line database

I am pleased to advise that an article on the on-line database has been accepted for publication in both the British Astronomical Association Journal and in 'Astronomy and Geophysics'.

On-line database and old observations!

Yes, there is still a big hole in some of the data, like the 2004-2006 dearth and particularly 2005. We are investigating this and may be calling on observers to re-submit data for some or all of those years if possible. However, before we do that it would be good to hear from other observers who have checked their own totals against those held in the database. Take a look at the light curve for V Vulpeculae (page 2), which runs from approximately the middle of 2003 to the end of 2007 to see what I mean. If you are one of the observers listed, please take a look at your observations that cover the gap to see if any are missing.

Reporting Visual Observations using the new Spreadsheet

We are starting to get feedback from observers who are now using this essential form of data submission. There maybe one or two tweaks required to the spreadsheet but in the meantime I would encourage you all to submit data this way if you are not already intending to do so.

Section Meeting

The next Members meeting will be in collaboration with 'The Astronomer' magazine and will be on 13th October 2013 at St Mary's Church hall, Basingstoke - see the announcement by Guy Hurst elsewhere in this Circular.

This year our meeting celebrates the 100th anniversary of George Alcock's birth and Guy Hurst will be giving a talk about the lifetime achievements of George. Other speakers include Professor Boris Gaensicke, (those who attended this year's Winchester Meeting, will recall his brilliant lecture there). Other talks are planned along the theme of the types of object George studied over his long observing career.

Further details of the event and booking arrangements will follow in due course. In the meantime please ensure this date is entered in your diary.

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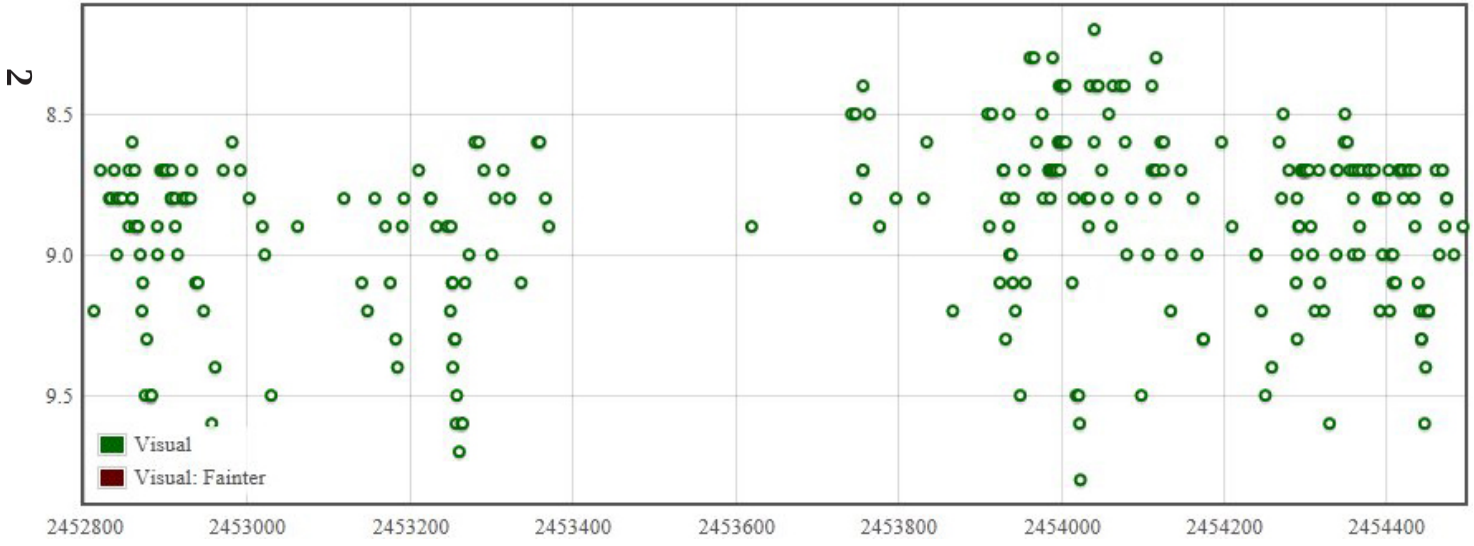
Light Curve for V Vulpeculae.

Contributors:

A J Hollis, A K Porter, A Kimber, A L Smith, B H Granslo, B J Beesley, C Anton, C Brookman, C M Allen, C M Briden, D Couzin, D Hufton, D L Young, D M Swain, D Stott, E G D Youngs, E Spooner, F Hamilton, G A V Coady, G J Kirby, G Poyner, H Peter, I A Middlemist, J A Bailey, J D Shanklin, J E Isles, J Lashley, J S Bullivant, J S Day, J Toone, J W L Ells, J W Rock, K Locher, L R Matthews, M A Brookes, M A Hather, M B Houchen, M D Taylor, M J Nicholls, M Poxon, M R Bell, N F H Knight, N S Kiernan, P C Burgess, P J Swift, P J Wheeler, P Mettam, P W Hornby, R B I Fraser, C R Dryden, R D Pickard, R Diethelm, R E Kelly, R H Chambers, R H McNaught, R Lody, S J Lubbock, S Koushiappas, S R Dunlop, S W Albrighton, T Brelstaff, T G Saville, T Hoare, T Laban, T Markham, T Tanti, V G Mormyl, W R Worraker.



THE ASTRONOMER / BAA VSS, ANNUAL MEETING, SATURDAY, 13th OCTOBER 2012

Guy Hurst

As announced on TA E-Circular 2816 the editor has agreed that this year's meeting will be a joint gathering of 'The Astronomer' and the British Astronomical Association's Variable Star Section (BAAVSS).

We are dedicating the event, on Saturday October 13th to one of the UK's great modern observers, George Alcock, and to commemorate the centenary of his birth in 1912.

The content will be a combination of talks linked to variable star matters, and topics about the wider range of types of object favoured by George in his observing career.

Roger Pickard has asked the TA Editor to give a talk about the lifetime achievements of George Alcock which I am happy to do.

Boris Gaensicke has also kindly agreed to talk about a very topical matter of the moment relating to SN Ia progenitors.

Mark Kidger is travelling from Spain and his provisional title will be along the lines of "From Alcock's last comet to Herschel - studying comets from space".

There will be further speakers and when the agenda is more complete I will open the booking procedure.

PLEASE RESERVE OCTOBER 13 IN YOUR DIARIES FOR THIS SPECIAL EVENT.

If you have any queries please e-mail Guy Hurst: *guy@tahq.demon.co.uk*

JOHN BORTLE JOINS THE 200K CLUB

John Toone

On St Patrick's Day 2012 John Bortle secured his 200,000th visual variable star observation. This is the latest major milestone of a long observing career which began as early as 1957. John is only the eighth observer to reach this remarkable milestone and amazingly it comes less than two months after the seventh Rod Stubbings (see VSSC 151, page 4). When I listed the observers who have made 200,000 visual observations in VSSC 151, I did not expect that the list would require expansion by the time that VSSC 152 was published.

John is one of the stalwart AAVSO observers whose reputation for acquisition of large quantities of precision visual data for many years (especially throughout the Janet Mattei era of 1973 to 2003) is renowned worldwide.

I met John at the October 2000 AAVSO meeting in Boston and held several interesting

conversations with him, mainly about the behaviour of variable stars that we jointly monitored. He struck me as being intensely knowledgeable about those stars, and I recognized that this level of knowledge could only come about through systematic visual monitoring over many years.

I took the following two photos of John at that 2000 AAVSO meeting. The first photo shows John in conversation with Tom Cragg and Ray Berg, three experienced observers that are currently responsible for a colossal 380,000 visual variable star observations. The second photo shows John being presented with an appreciation award from AAVSO president Lee Anne Willson (with director Janet Mattei looking on), for 30 years editorship of the AAVSO Circular.

Figure 1: John Bortle in conversation with Tom Cragg and Ray Berg. photo - Toone

Figure 2: AAVSO president Lee Anne Willson (with director Janet Mattei looking on), presenting John Bortle with an appreciation award for 30 years editorship of the AAVSO Circular. photo - Toone

In the near future John is likely to become America's leading visual observer and with the expected continued proliferation of digital photometry it is unlikely that he will ever lose that mantle. Many congratulations John, your dedicated work is much appreciated by the BAA VSS and it is hoped that you will continue observing variable stars for many more years. [*See also page 11*]

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ONE QUARTER MILLION – AND COUNTING!

GARY POYNER

If someone had told me on that night of August 30th 1975 when I looked up to see a changed view of Cygnus that 36 years later I would be making my 250,000th variable star observation, I would have thought it a joke. As a seventeen year old amateur astronomer I was happy making observations of the planets and viewing double stars and deep sky objects. Not once did a variable star invade my observing time. Yet Nova Cygni 1975 created such an impression on me that I had to pursue it further. In those days I did not belong to a local society (although I had been a junior member of the Birmingham Astronomical Society {BAS} five years earlier), so I had no contact with anyone interested in variables. I did however have a friend (who had joined the BAS with me in 1970) who had

lost interest in astronomy and knowing that I was still interested, gave me a few books and some variable star charts he had obtained (I assume) from the BAA. I had also bought Glasby's 'Variable Star Handbook' which contained a few charts at the back, so armed with these and getting charts and sequences from as many other sources as possible ('Sky and Telescope' and various books) I began to observe more and more variable stars. It took some time to 'get it' at first, as I was doing this alone and did not know anyone to turn to for help, but I soon got the knack and found myself observing variables on each night I could manage. The early observations were made with a 6 inch f8 Newtonian and binoculars, but this was soon upgraded to a 10 inch f6.2 in 1977 – the first signs of aperture fever! Work and being a 'normal teenager' proved to be a distraction in those early years, so it wasn't until 1978 that I passed 1,000 Variable Star observations.

Figure 1: The 6inch F8 Newtonian which was used for the first Variable Star observations in 1975.

The stars on my programme at that time were pretty much a mixed bunch – mostly red stars with a few of the brighter CVs and a couple of RCB stars. When I moved up to the 10 inch I added more CVs as my limiting magnitude was now below magnitude 14. I also dropped many of the binocular stars I had on my programme, as I just did not enjoy observing bright variables as much as the fainter ones. Joining the BAAVSS and TA in 1978 helped me enormously, as I had access to as many charts as I could handle, and finally had contact with other VS observers. In around 1990 I got involved with a Pro-Am project run by Guy Hurst to monitor CVs for outbursts in conjunction with ROSAT. Many of these CVs were virtually unknown and uncharted (until Guy produced those 'postage stamp' sized charts for observers to use – invaluable they were), so it proved to be a wonderfully exciting programme. By this time I had upgraded my scope yet again to a 16 inch (in 1987), which proved to be very useful for this project. This was my first Dobsonian telescope. Previous instruments had been mounted on German equatorials with setting circles. Once the ROSAT programme had ended I kept all of the CVs on my observing programme as many were still awaiting their first outburst detection. I also dropped many of the red stars I had been observing to concentrate on these new CVs, but I did keep R Scuti and chi Cygni on my list, as I just could not bring myself to ignore them. These extra stars helped me to 50,000 observations by 1993, and only five years later in 1998 my 100,000th observation was made following my best year for observing in 1995 with 138 observable nights and over 15,000 observations made in that year.

The 200,000 landmark came in 2007, with an observation of DW Cancri (reported in VSSC 132, June 2007). A couple of years later I changed telescope again (from a 35cm SCT) this time to a 51cm f4 reflector, and it was with this instrument that observation number

250,000 was made on the night of 2012 March 23.989 with an estimate of the Blazar W Comae Berenices at 14.9. I knew that if the weather held and I could observe to midnight, I might pass the landmark. I needed just over one hundred estimates to get it, but was not sure exactly how many when I went to the scope. The night was a poor one, with a limiting telescopic magnitude of 15 at best, but it remained clear until just before midnight. The following day when entering the observations into the spreadsheet, I found that the W Com observation was the 118th of the night, and five observations later the sky clouded over!

Although most of my efforts over the years have been in the field of CVs, my favourite star is DY Persei – the coolest RCB star known. In fact my most observed star is R Coronae Borealis itself, with nearly 3,000 observations made since 1977. If anything I find these totally unpredictable objects more fascinating than CVs, especially as they are so rare!

Limiting magnitude has always been something I have tried to improve on over the years, which might seem strange from an observer who lives in light polluted Birmingham, but I guess it goes hand in hand with observing CVs, many of which are quite faint even in outburst. I can still remember seeing my first 14th (AY Lyrae – 25cm reflector), 15th (AB Draconis – 40cm reflector) and 16th (FN Andromedae – 40cm reflector) magnitude variables, but in February 2011 I managed to see CY Ursae Majoris at a minimum of 17.1 with the 51cm reflector. I had always hoped to break the 17 barrier, and was pretty delighted when I managed it. It was one of those very rare clear nights with a dry and clear polar airstream, and the 17.1 was the culmination of a night filled with 16.5 and fainter estimates. I have been beyond 17 a few times since then, but the first will be remembered. The two main criteria for moving to the 51cm were to get back to a Dobsonian mount after a few years using a GOTO, and to try to monitor as many CVs at minimum as possible.

As with many VS observers who have made a few observations, there have been many interesting and exciting observations made over the years. I remember in the early 1990s seeing an outburst in the HMXB V635 Cassiopeiae. I had been exchanging observations with Dr. Diane Roussel-Dupre at Los Alamos, who was particularly interested in this object. Previous optical outbursts had always followed (by about 24h) X-ray outbursts. However on this occasion I reported V635 Cas has risen by nearly one magnitude only to be told that no increased X-ray activity had been seen. Twenty four hours later an X-ray outburst did occur, and to my knowledge this is the only occasion when optical activity had preceded X-ray with this object. Flickering in CVs has always been an interesting thing to see too, especially if you stop and think about what is actually happening. I have experienced this phenomenon many times in the past, but by far the most remarkable observation I think I have ever made was the high amplitude flickering in 1RXSJ053234.9+624755 (V391 Camelopardalis) during the March 2005 outburst (see Poyner and Shears, JBAA 116, 1 2006 and BAAVSSC 124, June 2005). It was spectacular to see a star (or more accurately an accretion disc) flicker by nearly one magnitude in the space of seconds. I have looked for it since in this object but have yet to see a repeat performance.

Playing with numbers can be fun, so taking my first VS observation as Nova Cygni 1975 on August 30th 1975, and number 250,000 on March 23th 2012 gives us 13,355 days. This equates to 18.72 VS observations made every day of the week for 36.6 years. The enjoyment has not diminished one bit over the years, and I still get a big thrill in seeing SS Cygni in outburst and chi Cygni at minimum or maximum. Jeremy Shears reminded me

of something I said some time ago, that when I get to 250k visual observations I would turn to CCD. Did I really say that Jeremy? Can we make it 500k?

Figure 2: The 20 inch F4, used to make number 250,000, over 36 years later since my first observations with the 6 inch Newtonian.

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ECLIPSING BINARY NEWS

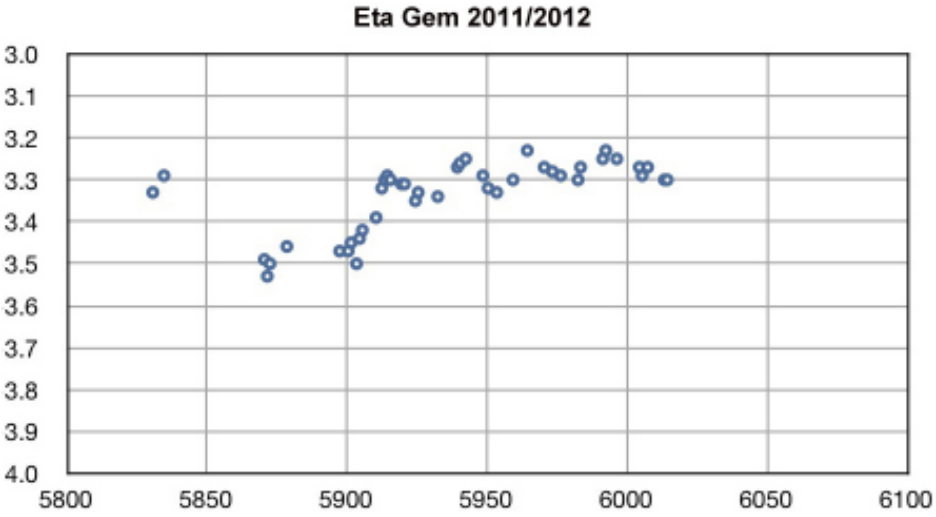
DES LOUGHNEY

Eta Geminorum

DSLR Measurements were continued until the end of March 2012 and are illustrated in the figure below. It had been hoped to continue measurements in April but the weather did not permit.

Measurements will be resumed from the middle of August to catch the eclipse but they will have to be done at around 05:00 BST.

All observations and measurements are welcome.



"Did the ancient Egyptians record the period of the eclipsing binary Algol – the Raging one?"

The abstract of the recently published paper reads:

"The eclipses in binary stars give precise information of orbital period changes. Goodricke discovered the 2.867 days period in the eclipses of Algol in the year 1783. The irregular orbital period changes of this longest known eclipsing binary continue to puzzle astronomers. The mass transfer between the two members of this binary should cause a long-term increase of the orbital period, but observations over two centuries have not confirmed this effect. Here, we present evidence indicating that the period of Algol was 2.850 days three millenia ago. For religious reasons, the ancient Egyptians have recorded this period into the Cairo Calendar, which describes the repetitive changes of the Raging one. Cairo Calendar may be the oldest preserved historical document of the discovery of a variable star."

The full paper can be read on: *http://arxiv.org/abs/1204.6206*

Supergiant Eclipsing Binary - V1765 Cygni

This is an intriguing EB system - the stars are nearly in contact and close enough to be tidally distorted. It is thought that one star is of 25 solar masses and the other star 12.2 solar masses. The evolutionary process of such large stars will always be interesting.

It is quite an easy system to find as it lies along the axis of Cygnus being near Eta Cygni (3.87 magnitude) and 17 Cygni (5.00 magnitude). The system is fairly bright with a magnitude of around 6.47. The period is 13.373415 days.

The light curve of the system shows a scatter of up to 0.08 magnitude which is due to the intrinsic variations of a supergiant or the effects of gas streams within the system. The system is asymmetric. Although primary minimum occurs at 1.0 on a phase diagram secondary minimum occurs at 0.6 (it would be expected to occur, in a symmetric system, at 0.5).

The system has not been studied that much because of the small variability. Primary minimum has a depth of 0.16 magnitude and the secondary minimum of 0.14 magnitude. Such small variation makes the system a very good target for precision DSLR photometry. The small variation and the 13 day period means that only two measurements, separated by as many hours as possible, will be required on a given night. For precision photometry 30 images of the system should be obtained. Although 30 images will take about 4 minutes this will not matter given the slow change in magnitude. The settings for a Canon 450D camera, using a 100mm lens, will be exposure 5 seconds, f/3.5, ISO 800.

A study of the star field indicates that there are two possible, suitable, nearby comparisons. One is HIP 977307 at 6.18V and the other is HIP 96977 at 5.93V.

It is hope to start an observing campaign to find out if the system has changed since the last report in a paper of 1995.

V 1425 Cygni

This is another active EB class eclipsing binary composed of stars of 4.82 and 3.06 solar masses. The smaller star is thought to have filled its roche lobe and is losing mass to the larger star. The system is around 7.73 magnitude with a period of 1.2523875 days. It can be regarded as being in eclipse nearly all the time, and therefore measurements can be made at any time. It must be almost an EW contact binary. The primary eclipse is of 0.4 magnitudes in depth and the secondary 0.3.

The system can be fairly easily found, being on a line from Deneb to Errakis about one third of the way from Errakis. Possible comparators are HIP 104917 at 8.11V, or HIP 104255 at 8.05V. It is best studied with DSLR settings, using a 200 mm lens, of exposure 5 seconds, f/4 and ISO 800,

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OBSERVER PROFILE

JOHN BORTLE

Figure 1: Current photo

My interest in astronomy arose in 1953-1954, marked by a transit of Mercury, a very close approach of Mars, and eclipses of both the sun and moon, all viewed in short succession. This spurred me to acquire a little 30mm refractor of rather dubious quality at Christmas 1955. It would prove to be the first in a long line of increasingly larger and far better quality instruments.

I had first tried my hand at variable star observing in 1957, but found that I was still a bit short of the minimum age to officially join the AAVSO. As it happened, the appearance of two brilliant comets that same year served to divert my interests away from variable stars and, in fact, spur my lifelong interest in observing these wondrous visitors.

A local astronomy group to which I belonged in 1963 obtained a group membership in the AAVSO and members were handed a selection of charts from which, if they wished, they could make and submit observations. I and another member took up the challenge seriously, and together began variable star observations both with binoculars and his observatory-housed 15-cm reflector.

In 1965 the local group dissolved, but my friend and I continued our pursuit of variables and took out individual memberships in the AAVSO. My observing program soon far outstripped that of my friend's, often with my observing session lasting dusk until dawn and within a few years ranking me among the Association's major observers.

I had the incredibly good fortune to reside in an area that was at that time a hotbed of other major AAVSO observers and I soon became acquainted with many of the foremost constituents of the organization. Some of their names rank today as the organization's foremost observers of all time, among them Wayne Lowder and Edward Oravec, both of whom became very close friends sharing their enormous observing knowledge with me.

In 1970 I moved from an urban setting to a pristine rural location graced with nightly magnitude 7.0-7.5 skies. That same year I acquired a 32-cm reflector and together with my study of comets, advanced my variable star observing program from mainly Mira-type and binocular stars to almost exclusively CVs of various sorts. About this time I also initiated the AAVSO Circular for the association, chronicling the monthly activity of various CV stars on the AAVSO program. This publication I edited for the next 30 years.

Although my days of all night observing sessions were already behind me, and my regular nightly program required no more than 90-120 minutes to run through, the total count of my observations steadily progressed, passing the 100,000 in September of

1992. Likewise, the selection of equipment at my disposal broadened. Over the years my W.R. Brooks Observatory saw instruments including 20x120 binoculars, a 20-cm f/1.5 Schmidt camera, and a 51-cm Dobsonian reflector placed into service. But my desire for a true workhorse, easy to handle, moderately large telescope perfectly suited to my observing program finally centred on a 41-cm reflector which has remained my primary instrument for the better part of 15 years now.

My first observation submitted to the AAVSO was of Nova Herculis discovered in April of 1963 by Leslie Peltier, later to also become a long time friend. That star is a favourite and I have secured visual observations of it in each of the subsequent 48 years. Thus, when I could see that the night of my 200,000th observation was approaching, I hoped that it would be an observation of this star that would mark the occasion.

As the time drew very close it found V533 Herculis an early morning object, just as it had been when I first spotted it in 1963. Having limited myself to only evening observing sessions in recent years I was unwilling to go to the needed effort of arising so early and open up the observatory. Thus, the honour fell to whatever star would happen to come along in the course of the evening's observation run of March 17/18, 2012. That night turned out to be a rather mediocre one with poor seeing, but not so bad that about two score estimates could not be obtained. The 22nd estimate of that evening, marking estimate number 200,000, fell to SY Cancri, which that night was at maximum.

Figure 2: Circa 1986, showing myself with my 51-cm and in the background the 3-meter dome housing a 20-cm f/1.5 Schmidt camera.

My 50th year with AAVSO begins in April 2012 and some night not too long thereafter I will catch sight of V533 Herculis now about 15th magnitude, once again marking another annual round in what has been a long and interesting journey for me.

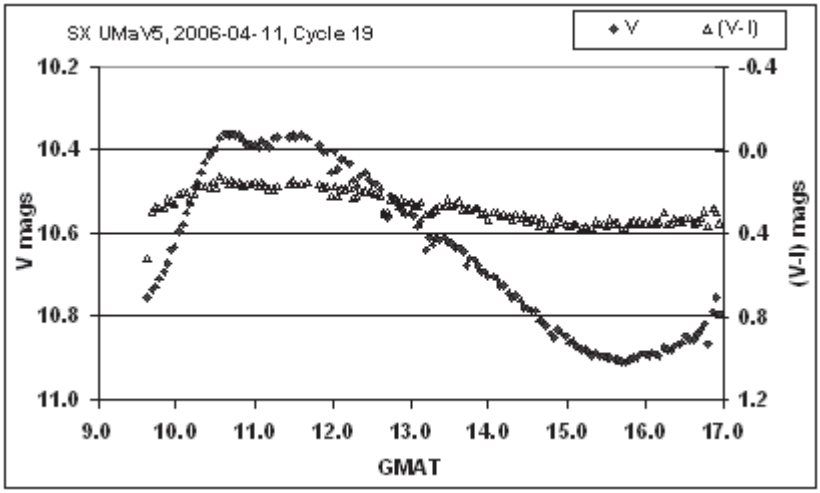
AN ENCOUNTER WITH RR LYRAE STARS

(The third of three articles)

GRAHAM SALMON

C. RR Lyrae stars – the Mathematical Models

Figure 8: (repeated from 'B. Pulsation in RR Lyrae Stars', VSSC No.151)
Light curve for SX Ursae Majoris



The cause of the double maximum of SX Ursa Majoris continued to puzzle me and so I submitted an article to the December 2006 VSSC (No. 130) entitled 'HELP'. However no help was forthcoming! I was regularly contributing my observations to the database run by GEOS and in 2010 one of their members, Gisela Maintz, suggested that an article by Stellingwerf and Bono might be of help. She sent me a copy, all 67 pages of it, and with the help of a lot of strong black coffee I absorbed all I could of it, although I had to skip the vector maths.

One of the particularly interesting things about this paper is that it is an example of what an astrophysicist does – starting with a hypothesis of the structure and composition of the star and a knowledge of the dynamics and nuclear processes involved, he attempts to calculate the behaviour of the star and the resulting light curves which can then be compared with the observed light curves.

I am showing on pages 15-16, figures 16 and 18 from Stellingwerf and Bono's paper, which are the light curves calculated for the pulsations in the fundamental mode and in the first overtone mode. The models which Bono and Stellingwerf generate all have a fixed mass ($M = 0.65\ M_{\odot}$), and a chemical composition ($Y = 0.299$, $Z = 0.001$). (X, Y and Z are the fractions in mass of Hydrogen, Helium and everything else respectively, so in this case X=0.7) Results were presented for 4 series of models, each at a different luminosity level ($L_{\odot}$= solar luminosity):

Series 2 at $\log L/L_{\odot} = 1.81$
Series 3 at $\log L/L_{\odot} = 1.72$
Series 35 at $\log L/L_{\odot} = 1.61$
Series 4 at $\log L/L_{\odot} = 1.51$

For each series models were generated with the effective temperature, T_e, within the overall range from 5700° K to 8000°K. (The effective temperature is the temperature of a black body with the same luminosity per surface area as the star). M, Y, Z, L, and T_e are apparently the only input parameters required for the computations.

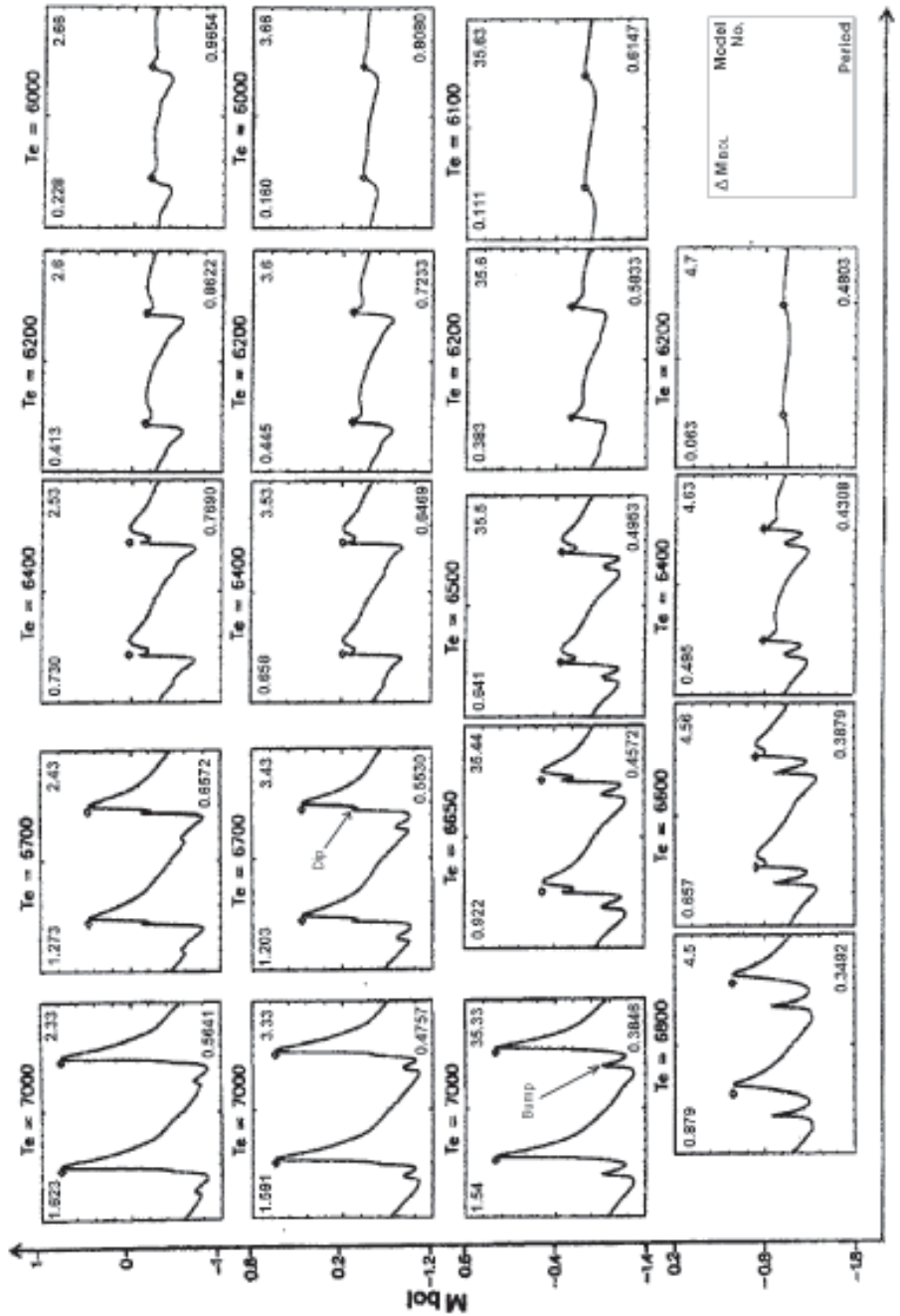
The results are not given for the full range of possibilities, presumably because some combinations would not pulsate. For each series, they tabulate the output results for groups of about 12 models oscillating in the fundamental and for about 12 oscillating in the first overtone, some of which are represented in these light curves. I have shown the amplitude of the oscillation in the top left corner, the period in the bottom right corner, and the model number in the top right corner.

From these little charts it is clear that both the fundamental and first overtone pulsation increase in amplitude with increase in T_e and L, but decrease in period. Also all the fundamentals have a steep rise and slow fall, while only those first overtone with a low L and a high T_e do so - the other first overtone curves are becoming increasingly sinusoidal in shape.

I was able to match up all the light curves I had observed with one of these calculated light curves, or fit them between two adjacent ones, for shape, period and amplitude. However, I was conscious that these fits might not be unique, and there might be other values of M, Y and Z which would also provide a fit from a different set of curves. Model 35.44, fundamental, matched SW Andromedae (although rather exaggerated), Model 3.4, 1st overtone, matched RW Arietis and Model 35.4, 1st overtone, matched SX Ursae Majoris, but note that this model also appears in the fundamental group.

Continued page 15

Figure 11, p.15:
Morphology of the fundamental light curves inside the instability strip for the four series of models at selected temperatures. Each plot shows the bolometric amplitudes for two consecutive periods. Diamonds mark the phase of minimum radius. From Stellingwerf and Bono, Fig. 16.


Te = 7000
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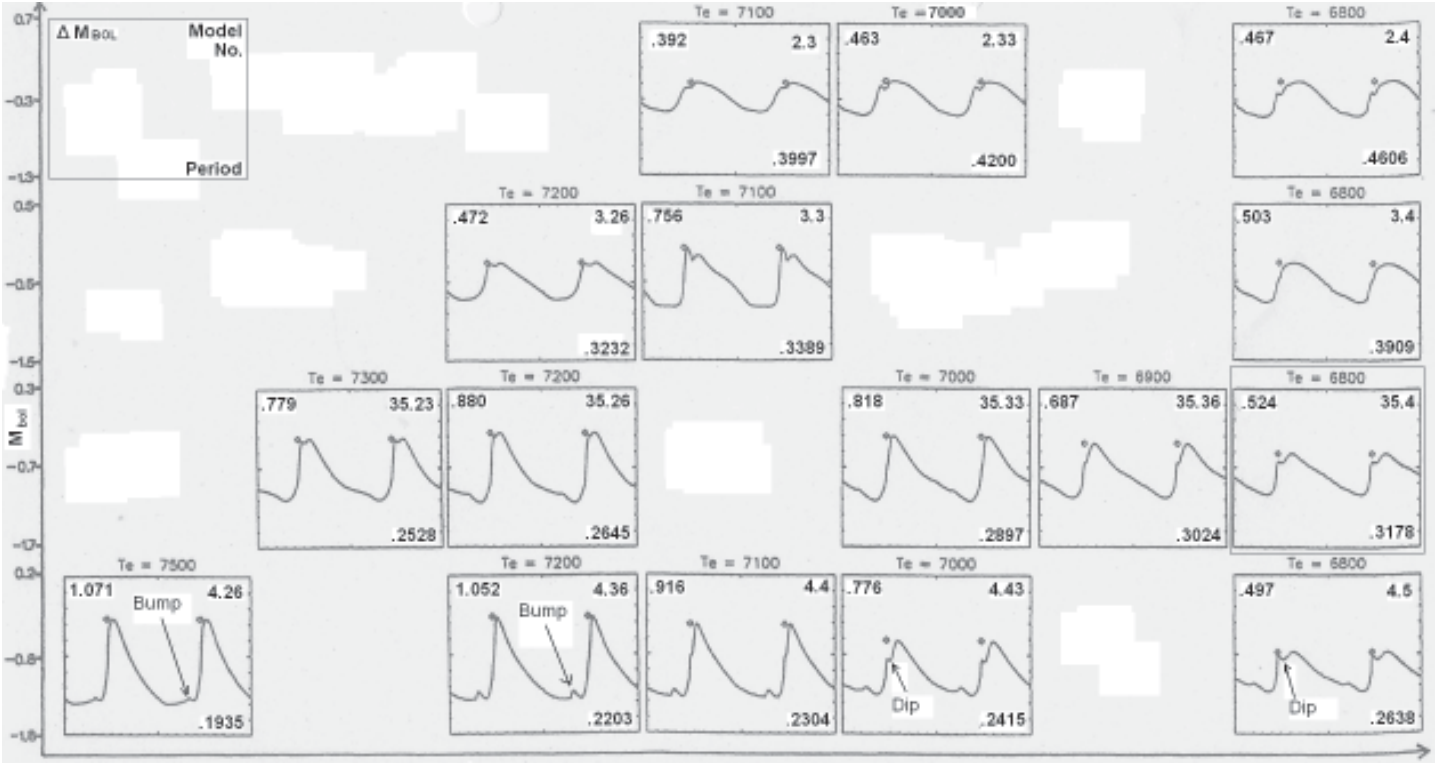
Te = 6800
Te = 6700
Te = 6650
Te = 6600
Te = 6500
Te = 6400
Te = 6200
Te = 6100
Te = 6000
Te = 5000
Bump
Dip
Mbol
Te
ΔMbol
Model No.
Period

Figure 12: Morphology of the first overtone light curves inside the instability strip for the four series of models at selected temperatures. Each plot shows the bolometric amplitudes for two consecutive periods. Diamonds mark the phase of minimum radius. From Stellingwerf and Bono, Fig. 18.



Some of the light curves feature “bumps” and “dips”. The bump occurs just before the minimum of the light curve, which is also the point of maximum compression. The dip occurs partway up the rise creating a “shoulder”, as in SW Andromedae, or at the top creating a double maximum - just like SX Ursae Majoris! On searching through the text I found the following explanations for the bump and dip:

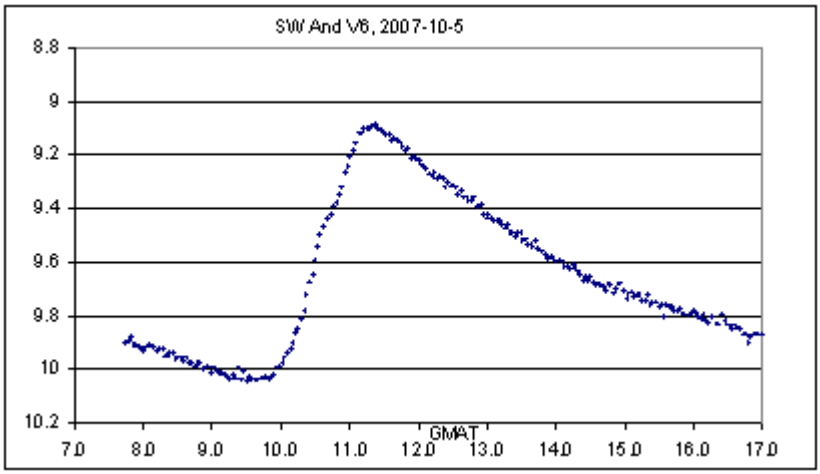
‘In particular, it is clear that the Bump is tightly correlated with a phase during which a shock front reaches the star’s surface, and the outer regions of the envelope stop their contraction and start to expand for a short interval.’

‘The Dip can be easily identified on the rising branch of the light curves shown in Fig 16. This secondary feature is strongly dependent on the efficiency of the convective flux in the ionisation regions close to the phase of maximum compression’. This I found very confusing. However, recently I found that Mr Stellingwerf had a website with an e-mail box in it and so I was able to ask for some help. Back came the answer:

‘In the overtone modes everything is moving more quickly, the gradients are larger, and the main shock caused by the outer layers bouncing on the core each period tends to be stronger than in the fundamental mode. This compression wave tends to increase the temperature as it passes, and also tends to increase the opacity and local turbulence briefly. In some models (and perhaps some stars), this produces a dip either on the rising branch of the light curve, or near maximum light. The timing is such that it can appear near maximum light for some overtone RR Lyrae models.’

So there we have it – the collapsing outer layers, the shock wave bouncing up, the momentary increase in opacity and the dip showing as on the rising branch of SW And

Figure 4: (repeated from ‘B. Pulsation in RR Lyrae Stars’, VSSC No.151)
Light curve for SW Andromedae



(Fig4 , last article) or the double max on SX UMa. Thank you, Bob.
Sadly, we moved from Cornwall a year ago and the telescope remained with the house, so I am now contemplating a small solarscope.

Reference

1. "Pulsation and Instability of RR Lyrae stars" by G.Bono and R.F.Stellingwerf (The Astrophysical Journal Supplement Series, 93:233-269, 1994 July)

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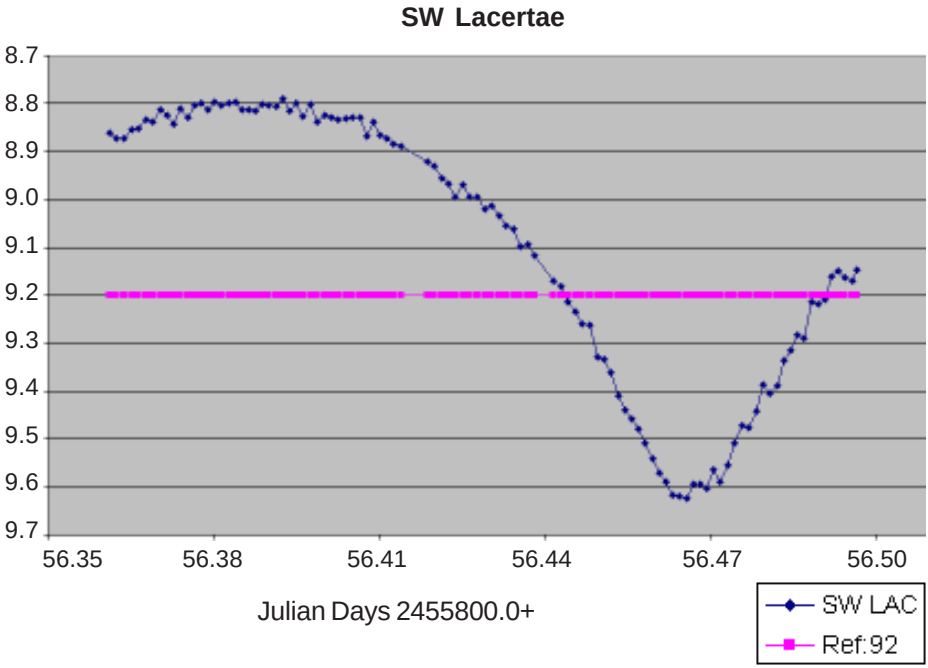
LIGHT CURVE OF THE ECLIPSING CONTACT BINARY, SW LACERTAE.

LAURENT CORP



SW Lac, first discovered by Miss Leavitt in 1918, is the most extreme of the W type W UMa stars. Its light curve is variable with 0.1-0.2 magnitude changes which is thought likely to be caused by star spots. Its orbital period is also variable. It is thought to be a a quadruple system, but that the two smaller bodies have little effect on the light curve or the period, and that the period increase is more likely to be caused by mass transfer from the lesser to the more massive star.

Reference

'Period and light-curve study of the eclipsing contact binary SW Lac'. T. Pribulla, D. Chochol, S. Parimucha, 1999. SAO/NASA Astrophysics Data System

UK NIGHT TIME CLOUD COVER

JOHN TOONE

David Boyd's report on photometric nights in South Oxfordshire during 2005 to 2011 (VSSC 151, Page 27) provides a very similar result to what I earlier reported for Manchester and Shrewsbury (VSSC 150, Page 28). David's overall percentage of nights producing useful photometry is equivalent to my partly clear and clear nights, so the results for the three sites can be compared as follows:

Location	Period	Photometric Nights
Manchester	1975 - 1992	44%
Shrewsbury	1993 - 2010	45%
South Oxfordshire	2005 - 2011	42%

David reports that he mainly undertakes photometry in the evening between onset of darkness and midnight, whereas I strive to observe in both the evening and morning. This may mean that David is not recording a few unexpected photometric opportunities in the morning hours, and might account for the slightly lower percentage reported for South Oxfordshire.

It would be good if we could get data for more sites to see if there is any significant difference in geographical terms. It is advantageous to have a dataset longer than ten years if possible to give a high level of confidence to the figures.

For the above three sites it was also found that springtime was the best season for observing opportunities. Again, it would also be interesting to hear if other locations provide support or otherwise to this finding (so far 2012 is not following the statistical norm in this respect).

In any case I agree with David's conclusion that the UK is not so bad for variable star photometry as is often portrayed. Providing you are flexible and prepared to work on a partly clear night your prospect for photometry would seem to be in the region of 40-45%.

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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	

Updated 7th February 2010, M.T.

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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

2012 Jul 1 Sun
TW Dra.....D22(20)25
TV Cas.....23(27)26D
2012 Jul 2 Mon
AI Dra.....01(02)02D
RZ Cas.....D22(22)25
Z Per.....L22(26)26D
Y Psc.....L23(27)26D
2012 Jul 3 Tue
Z Dra.....01(03)02D
del Lib.....D22(17)23
U Sge.....D22(20)25
TV Cas....D22(22)26D
2012 Jul 4 Wed
RZ Cas.....00(03)02D
SW Cyg.....02(08)02D
RS CVn.....D22(17)23
Z Vul.....D22(19)24
U CrB.....D22(25)26D
2012 Jul 5 Thu
Z Dra.....D22(21)23
S Equ.....D22(23)26D
del Lib.....D22(24)24L
U Cep.....D22(25)26D
Z Per.....23(28)26D
2012 Jul 6 Fri
AI Dra.....D22(21)22
Y Psc.....L23(21)25
U Sge.....23(29)26D
2012 Jul 7 Sat
Z Vul.....00(06)02D
V367 Cyg...24(68)26D
2012 Jul 8 Sun
AI Dra.....01(02)02D
SW Cyg...D22(22)26D
RZ Cas.....D22(22)24
V367Cyg.D22(44)26D
2012 Jul 9 Mon
Z Per.....00(05)02D
V367Cyg.D22(20)26D
Z Dra.....D22(22)25
RZ Cas.....24(26)26D
2012 Jul 10 Tue
TW Dra.....01(06)02D
V367Cyg.D22(<<)26D
del Lib.....D22(16)22
U Cep.....D22(25)26D
2012 Jul 11 Wed
TV Cas.....00(04)02D
RW Tau..L01(04)02D
U CrB....D22(22)26D
Z Vul.....22(27)26D
2012 Jul 12 Thu
X Tri.....01(04)02D
Z Per.....02(06)02D
S Equ.....D22(20)25
AI Dra.....D22(21)22
TV Cas..D22(24)26D
del Lib....D22(24)24L
TW Dra.D22(26)26D
2012 Jul 13 Fri
X Tri.....01(03)02D
U Sge.....D22(23)26D
Z Dra.....D22(24)26D
2012 Jul 14 Sat
X Tri.....00(03)02D
AI Dra.....00(02)02D
RS CVn.....00(07)02L
RW Tau..L01(<<)02D
SS Cet.....L02(05)02D
TV Cas.....D22(19)23
RZ Cas.....D22(21)23
X Tri.....23(26)26D
2012 Jul 15 Sun
TW Dra....D22(21)26
U Cep....D22(25)26D
X Tri.....L23(25)26D
RZ Cas.....23(26)26D
2012 Jul 16 Mon
S Equ.....01(06)02D
Z Vul.....D22(25)26D
X Tri.....L23(25)26D
2012 Jul 17 Tue
SS Cet.....L02(04)02D
del Lib.....D22(16)22
SW Cyg.D22(25)26D
X Tri.....L23(24)26D
Z Dra.....23(26)26D
Y Psc.....24(28)26D
2012 Jul 18 Wed
U CrB.....D22(20)26
AI Dra.....D22(21)22
RS CVn..D22(26)26L
X Tri.....L23(23)26
2012 Jul 19 Thu
S Equ.....D22(17)22
del Lib....D22(24)23L
X Tri.....L23(22)25
2012 Jul 20 Fri
AI Dra.....00(02)02D
TV Cas.....02(06)02D
SS Cet.....L02(03)02D
U Sge.....D22(17)23
RZ Cas.....D22(20)23
U Cep.....D22(24)26D
X Tri.....L22(22)24
2012 Jul 21 Sat
Z Vul.....D22(23)26D
TV Cas....D22(25)26D
Y Psc.....L22(22)26D
X Tri.....L22(21)24
RZ Cas.....23(25)26D
2012 Jul 22 Sun
Z Dra.....01(03)02D
RW Tau.....01(06)02D
U CrB.....01(07)02D
S Equ.....22(27)27D
X Tri.....L22(20)23
2012 Jul 23 Mon
SS Cet.....L02(03)03D
TV Cas.....D21(21)25
RS CVn....D21(21)25L
U Sge.....D21(26)27D
2012 Jul 24 Tue
TW Dra.....02(07)03D
del Lib.....D21(15)22
TX UMa....D21(18)22
AI Dra.....D21(21)22
Z Dra.....D21(21)23
2012 Jul 25 Wed
RW Tau....L00(00)03D
U CrB.....D21(18)24
U Cep.....D21(24)27D
2012 Jul 26 Thu
AI Dra.....00(01)03D
SS Cet.....L01(02)03D
RZ Cas.....D21(20)22
Z Vul.....D21(21)26
del Lib.....D21(23)23L
V367Cyg.D21(59)27D
TW Dra.....22(27)27D
SW Cyg.....22(29)27D
2012 Jul 27 Fri
TX UMa....D21(19)24
V367Cyg..D21(35)27D
RZ Cas.....22(25)27D
2012 Jul 28 Sat
V367Cyg..D21(11)27D
RS CVn.....D21(16)23
Z Dra.....D21(22)25
U CrB.....23(29)27L
2012 Jul 29 Sun
SS Cet.....L01(02)03D
Z Vul.....03(08)03D
V367Cyg.D21(<<)27D
TW Dra...D21(22)27D
S Equ.....D21(24)27D
2012 Jul 30 Mon
AI Dra.....D21(20)22
U Sge.....D21(21)26
TX UMa..D21(21)25L
U Cep.....D21(24)27D
TV Cas.....23(27)27D
2012 Jul 31 Tue
del Lib.....D21(15)21
SW Cyg.....D21(18)24
Z Vul.....D21(19)24
AI Dra.....24(25)27

August

2012 Aug 1 Wed
SS Cet.....L01(01)03D
U CrB.....D21(15)21
TW Dra.....D21(17)22
RZ Cas.....D21(19)22
TV Cas.....D21(22)26
Z Dra.....22(24)27
2012 Aug 2 Thu
Y Psc.....01(06)03D
RW Tau.....03(08)03D
TX UMa..D21(22)25L
del Lib.....D21(23)22L
RZ Cas.....22(24)26
2012 Aug 3 Fri
U Sge.....00(06)03D
Z Vul.....00(06)03D
HU Tau.....L01(<<)01
TV Cas.....D21(18)22
2012 Aug 4 Sat
SS Cet.....L01(00)03D
RZ Cas.....02(05)03D
U Cep.....D21(23)27D
U CrB.....D21(26)26L
RW Tau....L24(26)27D

2012 Aug 5 Sun
HU Tau.....L01(<<)02
SW Cyg.....02(08)03D
Z Vul.....D21(17)22
Z Per.....D21(17)22
AI Dra.....D21(20)22
S Equ.....D21(21)27
TX UMa.D21(24)24L
Y Psc.....D21(24)27D
Z Dra.....23(26)27D

2012 Aug 6 Mon
TX UMa.L03(00)03D
AI Dra.....24(25)26

2012 Aug 7 Tue
RS CVn.....00(07)01L
SS Cet.....L01(00)03D
HU Tau....L01(00)03D
TW Dra.....03(08)03D
RZ Cas.....D21(19)21
Z Vul.....22(28)27D
RW Tau.....L23(20)25

2012 Aug 8 Wed
Z Per.....D21(19)23
Z Dra.....D21(19)21
TX UMa.D21(25)24L
RZ Cas.....21(23)26

2012 Aug 9 Thu
TV Cas.....00(04)03D
HU Tau....L01(01)03D
S Equ.....02(08)03D
TX UMa.L03(01)03D
Y Psc.....D21(18)23
SW Cyg...D21(22)27D
del Lib.....D21(22)22L
U Cep.....D21(23)27D
U Sge.....D21(24)27D
TW Dra.....22(27)27D

2012 Aug 10 Fri
SS Cet.....L00(<<)03D
Z Dra.....01(04)03D
RZ Cas.....02(04)03D
TV Cas....D21(24)27D

2012 Aug 11 Sat
HU Tau....L00(03)03D
Z Per.....D21(20)25
AI Dra.....D21(20)22
U CrB.....D21(24)26L
RS CVn...D21(26)24L
TX UMa....22(27)24L

2012 Aug 12 Sun
TX UMa..L03(03)03D
S Equ.....D21(18)23
TV Cas.....D21(19)23
Z Dra.....D21(21)23
TW Dra...D21(23)27D
Z Vul.....D21(25)27D
AI Dra.....24(25)26

2012 Aug 13 Mon
SS Cet.....L00(<<)03
HU Tau....L00(04)03D
X Tri.....03(05)03D

2012 Aug 14 Tue
X Tri.....02(05)03D
Z Dra.....03(05)03D
Z Per.....D21(21)26
U Cep.....D21(23)27
RZ Cas.....D21(23)25
V367Cyg.D21(49)27D
TX UMa.....24(28)24L

2012 Aug 15 Wed
HU Tau.....01(05)03D
X Tri.....02(04)03D
TX UMa..L02(04)03D
TW Dra.....D20(18)23
V367Cyg.D20(25)27D
RW Tau.....23(28)27D
S Equ.....23(29)27D

2012 Aug 16 Thu
SS Cet.....L00(<<)02
X Tri.....01(03)03D
RZ Cas.....01(04)03D
V367Cyg.D20(01)27D
U Sge.....D20(18)24
RS CVn....D20(21)24L
del Lib.....D20(22)21L
Z Dra.....D20(22)25

2012 Aug 17 Fri
X Tri.....00(03)03D
Y Psc.....03(07)03D
HU Tau.....03(07)03D
V367 Cyg...D20(<<)21
AI Dra.....D20(20)21
Z Per.....D20(23)27
Z Vul.....D20(23)28D
X Tri.....23(26)28D

2012 Aug 18 Sat
TV Cas.....02(06)04D
TX UMa..L02(06)04D
U CrB.....D20(22)25L
SW Cyg....D20(25)28D
RW Tau.....L23(22)27
X Tri.....23(25)28D
AI Dra.....24(25)26
SS Cet.....L24(21)26

2012 Aug 19 Sun
S Equ.....D20(15)20
U Cep.....D20(22)27
TV Cas.....21(25)28D
U Sge.....22(28)28D
X Tri.....22(25)27

2012 Aug 20 Mon
RZ Cas.....D20(22)25
Z Per.....D20(24)28D
Y Psc.....21(25)28D
X Tri.....21(24)26
Z Dra.....22(24)27

2012 Aug 21 Tue
TX UMa.....03(07)04D
RS CVn.....D20(16)22
TV Cas.....D20(21)25
X Tri.....21(23)26
SS Cet.....L24(21)25

2012 Aug 22 Wed
RZ Cas.....01(03)04D
Z Vul.....D20(21)26
S Equ.....D20(26)28D
X Tri.....L20(23)25

2012 Aug 23 Thu
SW Cyg.....D20(15)21
TV Cas.....D20(16)20
AI Dra.....D20(20)21
del Lib.....D20(21)21L
X Tri.....L20(22)24
Z Per.....21(25)28D
TW Dra.....23(28)28D

2012 Aug 24 Fri
Y Psc.....D20(20)24
U Cep.....D20(22)27
X Tri.....L20(21)24
AI Dra.....23(25)26
SS Cet.....L23(20)25
Z Dra.....24(26)28D

2012 Aug 25 Sat
Z Vul.....03(08)04D
U CrB.....D20(19)25L
X Tri.....L20(21)23

2012 Aug 26 Sun
RZ Cas.....D20(22)24
U Sge.....D20(22)27L
TW Dra..D20(24)28D
X Tri.....L20(20)22
Z Per.....22(27)28D

2012 Aug 27 Mon
RW Tau.....01(06)04D
TV Cas.....03(07)04D
Z Vul.....D20(19)24
Z Dra.....D20(19)22
X Tri.....L20(19)22
SW Cyg.....23(29)28D
SS Cet.....L23(19)24

2012 Aug 28 Tue
RZ Cas.....00(02)04D
X Tri.....L20(18)21
TV Cas.....23(27)28D

2012 Aug 29 Wed
U CrB.....00(06)01L
Z Dra.....01(04)04D
X Tri.....D20(18)20
TW Dra.....D20(19)24
AI Dra.....D20(20)21
U Cep.....D20(22)26
S Equ.....D20(22)28L
RW Tau...L22(24)28D
Z Per.....23(28)28D

2012 Aug 30 Thu
Z Vul.....00(06)04L
U Sge.....01(07)03L
del Lib.....D20(21)20L
TV Cas.....D20(22)26
SS Cet.....L23(19)23
AI Dra.....23(25)26

2012 Aug 31 Fri
Z Dra.....D20(21)23

SEPTEMBER

2012 Sep 1 Sat
Z Vul.....D20(17)22
U CrB.....D20(17)23
TV Cas.....D20(18)22
SW Cyg.....D20(19)25
RZ Cas.....D20(21)24
V367Cyg.D20(63)28D
RW Tau.....L22(19)23

2012 Sep 2 Sun
Z Per.....01(05)04D
Z Dra.....03(05)04D
U Sge.....D20(16)22
V367Cyg.D20(39)28D
RZ Cas.....23(26)28D
2012 Sep 3 Mon
V367Cyg.D20(15)28D
U Cep.....D20(21)26
Z Vul.....22(28)28L
2012 Sep 4 Tue
V367Cyg.D20(<<)28D
AI Dra.....D20(20)21
RS CVn....D20(25)23L
Z Dra.....20(23)25
U CrB.....22(28)24L
Y Psc.....22(27)28D
2012 Sep 5 Wed
Z Per.....02(07)04D
TX UMa....D20(15)20
S Equ.....D20(19)25
U Sge.....D20(25)27L
AI Dra.....23(24)26
2012 Sep 6 Thu
SW Cyg.....02(08)04D
Z Vul.....D20(15)20
del Lib.....D20(21)20L
HU Tau.....L23(20)24
TW Dra.....24(29)28D
2012 Sep 7 Fri
TV Cas.....00(04)04D
RW Tau.....03(07)04D
AI Dra.....04(05)04D
RZ Cas.....D19(21)23
2012 Sep 8 Sat
Z Per.....03(08)04D
U CrB.....D19(15)21
TX UMa.....D19(17)21
U Cep.....D19(21)26
Y Psc.....D19(21)26
TV Cas.....20(24)28
Z Vul.....20(25)27L
Z Dra.....22(24)27
HU Tau.....L23(22)25
RZ Cas.....23(25)28
2012 Sep 9 Sun
S Equ.....01(06)03L
RS CVn....D19(21)22L
TW Dra...D19(24)28D
RW Tau.....21(26)28D
2012 Sep 10 Mon
RZ Cas.....04(06)04D
TV Cas.....D19(19)23
AI Dra.....D19(19)21
SW Cyg.....D19(22)28
HU Tau.....L22(23)27
2012 Sep 11 Tue
U Cep.....04(09)04D
Z Dra.....D19(17)20
TX UMa..D19(18)22L
U CrB.....20(26)24L
AI Dra.....23(24)26
2012 Sep 12 Wed
Y Psc.....D19(16)20
S Equ.....D19(16)22
U Sge.....D19(20)25
TW Dra.....D19(20)25
RW Tau.....L21(20)25
HU Tau.....L22(24)28
Z Dra.....24(26)28D
2012 Sep 13 Thu
AI Dra.....04(05)04D
RZ Cas.....D19(20)22
del Lib.....D19(20)19L
U Cep.....D19(21)25
Z Vul.....D19(23)27L
2012 Sep 14 Fri
X Tri.....4(07)04D
RS CVn....D19(16)22L
TX UMa..D19(20)22L
HU Tau...L22(26)28D
RZ Cas.....22(25)27
2012 Sep 15 Sat
X Tri.....04(06)04D
TW Dra.....D19(15)20
Z Dra.....D19(19)22
S Equ.....21(27)26L
U Sge.....23(29)26L
2012 Sep 16 Sun
TV Cas.....02(06)04D
RZ Cas.....03(05)04D
X Tri.....03(05)04D
U Cep.....04(08)04D
AI Dra.....D19(19)21
HU Tau.....23(27)29D
2012 Sep 17 Mon
Z Dra.....01(04)05D
X Tri.....02(05)05D
TX UMa..D19(21)22L
TV Cas.....21(25)29D
AI Dra.....3(24)25
2012 Sep 18 Tue
TX UMa....L00(<<)02
X Tri.....02(04)05D
RW Tau.....05(09)05D
U Cep.....D19(20)25
Z Vul.....D19(21)26
U CrB.....D19(23)23L
2012 Sep 19 Wed
HU Tau.....00(04)05D
X Tri.....01(03)05D
AI Dra.....04(05)05D
U Sge.....D19(14)19
RZ Cas.....D19(19)22
TV Cas D19(21)25
Z Dra.....D19(21)23
SW Cyg.....20(26)29D
Y Psc.....24(28)29D
2012 Sep 20 Thu
X Tri.....00(03)05D
del Lib.....D19(20)19L
TX UMa..D19(23)21L
V367Cyg..D19(53)29D
RZ Cas.....22(24)27
RW Tau.....23(28)29D
X Tri.....24(26)29
TX UMa....L24(23)27
2012 Sep 21 Fri
TW Dra.....01(06)05D
HU Tau.....02(06)05D
Z Dra.....03(06)05D
U Cep.....03(08)05D
TV Cas.....D19(16)20
V367Cyg..D19(29)29D
X Tri.....23(25)28
2012 Sep 22 Sat
RZ Cas.....02(05)05D
V367Cyg..D19(05)29D
AI Dra.....D19(19)20
U Sge.....D19(23)26L
S Equ.....D19(24)26L
X Tri.....22(25)27
2012 Sep 23 Sun
HU Tau.....03(07)05D
V367Cyg...D19(<<)26
Z Per.....D19(15)20
Z Vul.....D19(19)24
U Cep.....D19(20)25
Y Psc.....D19(23)27
TX UMa....19(24)21L
TW Dra.....20(25)29D
RW Tau.....L20(22)27
Z Dra.....20(23)25
X Tri.....22(24)27
AI Dra.....23(24)25
TX UMa.L24(24)29D
2012 Sep 24 Mon
RS CVn..L04(06)05D
SW Cyg.....D19(15)21
X Tri.....21(23)26
2012 Sep 25 Tue
TV Cas.....03(07)05D
AI Dra.....03(05)05D
HU Tau.....05(08)05D
RZ Cas.....D19(19)21
U CrB.....D19(21)23L
X Tri.....20(23)25
2012 Sep 26 Wed
Z Vul.....01(06)02L
U Cep.....03(08)05D
Z Per.....D19(16)21
TW Dra....D19(21)26
X Tri.....19(22)24
RW Tau.....L20(17)21
TX UMa...21(26)21L
RZ Cas.....21(24)26
TV Cas.....23(27)29D
TX UMa.L24(26)29D
2012 Sep 27 Thu
Y Psc.....D19(17)22
X Tri.....19(21)24
Z Dra.....22(24)27
2012 Sep 28 Fri
RZ Cas.....02(04)05D
Z Vul.....D19(17)22
AI Dra.....D19(19)20
U Cep.....D19(20)24
X Tri.....D19(21)23
TV Cas.....D19(22)26
RS CVn.....19(25)21L
SW Cyg.....23(29)29D
2012 Sep 29 Sat
RS CVn..L04(01)05D
TW Dra.....D19(16)21
U Sge.....D19(17)23
Z Per.....D19(18)22
X Tri.....D19(20)22
S Equ.....D19(21)26L
AI Dra.....23(24)25
TX UMa.L23(27)29D
2012 Sep 30 Sun
Z Dra.....D19(18)20
TV Cas.....D19(18)22
X Tri.....D19(19)22
Z Vul.....22(28)26L

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The **deadline for contributions** to the next issue of VSSC (number 153) will be 7th August, 2012. All articles should be sent to the editor (details are given on the back of this issue).

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