Contents

Personal Light Curves - Gary Poyner ........................................ inside front cover
From the Director ........................................................................................................... 1
Recurrent Objects News ................................................................................................. 4
Magnetic CVs .................................................................................................................. 7
AG Draconis .................................................................................................................. 10
V2362 Cygni: a 2006 Nova in Cygnus ................................................................. 12
The Period of RZ Cas in 2005-2006 ................................................................. 14
New Chart for X Per ................................................................................................. 19
Algol: My Favorite Star ............................................................................................. 20
HR Delphini: My Favorite Star ................................................................................ 22
SW Ursa Majoris: My Favorite Star ........................................................................ 23
Possible Eclipsing Binary Star .................................................................................. 23
IBVS ............................................................................................................................. 25
Recent VS Papers Published ..................................................................................... 26
New Chart for R Aquilae .......................................................................................... 27
New Chart for R Aquilae .......................................................................................... 28
Binocular Priority List ................................................................................................. 29
Eclipsing Binary Predictions ...................................................................................... 29
Charges for Section Publications ............................................................................. inside back cover
Guidelines for Contributing to the Circular ............................................................. inside back cover

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Office: Burlington House, Piccadilly, London, W1J 0DU
V482 Cyg: Visual G Poyner
This is a classical RCB star with a visual range of 10.5-15.0. The star has been inactive since the modest fade in 1996, with only minor variations of the order of 0.5 magnitudes. Compare this light curve to that of Z UMi!

CG Cam: Visual G Poyner
Listed in the GCVS as an RCB star with a range of 14.2-15.8, eight years of observations have yet to reveal any RCB type decline.
FROM THE DIRECTOR

ROGER PICKARD

New e-address

I shall be obliged if members would note my new email address of rdp@astronomy.freeserve.co.uk. This change has been forced on me due to continual problems with the University of Kent email system.

New Eclipsing Binary Secretary

I'm very pleased to advise, that following the appeal in the last Circular, Des Loughney has agreed to be our new Eclipsing Binary Secretary. All correspondence relating to these interesting stars should be directed to Des, whose details will now be found on the back page. I'm sure Des will be familiar to most members as he has contributed a number of articles to the Circulars, especially in more recent times. We wish Des every success in his new role.

New Assistant Circulars Editor

I’m also pleased to advise that Janet Simpson has taken on the role of Assistant Circulars Editor. Janet will provide assistance to Karen, but contributors should continue to contact the Circulars Editor in the normal way.

New Mentoring Scheme Administrator

Karen Holland has asked if I might find someone else to administer the VS mentoring scheme that she set up several years ago. I have agreed to take on this role myself, and if anyone therefore feels that they would benefit by being allocated a mentor, for visual, CCD or analytical work, please contact me for more information. Thanks to Karen for setting-up, and running the scheme over the years.

New CCD Target List Co-ordinator

Karen has also asked if I might find someone else to maintain the CCD target list that she initiated several years ago. I am happy to say that Jeremy Shears has agreed to take on this role, and he should now be contacted if you have any ideas or comments regarding this programme. Thanks, once again, to Karen for setting up and administering this programme for the last few years.
Reversed Charts

Thanks to Gary Poyner and Janet Simpson we can now offer the following reversed charts on-line:

Z Cam, T Crb, RZ Cas, Mira Cet, OJ+287 Cnc, NQ Gem, LS And, CH Cyg, BF Cyg, AG Peg

However, as John Toone has pointed out, observers do need to be careful when using telescopes on binocular stars (except where absolutely necessary) as it always introduces a step in the estimates.

Sequences

Again, following my appeal in the last Circular Ian Miller has updated a large number of the Section's sequences, which should allow John Saxton's software to run much more smoothly. There is still much work to do and John Toone and Ian will be working together to complete this task. My thanks to Ian for undertaking this work.

Scanning of Old Circulars

And yet again, following my appeal in the last Circular for help with the preparation of old Circulars for scanning, Peter Little has come forward and has already made a start. Thank you Peter. In connection with this, if anybody has a copy of Circulars 1-12, 14 and 54 that they no longer require, I shall be pleased to receive them.

Also, there is mention in past BAA Journals of Circulars pre-dating our own No.1 published on 1922 March 31. If anybody has any information regarding these I shall again be pleased to hear from them.

Open European Journal on Variable Stars

I'm sure most of you have heard if not used or submitted items to, the OEJV. Recently, there has been a change in editorial policy which means that the OEJV has changed from a non-refereed to a refereed journal. This means that they required an editorial panel and I'm pleased to advise that Gary Poyner has been appointed to that panel.

New Long Term Polar Monitoring Programme

Further to the article by Dr Boriss Gaensicke of Warwick University on page 7 of this Circular, it has been decided to include ALL of the stars listed in a new observing programme Long Term Polar Monitoring.

Although this will be heavily biased towards CCD observers there are a number of objects suitable for visual observers and Gary Poyner has offered the following notes:
**BY Cam** is a very active AM star in the mid 15's range. Hourly variations of up to 0.7 magnitude are observable at times, and low states (to 17th magnitude) are uncommon. Look out for flickering!

**QQ Vul** is fairly bright at 14.5 in the high state. Alert if you suspect the star is fading.

**ST LMi** can sometimes be seen rising above 16th magnitude to occasional 'peaks' to the mid-15's, but these are short term events.

**AN and AR UMa** are possible visual targets with the larger telescope in the mid 16's. **AN UMa** occasionally reaches 15.5

**MR Ser** can usually be seen in the mid 15's.

Gary Poyner has also offered to co-ordinate the programme and so any queries should initially be addressed to him.

Thanks again to Gary for preparing the following sequence information.

AAVSO charts already exist for the following stars:

<table>
<thead>
<tr>
<th>Star</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>BY Cam</td>
<td>Henden</td>
</tr>
<tr>
<td>ST LMi</td>
<td>Henden/Sumner</td>
</tr>
<tr>
<td>MR Ser</td>
<td>Henden/Price</td>
</tr>
<tr>
<td>QQ Vul</td>
<td>Henden/Price</td>
</tr>
<tr>
<td>AN UMa</td>
<td>Stanton</td>
</tr>
<tr>
<td>AR UMa</td>
<td>Tycho &amp; Henden</td>
</tr>
<tr>
<td>EU UMa</td>
<td>Henden/Sumner</td>
</tr>
</tbody>
</table>

And Mike Simonsen has produced a chart for SDSSJ0155 Cet from a Henden sequence.

This means we will need charts and sequences for:-

RXJ1554.2+2721 CrB
V884 Her
GG Leo
DP Leo
V2301 Oph
V1309 Ori
1RXSJ161008+035222 Ser
AL Tri
SDSSJ121209+013627 Vir

Dr Arne Henden has been approached and has offered assistance but it will take some time for suitable charts to be prepared. The Director has obtained data for three of these stars, but more may be necessary before a reliable sequence can be produced.

CCD images should still be taken of these stars as there is no reason why monitoring of the fields can't begin immediately. Photometry can always be reduced at a later date once a chart and sequence are available.

I do hope observers rise to this challenge and I strongly urge you to thoroughly read Boris's article - especially the final paragraph.
V337 Cyg

The first ever superoutburst of this object was observed during May 2006. V337 Cyg was first detected by Jeremy Shears on May 21.04UT at 15.8C, rising to 15.2C by May 22.15 before declining to 17.0C by June 3.187. The Bradford Robotic Telescope (BRT) CCD measures helped Shears and Poyner in monitoring the fade of V337 Cyg, as poor weather limited observing opportunities. David Boyd obtained a superhump period of 0.0702 +/- 0.0003d following a combined 13.1 hour times series run. Boyd also finally confirmed the position of V337 Cyg as RA 19 59 52.93 +/- 0.10, Dec +39 13 59.94 +/- 0.10 (J2000). The position of V337 Cyg had been the topic of much debate in the past.

RZ Leo

A rare outburst of this suspected UGWZ star was detected on May 27.46 by Stephen Kerr (USA) at magnitude 12.5, the first detected outburst since December 20th 2000. G. Poyner, using the BRT, was able to follow the decline to June 11th when RZ Leo had faded to 15.83C. The field was then lost in the evening twilight sky. Ian Miller (Swansea) obtained a two hour unfiltered CCD run on May 30th resulting in the the light curve shown in Figure 1. A superhump profile can be clearly seen, but a curious peak on the ascending branch of the light curve still requires explanation. Extended time series observations were difficult due to the field being low in the western sky during the evening.

Figure 1: Light Curve of RZ Leo obtained by Ian Miller, unfiltered CCD
Figure 2: RZ Leo at magnitude 13.7C taken with the BRT on Jun 4.008UT. G. Poyner

V1316 Cyg

This enigmatic UG star was finally observed in superoutburst – the first to be detected. The outburst was detected by David Boyd on Jun 7.92 at 15.9C, peaked on June 9.91 at 14.94C, and by June 21 V1316 Cyg was back at quiescence at 17.1C. Time-series photometry by Boyd on June 9 running over 4 hours, revealed a superhump amplitude of 0.5 magnitudes, with a Psh of 0.0769d. A paper co-authored by Boyd, Shears and Poyner on unusual short period outbursts in V1316 Cyg has been accepted for publication in the BAAJ, and a preprint can be seen at http://arxiv.org/abs/astro-ph/0605284

Campaign to Observe V1316 Cyg

The authors of the aforementioned paper on V1316 Cyg would like to invite observers, both visual and CCD to take part in an observing campaign to monitor V1316 Cyg over the next few years. The aims are as follows:

- Are the brief outbursts we have observed in 2005-2006 still occurring, or were they precursor phenomenon to the most recent superoutburst?
- Do the brief outbursts continue as before unaltered, or will the cycle/amplitude be changed because of the superoutburst?
- Will V1316 Cyg undergo more superoutbursts, normal type outbursts or return to the brief outbursts?"
Historically V1316 Cyg was often misidentified in the field. There is a bright field star (‘148’ on the AAVSO chart and unmarked on the BAA chart) nearby, which is itself variable. Please make sure you are using the latest BAAVSS or AAVSO charts to observe this star.

Other notable outbursts include the well-documented outburst of RS Oph in February, V589 Her in March and June, KV Dra in April, CP Dra in January and June, GO Com in March and June. BZ UMa once again entered outburst in June, just six months following the previous outburst in December 2005. Despite extensive CCD time series photometry undertaken by many observers worldwide, superhumps have still not shown themselves. BZ UMa remains an enigma.

**Changes to the programme**

Four stars have been dropped from the ROP with no additions during this review. These four stars will remain on the Telescopic Programme, and regular monitoring should continue. The stars dropped are:

**GO Com**

With two outbursts this year (see above) and eleven detected in total since 1995, this is now a well-established UGSU star, with a measured superhump period of 0.06327d (VSNET). GO Com remains a most interesting star for further monitoring, especially those infrequent superoutbursts.

**CP Dra**

This confirmed UGSU star has a measured superhump period (0.08473d, Vanunster), and has been detected in outburst four times since January 2005 during February and August 2005 and January and June 2006. In total seven outbursts have been detected since the star was added to the ROP in 2002.

**V589 Her**

The superhump period was measured in 2003 by T. Vanmunster as 0.0947d, which suggests that V589 Her is a period gap UGSU star. There have been two outbursts detected so far this year (see above), and ten since 1999.

**BZ UMa**

There have been twenty outbursts detected since 1991, with two this year. This is a high profile star with Pro-Am and various observing campaigns. Superoutbursts are still elusive (if in fact this is a UGSU star), with speculation that BZ UMa may well be an IP. Certainly nightly coverage should continue, but BZ UMa no longer meets ROP criteria.

Suggestions are always welcome for new additions to the ROP. Basically objects should be poorly studied, and have a recurrence period of greater than one year, although this is very often difficult to determine if the star hasn’t been observed.
In 1924 M. Wolf published a short notice in Astronomische Nachrichten announcing the discovery of a new variable star in the constellation Hercules, which much later received the GCVS name AM Herculis. In the many decades that followed, AM Her remained a Sleeping Beauty. Only in the early days of X-ray astronomy, did AM Her again attract attention, as it turned out to be the optical counterpart of the bright X-ray source 3U 1809+50 detected with the Uhuru satellite. Strong flickering observed both at optical and X-ray wavelengths led to the suggestion that AM Her is a cataclysmic variable (CV) of the U Geminorum type. A little later, the detection of linearly and circularly polarised light from AM Her (Tapia 1976, IAU Circ 2984, 2987, 2994) uncovered the so far unique nature of this star: a CV containing a strongly magnetised white dwarf. It is because of the strong polarisation found in AM Her and similar stars that they were dubbed “polars”.

The vast majority of CVs are made up of a non-magnetic white dwarf and a main-sequence donor. The material lost from the donor forms an accretion disc around the white dwarf, slowly spiralling inwards, and it is these discs that are the source of the dwarf nova outbursts that attract a great deal of attention by visual observers. In polars, the strong magnetic field of the white dwarf, typically exceeding 1000 Tesla and reaching 20000 Tesla in AR UMa, results in a number of fundamental differences. Firstly, the magnetic field keeps the rotation of the white dwarf synchronised with the orbital period of the binary star. In other words, the same hemisphere of the white dwarf always faces the donor star (in dwarf novae, or the weakly intermediate polars, the period of the white dwarf rotation is much shorter than the orbital period). Secondly, the strong field suppresses the formation of an accretion disc. Instead, the material lost from the donor star locks on to the magnetic field lines, and impacts near the magnetic poles of the white dwarf (see Figure 1). It is in those impact regions that the accreting matter is heated to about 100 million degrees, and produces both the observed strong X-ray emission and the polarised optical and infrared light.

The absence of an accretion disc has a very important consequence: polars do not exhibit dwarf nova outbursts. However, they do exhibit long-term variability, typically with an amplitude of 2 to 3 magnitudes. The best-documented case of this variability is the prototype AM Herculis itself (see Figure 2). The light curve of AM Her shows that the system moves between low states (V=15) and high states (V=12.5-13), but can spend some amount of time at any intermediate level. The timescales on which the system switches from one state into the other varies dramatically, some transitions occur in a few days, i.e. the short high state near JD=2448900, and the short low state near JD=2449100, or gradually over months, as the decline from a high state to a low state at JD=2448400. The only possible explanation for this variability is that the mass transfer from the donor star undergoes large variations. In fact, during the low state, the mass transfer decreases to a trickle, or may even cease totally, and AM Her looks very much like a detached white dwarf plus a main sequence binary. The exact cause of these mass transfer variations are still unknown, but most likely they are due to stellar activity on the donor star, possibly the coming and going of star spots that temporarily
cover the inner Lagrange point, i.e. the point of the donor star that is closest to the white dwarf, and through which the donor loses material onto the white dwarf (e.g. Livio & Pringle 1994, ApJ 427, 956).

In non-magnetic CVs such as dwarf novae, and the high-mass transfer novalike variables, the donor stars are likely to undergo similar changes in stellar activity, modulating the rate at which material is dumped towards the white dwarf. However, in the non-magnetic systems, the accretion disc acts as a buffer, largely smoothing out any variation in the rate at which material is supplied to the disc. Only a few dwarf novae are known to exhibit “low states”, i.e. phases where they are substantially fainter than their normal quiescent level, examples are HT Cas, and RX And. It is, however, likely that some of the variations in the outburst activity that we see in dwarf novae are related to changes in the mass transfer rate from the donor.

![Figure 1, Diagram of a polar](image.png)

**Figure 1, Diagram of a polar, showing how the material lost from the donor star locks on to the magnetic field lines, and impacts near the magnetic poles of the white dwarf. Thanks to Gavin Williams who produced this figure, and gave permission for it to be reproduced here.**

As the hallmark of polars is strong X-ray emission, satellite missions such as ROSAT and EUVE have discovered a large number of new polars, with the total number of known AM Her stars being close to 100. As mentioned, the only polar with a well-documented optical light curve covering several decades is AM Her itself, for a simple reason: it is the only polar which even during the low state is visible to visual observers. For all other polars, knowledge of their long-term variability is very poor, but the little data that is available suggests that the systems display a huge variety of variability. Just to name two examples: EF Eri has been found during all pointed observations by ground or space-based observatories in a high state for nearly twenty years, until, in the mid-nineties, it plunged into a deep low state, in which it remained until early this year! QQ Vul, in contrast, has, to my knowledge, never been found in a deep low state where accretion activity dropped close to zero.

With the advent of sensitive and relatively cheap CCD cameras, a large number of observers are now in the position to detect a few dozen polars even in their low states. However, so far the interest in these stars has remained very feeble. It would be of great scientific interest if more CCD observers would add polars to their regular monitoring targets, so that within a few years high-quality light curves such as that of AM Her would be the norm, rather than the exception, for a substantial number of the known
polars. Only at that point would we have a chance to cast some light on the activity cycles of their donor stars, which is an important task for our general understanding not only of polars, but of CVs in general.
AG DRACONIS
MELVYN TAYLOR

James Kaler in his book “The 100 Greatest Stars” described AG Dra as an “unusual erupting symbiotic”. As a circumpolar variable for UK observers this binary was seen recently to be active, and during July 2006 it had an outburst. Raw light estimates of The Astronomer and VSS observers; Chris Allen, Len Brundle, Guy Hurst, Tony Markham, Gary Poyner and Jonathan Shanklin are shown in the light curve of this brightening (see Figure 1 below). The star rose from the start of July by about one magnitude to a mean value of 8.8 on 2006 July 25. Normally at minimum the star shows semi-periodic variations around visual magnitude 10.1 to 9.7 but it has been recorded in a very long active state for five years in 1981 to 1986 attaining magnitude 8.2.

The star is at RA 16h 02m Dec.N 66° 48’ (2000) and has a catalogued period of 554 days; the VSS chart sequence number is 080.02, and a copy of the chart is shown opposite.

Figure 1: Observations of AG Draconis during 2005-2006
V2362 CYGNI: A 2006 NOVA IN CYGNUS

GUY HURST

This nova was discovered by H. Nishimura of Japan and first recorded on 2006 April 2.807UT with a 200-mm telephoto lens on Kodak T-Max 400 film at magnitude 10.5. It is located at: RA 21h 11m 32s DEC +44°48′02″ (equinox 2000.0). Richard Miles confirmed the object on April 4.995UT and obtained a V value of magnitude 8.5. K. Kinugasa, Gunma Astronomical Observatory, used a 1.5-m telescope around April 5.8UT to obtain a spectrum confirming it was a classical nova.

The chart in Figure 1 shows stars to about magnitude 14 and the sequence in the table is from V measures by Richard Miles and David Boyd.

At the time of writing, the light curve (Figure 2) is based on the compilation of 97 estimates reported by observers from ‘The Astronomer’, BAA and also some V-measures by Japanese observers, primarily K. Nakajima and H. Maehara listed on the VSNET newsgroup. During the latest 50 days plotted, the decline has virtually stopped.

Figure 1: Sequence (V measures) of V2362 Cygni
BAAVSS reference for this sequence: N/051.01
near magnitude 12 so, coupled with Cygnus now being well placed, this presents an excellent opportunity for more people to monitor the next stage in this nova’s activity.

A regularly-updated light curve is being maintained on the website of ‘The Astronomer’ to act as feedback to observers and can be found at: http://www.theastronomer.org/vars/2006/V2362CygLC.gif

Please send monthly reports, preferably by e-mail, quoting dates, times, full estimate, magnitude, class and instrument, together with your full names to guy@tahq.demon.co.uk.

Figure 2: Current light curve based on 97 observations
THE PERIOD OF RZ CAS IN 2005/2006

DES LOUGHEY, JANET SIMPSON, MELVYN TAYLOR

Introduction

RZ Cas is seen as an easy eclipsing binary for binoculars, having fairly deep eclipses which last just under five hours; it is also as a good practice object for visual observers [1]. The elements of the system are given within the ‘Atlas of O-C Diagrams of Eclipsing Binary Stars’ [2]. The standard period is stated as 1.1952498 days (1993) with the most recent determined period being 1.1952578 days (2002).

Fortuitous weather conditions allowed an unusually large number of eclipses to be observed within a sixth month period, which we report on in this article.

19 eclipses were observed between the 5th November 2005 and 4th May 2006 by D Loughney, J Simpson and M Taylor. Three separate observations were made of the eclipse on 2/3/06. Two estimations were made on 6/12/05 and 24/12/05. 19 estimations were made of the time of mid-eclipse. It is submitted that the slow rate of change of the period allows either the 19 midpoints to be considered as virtually simultaneous, or to be divided into two groups of 10 in 2005 and 9 in 2006. The observed times of mid eclipse were compared with the predicted times of mid-eclipse according to the elements stated in [2].

These observations suggest that the period has not increased significantly since 2002.

Observations

All observations, by experienced observers, were made with binoculars using the guidelines of the BAA Handbook [3] and the Webb Society Handbook [1]. Observations were made in Edinburgh (DL), Argyll (JS) and Wakefield (MT).

It is not possible to list here all the observations made during the 19 eclipses. However, the data is available, for those interested, from DL.

Figure 1 shows a plot of the observations made on 24/11/05. The horizontal axis is hours. On this date the light curve was symmetrical. This symmetry has been seen in professional photometric studies [4] and [5]. On these occasions the mid-point of the eclipse was fairly easy to estimate by the bisected chord method. On other occasions the light curves showed features which made it seem less symmetrical. An example is the light curve of 12th February 2006 (Figure 2). This asymmetry is referred to in the literature [5]. RZ Cas can have both partial and ‘total’ eclipses. The primary is a delta Scuti type pulsator [6]. There may be star spots on the secondary star and a hot spot on the accretion disc [7]. Star spots can cover a significant proportion of the surface of the cooler star in an Algol type binary such RZ Cas [10]. The brightness variations due to cool star spots can only be seen during primary eclipses when the hotter star is hidden. It is possible that the variations in the eclipse light curve of RZ Cas seen by observers may be due to star spots.
These features, when they are present, make it quite difficult to accurately estimate the time of mid eclipse.

The same eclipse was recorded by all three observers on 2nd March 2006 and two observers on 6/12/05 and 24/12/05. The estimated mid-points varied by six minutes and by one minute in the last two. It is suggested that this level of error is likely in all the 19 estimations. Nevertheless it is possible that many errors will not be systematic and will be minimised by the use of 19 estimations (and three observers).

**Estimated mid-eclipses**

Table 1 presents the results of the observations. Heliocentric Julian Dates were calculated using the web site: [http://www.physics.sfasu.edu/astro/javascript/hjd.html](http://www.physics.sfasu.edu/astro/javascript/hjd.html).

The column entitled KR1 (days) represents the difference between the predicted time of mid-eclipse according to the 1993 elements quoted in [2] and the observed time. The HJD of the element was subtracted from the HJD of the mid-eclipse. The product of this
was divided by the period of the element. The result gave the number of periods that
had occurred since the HJD of the element. The result would be just over or just under
an exact period, and this amount over or under the exact period was multiplied by the
period, to convert the difference into a proportion of a day. Thus, on the 5/11/05 the
difference between the observed and calculated eclipse was plus 0.02 days or 29 min-
utes.

The column KR2 (days) represents the difference between the predicted times of mid-
eclipse according to the 2002 elements quoted in [2] and the observed times. Using the
same procedure described in the previous paragraph, the difference was minus 0.002
days on 5/11/05. The mid-eclipse was apparently 3 minutes earlier than the time pre-
dicted by the 2002 elements.

Period Change - 1993 Elements

The average of the observed/calculated times of the 19 mid-eclipses in the column KR1
is 0.0216 days or 31 minutes in relation to the 1993 elements.
The Atlas of O-C Diagrams of Eclipsing Binary Stars [2] has an O-C diagram for RZ Cas based on the 1993 elements. It shows an upward trend or increasing period since about 1990. If that trend is extrapolated to 2005/2006 it suggests a value around 0.02 days.

<table>
<thead>
<tr>
<th>Observer</th>
<th>Date</th>
<th>UT of mideclipse (hrs/ mins)</th>
<th>Heliocentric JD</th>
<th>KR1 (days)</th>
<th>KR2 (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL</td>
<td>5/11/05</td>
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Table 1

The Atlas of O-C Diagrams of Eclipsing Binary Stars [2] has an O-C diagram for RZ Cas based on the 1993 elements. It shows an upward trend or increasing period since about 1990. If that trend is extrapolated to 2005/2006 it suggests a value around 0.02 days.

**Period Change - 2002 Elements**

The average of the observed/calculated times of the 19 mid-eclipses in the column KR2 is plus 0.00043 days, or plus one minute and two seconds. This implies that the period has not changed since 2002.

If the rate of change of the period between 1993 and 2002 had continued until 2006, one can calculate that rather than plus one minute and two seconds the difference between observed and calculated should be plus 7 minutes. If the rate of change had continued then it would just be picked up by visual observation.

If the KR2 results are divided into those of 2005 and those of 2006 then the difference between observed and calculated becomes plus 0.00064 days (or 55 seconds) in 2005. This implies the period has not changed. However, the 2006 results have an average difference of minus 0.00161 (2 minutes 19 seconds). Apparently there has been a period
change. The trend that has existed since 1990 may have been reversed and the period is now decreasing. We clearly cannot be confident about this as the times involved are so near to, or within the margins of error.

**Professional Estimations in 2005**

We were able to find two professional timings of mid-eclipse which date from March 2005. The first was at HJD 53431.6769 (8). Using the elements described in the previous two sections the difference between observed and calculated times are 0.021 days and 0.002 days.

The other observation was made on HJD 53454.3881 (9). The difference between observed time and calculated time is 0.023 days and 0.0032 days.

These professional photometric estimates are broadly consistent with our observations.

It will be noted that the difference between these two estimates of the eclipse midpoints (0.023 and 0.021 days), separated by 23 days, is about 3 minutes (compared with the 1993 elements). This suggests that the variations in our observations may not just be a product of errors inherent in visual observations.

**Conclusion**

19 estimates of the mid-eclipse timings of RZ Cas in 2005/2006, based on visual observations through binoculars, suggest that the period has not changed since 2002. There is a possibility that the period has changed in 2006 and is decreasing. Hopefully photometric estimates will in due course shed light on this possibility.

**References**

4 IBVS 4509 (1997) ‘BVRI Observations of an eclipse of RZ Cas’;
5 IBVS 4738 (1999) ‘CCD Light Curves and Minima Times of the Eclipsing Binary RZ Cas’;
NEW CHART
JOHN TOONE

CHART: T 5.0 B 6.3 BAA VSS
BOREALIS W 5.5 Z 6.6 EPOCH: 2000
SEQUENCE: Y 5.8 D 6.9 DRAWN: JT 12-04-04
Z PICKARD, A 6.2 APPROVED: RDP
OTHERS TYCHO 2 VJ

X PERSEI 03h 55m 23.1s +31° 02'45" (2000)

277.01 9° FIELD DIRECT
ALGOL - MY FAVOURITE STAR

Melvyn Taylor

Algol is located at right ascension 03h 08m 10s, declination +40 degrees 57' 21" (epoch 2000), about 29 pc distant. Its visual magnitude varies from 2.1 to 3.4 magnitudes in a period of 2.867328 days. The secondary eclipse is only 0.07 magnitude in depth, and so is only measurable by instrumental methods, not with the human eye. Normally at a brightness of visual magnitude 2.1, its light takes about 5 hours to fade, then in another 5 hours the usual state is attained. For backyard observers the brightness changes are quite dramatic some 3 hours before and after the faintest phase. This was one of the first stellar objects that grabbed the attention of a novice Taylor observer.

Attempts at understanding magnitudes, brightness factors and the “numbers” were initially done for checking meteor magnitudes, but once nova HR Delphini (see page 22 for My favorite star - HR Delphini article) had captivated this observer, variable stars became a real interest, and Algol was, and still is a favourite. Observers watching for Perseid meteors over the night of August 11/12 may care to follow Algol as its light slowly “winks” to about 03h UT on that morning. Observations of the star made at 10 to 15 minute intervals can be fitted in to other observational programmes.

The mythology around this object meant that not only modern folk could appreciate the brightness changes, but that it was seen ages ago, the lure a connection with ancient observers. Algol has had curious names in history, to the Hebrews it was Satan’s Head, and some star maps have named it The Spectre’s Head. Over the centuries it has been cast in a sinister and dangerous light. The name Algol derives from the Arabic Al Ra’s al Ghul or the Demon’s Head, the head of Medusa which Perseus encountered in his infamous exploits. Whilst some historians believe the variations were seen by Arabic observers (or even Chinese), the discovery is normally attributed to G. Montanari, professor at The University of Bologna in 1667.

John Goodricke and Edward Pigott in York made the original brightness estimates of its variations. Their independently made observations from November and December of 1782, suggested a number of common factors about the nature of the variability of the star. Its minimum brightness was always the same, the shape of the minimum light curve was symmetrical, and the duration between fadings was constant. The physical explanation of the eclipse of one star, in orbit by another, darker star. The vogue among astronomers of the day for stellar variability seems to have been star spots, since those on the Sun had been known about from the early 1600s. However the two friends may have been influenced by the fairly novel idea of orbiting bodies such as double stars, and they saw in Algol a star being eclipsed by a darker body. Uranus had only been discovered by William Herschel in 1781.

Goodricke was born on the 17th September 1764. He was a deaf mute from birth until his death on the 20th April 1786, and was buried at Hunsingore, near Ribston Hall, North Yorkshire. The family lived partly in England, and in the low countries, notably Holland, but at some time settled in this area of Yorkshire. The Goodricke family in York apparently lived in the Treasurer’s house to the north-east of the Minster (see Figure 1 for image of plaque attached to the house). There is the possibility that he made observations from a vantage point of the Treasurers’ House. Much of his early learning was done at a
special school in Edinburgh, which was run for the benefit of wealthy parents who wanted the best specialist education for their children. In York 1781 he started writing his astronomical journals, and during this time he became friends with Edward Pigott, another young observer of the stars. It seems Pigott’s father owned a local observatory, and together with Goodricke they made carefully timed observations of Algol.

The 1783 May edition of the Philosophical Journal of the Royal Society, contained several items from Goodricke’s journals, and a paper about the “Light Variation of the star Algol” appeared. The interest that Goodricke had in clocks came to the fore with a paper in his journal titled “Of the Going of My Clock”, in which he notes referring his clock to that of the nearby York Minster. In 1783 he was awarded the Gold Medal of the Royal Society, for his remarkable work about the development of stellar processes, and was made a fellow of the Royal Society in February 1786.

The time interval of primary minima, the period of rotation of the twin star system, varies slightly. This is the result of dynamical interactions between the stars, which alters masses, energy levels, and as a consequence the orbit. One of the reasons eclipsing binaries are followed is to check on the period changes. In 1991, there was a paper in the British Astronomical Association Journal, number 101, page 3, showing an ephemeris which was derived from 95 visual timings, (with errors), of Algol’s primary eclipse, between 1972 and 1990, which was about 0.8h earlier than that given in the 2006 British Astronomical Association Handbook. The current ephemeris used is based on Julian Date 2452207.684 + 2.867328d.e issued by the Jagiellonian University, Krakow.

Figure 1: Plaque attached to Garden Wall of Treasurer’s house

Figure 2: A Taylor plot of a recently observed minimum is from observations made on the 29th November 2005.
When it was suggested that observers might like to contribute a short article to the Section Circulars on the above subject, I racked my brains and eventually came up with the very first nova I ever observed, which was, by coincidence, one of the most interesting novae of the 20th century, and which I have been observing ever since (a period of 39 years). It is one of the few variables on my original list which I observe to this day.

I joined the British Astronomical Association in 1966 after acquiring a 200mm Fullerscopes Newtonian, and commenced ‘serious’ observing (by which I mean submitting observations to the British Astronomical Association) at once. However I had been interested in astronomy for many years even then, serving my apprenticeship in seeking out Struve objects with a 2.1 inch refractor. Ownership of a decent sized telescope opened up a wide field of observing, including comets, which led directly to the eventual obsession with variable stars. In this I received much encouragement from the then new magazine The Casual Astronomer, which soon became The Astronomer, and also from John Isles.

In 1967 July George Alcock discovered a nova in Delphinus. Alerted by a British Astronomical Association Circular, my first observation was on the evening of July 17th, with Delphinus high in the sky, when I made it magnitude 6.0. It soon became evident that this was not a ‘normal’ nova. Over the next month it slowly increased to around magnitude 4.7, where it seemed to reach a plateau lasting to just before my birthday in early December, by which time it was becoming rather low in the sky. There then appeared to be a further slight brightening to 4.5 magnitude. But on December 14th an early Christmas present arrived, the nova shone brightly at around magnitude 3.6. Well, I say it shone brightly - actually I was lucky enough to catch a tantalising glimpse in a break in the clouds of an almost totally overcast night. Was it a reliable observation? I noted it as ‘class 3’, but the peak was confirmed in the next issue of TA.

Delphinus is not that easy to observe in January and February, and the number of estimates I managed dropped off; furthermore, because of conditions (twilight, low elevation etc.) the results show considerable scatter, but by January 6th I made it magnitude 5.8 - on the way down at last, I assumed. But by March it staged a comeback and rose again to magnitude 5.0, and by May 4th I made it magnitude 4.5. What would it do next? Well, what it did at last, was to show a more conventional nova-like rapid decline followed by a more conventional slow decline, and by September 1969 it required a telescope to follow it.

The object was given the designation HR Delphini, and classified as a type NB slow nova. It remains on the Variable Star Section programme, and I continue to observe it whenever possible. At declination 19 degrees 10’ north it is a nicely placed object, very easy to find, with what appear to be some decent comparison stars in the same field. It seems from my estimates to be varying between about 11.8 and 12.2 magnitude, although Sky Catalogue 2000 lists it at magnitude 12.38 visual. Perhaps the comparison star magnitudes are out.

I do not expect I’ll be around if and when it ‘goes off’ again, and perhaps my sanity should be questioned for continuing to observe it. But it seems like an old friend to me, and was far more interesting than my second nova, Nova Vulpeculae 1968 (another Alcock object, I believe).
POSSIBLE ECLIPSING BINARY STAR

ALEX VINCENT

The star HD 221670 in Cassiopeia [1] is an eclipsing binary star some five degrees north of Beta Cassiopeiae. It is possible that it is an eclipsing binary. Its magnitude at maximum is 7.36; its right ascension is 23 hours 33.6 minutes, and declination is +60 degrees 28 minutes (2000.0). It is very close to the 7.18 magnitude star HD 221639, which can be used as a comparison star.

The last dates of possible eclipses were on May 10th 1994, December 7th 1995, July 5th 1997, February 1st 1999, August 30th 2000, March 29th 2002, October 26th 2003 and May 24th 2005. It seems to have a period of about 576 days, so the next minimum is due on or around the 21st December 2006. The dates are accurate to a few days and the duration of the eclipse could last several days, and so observations should be made between December 5th and the January 6th.

The amplitude may be very small, probably less than 0.5 magnitude. On observations made by the author during August 2000, he estimated a fade of about 0.5, which also showed on photographs he had taken. These were submitted to the British Astronomical Associations’ Variable Star Section archives. Photometry was attempted, but errors of around 0.5 magnitude prevented the eclipse from showing. This means that either the amplitude is too small to be seen visually or photographically; no eclipse took place at the time; or the star doesn’t eclipse at all. Nightly, but not continuous, PEP and other measurements, may be needed at the next predicted minimum in December to detect any fade. A finder chart, for the purpose of locating the star is given on the next page in Figure 1.

References


SW URSAE MAJORIS - MY FAVORITE STAR

ROBERT PATERSON

I can think of many stars that are pleasing to observe. For instance, R Andromedae or Chi Cygni with their great magnitude ranges, their ‘disappearing’ at minimum and then their re-emerging from the black of the night sky as they rise to maximum, becoming bright and red are elegant. They are a bit like old friends as they turn up in the sky! Or AB Draconis, with its frequent outbursts, is, to me, a satisfying star to follow. But SW Ursae Majoris must rank as “favourite”. I can’t see it at minimum, using the 32 cm reflector, and its bright and relatively short lived maxima are so infrequent that when I do “catch” one I am overjoyed! It is quite possible, given the various adversities of observing in the UK, not to see anything at its position for years! And then, one night, there it is, bright and splendid. That is such a delight and surprise that I have to be careful not to fall off the observing ladder in my jubilation!
Figure 1: Finder Chart showing position of HD221670, for the purpose of locating the star only
New times of minima of some eclipsing binary stars (Bakis et al, 2005)
Unsuccessful optical search for the 0.006223HZ pulsar frequency from the X ray binary MX0656-072 (Bartolini et al, 2006)
TT Ari: Out from the positive superhump state (Andronov et al, 2005)
Search for photometric eclipses of the runaway star 9 Sge (Barannikov, 2005)
On the distribution of the modulation amplitudes of Blazhko type RRab stars (Jurcsik et al, 2005)
Five new Beta Cephei stars revealed in ASAS photometry (Handler, 2005)
New minima of selected eclipsing close binaries (Pribulla et al, 2005)
Discovery of the short-periodic pulsating component in the Algol-type eclipsing binary system IV Cas (Kim, et al 2005)
New times of minima of some eclipsing binaries (Lacy, 2006)
Southern cool stars misclassified as carbon stars (Macconnell, 2006)
CCD minima for selected eclipsing binaries in 2005 (Nelson, 2006)
VZ Gru: A Blazhko type RR Lyr, not a CV (Tappert et al, 2006)
New elements for 80 eclipsing binaries VIII (Otero et al, 2006)
Photometric times of minima of some eclipsing binaries (Mossakovskaya, 2006)
Precise CCD times of minima of selected eclipsing binaries (Kotkova & Marek, 2006)
Times of minima for neglected eclipsing binaries in 2005 (Dvorak, 2006)
Long term variations of the supergiant in the X-ray binary Cyg X1 (Karitskaya et al, 2006)
New eclipsing variables in the field of M67 (Sandquist, 2006)
The fast apsidal motion system NSV 18773 (Otero & Wils, 2006)
50 new eccentric eclipsing binaries found in the ASAS, Hipparcos and NSVS databases (Otero et al, 2006)
RW Lacertae: A new photometric triple star (Wolf et al, 2006)
VRI light curve of V1647 Ori during August 2004-November 2005 (Semkov, 2006)
New times of minima of eclipsing binary systems and of maximum of SXPHE type stars (Biro et al, 2006)
Z Gru and GSC 9092-1397 are double mode RR Lyrae variable stars (Wils, 2006)
The GEOS RR Lyr survey. (Le Borgne et al, 2006)
The first light curve analysis of HD 162905. (Tas & Evren, 2006)
The first ground based photometry of V1123 Tauri. (Ozdacan et al, 2006)
Photometric analysis of the contact binary V513 Herculis. (Byboth & Markworth, 2006)
Photoelectric minima of some eclipsing binary stars. (Krajci, 2006)
The first complete BVRI light curves of the near contact binary V370 Cyg. (Niarchos & Manimanis, 2006)
New light on the peculiar star HD 108. (Naze et al, 2006)
New CCD times of minima of eclipsing binary systems. (Kim et al, 2006)
V380 Cygni - request for new observations. (Roman & Roman, 2006)
RECENT VS PUBLICATIONS

VSS members have put the following papers up on astro-ph recently (thanks to Hazel McGee for typesetting). These have all been accepted for publication in the Journal.

**Brief outbursts in the dwarf nova V1316 Cygni**
Jeremy Shears, David Boyd & Gary Poyner

**CCD photometry and visual observations of V1663 Aquilae (Nova Aquilae 2005)**
David Boyd & Gary Poyner

**CG Draconis, a particularly active dwarf nova**
Jeremy Shears, Roger Pickard & Gary Poyner

**Determination of the superhump period of the dwarf nova V701 Tau during the 2005 December superoutburst**
Jeremy Shears & David Boyd

**Observations of the recently discovered dwarf nova 1RXS J053234.9+624755 during the 2005 March superoutburst**
Gary Poyner, Jeremy Shears

**Measurement of the orbital and superhump periods of the eclipsing cataclysmic variable SDSS J170213.26_322954.1**
David Boyd, Arto Oksanen, Arne Henden

The Information Bulletin on Variable Stars (IBVS) can be accessed through the WWW in HTML format at the following URL: http://www.konkoly.hu/IBVS/IBVS.html

If anyone would like a list of IBVS’s (as seen above with titles, authors etc.) from numbers 4126-5700, let me know and I’ll e-mail the document in whichever format is preferred.
NEW CHART
JOHN TOONE

030.02

9° FIELD DIRECT

R AQUILAE 19h 06m 22.3s +08° 13′ 49″ (2000)

CHART: ATLAS ECLIPTICALIS
SEQUENCE: TYCHO 2 VJ

A 5.2 B 5.6 D 6.3 E 6.9 G 7.4 AA 8.0 F 7.1

BAA VSS EPOCH: 2000

DRAWN: JT 22-04-03
APPROVED: RDP

27
NEW CHART
JOHN TOONE

030·02 1° FIELD INVERTED

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GUIDE 8 K 8·8 U 11·1 EPOCH: 2000
SEQUENCE: M 9·3 W 11·7 DRAWN: JT 22-04-03
H-S TYCHO 2 WJ P 9·5 X 12·0 APPROVED: RDP
U-Z JET R 10·3 Z 12·9
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**MELVYN TAYLOR**

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## ECLIPSING BINARY PREDICTIONS

**TONY MARKHAM**

The autumn months are generally the best time of the year for the observation of Eclipsing Binaries. The nights are long, often allowing whole eclipses to be observed; it’s not too cold yet, and the northern Milky Way constellations ranging from Cygnus through to Auriga are well-placed and well-populated with rewarding variables.

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.

Thus, for example, on Oct 12, U CrB  D18(23)22L  indicates that U CrB will be in mid-
Note that predictions for RZ Cas, U Cep, Beta Per and Lambda Tau can be found in the BAA Handbook. The long period eclipsing variable W Crucis is due to be in mid-eclipse on Oct 25, with the eclipse lasting from Oct 10 - Nov 13. Another long period eclipsing variable with an eclipse due is AS325 (NSV24607) which will be in eclipse from Oct 31 - Jan 23, with mid-eclipse on Dec 13. This variable, at RA 18h50m03.57s, Dec -26 24 15.4 (2000) has an eclipse depth of about 0.7 magnitudes and is likely to be around magnitude 10.5, although it does also show longer term changes in brightness. Unfortunately this latest eclipse occurs only a few weeks before conjunction, and so will be fairly unfavourable. In addition, eclipses of NN Del are predicted for approximately Oct 10 00h UT (secondary), Dec 29 14h UT (primary) and Jan 17 06h UT (secondary). Outside of eclipses, NN Del is of magnitude 8.4. Both eclipses are approx 0.5 magnitudes deep, with the primary eclipse lasting approx 17 hours, compared with approx 21 hours for the secondary eclipse.
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2006 Dec 7 Thu
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Z Dra 07(13)19
V367 Cyg D17(20)24

2006 Jan
TX UMa 08(16)20
Z Dra 17(19)21
V367 Cyg D17(20)24
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<th>Charge</th>
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<tbody>
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<td>Free</td>
</tr>
<tr>
<td>Binocular Charts</td>
<td>Chart Secretary</td>
<td>Free</td>
</tr>
<tr>
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<td>Chart Secretary</td>
<td>Free</td>
</tr>
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<td>Free</td>
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The deadline for contributions to the next issue of VSSC (number 130) will be 17th November, 2006. All articles should be sent to the editor (details are given on the back of this issue)

Whilst every effort is made to ensure that information in this circular is correct, the Editor and Officers of the BAA cannot be held responsible for errors that may occur.

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