British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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Contents

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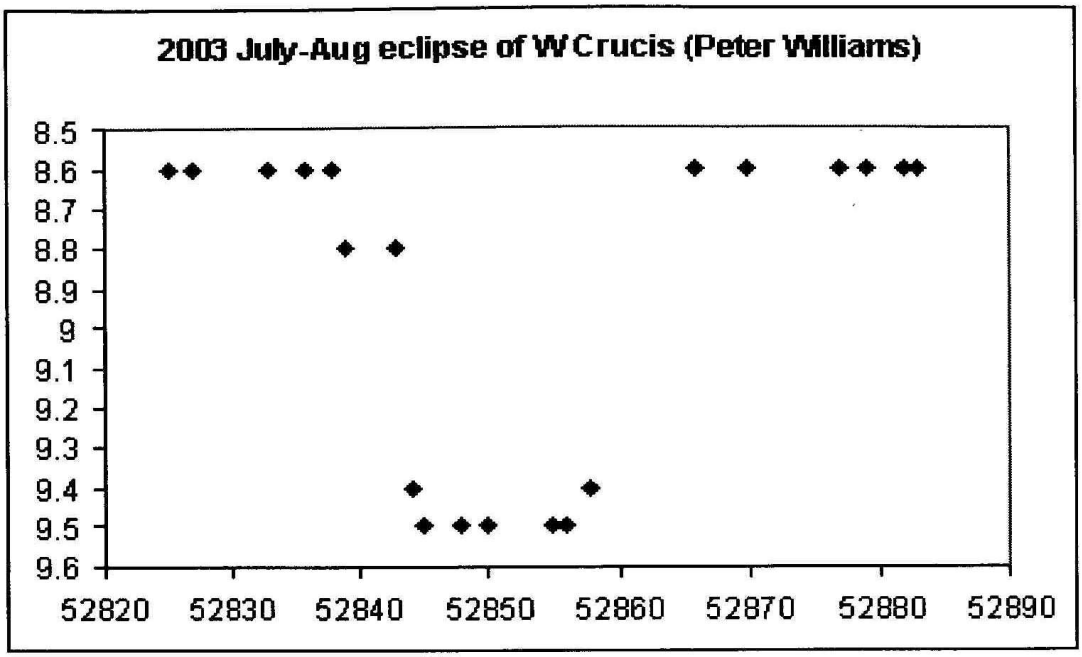
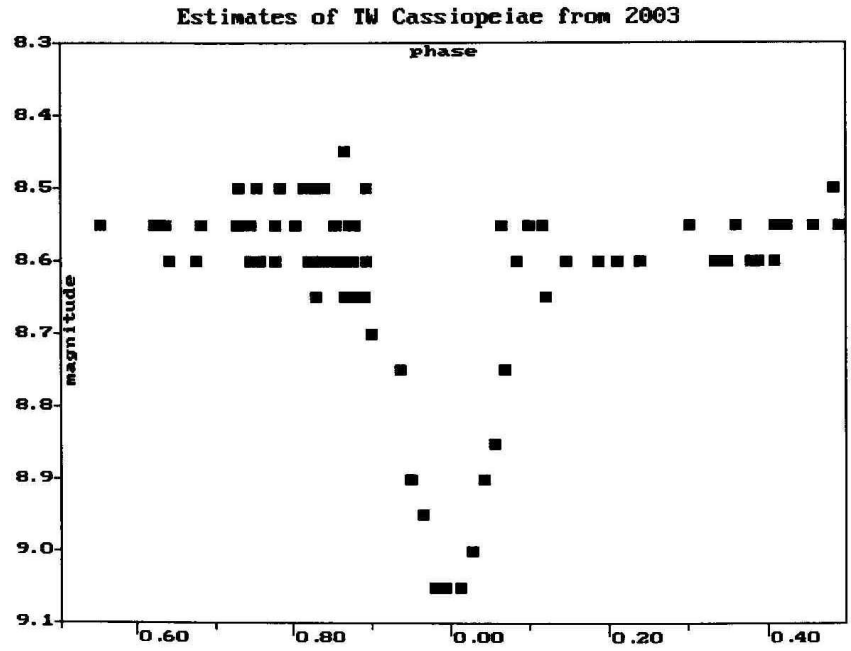
ECLIPSING BINARY LIGHT CURVES

TONY MARKHAM





TW Cas Observations by Tony Markham

FROM THE DIRECTOR

ROGER PICKARD

Dr Janet Mattei, 1943-2004

I'm sure most members will be aware that Janet Mattei, the Director of the AAVSO died on 22nd March 2004 from leukaemia. Rather than repeat here what has already appeared in the BAAJ etc, I summarise below some of the memories from Officers, past and present, who had the privilege to meet her.

The Memories of John Toone

In October 1991 at the BAA VSS Centenary Meeting at Crayford, I can clearly remember the personal congratulatory note from Janet read out by John Isles. It was warmly received by all of the delegates. Sadly we will not now be able to send her a comparable note upon the AAVSO's centenary in 2011. In May 1994 the VSS officers assembled in Cambridge to meet Janet and George Alcock. Janet was so excited to meet everyone, and listened intently to (and also tape recorded) George's description of his remarkable discovery of Nova Her 1991. In August 2000, Guy and Ann Hurst, Roger and myself, had a splendid dinner with Janet in Manchester following the IAU meeting. The first restaurant we came upon was amazingly Turkish and Janet's eyes lit up, but unfortunately it was full. We settled instead for another restaurant, and Janet kept us entertained until long after the restaurant closed. At "The Starry Universe: The Cecilia Payne-Gaposchkin Centenary" meeting in Boston in October 2000, Janet personally introduced me to one of Harvard's famous daughters, Dorrit Hoffleit. I was gobsmacked and stuttered "this is indeed an honour for me, I didn't know you were still alive". Dorrit responded with "I am very much alive young man, and kicking too". Janet was laughing her head off to all this. A few minutes later Janet also introduced me to Mike Simonsen, and charting has never been quite the same since. During the ICWG meetings in Boston in 2000 and 2001 Janet chaired the proceedings very effectively, and the AAVSO's resources were made fully available to advance the cause of chart and sequence improvement. Following the first meeting Janet took me on a personal tour of the AAVSO HQ, including the basement, where the boxes of millions of VS observations are stored. Janet gave me two books; "Variable Star Research: An International Perspective" and "JAAVSO 75th Anniversary Edition" both of which made avid reading on the long flight home. The High Energy Astrophysics Workshops at Huntsville and Hawaii in 2000 and 2002 respectively were both resounding successes, and Janet deserves much of the credit for conceiving and executing them. I last saw Janet via video conference in July 2003 at the "Cosmos in the Classroom: Chandra 101 Workshop". She gave no indication whatsoever of her deteriorating health at that time. Janet was always lively, engaging and friendly. Whenever we met I was greeted with a warm hug. She had a healthy respect for the BAA VSS and was a true friend to this organisation. She will be sadly missed.

The Memories of Gary Poyner

My first contact with Janet Mattei was in 1992, when I dropped her an e-mail asking if she would be interested in receiving my variable star observations on a regular basis, even though I wasn't a member of the AAVSO at that time. She immediately got back to me, saying that she knew of my interests through the various internet reports I had been

submitting (Varstars and very early VSNET), and that she would be delighted to receive them. We then spoke a couple of times on the telephone regarding special observing projects that the AAVSO were running, and I was thrilled to eventually meet her in 1994 when I was invited to attend an informal meeting at Cambridge University, along with the VSS officers of the day - and George Alcock! Janet greeted me as if we had been friends for years, and after just a few minutes in her company, I felt as if I had! Shortly after I took over from Tristram Brelstaff as Director of the VSS in 1995, Janet telephoned me to congratulate me on the Directorship, and said that she hoped that our two groups would be able to work together even more closely. I felt very honoured and delighted that Janet had taken time out of her very busy schedule to call me and chat about the BAAVSS and AAVSO. We met again in the mid 90's when she gave a talk at "The astronomer" AGM. Again her welcome was warm and very friendly, and we had plenty of time to discuss our two groups. We also spent some time discussing some light curves that I was displaying at the meeting - in particular DY Per. It was quite something to talk about one's personal VS observations with Janet. Janet always managed to keep in touch by e-mail, and even included a personal written note with the end of each year's observations summary received from AAVSO HQ. My last message from her was received in late 2003, when she informed me that I had been awarded the AAVSO Directors award. The letter accompanying the award and citation was full of thanks for contributions made over the years, and was written in Janet's own inimitable style, even though she must have been fully aware of the seriousness of her illness at the time. Sadly this Directors award was the last one she would present, which makes it personally a little more special.

Memories of Guy Hurst

Of the many meetings that I have attended there are one or two memorable moments. In May of 1994, Janet visited Cambridge, England and met with several amateur astronomers. One of these was the late George Alcock. Janet was absolutely thrilled to meet him and expressed her admiration for his work. More recently, in March of 2000, I learnt that Janet, as leader of the AAVSO had been in touch with officials at NASA regarding Gamma Ray Bursters. Janet also recognised that detection of afterglows, was an excellent new challenge in which amateur astronomers could participate. A joint High Energy Astrophysics conference was arranged in April of that year in Huntsville, Alabama, which I attended. Janet's enthusiasm was again at the fore, as she persuaded representatives from each country to go back and form teams to observe these afterglows, which later proved successful with detections by amateurs in USA and Europe. The superb organisation of this event with all the social activities arranged by Janet and her colleagues made everyone feel part of a worldwide team from the day they arrived. Yet another meeting with Janet demonstrated her connections with professionals, and the respect with which they held her. This time I met her at the International Astronomical Union's 24th Assembly in Manchester in August 2000. Janet was on hand again to introduce her professional friends and colleagues, in what might otherwise have been quite a daunting experience for those amateur astronomers who attended.

Memories of John Isles

Janet has been a good friend since I first welcomed her (with her husband Mike) to my home in England 20 years ago. I subsequently met her at many astronomical meetings in Europe and North America, where she always enlivened the proceedings. She was particularly helpful to me in persuading the AAVSO Council to give me a grant to travel from Cyprus to

Janet Mattei with VSS officers at the Cambridge meeting in May 1994. From left to right, Dave McAdam, Melvyn Taylor, Guy Hurst, John Toone, Janet Mattei, Roger Pickard, Gary Poyner

the AAVSO's first International Meeting, and she gave me an enormous amount of advice and information on non-astronomical matters when I dropped in to see her shortly after my move to the United States. We all owe her a great debt for her tireless promotion of pro-am collaboration in VS studies.

Memories of Roger Pickard

Just two small personal recollections, on the lighter side, to add to what I've already written elsewhere. One of the most memorable occasions, was to return from observing on Mauna Kea only to see Janet sharing a hot tub with a number of AAVSO members and our own John Toone - and this at one o'clock in the morning! The second was when Janet asked me to be the "official photographer" at the AFOEV Meeting in Bourbon-Lancy, France, during the banquet. This was only to use her own small digital camera, but I hadn't realised just how many pictures she would want. One with each of the 50 or so delegates it seemed like, and each one was made to feel as if they were part of her own family, which in a way they were - as lovers of variable stars.

CCD Symposium

I write this following a most successful and enjoyable two-day CCD Symposium organised by Karen Holland and Bob Marriott, Director of the I and I Section. Details of this will appear in future Circulars. We are now considering a second meeting to be held probably sometime in 2005, and possibly as part of the BAA series of Workshops. However, your input as to the desired level and topics to be covered would be appreciated. Please drop me (or Karen) a line with your thoughts. I also announced that the comparison star data is now available for the CCD Target list and this should be on the web page by the time you receive this Circular.

Peter Wheeler

Karen Holland sent me a note recently advising that Peter Wheeler would not be renewing his subscription as he was now 88 years old, and has not been able to observe for a long time, although he did enjoy being part of the group. So I decided to look up his record in the database to find that he contributed 5192 observations between 1972 and 1991! Well done Peter, and thank you.

Data input

Following an appeal in a recent BAAJ, which was prompted by Alex Menarry who had himself written a piece for his local astronomical society newsletter, I'm delighted to advise that it has produced an excellent response with 7 people responding. Indeed, some of them are already on their second, if not third, bundle of old records for inputting into the Section's database. However, we must not get too complacent and there is still room for more! All you need do is drop me an email.

2004 VARIABLE STAR SECTION MEETING

DENIS BUCZYNSKI AND ROGER PICKARD

The British Astronomical Association Variable Star Section Residential weekend meeting for 2004 October 22-24, wil be held at Alston Hall Residential College Longridge Preston, Lancashire PR3 3BP.

Following the success of the last residential Section meeting, held at the same venue in 2001 and the TA AGM last year, many members who attended have asked for another meeting to be held this year. The venue has gained a reputation for the friendly and welcoming manner of the staff. The accommodation and quality of the food and refreshments offered have been described, by Hazel McGee, as being superior to any other astronomical residential weekend she has attended. The convenience of having the entire event happen in one large country house (including the bar) has resulted in two relaxed and memorable weekends. The advantage of having the University of Central Lancashire's Observatories and Teaching Laboratories situated within a few hundred metres of Alston Hall is an added bonus (there has been a recent upgrade to some of the facilities there). One of the few grumbles heard during the last VSS meeting was the start and finish times. To try and ease the travel problems for those journeying from long distances via our congested motorways, we have arranged for the meeting to begin just after lunchtime on Friday and finish at lunchtime on Sunday. It should go without saying that the success of such a weekend meeting depends on two crucial factors; 1) that the arranged speakers are excellent and 2) that members attending take an

active part in the whole weekend, not just in the bar! It is encouraging to see displays of current work and short talks and illustrations by VSS members. The speakers list is still being compiled, and I hope that come the day we will have a range of speakers well worth travelling to hear. To date the arranged speakers are as follows: **Professor Don Kurtz** (University of Central Lancashire), **Mike Simonson** (AAVSO), **Bruce Sumner** (AAVSO), **Dr Keith Robinson** (Lecturer in Astronomy), **Denis Buczynski** (CBO Lancaster), **John Toone** (BAA), **Gary Poyner** (BAA).

Other speakers have been invited and we await their replies. Time will be made available for any VSS members who want to make a short contribution. A staged Astro quiz can also be included during the weekend should members wish to take part. There may be a session devoted to a debate, which members will be able to vote upon. The participants and the subject matter (contentious with some frivolity attached) are still under consideration. Any suggestions for this event would be welcomed!

All residential arrangements, which include accommodation, food/diet and any special needs have to be booked directly with ALSTON HALL. The basic cost for accommodation including all meals and refreshments is around 110 pounds, plus extra for supplements. Contact Dot Little at ALSTON HALL and discuss your requirements as soon as possible. The telephone number is 01772 78466; Fax number is 01772 785835; E-mail is alston.hall@ed.lancscc.gov.uk

As usual, residential space is limited to around 40 persons, so early reservation is essential. When you contact ALSTON HALL quote BAA Astronomy Weekend Oct 22-24. There will be spaces for any members who do not require accommodation but wish to attend on a daily basis. Anyone wanting to take this option should still book directly with ALSTON HALL to agree costs for any meals and refreshments. Anyone needing further details or anyone who would like give a short talk should contact Denis Buczynski (evening telephone 01524 68530 or E-mail denis@cb978iau.demon.co.uk).

Further details will be announced in the next VSS Circular and on the VSS Website prior to the meeting. Residential/travel/direction/location details will be sent directly from ALSTON HALL to those who book. I look forward to seeing many of you at the meeting and greeting you to beautiful Lancashire. It will be a great weekend, promise!

INVITATION TO JOIN A COLLABORATION WITH RADIO ASTRONOMERS

PETER KING

I would like to invite participation in a joint venture between the Variable Star Section and myself. The objective of this project is to monitor flare stars at radio wavelengths, at the same time as they are being monitored at optical wavelengths. I have access to a radio telescope, which is situated at the Mullard Radio Observatory Cambridge, for this project, amongst others. The results of our joint observations could then be reduced and analysed. It is hoped that this experiment might generate interesting results.

Further details of the proposed target stars, and the technical details of the radio telescope will be given in a circular at a later date, but if anyone is interested in collaborating on this project please contact both the director, Roger Pickard (details on back cover) and myself, Peter King (pdk@eng.cam.ac.uk).

Recurrent Object Programme News
Gary Poyner

DO Dra

The interesting Intermediate Polar DO Dra was detected in outburst by Mike Simonsen on January 23.229 at magnitude 14.5. The star peaked on Jan 23.99 at 11.2 visual, before fading to 11.7 by Jan 25.85 and eventually to 15.4 on Jan 28.98. David Boyd carried out a 7.5 hour V-band photometric run on January 24th (see plot below), and commented that There doesn't seem to be any regular periodic structure on or about the period in Downes and Shara (0.165374d). However there is a high frequency ripple on the signal which does seem to be real. As a check, I redid the analysis using a different comparison star (star 4 on the AAVSO chart), and the DO Dra light curve was virtually identical. At first it looks like a noisy signal till you realise that the uncertainty on the individual data points are rather small relative to the fluctuations. Plus the reproducibility with a different comparison star makes me think its a real effect we're seeing.

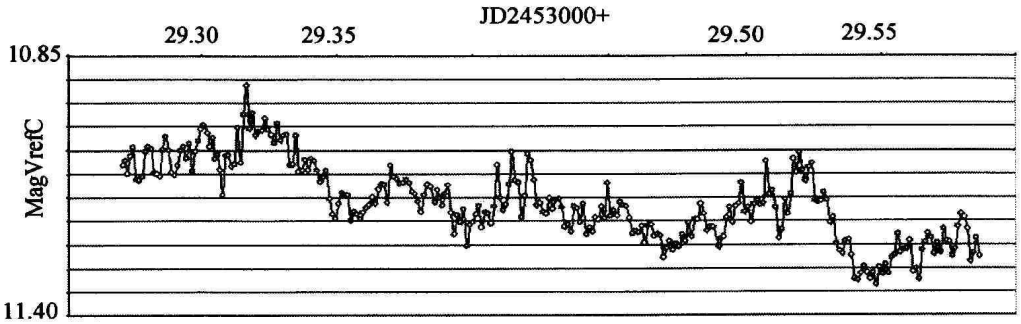


Fig 1: David Boyd's light curve for DO Dra

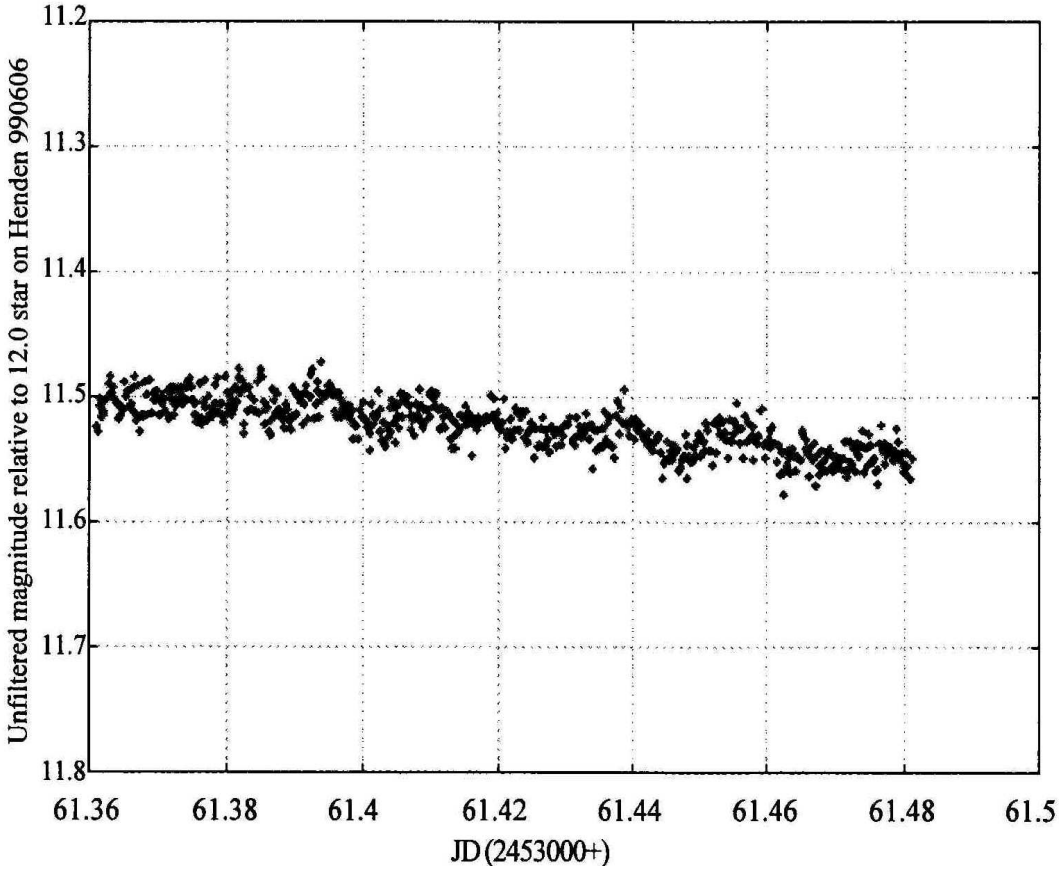
Maurice Gavin obtained this unfiltered CCD image in Figure 2 on Jan 24th (with grating!).

Figure 2, DO Dra CCD image

BZ UMa

An outburst of this UG star was detected by Mike Simonsen on Feb 25.294 at 11.6, the first detected since December 19th, 2002. A request was circulated to CCD observers in the hope of detecting superhumps, which have always been absent from previous outbursts, despite BZ UMa being a suspected UGSU star. However, once again, the outburst proved to be normal. By Feb 29.91 the star had faded to 15.1. Nick James provided nearly three hours unfiltered CCD photometry on Feb 25th, with nothing too unusual showing in the data (see below).

BZ UMa 2004 Feb 25 0.3m Newt + unfiltered KAF-0401E. 586x10s exposures. Nick James

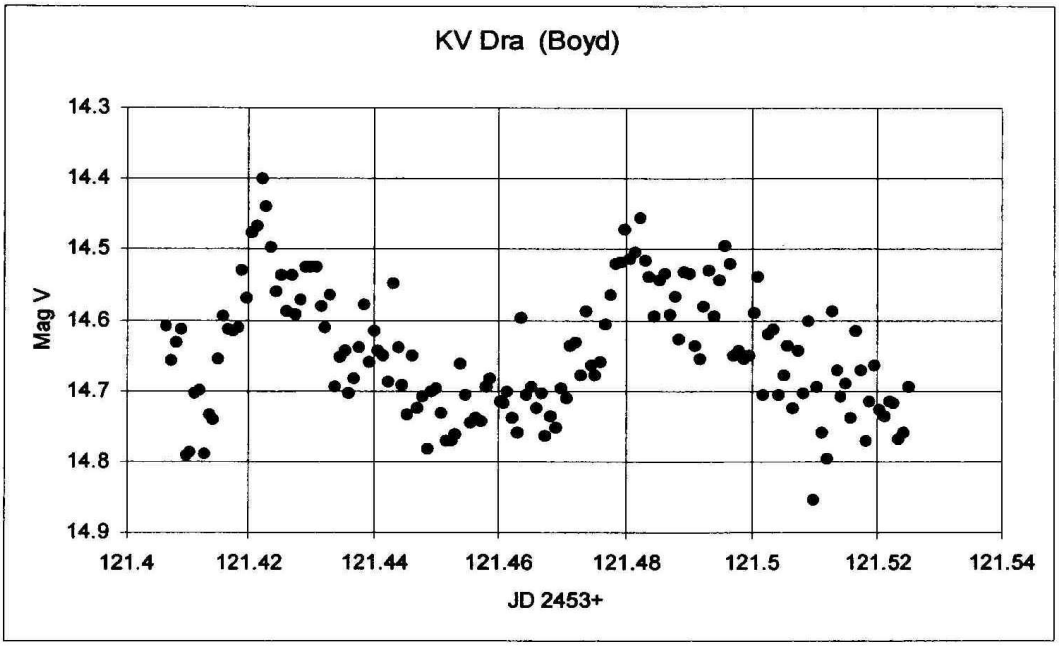


KV Dra

An outburst of this UGSU star was detected by Hazel McGee on April 22.922 at 14.5, and confirmed by Eddy Muyllaert on Apr 23.908. The last outburst occurred on June 20th 2003. The previous outburst to this occurred on Aug 31 2002, thus the outburst interval seems to be around ten months (for the last three outbursts anyway). Both normal and superoutbursts

have been reported in this system. David Boyd obtained CCD V band photometry over two orbital periods on the night of April 25th (see below). David comments *I recorded two orbital periods of KV Dra on Sunday night, and had hoped to get data on at least one other night, but the weather has been lousy; it was very hazy/cloudy here on Monday and Tuesday, and raining today, so it looks like a washout for this outburst. Even Sunday wasn't that transparent; I should probably have removed the V-filter, but didn't think about that until it was too late. However, I've measured a period based on the two maxima that I recorded, and it comes out at 0.059d. Uncertainty in that is about 0.001d. I really need two nights to get better precision.*

T. Kato et al, notes in PASJ 53, 1191 that Nogami (2000) suggests that KV Dra is an intermediate object between WZ Sge and ER UMa- type stars. The superhumps recorded by David are approximately 0.35 mag in amplitude. Large enough for visual detection?



David Boyd's light curve for KV Dra, obtained during the recent outburst

LL And

At the time of writing (May 30th), a very rare outburst of the UGSU star LL And is ongoing. This outburst was detected by P. Schmeer with the University of Iowa telescope remotely from Germany at magnitude 12.6CR on May 22.463. The outburst was confirmed visually by E. Muyllaert on May 28.059 at 13.2. and by Akira Imada and Yohei Tanaka of the Kyoto team.

The previously detected outburst of LL And occurred way back on July 12th 1993 (Vanmunster). Unfortunately the field is low in the NE sky before dawn, allowing only a very short observing window. Hopefully more information will be available for the next circular.

PROJECT QUIXOTE - A VARIABLE STAR SECTION PILOT PROJECT

ROGER DYMOCK

Quixote is a project to create an on-line database of observations that have been submitted to the British Astronomical Association by its members. It was presented to the BAA Council by Roger Dymock in early 2003.

The reasons for giving consideration to an on-line database included improving members' access to data and thus allowing them to perform their own analysis; safeguarding data for future generations of amateur astronomers; and guarding against the risk of losing many years worth of valuable data due to natural disasters, or a Section Director and the BAA parting company.

Such a mammoth task required a very careful, step-by-step approach, and thus approval was given in June 2003 for the Variable Star Section to run a pilot project (as publicised on the VSS stand at the 2003 Exhibition Meeting). Participating BAA members were Roger Dymock, Dominic Ford, Nick Hewitt, Roger Pickard, Callum Potter and John Saxton. The plan was to have an on-line database of VSS visual observations up and running by the end of 2003. This was actually achieved by March 2004 using verified data provided by John Saxton, and following extensive off-line, on-line and user testing. For the technically-minded the database was generated using MySQL and PHP. Internet Service Provider (Lycos Tripod) limitations severely restricted the amount of data that could be input but the concept was proven.

Data (password-controlled) can be accessed by observer, year and star to generate a list of observations and/or a light curve. Access is currently limited, but details of the project can be viewed at; **http://members.lycos.co.uk/rogerdymock**. The on-line *instruction manual* includes screen shots of the list and graph formats. It is hoped to arrange a demonstration to VSS members in the near future.

At this year's BAA Winchester Weekend the VSS Director agreed that the project should continue. The next steps will be:

- Relocate the database to an ISP who can provide the required storage capacity and the ability to upload data en bloc
- Upload said (verified) data
- Implement enhancements eg; links to star charts, Journal articles, images and other databases

In due course access will become available to all VSS members and non-BAA members subject to approval by the VSS Director.

Roger Dymock is happy to provide advice to other sections who may decide to go down this route, but his time will necessarily be limited due to the effort required to support the VSS (and, of course, his NEO coordination for the Asteroid and Remote Planets Section).

FROM 'SIGNALLING TO MARS' TO MAKING VARIABLE STAR OBSERVATIONS - A NEW OBSERVER'S STORY

JANET SIMPSON

My interest in astronomy which started with Dick and signaling Mars in Arthur Ransome's *Winter Holiday,* was further fed by my friendship with Margaret Evershed, the second wife of the astronomer John Evershed (1864-1956), and, related to Astronomy, a year's passion with Geology at school.

It lay dormant through years of Art College and bringing up a family, until a chance siting of astronomy telescopes in a photography shop was followed, soon after, by the purchase of an ETX 90 EC; I also joined the Southampton Astronomical Society (both helpful and inspiring).

I struggled to point the ETX in the right direction, catching a fleeting glimpse of Saturn. It was much easier to find objects with binoculars. I often just searched the night sky with my bird-watching 8.5x44s, and planisphere, learning my way around.

I tried with varying success to use the setting circles. I was thrilled to find the Andromeda galaxy, and something very faint and fuzzy in Virgo, and followed the comet Ikea-Zhang on clear nights. I started chopping down trees in the garden to open out the sky. From the start I had decided that I was most interested in Deep Sky objects.

A breakthrough came with a copy of Penningtons *Year round Messier Marathon* and a Telrad finder. As yet, I have not had such success finding things even with my 10" LXD55 GoTo, admittedly in storage for most of this year due to our move from the New Forest to the shore of Loch Fyne, Scotland. At the beginning of this year I realised that my eyes, and or my brain, had learnt to see or recognise more than before. On a clear night I thought I detected a faint cloud band on Saturn, and caught a fleeting glimpse of the Cassini division. I saw an extra grey band under the two darker bands on Jupiter, and with higher magnification, the flattening of the poles. Faint fuzzies were more easily recognised. A dark site in Suffolk brought more finds.

My particualar interest in variable stars started after reading *Starlight Nights* by Leslie C Peltiers. Next, I read Melvyn Taylor's chapter on variable stars in *The Observational Amateur Astronomer*. Another general book I found very useful (as a beginner), with a chapter on variable stars was *Through the Telescope* by Patricia L Barnes-Svarney and Michael R Porcellino.

Variable stars seemed a way to give more direction to my observing, and to learn the sky really well, which could lead also to recognising other things. I like the feeling that, in some infinitesimal way, I might be involved in contributing towards some much larger understanding. When I heard about the BAA workshops I was keen to go anyway, but to Cambridge particularly because of Karen's talk *Why Observe Variable Stars,* which was most timely for me. When she mentioned the *Mentor Scheme* I was immediately interested, as I had been wanting to observe variable stars but not sure how to go about it. I approached Karen after the talk, and she offered to be my mentor.

We both thought that I would find it easier to start with binoculars. As I didn't have a computer it was a great help that Karen sent me lots of charts from Melyvn's Binocular Priority

The Author - Janet Simpson

List, which she had downloaded from the internet. She also sent some Variable Star Circulars (which included the priority list) and asked Roger to send me the chart list, report forms and the leaflets *An Introduction to the Variable Star Section* and *Making Visual Observations for the Variable Star Section*, the latter particularly useful. I immediately started my observing log book.

I found it easier than I had expected to find the stars. First, I compared the variable star charts with *The Sky Atlas 2000*, drawing on the charts in 2B pencil (easy to rub out) whatever was necessary to fix their position in my mind, and make it easy to double check the chart if I couldn't find the variable star. I tried to get a firm idea of where to look and to choose the ones I thought would be easiest to find.

The first time I thought RS Cancri was similar to comparison star G (at magnitude 5.9), maybe slightly dimmer, but slightly brighter than F (at magnitude 5.8), eventually deciding it was the same as F. This entailed much to-ing and fro-ing, in and out of focus; the whole process took about 40 minutes! The difficulty might have been because of F's close proximity to E. Karen reminded me to also remember the Purkinje effect, which because red light builds up on your retina, causes red stars to look brighter than they are. The way to minimise this is to try not to stare too long at the star, and to use averted vision.

The original plan was for Karen to get some new binoculars (as hers had become unusable since she dropped them!), and observe the same stars to compare results, but due to an unexpectedly heavy workload at that time, she was unable to do this immediately, and so she checked visual observations reported to the Japanese Organisation VSNET, which worked just as well (it would have been better to use BAA observations, of course, but these were not yet available on-line, and the VSNET results provided an instant rough guideline as to the accuracy of my results). These results seemed to suggest that my estimates were within the range expected for my first star RS Cancri, and this continued with my subsequent observations, which was most encouraging, especially when sometimes the differences seemed to be so slight they were difficult to pin down.

I was worried that it seemed to take me a while to get started ,and felt greatly encouraged when Karen said that I'd got going quickly (she'd averaged a star every half hour when she first started!), and she encouraged me to continue with RS Cancri and see if I could add another star or two to my list. I slowly built up to five stars with the addition of VY Ursae Majoris, Mu Cephei, UU Aurigae and CH Cygni, but I still took a long time on each one, which I hope will improve. I had the most trouble with Mu Cephei, which was too low in the sky.

My last observation was on the 19th May, 2003. Since then, I have been interrupted by our move to a small flat in Largs, where I did not find it so easy to observe from; this was made worse by the brighter Scottish summer nights. Finally, we moved into our new home on Loch Fyne, Argyll, with darker skies frustratingly clear for the first busy week of our move. I look forward to continuing once properly settled. I sent my records to Karen and she thought them reliable enough to send to the database. She prepared them and had me check them over before finally submitting them. She also checked the web for Astronomy Societies in Scotland for me to join.

I feel the VSS Mentor System has given me direction, and the means and encouragement, which gave me the confidence to get started and a way of checking my results are on track, and a friend.

THE 2003 MEETING OF THE BAA VARIABLE STAR SECTION

ROB JANUESWSKI

The meeting took place on Saturday 8th November at the Humfrey Rooms, 10 Castilian Terrace, Northampton, and was hosted, as it has been for many years now, by the Northamptonshire Natural History Society. This was not surprising as the Humfrey Rooms have excellent facilities, including a spacious lecture room adorned with many fine natural history exhibits, and are centrally located, allowing speakers and participants from all around the country to attend. The NNHS are also fine hosts and have a society that includes many distinguished BAA members, such as Tom Boles (new BAA president), past president Nick Hewitt and is associated with comet discoverer Roy Panther.

Bob Marriott opened the meeting at 10.30, welcomed everybody on behalf of the NNHS and then handed over to Variable Star Section Director Roger Pickard, who was chairing the event. Roger Pickard discussed some changes that would be made to the VSS circular; these included making past circulars available on the web site, and offering subscribers a version in PDF format, which would be sent by email to section members. Roger went on to say how successful the Alston Hall event had been, and that, with general agreement from the attendees, a 2004 meeting would be held. Some other forthcoming meetings were also mentioned, which included a CCD Photometry Symposium. The Director said that he had received many requests from BAA members on how to submit observations; he agreed that the Section's web pages gave no indication of how to do this, and said that there were plans to rectify this. Roger finished his report by mentioning the poster papers, which were on display in an adjoining room. The papers included a fine display of light curves by Gary Poyner, the Section's display on *How to Observe Variables* and details of the Director's experiments with a small lens attached to a CCD camera. Roger then introduced the first speaker of the day.

Dr. Darren Baskill of Leicester University was speaking on the *X-rays of Dwarf Novae*. Darren started by giving an overview of such binary systems, consisting of a white dwarf primary star and a main sequence companion, where the powerful gravitation of the primary draws material from the secondary to form an accretion disc. In such a system, producing high-energy radiation, one would expect to see soft and hard X-rays; indeed X-rays are produced in dwarf novae systems. Using Powerpoint, Darren provided some excellent representations of such binaries, including some amusing analogies with animated beer mats and teapots provided by colleagues from Leicester. It was noted that in many stars X-rays are only visible during quiescence, one idea being that, during outbursts, the gas becomes opaque to X-rays, and indeed many systems show light curves that vary oppositely in X-ray and visible light. However, many dwarf novae do not, and the question for the Leicester team is to locate the source of X-rays. Because the earth's atmosphere is opaque to X-rays, the only way to observe them is from orbiting instruments. Darren went on to describe some observations using the ROSAT Satellite; these early observations showed X-ray emissions that ceased during eclipses. However, the resolution of the early instruments was insufficient to pinpoint the source, the light curves in both visible light and X-Rays seemed to coincide, indicating the primary as the source. The launch of the Chandra and XMM Newton satellites, the latter in which Leicester University had been involved, had allowed new observations to be made at much higher resolutions. Dr. Baskill went on to describe the basic principal of an X-ray telescope, which involves using cylindrical mirrors. If X-rays strike a surface

perpendicularly, such as they would in a conventional telescope, the X-rays would be absorbed, so cylindrical mirrors are therefore used in which the X-rays are reflected at a shallow angle and focused onto the detector. Darren said that the Chandra and XMM Newton telescopes were complimentary, as Chandra had the ability to see *fainter* and XMM provided *higher resolution*. Indeed, new observations with XMM revealed much higher resolution light curves for the star during the eclipse; when overlaid on visible light curves, a difference between the fade and brightening was noticed. The observations revealed that in X-rays the fade occurred later than in the visible at the start of the eclipse. The opposite was shown at the end of eclipse. This was displayed on the screen with a diagram showing the contact points of the eclipse, and the corresponding light curve in visible and X-rays. These observations seemed to indicate that the X-ray emission is located in one hemisphere of the white dwarf star. Darren concluded his talk, as is nearly always the case in astronomy, by saying that more observations are still needed, as there are still many unanswered questions regarding X-rays from dwarf novae stars. The Director thanked Dr. Baskill for his talk and announced that it was time for lunch. This was a longer than normal break, allowing more time to speak to fellow attendees about observing, telescopes and just generally enjoying a good chat with old and new friends.

After the lunch break Roger Pickard welcomed everyone back to the meeting; the next part of the day was to be the Section Officer Reports. First up was **Tony Markham** on the topic of eclipsing binaries. Included in the list of stars that required observations was the star Eta Gem. Tony said that the point of minimum for this star and the length of eclipse were still unknown. The constellation of Gemini was now visible from mid-evening in the west. Tony showed charts for this star, and remarked that one of the comparison stars was variable. He went on to say that using a variable comparison star would normally be bad practice, but he went on to consider the need to have appropriate comparison stars near the variable. Some discussion took place, including some comments about the danger of this by Andrew Hollis. Tony replied, by saying that he had considered this and that it was not ideal, but the comparison star in question varied by a few hundredths of a magnitude, which was very small compared to the much larger amplitude variation of Eta Gem. As the aim was to determine the length and midpoint of the eclipse, it was generally agreed that the use of such a star in this case was acceptable.

Following Tony's report, **Martin Taylor** reported for the CfDS. He said that the government had produced a report on the issue of light pollution, and that this was available on the association's web pages. Martin said that although the paper had recognised the problem of light pollution, there was an unwillingness to force legislation to control it, leaving this to local authorities.

Next, **Gary Poyner** reported on the Recurrent Objects Programme. Gary provided a list of stars that had been dropped from the observing programme, this being due to the fact that these stars had been well-observed for many years, and the need to keep the list to a manageable level. Gary said these should still be monitored for outbursts but were not considered as alert objects. While nine stars had been dropped from the list, ten new stars had been added; details of these can be found in the VSS circular for September 2003 No.117.

Following Gary Poyner was the Circulars Editor, **Karen Holland**. Karen spoke of the insertion onto the BAA web site of the Section Circular, and that it would be available to

Some mentors and mentees had the opportunity to meet at this meeting. From left to right: Janet Simpson, Tony Markham, Martin Taylor, Gordon Aspin, Karen Holland, John Toone

subscribers in PDF format as Email. She also said that the circular would retain its current format and all that was required was the continuation of the high quality circular articles. Of particular note were the items from Chris Jones and John Toone, who were regular contributors. On the subject of the mentoring scheme, Karen spoke of her own experiences, saying that having someone who could give advice and compare estimates with had been invaluable in getting her started in visual observing. There were now twelve mentors in the section, covering the UK, and it is hoped that the programme would grow in time to allow better coverage.

The Nova and Supernova Secretary, **Guy Hurst**, gave a brief overview of the section's history. The first nova discovered by the group was discovered in 1977 by John Hosty; since then there had been many other discoveries. Of the observers involved, Mike Collins had been the most prolific with his discoveries of new variable stars on the patrol photographs taken in search of novae. Guy Hurst said that since the first UK supernova discovery in 1996, the successes had come rapidly, with three observers all having made multiple discoveries. Of course, the culmination of this effort had been the 100th UK supernova discovery by Tom Boles. This remarkable event had even been mentioned by the science journal *New Scientist*. The success of finding supernovae was very much due to the availability of affordable CCD cameras now on the market, along with the computer hardware and software making storing and searches very much easier. Another unique event had been Tom Boles' discovery of a Nova in the galaxy M31; the object was magnitude 18.1 and was confirmed by another image by Tom himself and Norwegian observer Odd Trondal. To add to this already prominent list of discoveries was yet another major observation by a UK observer. This was the imaging of a GRB afterglow by several observers in the section. Observations of a subsequent GRB

afterglow, or optical transient (OT), had led to the discovery that this was a supernova, as indicated by its spectrum. However we can't assume for the moment that all GRBs are linked to supernovae.

Following on from Guy was the chart secretary **John Toone**. A long-standing problem had been the discrepancies between sequences used on charts. John said that this was the consequence of different organisations adopting their own sources for data ,and the emergence of photometry from new surveys. The drawing up of new charts and the adoption of more consistent sequences was now in progress, but this would undoubtedly be a long, and time consuming process. (The new charts appearing in the VSS circular are certainly excellent and much improved upon the older hand drawn versions).

The section's secretary, **John Saxton**, maintains the VSS Database which now has over a million observations. Most members now provide their observations using Excel spreadsheets, and there is a standardised template available. Despite the use of spreadsheets, errors still occur, particularly regarding the input of data. John said that new software was being developed to automate this process further, and to help detect input errors before observations were submitted. The secretary said that he had some CDs for each of the section officers to try out, and then proceeded to give a demonstration. John loaded up some recent observations of Gary Poyner, which was a poor choice in as much as section members will know that Gary is a prolific observer, and this meant waiting a considerable time for the spreadsheet to load. Once loaded, the secretary showed how the software searched for numerical errors, and then highlighted these for inspection. It was hoped that all observers would be able to have this new software, allowing them to check their own observations before submitting them, thus reducing the workload of the officers.

The final officer to give their report was **Richard Miles**, who is the section's CCD advisor. Richard began by discussing the working group, which was currently in the process of providing a programme and assistance for observers wishing to undertake CCD photometry. During the report Richard spoke of four types of photometry that observers could attempt, depending on their experience and equipment available. These consisted of (a) basic photometry, in which an observer used the simplest equipment configuration in order to start to learn how to do photometry; (b) time-series photometry, in which an unfiltered system could be used to provide data on, for example, eclipsing systems; (c) approximate differential photometry using a V filter; and (d) precision differential photometry using multiple filters, and transforming all reduced data carefully. Standardising observations was another element of the group's work, and Richard showed a demonstration version of a new Excel spreadsheet that could be used by observers to aid data reduction and checking. This would allow the input of set fields using standardised data, which would assist observers in the production of their CCD photometry.

The section officers reports were concluded and a short break commenced, allowing attendees to chat further.

Following the break was a talk by **Mr. Owen Matthews** of Leicester University, whose subject was *Accretion in Cataclysmic variables (CVs)*. Owen spoke of his work using some standard modelling principles to look at accretion disc formation in CVs. One star of particular interest was WZ Sagittae, which is the prototype of its subgroup of dwarf novae. The modelling of this star was performed using the UKAFF (UK Astrophysical Fluids Facility) supercomputer

at Leicester University; the purpose of this exercise was to model dwarf novae accretion discs. Owen provided some images showing the resultant disc based on data and known parameters of WZ Sagitta; the surprise was that he suggested that such a disc was formed in the presence of a magnetic field. This, as it was put by questions from the audience, was contrary to existing observational evidence, which showed that stars with magnetic fields did not possess accretion discs. Although a little hard for the non-scientist/mathematician to follow at times, Owen's talk was certainly informative as well as somewhat controversial.

The final presentation of the day was given by **Gary Poyner** on the subject of R Corona Borealis Stars. These Hydrogen-poor, Carbon-rich stars were normally at maximum but sometimes faded dramatically, often by many magnitudes. Gary said that many of these stars appeared to show periodic pulsations, and he had used his own data to search for periods in several of these stars. He said that he had used a Portuguese software program called AVE to look for periods. After displaying a number of stars on the screen that did not show any periodicity, Gary showed a graph for the star Z Umi, and it was clear that it clearly showed a clean cyclic curve. Another star, DY Per, also displayed a tell-tale periodic curve, indicating that this could be R CrB star with pulsating variations as well as deep fades. Gary finished by saying that he would continue to look for periods amongst the many other R CrB stars that he has been observing over many years.

The VSS director, Roger Pickard, thanked the people who had provided the lunch and refreshments, the speakers and the participants and, finally, Bob Marriott for organising the event, and then formally closed the meeting.

THE 2004 ECLIPSE OF ETA GEMINORUM

TONY MARKHAM

Eta Geminorum is best known as a semi-regular variable, which varies over a range of about half a magnitude with a period of approx 233 days. It is, however, also an eclipsing variable with a period of approx 2984 days. The last three eclipses occurred in Feb 1980, Apr 1988 and Jun 1996, although the last of these was unobserved due to Gemini being close to conjunction.

The 2004 eclipse is often described as being unobservable due to its proximity to conjunction. However, predictions give the date of mid-eclipse as being around 2004 Aug 1, and at the start of August, Gemini is reappearing low down in the morning twilight. Hence, although circumstances are far from ideal, there is the opportunity to see at least part of the eclipse; indeed observers on holiday closer to the equator should be able to pick it up in late July.

There is some uncertainty as to the duration of the eclipse. The duration of totality is usually given as about 30 days, but whereas some sources suggest that the partial phases last only a few days, others suggest that they last several weeks. Thus the eclipse may be over by mid- August or may last into September. Analyses are, of course, complicated by the semi regular brightness variations.

Figure 1 shows all observations made by JAS VSS and BAA VSS members around the time of the 1988 eclipse. Before and after the eclipse, when most observations were contributed by John Isles, the low amplitude periodic variations can be seen. Unfortunately at around the

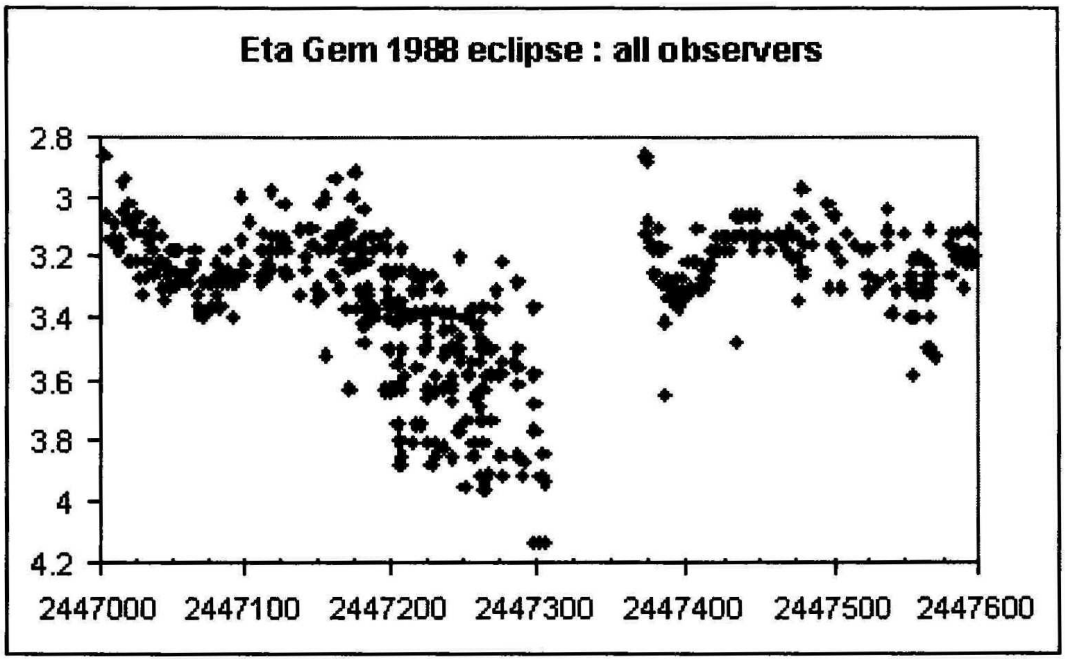


Figure 1: Observations made by JASVSS and BAAVSS members around the time of the 1988 eclipse

time of the eclipse there is a large amount of scatter. There were two reasons for this. Firstly Eta Gem is a red star, so systematic differences of several tenths of a magnitude between the many different observers are to be expected. The second is that by the time that Eta Gem would be emerging from eclipse, it was getting quite low in the western sky and there were significant altitude differences between it and its comparison stars.

It is more meaningful if we look at the data for individual observers. Figures 2 and 3 show two examples. We can see that although the two observers saw different magnitude ranges they did agree fairly well on the date of of mid-eclipse, and that their observations also tended to favour the longer eclipse duration. With Eta Gem being low in the morning sky in Aug 2004, we need to be wary of altitude factors. For this reason, Xi Gem and Lambda Gem will be unsuitable as comparison stars. Fortunately the other comparison stars will be at a fairly similar altitude to Eta Gem. Thus a suitable sequence will be

	Mag	**Spectrum**	**B-V**
Mu Gem	2.86	M0	1.62
Epsilon Gem	2.98	G5	1.38
Zeta Tau	3.03	B3	-0.15
Theta Gem	3.60	A2	0.10
Nu Gem	4.14	B5	-0.12
1 Gem	4.15	G5	0.84

Guide lists Eta as being spectrum M1, B-V = 1.60. Obviously in terms of colours Mu, Epsilon and 1 Gem are best, but this does leave a rather large gap for observers using the Pogson step method. However, all observations will be very welcome - even if they are only class 3.

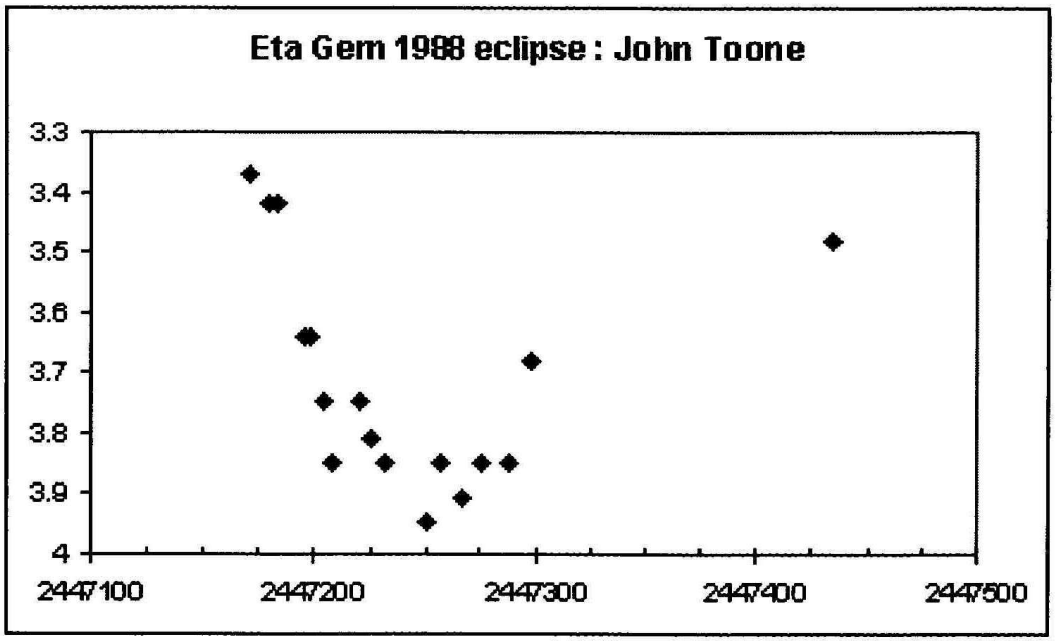


Figure 2: Light curve produced by J Toone

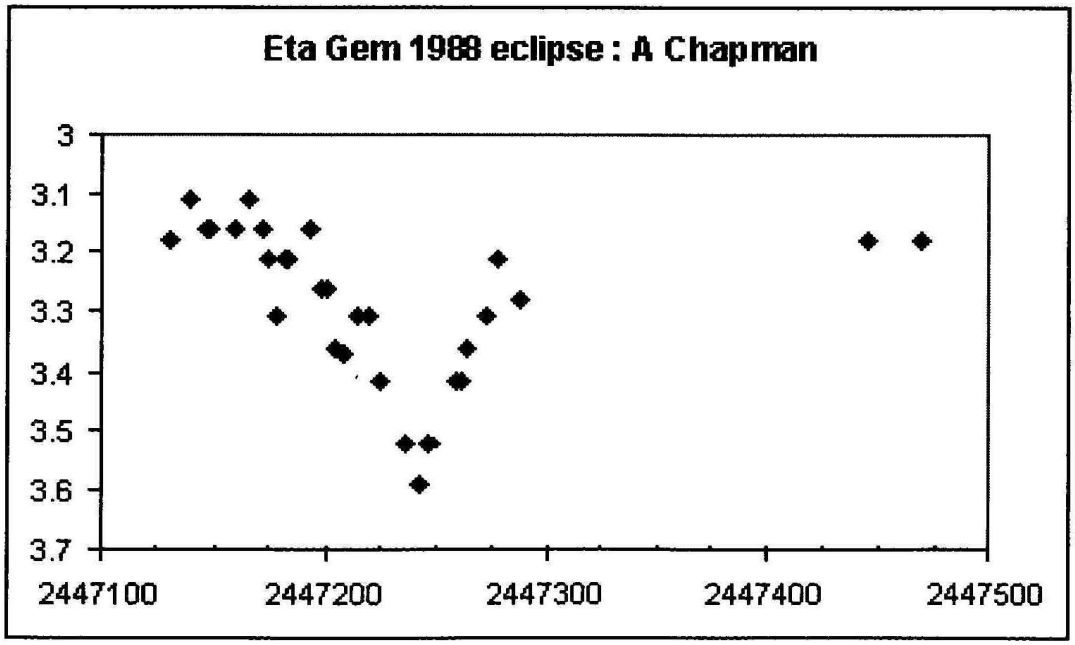


Figure 3: Light curve produced by A Chapman

SOURCES OF SCATTER AND ERROR (PART 3)

TONY MARKHAM

Rod and Cone Cells : Incorrect use of Averted Vision

As already described, there are two types of light detecting cells in the retina of the eye. Cone-shaped cells are good at detecting colours and seeing fine detail, but are less responsive to low light levels. Rod-shaped cells are more receptive to low light levels, but lack resolution and colour sensitivity. Cone cells are most numerous in the centre of the field of vision, whereas away from the centre rod cells provide most of the light detection.

When a variable is close to the limiting magnitude of an instrument, it will become invisible to direct vision due to the poor low light level response of the cone cells. However, it may still be visible using *averted vision* by looking slightly to the side of the variable, such that the variable's light falls on an area with more rod cells. Although averted vision can thus allow an observation to be made which otherwise wouldn't have been possible, the risk is that the observer will compare the brightness of the variable as seen using averted vision with that of a comparison star seen using direct vision. The correct policy in such circumstances is to view both the comparison and the variable using averted vision, so that the same types of cell are used when comparing the brightnesses.

Cone cells : Change of Instrument

Sudden jumps in the estimated brightness of a variable can occur if the instrument used is changed between observations. A red variable will appear fainter relative to whiter comparison stars when viewed using direct vision through an instrument of small aperture than through a larger instrument. This happens because the sensitivity of the cone cells at low light levels becomes skewed away from the red end of the spectrum. Obviously in large amplitude variables, it will sometimes be necessary to switch to a different instrument in order to be able to follow the full brightness range. However, switching between instruments should only occur when really necessary. When selecting the instrument to use for observations of a smaller amplitude variable try, as far as is practicable, to choose an instrument that can follow its whole brightness range.

Cone cells : Prolonged Staring

Many observers find that if they stare at a red variable, it appears to brighten relative to its whiter neighbours. This happens because the cone cells accumulate more light from the variable, and with this higher accumulated light level, the responsiveness of the cone cells changes, becoming more sensitive to red light. Thus it is best to avoid staring at variables and their comparisons; a series of quick glances is better.

Position Angle Effect

If two stars of equal magnitude are positioned one above the other in the field of view, then the lower star will appear to be the brighter by several tenths of a magnitude. This becomes a problem as the relative positions of a variable and its comparison in the field of view change during the year (or during the night), and can lead to spurious patterns in the data such as periods of variation close to a year. The effect shows up most in circumpolar variables.

It is sometimes suggested that the solution is merely to bring the variable and comparison in turn to the centre of your field of view. However, although this is to be recommended as a good policy in general, you should bear in mind that when observing the second star you can still be influenced by the presence of the first star in its new off-centre location and, in any case, it takes a finite amount of time to move the centre of the field of view from the first star to the second star. The best solution is to employ consistency: always observe the field of view such that the variable and comparison start in the same relative orientation (side by side is best) and then bring each in turn to the centre of your field of view.

Position-angle effects can also arise as a variable brightens into or fades below binocular visibility. If the variable is located above the comparison in the binocular field, then in an (inverted) telescopic field it will lie below the comparison and hence a sudden jump in the estimated magnitudes can occur.

Bias: Advanced Prediction

Bias occurs when the brain overrides the eyes in the making of a brightness estimate. The risk is that before you make a new observation of a variable, you will have already decided on the magnitude at which you expect it to be and, when you do observe it, you will then convince yourself that it is at this expected magnitude. Discussions of bias often say that you should *forget* your previous observations before making a new observation. This is not realistic, for example, you need some idea of the likely brightness of Mira in order to decide whether to observe it with the naked eye, with binoculars or with a telescope. It is more correct to say that when making a new observation of a variable you shouldn't use your previous observations in order to predict the trend in future brightness changes.

Published predictions, for stars such as Eclipsing Binaries and Mira type variables, can also be a problem. These can be useful when planning observations, but always treat these as an indication, rather than a guarantee, of the likely activity. Ideally the publishers of such predictions should limit the accuracy to which they specify dates and times.

Bias: Catalogued Data

Published lists of variable stars quote magnitude ranges for each variable. Observers may assume these to be more accurate than they really are. In reality, some of the published ranges may be based on V magnitudes rather than visual magnitudes (and for red variables these can be significantly different), whereas in other cases, such as Miras, Semi-Regular variables and Eruptive variables, they will usually be extreme observed ranges. In some cases more recent observations may have set new upper or lower limits on the brightness range and so the published range will now be out of date.

When I first started observing, several variables caused me problems. For example, the chart for V566 Herculis, listed it as having a brightness range of 7.1-7.8, but my first attempts at estimating it placed it fainter than mag 7.8. Similarly, the range of TX Piscium was listed as 4.8-5.2, but I was seeing it varying in the fainter range of 5.8-6.1. Experience has shown that I tend to see many red variables fainter than the averages reported elsewhere. However, this is not an *error*. As long as I see the same rises and falls in brightness as do other observers, analyses can take these systematic differences into account. The risk is that observers may be influenced by the published magnitude ranges into adjusting their observations so that they *fit in* with the published limits. Alternatively observers may simply not report those observations that appear to be *too faint* or too *bright*.

This bias can be seen in the light curves of stars such as Beta Lyrae. The published range is 3.4-4.3. However, in the mean light curve based on visual observations, the primary minimum is usually shallower than expected. When the star is at its primary minimum of mag 4.3, it would be expected that normal scatter would result in equal numbers of estimates of mag 4.2 and mag 4.4. However, in practice, reported estimates of mag 4.2 (within the range) easily outnumber those reported at mag 4.4 (outside the range). A further cause of error can be that an observer might be *reluctant* to report an eclipsing variable starting to rise in brightness until after it has been seen at its catalogued minimum brightness.

Bias: Influence of Other Observers

As has already been noted, different observers will observe under different observing conditions, and their eyes may have slightly different colour sensitivities. Hence it is not unreasonable for observers to differ in their magnitude estimates by a few tenths of a magnitude, especially when red variables are involved. The risk here is the same as in the Advanced Prediction section, in that an observer may be influenced to make future magnitude estimates fit in with the magnitude estimates of other observers.

The risk of being influenced by other observers has increased significantly in recent years due to the possibility of magnitude estimates being rapidly published via the Internet. Although the Internet provides a way of quickly informing observers about interesting activity of variable stars, there have been cases in which one observer has published a report of a sudden brightening or fade of a variable, and observers who read this report then also see this change, whereas observers who haven't seen the report don't see the change.

A good policy to follow is to never look up reports of magnitude estimates before you go out to observe. Wait until after your observing session before comparing your results with those of other observers. I f there are differences between your estimates and those of other observers, always assume that these are due to one or more of the following: systematic differences between observers, the actual variation of the variable, or the estimates of the other observers being incorrect.

Habit

This can be a problem when observing stars which often show little of no variation for weeks, months or even years. Often the observer will report the same magnitude night after night (even when other factors described in this section should lead to scatter in the reported magnitudes). This can sometimes be seen in stars such as R CrB, whereby some observers continue to report the star at maximum for several days after other observers have seen it start to fade.

Speed

If sufficient time is not taken over brightness estimates then errors can creep in for various reasons. These include not allowing sufficient time for dark adaption, a greater risk of bias and not making a true comparison of the brightness of the variable and its comparison stars (such as a mixture of direct and averted vision).

Tiredness

Fatigue can reduce the accuracy of variable star estimates. It can lead to errors due to the reasons described under Speed. One effect sometimes seen in Eclipsing Binary observations,

is that the observed rise from minimum is more rapid than the fade to minimum (because the tired observer wants the eclipse to end as soon as possible). Often it is better when tired to get some sleep. When you wake the oxygen supply to your eyes will have been replenished and, provided that you have the will power to leave your warm bed, you can then make more accurate observations.

Posture and Comfort

Observing in a uncomfortable position in order to access a particular area of sky can lead to errors, due to encouraging a too hastily-made observation, and due to the difficulty in maintaining posture and in maintaining the position of the variables and comparisons in the field of view.

Inconsistent use of Defocussing

Some observers find it easier to compare stars when they are defocused such that they appear as small disc. This can help by making differences in colour between the variable and its comparisons less obvious. Obviously this will affect the limiting magnitude seen through a particular instrument as the faintest stars will disappear when defocused. In any case, if this method is used for some estimates of a variable, it should be used for all estimates of that variable, otherwise the estimated magnitude is likely to jump around between observations, depending on whether or not defocusing was used.

Observations restricted by time of night

Some observers are able to observe at any time of the night, whereas others may only be able to observe during the evenings. Although this won't affect the scatter in the estimates of the individual observers, it can affect the combined light curves due to the systematic differences that occur between observers, leading to apparent changes in the variable that are, in reality, spurious. As has already been mentioned, however, analyses can make corrections to allow for these systematic variations.

Incorrect Identification of the Variable and Comparison stars

After observing a variable for many years, you may reach the situation in which you can point your binoculars or finder scope at an area of sky, and the variable will be immediately in your field of view. When first observing a variable, however, you may need to *star hop* from a more prominent asterism.

Difficulties can arise if there is another fairly similar grouping of stars nearby. Further complications arise if another variable in the area has a large brightness range, as this can significantly change the star patterns that you recognise. Similar problems occur if an asteroid passes through the field of the variable. Problems can also occur if there is another star very close to the variable. If the variable has a large range, then care needs to be taken when the variable is at minimum (and possibly not visible) to ensure that estimates are not mistakenly made of the brightness of this nearby star !

Method of brightness estimation

The Fractional method and Pogson Step method each have their own limitations. The accuracy

of the Pogson Step method is dependent on the ability of observers to estimate brightness differences in steps of 0.1 magnitude, and becomes increasingly inaccurate as the number of 0.1 magnitude steps increases. Experienced observers often find it possible to detect brightness differences of less than 0.1 magnitude, whereas less experienced observers may only recognise brightness differences larger than 0.1 magnitude. The problem is most serious when only one comparison star is used, or if the comparison stars used are all brighter or all fainter than the variable.

Fractional methods may lead to some deduced magnitudes more readily than others. For example, if A is magnitude 7.0 and B is magnitude 7.5, then rounding to the nearest 0.1 magnitude gives magnitude 7.2 for A(1)V(2)B , but gives magnitude 7.3 for both A(1)V(1)B and A(2)V(1)B. The Fractional method also tends to involve more tricky arithmetic. Again, the errors are likely to be larger if the comparison stars used are all brighter or all fainter than the variable.

Incorrect Recording of Estimates

Brightness estimates can be incorrectly recorded in various different ways. For example the name of the star may be incorrectly recorded (e.g. observers sometimes interchange reports of Zeta Gem and Eta Gem); the date of the observation may be incorrect if the observer fails to allow for the change of the UT date at midnight; the time of the observation may be incorrect if the observer fails to allow for Daylight Saving time or other adjustments from UT; or the deduced magnitude may not match the light estimate either due to arithmetical errors or due to incorrect rounding (e.g. by truncating to 1 decimal place instead of rounding to the nearest 0.1 magnitude)

Delayed Recording of Estimates

Estimates should always be recorded as soon as possible after making the observation. Don't wait until the next morning as it is easy for errors to creep in (for example you remember that the difference in brightness was 0.2 magnitude, but can't remember whether it was the variable or the comparison which was the brighter), or to totally forget to record particular estimates. If you are unsure, then don't record the estimate at all.

Isolated Estimates

As has already been described, corrections can be made for systematic differences between observers. However, in order to determine the *correction* required, it is necessary to have a good number of observations made by the observer. Isolated estimates are consequently very difficult to interpret. For example, whereas most observers routinely report Rho Cas at around magnitude 4.5, a few routinely report it at around magnitude 4.0 and a few routinely report it at around magnitude 5.0. If a new observer reports Rho Cas at magnitude 5.0, then without additional observations, there is no way of knowing whether or not this represents a dramatic fade. Unfortunately it is sometimes the case that after professional astronomers speculate on future activity of variables, such isolated estimates do get published without reference to previously observed activity by the observer involved.

BINOCULAR PRIORITY LIST

MELVYN TAYLOR

Variable	Range	Type	Period	Chart
AQ And	8.0-8.9	SRC	346d	82/08/16
EG And	7.1-7.8	ZA		072.01
V Aql	6.6-8.4	SRB	353d	026.03
UU Aur	5.1-6.8	SRB	234d	230.01.
AB Aur	7.2-8.4	INA		83/10/01
V Boo	7-12	SRA	258d	037.01
RW Boo	6.4-7.9	SRB	209d	104.01
RX Boo	6.9-9.1	SRB	160d	219.01
ST Cam	6.0-8.0	SRB	300d?	111.01
XX Cam	7.3-9.7?	RCB?		068.01
X Cnc	5.6-7.5	SRB	195d	231.01
RS Cnc	5.1-7.0	SRC	120d?	84/04/12
V CVn	6.5-8.6	SRA	192d	214.01
WZ Cas	6.9-8.5	SRB	186d	82/08/16
V465 Cas	6.2-7.2	SRB	60d	233.01
γ Cas	1.6-3.0	GC		064.01
rho Cas	4.1-6.2	SRD	320d	064.01
W Cep	7.0-9.2	SRC		83/10/01
AR Cep	7.0-7.9	SRB		85/05/06
mu Cep	3.4-5.1	SRC	730d	112.01
O Cet	2.0-10.1	M	332d	039.02
R CrB	5.7-14.8	RCB		041.02
W Cyg	5.0-7.6	SRB	131d	062.1
AF Cyg	6.4-8.4	SRB	92d	232.01
CH Cyg	5.6-10.0	ZA+SR		089.02
U Del	5.6-7.5	SRB	110d?	228.01
EU Del	5.8-6.9	SRB	60d?	228.01
TX Dra	6.8-8.3	SRB	78d?	106.01

Variable	Range	Type	Period	Chart
AH Dra	7.1-7.9	SRB	158d?	106.01
NQ Gem	7.4-8.0	SR+ZA	70d?	077.01
X Her	6.3-7.4	SRB	95d?	223.01
SX Her	8.0-9.2	SRD	103d	113.01
UW Her	7.8-8.7	SRB	104d	107.01
AC Her	6.8-9.0	RVA	75d	048.03
IQ Her	7.0-7.5	SRB	75d	048.03
OP Her	5.9-6.7	SRB	120d	84/04/
				12
R Hya	3.5-10.9	M	389d	049.01
RX Lep	5.0-7.4	SRB	60d?	110.01
SS Lep	4.8-5.1	ZA		075.01
Y Lyn	6.9-8.0	SRC	110d	229.01
SV Lyn	6.6-7.5	SRB	70d?	108.01
U Mon	5.9-7.8	RVB	91d	029.03
X Oph	5.9-9.2	M	328d	099.01
BQ Ori	6.9-8.9	SR	110d	84/04/
				12
AG Peg	6.0-9.4	NC		094.01.
X Per	6.0-7.0	GC+XP		84/04/
				08
R Sct	4.2-8.6	RVA	146d	026.03
YTau	6.5-9.2	SRB	242d	84/04/
				12
W Tri	7.5-8.8	SRC	108d	114.01
Z UMa	6.2-9.4	SRB	196d	217.01
ST UMa	6.0-7.6	SRB	110d?	102.01
VY UMa	5.9-7.0	LB		226.01
V UMi	7.2-9.1	SRB	72d	101.01
SS Vir	6.9-9.6	SRA	364d	097.01
SW Vir	6.4-7.9	SRB	150d?	098.01

LETTERS

Rob Peeling sent this interesting reply to Tony Markham's letter which was published in VSSC 120:

I agree with Tony Markham's conclusion that variations in the brightness of nebulae due to eclipsing binaries are unlikely to be detectable, but there may be a different physical explanation of this: the light we see from an emission nebulae is caused by the UV light from the primary star being absorbed by atoms and then being re-emitted as visible light. The crucial point is that the direction of re-emission is completely random. The nebula we see is therefore being illuminated by UV light coming from all over the surface of the star rather than simply in our line of sight. A related reason should apply to reflection nebulae, since once again the observer is not seeing light direct from the primary star, but light that has been scattered by multiple reflections within the dust cloud between the observer and the star. The likelihood of light being reflected 180 degrees from the far side of the star is less than re-emission in our direction, and so any slight chance of detecting light variation should lie with relection nebulae.

ECLIPSING BINARY PREDICTIONS

TONY MARKHAM

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/end 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 Aug 10, X Tri L21(22)25 indicates that X Tri will be in mid eclipse at approx 22h UT (23h BST). The eclipse will be observable between 21h UT and 01h UT on Aug 11 but low altitude will hinder observation of the start of the eclipse. 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	Z Dra	10.8-14.1p	U Sge	6.45-9.28V
TV Cas	7.2-8.2V	TW Dra	8.0-10.5v	RW Tau	7.98-11.59V
U Cep	6.75-9.24V	S Equ	8.0-10.08V	HU Tau	5.92-6.70V
SS Cet	9.4-13.0v	delta Lib	4.9-5.9V	X Tri	8.88-11.27V
U CrB	7.7-8.8V	Z Per	9.7-12.4p	TX UMa	7.06-8.80V
SW Cyg	9.24-11.83V	Y Psc	9.44-12.23V	Z Vul	7.25-8.90V

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

Several long period eclipsing variables have eclipses due during this period. These include BM Cas (Jly 7), RZ Oph (Jly 18), Eta Gem (Aug 1), Mu Sgr (Aug 13), W Cru (Aug 18) and V748 Cen (Aug 29). For further details see VSSC 114.

2004 Jul 1 Thu
X Tri 00(03)02D
TW Dra D22(22)26D
X Tri L24(26)26D

2004 Jul 2 Fri
TX UMa D22(22)26D
Z Vul D22(23)26D
del Lib D22(23)24L
U CrB D22(24)26D
Y Psc L23(21)25
X Tri L24(25)26D

2004 Jul 3 Sat
S Equ D22(19)25
Z Dra D22(23)25
TV Cas D22(25)26D
SW Cyg 22(28)26D
X Tri L24(25)26D

2004 Jul 4 Sun
RS CVn D22(20)26D
U Sge D22(23)26D
X Tri L24(24)26D

2004 Jul 5 Mon
TV Cas D22(20)24
TX UMa D22(24)26D
U Cep D22(27)26D
X Tri L23(23)26

2004 Jul 6 Tue
X Tri L23(23)25

2004 Jul 7 Wed
Z Vul D22(21)26D
Z Dra 22(25)26D
X Tri L23(22)25

2004 Jul 8 Thu
SW Cyg D22(18)24
TX UMa
D22(25)26D
X Tri L23(21)24

2004 Jul 9 Fri
U CrB D22(21)26D
del Lib D22(23)24L

2004 Jul 10 Sat
U Cep D22(26)26D

2004 Jul 11 Sun
TX UMa 22(27)26L
Z Dra 24(26)26D

2004 Jul 12 Mon
RW Tau L01(03)02D
Z Vul D22(19)24
TV Cas 22(26)26D
TW Dra 22(27)26D

2004 Jul 13 Tue
S Equ D22(27)26D
Y Psc 23(28)26D

2004 Jul 14 Wed
TV Cas D22(22)26
U Sge D22(27)26D
TX UMa 23(28)26L
2004 Jul 15 Thu
Z Vul 00(05)02D
RW Tau L01(<<)02D
TW Dra D22(23)26D
U Cep D22(26)26D
2004 Jul 16 Fri
U CrB D22(19)25
del Lib D22(22)23L
2004 Jul 17 Sat
SW Cyg D22(21)26D
Y Psc L22(22)26D
2004 Jul 18 Sun
Z Dra D22(21)24
RS CVn 24(30)26L
2004 Jul 19 Mon
Z Vul 22(27)26D
2004 Jul 20 Tue
U CrB 00(06)02D
S Equ D22(24)26D
U Cep D22(26)26D
2004 Jul 21 Wed
U Sge D21(21)26D
TV Cas 24(28)26D
2004 Jul 22 Thu
Z Dra D21(23)25
2004 Jul 23 Fri
RW Tau L00(05)02D
U CrB D21(17)23
del Lib D21(22)23L
TV Cas D21(23)27D
RS CVn D21(25)25L
2004 Jul 24 Sat
Z Vul D21(25)27D
2004 Jul 25 Sun
U Sge 00(06)03D
TV Cas D21(19)23
U Cep D21(25)27D
2004 Jul 26 Mon
RW Tau L00(<<)03D
SW Cyg D21(25)27D
U CrB 22(28)27D
Z Dra 22(25)27D
TW Dra 23(28)27D
2004 Jul 27 Tue
Z Per D21(19)23
S Equ D21(21)26
2004 Jul 28 Wed
RS CVn D21(20)25L
2004 Jul 29 Thu
Y Psc 01(05)03D
Z Vul D21(23)27D
TW Dra D21(23)27D
2004 Jul 30 Fri
Z Per D21(20)25
del Lib D21(22)22L
U Cep D21(25)27D
2004 Jul 31 Sat
Z Dra 00(02)03D
TV Cas 01(05)03D
S Equ 02(07)03D
U Sge D21(24)27D
2004 Aug 1 Sun
X Tri 02(05)03D
TW Dra D21(19)24
TV Cas D21(25)27D
Y Psc L21(24)27D
2004 Aug 2 Mon
X Tri 02(04)03D
Z Dra D21(20)22
Z Per D21(21)26
U CrB D21(25)26L
2004 Aug 3 Tue
X Tri 01(04)03D
S Equ D21(18)23
TV Cas D21(20)24
Z Vul D21(21)26
2004 Aug 4 Wed
X Tri 00(03)03D
Z Dra 02(04)03D
U Cep D21(25)27D
SW Cyg 22(28)27D
X Tri 24(26)27D
2004 Aug 5 Thu
HU Tau L01(<<)02
Y Psc D21(18)23
Z Per D21(23)27D
X Tri 23(26)27D
RW Tau L23(25)27D
2004 Aug 6 Fri
del Lib D21(21)22L
Z Dra D21(21)24
X Tri 22(25)27D
S Equ 23(28)27D
2004 Aug 7 Sat
HU Tau L01(00)03D
U Sge D21(19)24
X Tri 22(24)27
2004 Aug 8 Sun
Z Vul D21(19)24
Z Per D21(24)27D
X Tri L21(23)26
RW Tau L23(20)24
2004 Aug 9 Mon
HU Tau L01(01)03D
SW Cyg D21(18)24
U CrB D21(23)26L
U Cep D21(24)27D
X Tri L21(23)25
TW Dra 24(29)27D
2004 Aug 10 Tue
Z Dra 21(23)26
X Tri L21(22)25
U Sge 22(28)27D
TV Cas 22(26)27D
2004 Aug 11 Wed
Z Vul 00(06)03D
HU Tau L00(03)03D
Z Per D21(25)27D
X Tri L21(21)24
2004 Aug 12 Thu
TV Cas D21(22)26
TW Dra D21(24)27D
X Tri L21(21)23
2004 Aug 13 Fri
HU Tau L00(04)03D
del Lib D21(21)21L
S Equ D21(25)27D
X Tri L21(20)23
2004 Aug 14 Sat
TX UMa D21(19)24L
U Cep D21(24)27D
X Tri L21(19)22
Z Per 22(27)27D
Z Dra 22(25)27
2004 Aug 15 Sun
HU Tau 01(05)03D
TW Dra D20(20)25
X Tri L21(19)21
Z Vul 22(27)27D
2004 Aug 16 Mon
U CrB D20(21)25L
RS CVn D20(25)24L
Y Psc 21(25)27D
RW Tau L23(27)27D
2004 Aug 17 Tue
TX UMa D20(21)24L
U Sge D20(22)27D
Z Per 23(28)27D
2004 Aug 18 Wed
SW Cyg D20(22)28D
2004 Aug 19 Thu
Z Dra 00(03)04D
U Cep D20(24)28D
RW Tau L23(21)26
TV Cas 24(28)28D
2004 Aug 20 Fri
Y Psc D20(20)24
del Lib D20(20)21L
S Equ D20(22)27
TX UMa D20(22)23L
Z Vul D20(25)28D
2004 Aug 21 Sat
Z Per 01(05)04D
U Sge 01(07)04D
TX UMa L02(<<)03
Z Dra D20(20)22
RS CVn D20(20)23L
TV Cas D20(23)27
2004 Aug 23 Mon
Z Dra 02(04)04D
U CrB D20(19)24
TV Cas D20(19)23
TX UMa D20(24)23L
2004 Aug 24 Tue
TW Dra 01(06)04D
TX UMa L02(00)04D
Z Per 02(07)04D
U Sge D20(16)22
U Cep D20(23)28D
2004 Aug 25 Wed
Z Dra D20(21)24
Z Vul D20(23)28D
2004 Aug 26 Thu
TW Dra 20(25)28D
TX UMa 21(25)23L
U CrB 24(29)25L
2004 Aug 27 Fri
TX UMa L02(01)04D
S Equ D20(19)24
del Lib D20(20)20L
SW Cyg D20(25)28D
U Sge D20(25)27L
2004 Aug 28 Sat
RW Tau 00(05)04D
2004 Aug 29 Sun
TV Cas 01(05)04D

TW Dra D20(20)25
U Cep D20(23)28
Z Dra 21(23)26
TX UMa 22(27)23L

2004 Aug 30 Mon

TX UMa L01(03)04D
U CrB D20(16)22
Z Vul D20(21)26
TV Cas 21(25)28D
RW Tau L22(23)28

2004 Aug 31 Tue

S Equ 00(05)04L
Y Psc 22(27)28D

2004 Sep 1 Wed

TW Dra D20(16)21
TV Cas D20(20)24

2004 Sep 2 Thu

TX UMa L01(04)04D
U CrB 21(27)24L
RW Tau L22(18)22
Z Dra 23(25)27

2004 Sep 3 Fri

X Tri 03(06)04D
del Lib D20(19)20L
U Sge D20(20)25
U Cep D20(23)28

2004 Sep 4 Sat

X Tri 03(05)04D
SS Cet 03(07)04D
Z Vul D20(19)24
Y Psc D20(21)26

2004 Sep 5 Sun

TX UMa 01(06)04D
X Tri 02(04)04D
Z Dra D20(18)20
SW Cyg 23(29)28D

2004 Sep 6 Mon

X Tri 01(04)04D
S Equ 21(26)27L
HU Tau L23(20)24
U Sge 23(29)27L

2004 Sep 7 Tue

Z Dra 00(03)04D
Z Vul 00(06)03L
X Tri 01(03)04D
TW Dra 01(07)04D
SS Cet 02(07)04D
TV Cas 03(07)04D
X Tri 24(26)28D

2004 Sep 8 Wed

RW Tau 02(07)04D
TX UMa 03(07)04D
U Cep D19(22)27
TV Cas 22(26)28D
HU Tau L23(21)25
X Tri 23(26)28

2004 Sep 9 Thu

Z Vul D19(17)22
Z Dra D19(20)22
RS CVn D19(24)22L
U CrB D19(25)24L
TW Dra 21(26)28D
X Tri 22(25)27

2004 Sep 10 Fri

SS Cet 02(06)04D
SW Cyg D19(18)24
del Lib D19(19)20L
TV Cas D19(22)26
RW Tau L21(25)28D
X Tri 22(24)27
HU Tau L22(23)27

2004 Sep 11 Sat

Z Dra 02(04)04D
X Tri 21(24)26
Z Vul 22(28)27L

2004 Sep 12 Sun

TV Cas D19(17)21
TW Dra D19(21)26
X Tri 20(23)25
HU Tau L22(24)28

2004 Sep 13 Mon

SS Cet 01(06)04D
Z Dra D19(22)24
U Cep D19(22)27
U Sge D19(23)26L
S Equ D19(23)27L
X Tri 20(22)25
RW Tau L21(19)24

2004 Sep 14 Tue

Z Per D19(16)21
RS CVn D19(20)22L
X Tri D19(22)24
HU Tau L22(25)28D

2004 Sep 15 Wed

SW Cyg 02(08)04D
TW Dra D19(17)22
X Tri D19(21)23
Y Psc 24(28)28D

2004 Sep 16 Thu

SS Cet 00(05)04D
X Tri D19(20)23
U CrB D19(22)23L
Z Vul 20(25)27L
HU Tau 23(27)28D

2004 Sep 17 Fri

Z Per D19(18)22
X Tri D19(19)22
Z Dra 21(23)26
TV Cas 24(28)29D

2004 Sep 18 Sat

X Tri D19(19)21
U Cep D19(22)27
SS Cet 24(28)29D

2004 Sep 19 Sun

HU Tau 00(04)05D
RW Tau 04(08)05D
RS CVn D19(15)21
X Tri D19(18)21
SW Cyg D19(22)28
Y Psc D19(23)27
TV Cas 19(23)27

2004 Sep 20 Mon

U Sge D19(17)23
X Tri D19(17)20
Z Per D19(19)24
S Equ D19(20)26

2004 Sep 21 Tue

HU Tau 02(06)05D
TW Dra 02(07)05D
TV Cas D19(19)23
Z Vul D19(23)26L
RW Tau 22(27)29D
Z Dra 23(25)27
SS Cet 23(28)29D

2004 Sep 23 Thu

HU Tau 03(07)05D
TX UMa D19(15)20
Y Psc D19(17)21
U CrB D19(20)23L
Z Per D19(20)25
U Cep D19(21)26
U Sge 21(26)26L
TW Dra 22(27)29D

2004 Sep 24 Fri

S Equ 01(07)02L
Z Dra D19(18)21
RW Tau L20(21)26
SS Cet 22(27)29D

2004 Sep 26 Sun

Z Dra 00(03)05D
U Cep 04(09)05D
TX UMa D19(17)21L
Z Vul D19(21)26L
Z Per D19(22)26
TW Dra D19(22)27

2004 Sep 27 Mon

TV Cas 01(05)05D
S Equ D19(17)23
RW Tau L20(16)20
SS Cet 22(26)29D

2004 Sep 28 Tue

Z Dra D19(20)22
U Cep D19(21)26
SW Cyg 19(25)29D
TV Cas 21(25)29

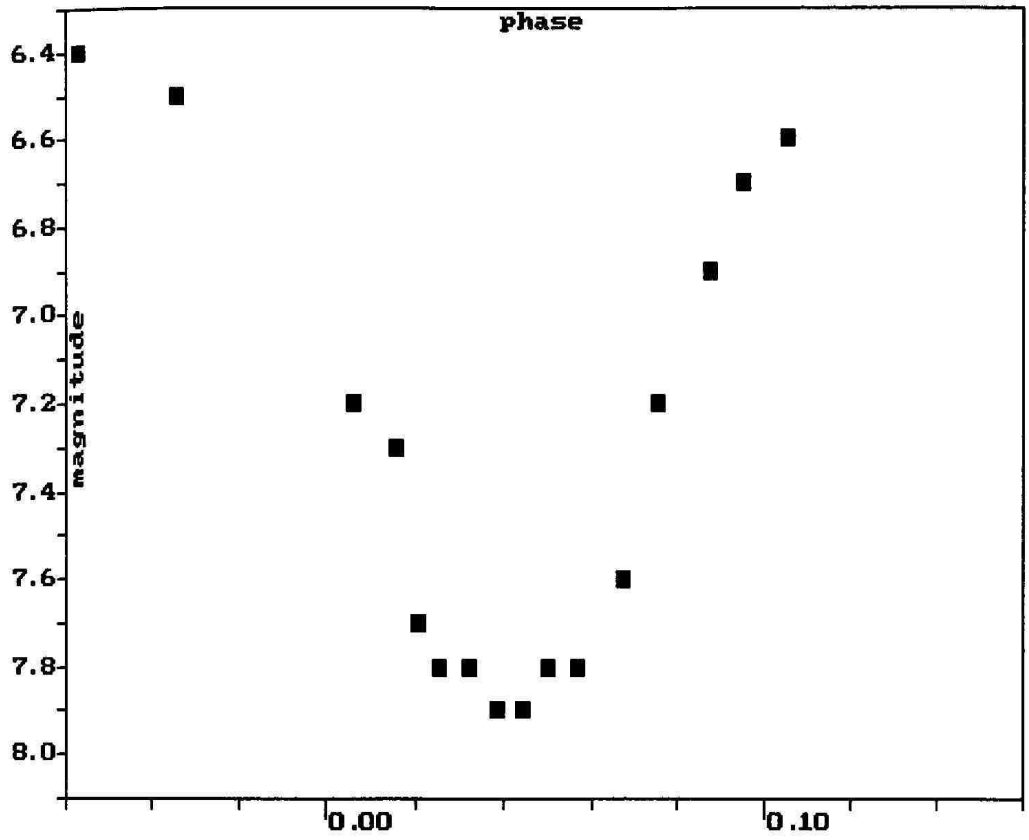
2004 Sep 29 Wed

RS CVn L04(05)05D
TW Dra D19(17)22
TX UMa D19(18)21L
Z Per D19(23)28

2004 Sep 30 Thu

Z Dra 02(05)05D
U CrB D19(18)22L
TV Cas D19(20)24
U Sge D19(21)25L
SS Cet 21(26)29D
S Equ 22(28)25L

Primary Eclipse of RZ Cas : 2004 Feb 8 (Des Loughney)



The deadline for contributions to the issue of VSSC 121 will be August 7th, 2004. 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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Nova and Supernova discoveries

First telephone the Nova/Supernova Secretary. If only answering machine response, leave a message and then try the following: Denis Buczynski 01524 68530, Glyn Marsh 01772 690502, or Martin Mobberley 01284 828431.

Variable Star Alerts Telephone Gary Poyner (see above for number)

BAAVSS web pages:http://www.britastro.org/vss

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