

BRITISH ASTRONOMICAL ASSOCIATION: VARIABLE STAR SECTION

CIRCULAR No.15

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It is the Director's sad duty to report the death last September of W M LINDLEY, Secretary of the Variable Star Section 1934-9, and Director 1939-58. An obituary notice will be published in the April issue of the Journal.

R Trianguli. The Director will be most grateful if all members who have observed this star so far this year would communicate details of their estimates to him as soon as possible. It would also be appreciated if any members who observed this star in 1972 would submit their results immediately, if necessary in advance of the remainder of the year's work, if they have not already done so.

SU Tauri. After several weeks of erratic variation in the range 9.6 - 10.6, this R CrB star commenced a rapid drop on Feb 16, reaching 14.6 on Mar 9, the last reported positive observation. The decline was first reported by W E Pennell, who telephoned the Director immediately, enabling the IAU Central Bureau for Astronomical Telegrams to be notified. Details of observations by VSS members have been published in three recent IAU Circulars. Every effort should be made to secure continuous observations during the coming weeks as the field disappears into evening twilight.

Members are reminded that they should telephone the Director whenever a drop of 0.4m or more below normal is observed in any R CrB star on the programme. Relatively few spectroscopic observations have been made of R CrB stars at the commencement of a minimum, and it might be several days before the decline is reported by another group - as happened with the last minimum of R CrB itself (see VSSC 12).

IAU Flare Star Patrols. Members of the Section have again been active in the international patrols on the flare stars EV Lac (1972 Sep 1 - 15) and AD Leo (1973 Jan 27 - Feb 9). Allowing for overlap, EV Lac was observed for a total of 13^h 20^m, in which two possible flares were recorded; and AD Leo for 14^h 21^m, in which six possible flares were recorded. The observations have been reported in IAU Information Bulletins on Variable Stars Nos. 738 and 772. The observers were F Gribbin, K Hall, D Keir, R J Livesey, R McKay, P A Moore, R A H Paterson, G Prior, A M Savill, J R Savill and H W Smith.

None of the recorded flares, which have amplitudes ranging between 0.3m and 0.8m, can be considered certain, since they lack confirmation by independent observers. The value of our work would be considerably increased if there were enough participants to ensure that at least two observers were watching the star most of the time it is visible. Local groups would do well to imitate the South Downs Astronomical Society, who managed to amass up to 7 hours continuous observing time on AD Leo, by working three 20 minute shifts in rotation.

Forthcoming patrols are as follows:

1973	Jun 23 - Jul 7	V1216 Sgr
	Aug 22 - Sep 4	EV Lac
	Sep 20 - Oct 4	UV Cet

Charts for EV Lac and UV Cet are available to experienced variable star observers from the Director. Members are referred to the 1972 June issue of the Journal for information on the patrols and the recommended procedure for visual observers.

Eruptive object in UMa. VSSC 14 referred to the discovery by Tanskij of a probable bright new U Gem star in Ursa Major. Preliminary charts for this object have been drawn up, the sequence being a combination of photovisual measures by D S Brown and estimates from a photograph by W E Pennell. Using this chart, several members observed a maximum of about 11.6m at the end of 1972 Dec. The last recorded maximum was that reported on IAUC 2408, on 1972 May 11. The period of the star is therefore probably not greater than 250^d. A photograph by

D S Brown in 1972 Aug seems to show it at about 13.3m. This may not represent a true maximum, since a subsidiary rise to 13½m has been observed in 1973 Mar.

Since the period of Tanskij's object is not known, it should be observed intensively. The extreme visual range is probably 10.7 - 15.0

T Tauri. Dr. Martin Cohen, University of California, is currently engaged in a programme of infrared observation of T Tauri, and is interested in VSS observations of this star. If the visual and infrared brightnesses go up and down together, the changes are probably due to variations in the star itself. If they vary in antiphase, the amounts of dust around the star may be changing. If an inhomogeneous dust cloud is swirling past the star, the visual magnitude may vary, but the infrared should not. There is some evidence that visual and infrared magnitudes are anti-correlated, but more extensive observations are needed to settle the point.

Observers of T Tau are asked to communicate their results for 1973 to the Director as soon as possible after the end of the present apparition.

New and revised charts. All observers of HT Cas, Rho Cas and S Cyg are asked to correct the errors noted below occurring in charts issued by the Section.

UU Aql: A 10' field chart has been prepared, with an extended sequence to 15.9m. The comparison star magnitudes are taken from the preliminary AAVSO (e) chart. Observers should take care not to confuse the variable when faint with the 15.4m comparison about 18" Np. Some observers have reported UU as being 15.4m when it has in fact been much fainter.

HT Cas: On the 20' field chart dated 1971 Feb, the variable is incorrectly identified with a nearby faint star. The correct position, according to the preliminary AAVSO (f) chart, is about 18" Np that shown.

Rho Cas: Comparison star G is incorrectly identified on the 9° chart. The correct identification is the star about 1° S, 12mm below the lower frame line and 67mm from the left hand one (projected). The star incorrectly shown as G is BS 96, listed in Harvard Annals 50 as of magnitude 5.72.

S Cyg: Comparison star 74 is incorrectly identified on the 20' chart. The correct identification is the star 54mm from the left hand frame line and 21mm from the upper one. The star incorrectly shown as 74 is Hagen 92, magnitude 14.44, which is no longer included in the sequence.

HR Del: The final sequence for this star has now been settled upon. The adopted magnitudes of the numbered stars 1 to 15 are the same as those in use at present. Further comparison stars down to 13.7m have been selected, their magnitudes being taken from the preliminary AAVSO (e) chart, and a 20' field chart has been prepared. Although the nova is not expected to fall much below its pre-outburst level of 12m, the additional faint comparisons will be useful if the suggestion that it is an eclipsing binary proves correct.

Submission of observations. Observers are asked to submit all outstanding observations for 1972 to the secretary, or to the Binocular Group Coordinator, as appropriate, to arrive no later than the end of June. Members are reminded that report forms should be obtained from the Secretary, and that they are expected to refund (or pay in advance) postage costs: 3p will suffice for 10 forms.

Eclipsing binary project. A total number of 95 timed minima has been received for 1972, including observations, by the Binocular Sky Society. Work has now started on the reduction of these observations, the results of which will be published as an IAU Bulletin on Variable Stars. Any outstanding eclipsing binary observations for 1972 should therefore be submitted immediately.

The following stars, which have been under or unobserved in 1972, deserve members' attention. Not all of them are observable at present, but they should be given priority when minima become observable: V822 Aql, WW Aur, ZZ Boo, RS CVn, Y Cyg, BH Dra, S Equ, Z Her, U Oph, DM Per, IZ Per, SZ Psc, RW Tau, TX UMa, Z Vul.

Predictions for 1973 Apr-Jun may be obtained by sending a long SAE to J C Smith, ~~36 Manor Road, Clifton-on-Teme, Worcester WR6 6DP~~ [Erratum] 38, Berry Way, Newton Longville, Milton Keynes MK17 0AR. Early receipt of future predictions may be secured by sending more than one SAE. We apologise for the fact that some members did not receive predictions for Jan-Mar, owing to circumstances beyond our control.

RW Tauri. In BBSAG Bulletin 5, 1972 Oct, R Diethelm reports that observations of RW Tau by members of the Swiss Astronomical Society indicate a sudden period change in early 1970. Observers are urged to give this star special attention this year.

Telescopic Meteors. So far, 23 telescopic meteors have been reported by G E D Alcock, and 1 by E. Waring. A form for recording observations of these objects, which we collect and forward to the Meteor Section, may be obtained from the Director.

Nova patrol. It has been decided to initiate a visual nova search project within the VSS, in collaboration with the AAVSO. The coordinator of the project is Carmine V Borzelli Jr, 12 Corbin Avenue, Jersey City, N.J. 07306, U.S.A. Mr. Borzelli is also Chairman of the Nova Search Division of the AAVSO, of which your Director is now a committee member, although fortunately excused meetings! Details of the programme will be published in the Journal in due course, but interested members may care to write to Mr. Borzelli in advance.

VSS programme. Many replies have been received to Mr. Poxon's letter in the last Circular advocating the inclusion of more T Tau stars in our programme. It is only possible to summarise a selection.

A. Jones: As a beginner I get much pleasure from watching these stars (Gamma Cas, Rho Cas, W Cyg, U Mon, R Sct, V Boo), and if they were replaced by the suggested fainter stars (EQ Cas, EP Lyr, CO Ori, SU Aur, GW Ord, BG Cep), that would put yet more of the programme out of reach of my equipment. Also, are not some "old faithful" suited to beginners not yet ready to tackle Mr. Poxon's more exotic stars?

(Similar sentiments were expressed by A M Savill and P Gill)

G P Hawkins: As I see it, Michael Poxon advocates dropping two RV stars, two SRs, one RCB and one NI in exchange for two more RV types, another RCB, two T Tau types and one RW Aur. Where's the point? Isn't this change for the sake of change? I enjoy having a mixed programme of LPVs and eruptive stars.

E G Moore: Michael Poxon may have something in his proposals. The addition of the 6 stars could provide 'market research' material. If they proved popular, others could be phased out at a later date.

I D Howarth: Purkinje effect isn't confined just to the variables, but is of course a problem with comparison stars. Colour effects cannot be eliminated by choosing white variables. The programme shouldn't be based on what individuals fancy looking at, but on what will be useful to professionals. The value of continued observations of Mira stars is illustrated by the recent bright maximum of T Cas and faint maximum of R And.

M D Taylor: With 26% of the stars poorly covered, it would probably be foolish to add to the programme, but I would agree there are too many Mira types. Perhaps the Director would consider the nebular, flare and some peculiar eclipsing types as alternatives.

The Director: My own view is that nebular variables are unrewarding subjects for study, in view of their generally small amplitudes and the extremely intensive observation they require. Moreover, the observations are difficult to interpret. Probably the problems posed by these objects will only be solved by simultaneous spectroscopy and photoelectric photometry.

The programme undoubtedly requires revision, and it is proposed to bring it up to date along the lines hinted at in recent Circulars. It is important that observers' preferences are taken into account, and the Circulars provide space in which they may air their views. Members should remember that the process of drawing up and vetting new charts and sequences is one which cannot be hurried, and which depends on the assistance given by experienced observers, only a few of whom have written offering to check preliminary charts.

Below is given a list of the preliminary charts in existence, and an indication of their current status; further progress reports will be published from time to time.

<u>Chart</u>	<u>Star</u>	<u>Field</u>	<u>Date</u>	<u>Remarks</u>
P1	{ BC Cyg BI Cyg	2°	1972 May	needs revision
P2	EV Lac	3°	1972 Jun	for use in international patrols
P3	UV Cet	9°	1972 Jun	" " " " "
P4	UV Cet	1°	1972 Jun	" " " " "

P5	- UMa	2°	1972 Jul	replaced by P12
P6	UW Aql	9°	1972 Aug	
P7	UW Aql	2°	1972 Aug	
P8	{ RS Per	1°	1972 Oct	needs revision
	{ BU Per			
P9	AD Leo	3°	1972 Oct	for use in international patrols
P11	- UMa	9°	1972 Oct	= Tanskij's eruptive object, see
P12	- UMa	1°	1972 Oct	VSSC 14
P13	HT Cas	9°	1971 Feb	
P14	HT Cas	1°	1971 Feb	
P15	HT Cas	20'	1973 Feb	
P16	AB Dra	9°	1969 Jun	
P17	AB Dra	1°	1969 May	
P18	AB Dra	20'	1969 May	needs revision
P19	AF Cam	9°	1969 Jun	
P20	AF Cam	1°	1969 May	
P21	AF Cam	20'	1969 May	
P23	AY Lyr	1°	1969 May	
P24	AY Lyr	20'	1969 May	

Photographic sky patrol. S J Anderson writes: In the 1972 Dec issue of "The Astronomer", James Muirden expressed the view that, since the sky was different each night, valuable information was being lost by not documenting the nightly aspect. Observers reporting an unusual magnitude of a particular star obtain no confirmation as the chance of someone else observing it on the same night is very slight. Also, pre-discovery observations of novae would be very useful.

There are probably many other reasons for a nightly record to be kept, and so, in collaboration with "The Astronomer", a photographic sky patrol was formed. Basically, a number of photographic stations, fairly well scattered across the country, have been set up, to photograph the sky on every clear night. In this way, as long as the whole country is not under cloud cover, a record should be obtained for almost every night.

An attempt has been made to satisfy the following conditions:

- (i) The photography should be quick to do, with no guiding, and relatively modest equipment.
- (ii) It should be cheap!

A number of trial photographs were taken under varying sky conditions, and it was found that in moderate skies an exposure of 30 sec at f 2.8 on 400 ASA film easily reached 8.5m. This was unguided; and the trailing on a 30 sec exposure was still acceptable. In good skies, a 30 sec exposure at f 1.8 reached 10.4m!

Since most 35mm cameras on the market have 50mm lenses with focal ratios of at least f 2.8 (most are faster than this), and are relatively cheap, it was decided to use a technique suitable for a camera of this type. Therefore the members of the patrol were instructed to use a 35mm camera with a 50mm lens at full aperture and 400 ASA film.

Unguided photographs are taken with an exposure of 30 sec, over as much of the sky as possible. Participants were asked to photograph:

- (i) along the length of the galactic equator
- (ii) the north polar area
- (iii) any other parts of the sky they could (or felt like) in duplicate.

(i) and (ii) take something like 24 negatives, and hence a 36 exposure film would last only just over one night. After processing, the film is sent to me for filing ready for inspection.

Although this project is under way, it is proving rather costly, as a 35mm film is priced at about 22p. I hope this will be improved soon as I hope to purchase a large supply of film cheaply from Ilfords.

We have recently had one success with this project. It was recently reported that a star in the field of WZ Cas seemed brighter than normal by about 0.5m. A patrol photograph on the same night showed the star normal, and subsequent ones have shown it to be unchanged.

This scheme shows great potential, and from the letters I have had from volunteers it seems destined to a successful career. If any VSS members require further information or, better still, wish to take part, please write to me at the address on page 1.

(It is remarkable that no observatory or other amateur group is conducting such a patrol. The potential for investigating bright variable stars is obvious, and since hundreds of estimates could be made from one night's negatives the cost seems trivial. However, I think more thought needs to be given to how the results will be used, and the fruits made available to all. But don't let me stop anyone volunteering! - JEI)

Photoelectric photometry. M. Page (Langwith College, University of York, Heslington, York YO1 5DD) writes: I have been conducting a project involving photoelectric measurements of variable stars. The (as yet incomplete) results I have obtained with an 8in reflector indicate that with sufficient care pe measurements with amateur equipment could be very worthwhile. In particular, the time of minimum of an eclipsing binary can be found with great precision. Magnitude estimates need more care.

If anyone tries using pe equipment, they may find the following points helpful.

- 1) Mag differences are estimates using $m_1 - m_2 = 2.5 \log b_2/b_1$. A useful set of tables exists in J B Sidgwick's "Amateur Astronomer's Handbook".
- 2) A stop (about $\frac{1}{8}$ " dia) in front of the cathode of the photo-multiplier or photocell will considerably reduce background radiation, which should be measured regularly.
- 3) Two comparison stars, as close to the variable as possible, should be used. Their spectral types must be near that of the variable, since the frequency response of the photomultiplier will not be constant, even over a fairly short range. If possible, the two spectral classes should bracket that of the variable. A correction giving the true magnitude of the variable can then be made. Depending on the type of photomultiplier and the colours of the stars, this can be quite significant.
- 4) Readings should be taken in the order comparison-variable-comparison, with as little time between each reading as possible. The image of the star on the cathode should be slightly out of focus, to reduce the effect of any non-linearity across it. It may be necessary to adjust the slow motions until a maximum appears on the meter. It is helpful to have a rotating adaptor, which will hold an eyepiece and the photomultiplier tube. Centring the star in the field is easier if it is slightly out of focus.
- 5) Maximum sensitivity of a photocell often lies over a short frequency range, which will influence the types of variables to be observed: e.g. LPVs are unsuitable unless a special red-sensitive photocell is obtained. Pe techniques are probably best suited to relatively fast variations, although in the case of LPVs humps and stationary points would not be so easily missed owing to bias on the part of the visual observer; suitable comparison stars are the difficulty here for the pe observer.

I would be pleased to give more details if anyone is interested.

(Details of the equipment used, its cost, and the results obtained would be interesting. - JEI)

Help! Once again the VSS is without duplicating facilities. Any member who has access to duplicating equipment is begged to contact the Director - who will also be grateful for material for publication in the next Circular.