BRITISH ASTRONOMICAL ASSOCIATION
VARIABLE STAR SECTION
CIRCULAR 21

OFFICERS OF THE VSS

Director: J.E. Isles, 292 Caledonian Road, London N1 2BA
Tel: 01-607 0459.

Secretary: D.B.B. Saw, 12 Taylor Road, Aylesbury, Bucks. HP21 8DR.

Chart Curator: S.J. Anderson, 20 Bloomfield Avenue, Luton LU2 0PS
Tel: Luton (0603) 23360.

BINOCULAR GROUP

Co-ordinator: D.A. Pickup, 38 Brockwood Avenue, Penicuik, Midlothian EH26 9AN. Tel: Penicuik 72098.

Asst. Co-ordinator: A.L. Smith, 11 Lerryn Road, Gosport, Hants. PO13 0XG. Tel: Fareham (032 92) 4677.

Recorder: A.E.J. Forno, 92 Crockford Park Road, Addlestone, Surrey KT15 2LR. Tel: Weybridge (0932) 44668.

ECLIPSING BINARY PROJECT

Co-ordinator: J.E. Isles

Predictions: J.C. Smith, 18 St. James' Close, Hanslope, Bucks.

NOVA SEARCH PROJECT

Co-ordinator: G.V. Borzelli, 12 Corbin Avenue, Jersey City, N.J. 07306, U.S.A.

Novae Per and Sgr 1974. Neither of these objects, announced in BAA Circulars 557 and 558, was considered sufficiently spectacular to justify the issue of a special VSS Circular. Charts for both objects (3 sheets for each star) may be obtained in the usual way from Steve Anderson.

Members will recall the photographic sky patrol co-ordinated by Steve for "The Astronomer" (see VSSC 15). This has proved its worth since examination of the negatives by Guy Hurst has brought to light the following pre-discovery observations of Nova Per:

1974 Sep	17	(9.5
	19	9.0
	27	8.5
	28	8.5

These are, it is presumed, estimates against the preliminary VSS sequence from HP4 negatives, and would therefore be comparable with estimates on the same dates (had there been any). Assuming maximum occurred about Sep 25 at $8^m.5$, the latest visual estimates received by the Director show that the nova took about 67 days to fall 3 magnitudes, placing it in GCVS Class Na and giving it an absolute magnitude of -5.2 and distance around 1200 pc, under the usual assumptions. Well done everybody!

Submission of 1974 observations. The Secretary has been caused considerable inconvenience by the extremely late submission of several observers' 1973 work. Members are asked to ensure that their 1974 observations of objects on the main programme reach Doug Saw by the end of February 1975. We cannot guarantee that observations arriving later than then will be used.

The following stars are common to the main and binocular programmes, and observations of them may be sent to either the Secretary, or the Recorder of the Binocular Group, depending on whether the observer considers himself primarily a telescopic or a binocular observer: R And, R Aql, CO Aur, V Boo, X Cam, XX Cam, Gamma Cas, Rho Cas, Omicron Cet, R CrB, S CrB, W CrB, R Cyg, W Cyg, Chi Cyg, AC Her, R Hya, U Mon, U Ori, R Sct, R Ser, T UMa, V Vul. Observations of these stars should not be sent to both Doug Saw and Alan Forno.

Observations of stars, other than those above, listed in the Binocular Group Chart Catalogue (VSSC 19) should all go to Alan Forno. Observations of stars, other than those above, included in the list of stars on the main programme (VSSC 18) should all go to Doug Saw.

Observations of eclipsing binaries should be sent to the Director immediately after the end of the year, for inclusion in a combined report on the years 1973-4, which it is planned to submit to Council in April 1975.

Charts. Orders sent to the Chart Curator are handled as quickly as possible, but delays sometimes occur when charts are temporarily out of print or are due for revision. The Director apologises for the fact that, due to pressure of other work, he has been unable to draw up charts for several of the stars earmarked for inclusion in the programme in 1974, namely DZ And, VY Aqr, TZ Cas, UV Cas, PZ Cas, V358 Cas, SW Cep, RW Cyg, AZ Cyg, CI Cyg, V441 Cyg, AH Her, SU Lac, GK Per, UY Sct, BW Tau. Observers who have other (e.g. AAVSO) charts for these objects are urged to give them special attention and report the results to the Secretary in the usual way, but making it quite clear what comparison stars they have used. It is hoped to issue charts for these stars during 1975, and their appearance will be announced in these Circulars.

1973 Light-curves. The following notes, continued from VSSC 20, summarise some of the principal results obtained in 1973 for stars on the main programme, according to the plots prepared by the Secretary. Observers should note carefully which stars require more attention and when.

UW Aql: Min (9.5?) Jan?, Max (8.9) Jun/Jul, Min (9.4) Aug, Max (9.0) Nov. Period may be of the order of 180^{d}. Underobserved.

BC Cyg: Fall, with irregularities, from 9.8 in Jan to 10.5 in Dec. Underobserved.

BI Cyg: Min (9.7) Apr, Max (9.3) Oct. Underobserved.

R Leo: Fall from 6.5 on Jan 1 to 10.0 on Jun 11. Unobserved until Sep 17 7.9; rose to Max (5.6) at beginning of Nov.

AY Lyr: Maxima around Mar 24 (12.7), Aug 6 (13.2), Sep 11 (13.1), Oct 11 (13.0, long), Nov 6 (13.8). Period possibly around 32^{d} (GCVS 24^{d}). Estimates at min. mostly range 14.6 - 15.1. (GCVS 17.0p!). Underobserved.

CN Ori: Maxima around Jan 6 (12.3, S), Jan 17 (12.1, L), Feb 2 (11.8, S), Feb 14 (12.3, S), Feb 27 (12.0, L), Mar 11 (12.3, S), Mar 23 12.2, L), Apr 6 (12.5, S). No observations Apr 10 - Sep 5. Further maxima (probably not consecutive) around Sep 6 (12.9?), Sep 21 (12.4), Oct 24 (12.5, L), Nov 18 (12.2, L), Dec 5 (12.3), Dec 23 (12.3, L). Most likely value of period is 14^{d}.1 (GCVS 18.4). Estimates at min. mostly range 13.8 - 14.3 (GCVS 14.8). Underobserved especially Sep - Dec.

CZ Ori: Maxima around Jan 6 (12.3), Jan 30 (12.1), Feb 16 (13.3), Feb 24 (12.5), Mar 18 (?) Apr 8 (12.0). No observations Apr 26 - Aug 25, then maxima around Sep 6 (?), Oct 1 (12.2), Oct 21 (12.2), Nov 16 (12.0), Dec 30 (13.1). Assuming missing maxima around Sep 18 and Dec 10, mean period is 15^{d}.6 (GCVS 26.6!). Estimates at min. mostly range 14.5 - 15.0 (GCVS 16.2p). Underobserved especially Aug - Dec.

UV Per: No maxima observed during the year. Faintest negative observation 15.7.

BU Per: Maxima (9.5) in Jan, Jul; minima (9.9) in Apr, Nov. Period may be of the order of 200^{d}. Underobserved.

WZ Sge: Positive observations range 14.3 - 15.2. Underobserved.

R Ser: Unobserved until Feb 8, 10.7. Fell to min (13.7) in early May, rose to max (6.9) in early Oct. Fell to 9.4 on Dec 31.

T Tau: Observations range 10.1 - 10.6. Unobserved Apr 10 - Jul 29. Many observers are using the chart and sequence in "The Variable Star Observer's Handbook", which differs from the VSS sequence as follows:

	VSS		VSOH	
A	7.6	=	1	7.8
B	8.3	=	2	8.3
D	9.3	=	3	9.1
G	10.2	=	4	9.5
K	11.0	=	5	10.0
L	11.2	=	6	10.2
N	12.4	=	7	10.8
O	12.9	=	8	11.2
-	(13.4)	=	9	11.6
P	13.5	=	10	12.1

VSS comparisons C, E, F, H, M, Q are not marked in the VSOH chart. The other charts in this book contain numerous errors, and observers using them are urged to obtain replacements from Steve Anderson.

RV Tau: Min (10.2) Jan 14, Max (9.6) Feb 2, Min (10.2) Feb 25, Max (9.8) Mar 17, Min (10.4) Apr 10. Unobserved Apr 27 - Aug 2. Min (10.5) Aug 5?, Max (9.4) Aug 31, inflexion on descending branch at 9^{m}.6, Min (10.6) Oct 25, Max (9.4) Nov 13, Min (10.0) Dec 1, Max (9.5) Dec 18. Mean half-period comes to 40^{d}.0. A report on this star and U Mon, covering observations up to the end of 1973, is to be published in the February Journal.

(The last three stars are adequately observed, but any observations which help to close further the seasonal gaps will be of especial value.)

R Tri: Rose from 8.2 on Jan 4 to Max (5.5) at end Feb, fell to Min (11.5:) in Jul, rose to Max (6.4) at end Nov, fell to 7.8 on Dec 31.

R UMa: Near Max (7.1) on Jan 1, fell to Min (13.2) in Jul, rose to Max (7.6) early Nov, fell to 9.7 on Dec 31.

S UMa: Near Max (8.2) on Jan 1, fell to Min (11.8) early Jun, rose to Max (8.0) in Sep, fell to 11.7 on Dec 30. A secondary Max (8.2) early Aug.

T UMa: Rose from 12.5 on Jan 15 (first obsn.) to Max (8.0) early Apr, fell to Min (12.0) in Aug, rose to Max (7.9) in Nov. A hump on the second rise at 10^m.

SU UMa: Maxima around Feb 8 (12.2), Feb 22 (12.9), Mar 4 (12.0), Mar 28 (12.7), Apr 2 (12.8) double maximum! , Apr 29 (12.2), Jun 1 (11.8), Jun 14 (11.7), Jun 25 (?), Aug 5 (?), Aug 30 (?), Sep 8 (12.3), Sep 21 (12.5), Sep 29 (12.3), Oct 11 (11.8), Oct 21 (12.0), Nov 16 (11.4, supermax), Dec 1 (12.3), Dec 16 (12.8), Dec 24 (12.9), Dec 30 (12.8). Making allowance for unobserved maxima, mean period is 10 or 11 days (GCVS 17.8). Estimates at min. range 13.7 - 14.4. Underobserved.

SW UMa: Well-observed long max. at 10.5 on May 15. The star was brighter than 13^m for about 17 days. Estimates at min. range 14.4 - 15.9. Underobserved especially Jun - Oct.

CH UMa: Maximum around Jan 4 (11.6) and Jun 23 (13.0). Estimates at min. range 13.9 - 15.0. Underobserved.

S UMi: Fell from 9.0 on Jan 1 to Min (12.4) at end Apr, rose to Max (8.4) in Oct, fell to 10.4 on Dec 31.

S Vir: Fell from 8.2 on Jan 30 (first obsn.) to 12.7 on Jun 21. Unobserved until Nov 26, 7.0; no appreciable change until end of year.

V493 Monocerotis. IBVS 924 carried a request by Dr. J.K. Kalinowski, Indiana University, for observations of this extremely red carbon star 2.5' from the centre of the open cluster Trumpler 5, of which it may be a member. The V range was reported as 13.5 - 14.8. A determination of the star's variability class may help settle the question of its membership of the cluster, which, if confirmed, would mean that it is a highly evolved, low mass object of considerable interest to astrophysicists.

In a letter to the Director, Dr. Kalinowski reports that V493 had fallen to about 16^m in 1974 November. He will welcome any observations which VSS members may be able to make, and interested observers may obtain photographs of the field and details of comparison stars from the Director.

The 1975 co-ordinates of V493 Mon are $6^h\ 35^m.2$, $+9^\circ\ 27'$. The GCVS lists it as type SR?, photographic range 15.8 - 16.5, spectrum M1. The spectrum is presumably incorrect. According to Kalinowski the B-V colour index exceeds six magnitudes.

Orion nebula variables. Andrew Good (4 Lyhart Road, Norwich) has been co-ordinating a programme to detect short time-scale variations in the nebular variables in M42 (see VSSC 20 for a list of the objects concerned). On three nights in the 1973/4 apparition, variations of up to 0.4^m were suspected in T, IU, KS and V361 Ori, and possibly others. He has about 10 observers taking part in further sessions this apparition, the next being 1975 Jan 3 - 12. Interested observers should contact him.

V529 Orionis. Alan Pickup has pointed out that the position of this suspected recurrent nova is given incorrectly on the VSS charts for U Ori, and on the BSS chart for Y Tau (recently corrected - see below). The 1950 co-ordinates are $05^h\ 57^m.1$, $+20^\circ\ 16'$; on both charts, the RA is plotted as $05^h\ 56^m.1$. Observers of U Ori should correct this accordingly. It should, of course be remembered that the position of this object - if it exists - is not known accurately, and observers should report any suspicious object in the neighbourhood to the Director immediately.

T Tauri project. VSSC 20 announced a project of simultaneous visual observations of T Tauri stars by VSS members and spectroscopic observations at Herstmonceux. RW Aur, SU Aur, GW Ori, T Tau and RY Tau were observed during Oct 1 - 6, and some valuable results were obtained.

The project is continuing into January and February of next year. The spectroscopic observations will be made by R.W. Forrest with the 98 in. telescope, on BP, DF, DG, XZ, DS Tau, UX Tau A, UY Aur, CO and V649 Ori, and DI Cep, as will as the five stars mentioned above. Charts for such of these stars as are to be observed visually (not finally decided at the time of writing) may be obtained by writing to the Director.

BH Draconis. This eclipsing binary is unsuitable for observation in small instruments, because of the 9^m companion 10" distant. According to the 1969 GCVS, the combined range is 8.0 - 8.6, but it now appears that the combined range is only $0^m.3$ or $0^m.4$. It is being excluded from our predictions from 1975 Jan 1. However, any 1974 observations which seem likely to yield reliable timings of minima should still be reported to the Director.

W Ursae Majoris. This well-known eclipsing binary (7.9 - 8.6) is also a long-period visual binary (ADS 7494) with a distance of 7". In a recent paper (M.N. 168, 31, 1974 July) Whelan, Mochnacki and Worden suggest that there may be a fourth member of the system, a Hayashi star still contracting towards the main sequence. This would explain the disagreement between photometric and spectroscopic determinations of the mass ratio of the eclipsing pair, as well as part of the variation in O-C residuals for times of minima, which show (according to the authors) a possible period of around 20,000 days.

If the inclination of the orbit of the Hayashi star is close to 90° (which is admittedly not very likely since that of the eclipsing pair is only 85°), an eclipse of W UMa by the Hayashi star is possible around JD 2443000 (1976 July), lasting up to four months and with an amplitude up to $3^m.5$ (although the more distant companion will of course remain visible). Observers of W UMa please take note!

Another test of the hypothesis will be whether the 20,000 day period in the O-C diagram is continued. If not, the period changes must be due to mass exchange between the components. Visual timings of minima may be sufficiently accurate, but it will be necessary to continue them for several decades to decide the point.

New Binocular Group Charts. New charts are now available from Steve Anderson for the following stars:

Star	Desig	Range	Type	Period	Sp
XX Cam	040053	7.3 - 9.7	RCB	-	G1
V973 Cyg	194140	6.2 - 7.0	Lb	-	M3
BQ Ori	055122	6.9 - 8.9	SRa	110^d	M5
Y Tau	053920	6.8 - 9.2	SRa	241^d	N2

BQ Ori and Y Tau are on the same chart, which replaces the one previously in use. Observers are requested to adopt the new chart as soon as possible.

Preliminary charts for checking have been issued for VX And and V Ari, and are available in return for sequence observations and an SAE from Alan Pickup.

Binocular Chart Catalogue: Erratum. V377 Cas was accidentally omitted from the Binocular Chart Catalogue (issued with VSS Circular 19). The following entry should appear after WZ Cas:

Star	Desig	Range	Type	Period	Sp	Chart
V377 Cas	001359	7.8 - 8.3	Isb	-	F0	See note

The first note should read:

WZ and V377 Cas are contained on a single chart, which also covers TV Cas. AE Aur and IS Gem are on the same charts as AR Aur and WW Aur respectively. WW Aur, AR Aur and TV Cas are all members of the Eclipsing Binary Programme.

UX Draconis. D. Hufton has sent the Director an analysis of observations of this star by the West Yorkshire Astronomical Society. They indicate a range of about 6.5 - 7.0 in 1974 Jan - Aug, in apparent conflict with the V range of 5.94 - 6.54 given in the GCVS. This is in agreement with the Third Report of the BSS (not yet published) which notes that the visual range is $0^m.5$ fainter than the V range.

Such discrepancies are to be expected, and it seems worth while explaining the matter since it applies generally to red variables. Visual estimates of red stars, using V magnitudes for comparison stars, are generally fainter than V magnitudes by up to a quarter of the B-V colour index. (The comparison stars will also appear fainter, but since they are seldom red the effect is less noticeable.) This is because the rods in the retina (if the observer uses averted vision or the extra-focal method) or the mixture of rods and cones (if the observer uses direct vision) are less sensitive to long wavelengths than a photoelectric cell with a V filter. Also, there is a difference of about $0^m.1$ between the Harvard visual scale (that of most of our sequences) and the V scale, Harvard being the fainter.

With a B-V colour index of +2.87, we would expect the visual range of UX Dra to be fainter than the V range by up to $0.1 + (\frac{1}{4} \times 2.87) = 0.8^m$. This is somewhat greater than the discrepancy actually observed. The amount of the discrepancy will depend on the observer's choice of direct or averted vision or extra-focal observation. Without knowing this, observers might suspect errors in the GCVS, or the existence of secondary variations, where there are none.

V505 Monocerotis. Alan Pickup writes:

The General Catalogue of Variable Stars lists V505 Monocerotis as a probable Beta Lyrae eclipsing binary star with a photographic magnitude range of 7.5 to 8.0 and an unknown period, though it is noted that the period is probably less than 1 day. Attention was drawn to the star by a note in The Astronomer (1971 August), and it has been observed at every apparition since then by members of the Binocular Sky Society and the Variable Star Section.

A preliminary report, based on 104 visual observations made during the winter of 1971/1972, appeared in The Astronomer of 1972 November. No period was found which fitted the four occasions when the star was faintest and, implicitly, at or near to a minimum.

The ICL 4130 computer at the Royal Observatory, Edinburgh, has now been used for an analysis of 188 visual observations made in 1972/1973. Periods between 12 hours and infinity have been examined using a Fourier analysis technique based on the method of Barning (B.A.N. 17, no 1, 22 - 28). No outstanding periodicity has been found, though there are numerous possible periods any one of which could explain part of the observed variation.

Unfortunately, observations by different observers at almost identical times often lead to considerable discrepancies in the reduced magnitudes. These are probably indicative of inaccurate observations, and of errors in the comparison star magnitudes used, even though an attempt was made to improve the comparison star magnitudes by a 'feedback' mechanism from the observations themselves. Too many observations are step estimates relative to only one comparison star when at

least ...

least two, and preferably more, comparisons could have been used. Errors undoubtedly exist in the two sequences in use at present (BSS chart 71.08.22, and The Astronomer 1972 November) so that little reliance should be placed on the quoted magnitudes, and in particular no attempt should be made to fit the observation to the sequence. There are too few observations over the 1973/1974 winter to justify a similar analysis for that apparition.

Efforts are being made photoelectrically and visually to derive a good sequence, and 'final' comparison magnitudes will be given in a VSS Circular when they have been determined. Meantime V505 Mon is well placed for observation and a chart for it may be obtained from Steve Anderson. Observations should be made as often as possible, with a minimum separation of about 30 minutes. Observers should try to avoid being biased by any apparent trend in earlier estimates.

Finally, it is possible that V505 Mon is not an eclipsing binary at all. The spectral type (B9) is typical of the class of ('nebular') irregular variables classified in the GCVS as types Ias or Inas. Occasionally such stars have been incorrectly classified as eclipsing variables on the basis of apparently periodic 'eclipses'. It is too early to say that our observations justify a reclassification of V505 Mon, though there are observations on at least two nights (1972 Nov 28, 1973 Jan 21) which suggest that the variable was faint for longer than would be expected for a short period eclipsing binary. If it is eventually reclassified, it will be one of the brightest members of its new class, and therefore of exceptional interest.

(The same computer program is being used to check the conclusions drawn in the recent reports on U Boo, S Per, T Psc and V UMa. The results obtained so far are ectremely interesting and we hope to say more about them later. - JEI)

X Persei (see VSSC 20). Further interest in binocular group observations of this presumed X-ray source has been shown by Dr. N.E. White, University College London, who is comparing our visual estimates with X-ray flux measures made from the Orbiting Astronomical Observatory (Copernicus) on 1972 Dec 22 - 24 and 1974 Feb 2 - 7. If a correlation can be shown between the two sets of observations, this will confirm the identity of X Per with the X-ray source. On 1974 Feb 7 at 06.30 UT a flare involving a 25x increase in flux occurred, lasting one hour. Unfortunately the star was below the horizon at the time for British observers, so we do not know whether there was an optical flare. The UCL team have proposed a campaign involving correlated observations in the optical and X-ray regions, and the VSS will be taking part. The dates on which observations are especially needed will be announced in either VSSCs or BAA Circulars.

Bias. Ron Livesey writes: "Is there any suggestion that the printing of predictions of maxima in Circulars leads to any bias in observers? Newer trainees might take them for gospel although skilled observers should not. Personally I never read predictions of this sort so as never to be biased. Rather I observe the stars and find out for myself what they are up to."

May we emphasise once again that the purpose of these predictions is to indicate which LPVs are worth looking for on a particular night with a particular instrument. Large deviations from the predictions are common. But it is still possible to be biassed without knowing what the predictions are.

Doug Saw writes: "Regarding the note on frequency of observation in VSSC 19: I think you could issue a further general exhortation. I feel once a week is enough, except for the eruptive variables, and I've noticed during plotting that more often than weekly tends to bias. The tyros are especially guilty but so also are Knox, Saw, Young, etc. The trend is for mags to remain constant during over-observing, then after a break and having forgotten previous results

there ...

there is a sudden discontinuity."
It may be added that there are many under-observed objects on our programmes, so there is little excuse for over-observation.

Photometry supplement. No supplement has been prepared by the editor, Mr. Salter, who has expressed a wish to give up the job. Anyone who feels able to take it on in future is invited to contact the Director.
The Director wishes to make it clear that the notice on page 427 of the October Journal is premature and quite unofficial!

POSTSCRIPT:

1. Guy Hurst has sent further details of the pre-discovery observations of Nova Per, as follows: "I have re-examined over a period of about six hours all negatives with an improved system of illumination and magnification. The following results have been obtained.

Date and UT	Limiting mag	Est mag	Remarks
1974 Aug 18.93	9.2	(9.2	
19.95	9.0	(9.0	
21.95	9.2	(9.2	
27.86	8.0	(8.0	Fogged
Sep 01.87	8.0	(8.0	Fogged
05.95	9.0	(9.0	Slightly fogged
10.94	9.7	(9.7	
15.95	9.7	(9.7	
17.95	10.0	10.0	Suspected at very limit
19.93	10.0	9.4	
27.90	9.7	8.8	
28.91	10.0	9.0	
Oct 12.91	10.0	9.9	Suspected near limit
17.92	9.2	(9.2	
20.91	10.0	9.9	Suspected near limit
27.80	9.7	(9.7	
Nov 09.80	9.5	(9.5	

Photographs were taken by D Jones of Tyback, Gefncoch, Welshpool, Powys SY21 OAP. Film used was HP4 and photos were 50mm at f2.8, developed Microphen 10 min at 20°C. Sequence used was BAA VSS N44." Details as above have been communicated to Dr Marsden at the Smithsonian Observatory for inclusion in an IAUC. It should be noted that these are estimates of the combined mag of the Nova and star M (11.5).

2. P Cygni, the nova-like variable on the BG programme, was discovered in the 17th century by the Dutch mapmaker Willem Janszoon Blaeu, a specimen of whose work was recently seen in full colour reproduction on sale in the wrapping paper department of Liberty's in Regent Street, price 8p! Entitled "Nova Totius Terrarum sive Novi Orbis Tabula", it depicts both hemispheres of the earth with an array of monsters, monarchs and allegorical figures to fill the blank spaces.

3. The Second Supplement to the GCVS, Moscow 1974, has been received from Prof. Kukarkin and will be discussed in detail in VSSC 22. If anyone entertains doubts as to the value of amateur VS work, let him glance at the reference section of this volume, which abounds in references to amateur publications, not excluding those of the BAA VSS.

PREDICTED BRIGHTNESS OF LONG PERIOD VARIABLES IN 1975

The following diagram indicates when the Mira and SRa variables observed by the VSS are expected to be brighter than magnitude 9 and therefore observable in binoculars (XXX), between magnitudes 9 and 11 and therefore within the range of instruments of 75 - 100 mm aperture (xxx), between magnitudes 11 and 13.5 and therefore within the range of about 150 mm aperture (---), and fainter than magnitude 13.5 and therefore requiring observation with large instruments (blank). The predicted dates of maximum and minimum are indicated by M and m respectively.

It must be remembered that considerable deviations from the predicted behaviour can occur, and observers should not allow these predictions to influence their observations. The purpose of these predictions is simply to indicate which stars are worth looking for on a given night with an instrument of a given aperture.

	Star	Mean Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
001838	R And	6.9 - 14.3	---	---	---		m	-	---	xxX	XXX	XMX	XXX	XXX
011272	S Cas	8.9 - 14.8			m			---	---	---	--x	xxx	xMx	xxx
021403	o Cet	3.5 - 9.2	XXX	XXX	XMX	XXX	XXX	XXX	XXX	XXX	Xxx	xmx	xXX	XXX
043274	X Cam	8.1 - 12.6	xx-	-m-	-xx	XXM	Xxx	x--	m-x	xXX	MXX	xxx	--m	--x
054974	V Cam	9.9 - 15.4	---	---	---	--						m		
054920	U Ori	6.3 - 12.0	x--	---	-m-	---	xxx	xXX	XXM	XXX	XXX	XXX	xxx	xxx
123160	T UMa	7.7 - 12.9	m--	--x	xXX	XMX	XXX	xxx	x--	---	-m-	---	xxX	XXM
132422	R Hya	4.5 - 9.5	XXX	XMX	XXX	XXX	XXX	XXX	XXX	xxx	xmx	xxx	xxx	xxX
142539	V Boo	7.6 - 10.4	XXX	XXM	XYX	XXX	Xxx	xxx	mxx	xxx	XXX	XXX	XMX	XXX
151731	S CrB	7.3 - 12.9	XMX	XXX	XXx	xxx	xxx	---	---	---	m--	---	--x	xXX
154615	R Ser	6.9 - 13.4	xxx	x--	---	--m	---	---	xxx	xXX	XMX	XXX	XXX	Xxx
161138	W CrB	8.5 - 13.5	---	---	xxX	MXX	xxx	x--	---	-m-	---	--x	xXM	XXx
162807	SS Her	9.1 - 12.4	--x	xxM	xx-	-m-	xxM	xx-	-m-	xxM	xx-	m-x	xMx	xx-
190108	R Aql	5.1 - 11.5	Xxx	xxx	--m	--x	xxx	xXX	XXM	XXX	XXX	Xxx	xxx	x--
193449	R Cyg	7.5 - 13.9	XXX	MXX	XXX	XXX	xxx	xxx	x--	---	---	---	m	--
194632	χ Cyg	5.2 - 13.4	xxx	xxX	XXX	XXX	MXX	XXX	XXX	Xxx	xxx	---	---	-m-
200357	S Cyg	10.3 - 16	---	---	xxM	xx-	---	-			m		-	---
221955	SU Lac	?10 - 14	---	---				m				M		