

The British Astronomical Association

VARIABLE STAR SECTION



ISSN 0267-9272 Office: Burlington House, Piccadilly, London, W1V 9AG

VARIABLE STAR SECTION CIRCULAR 69

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Castle Printers of Wittering

Editorial

We would like to thank the many members who have sent appreciative comments on the layout and appearance of the last *Circular*. Several of the items in this *Circular* have been submitted by electronic mail, which certainly makes the Editor's life easier, and particular thanks must go to Jean Felles (again) for patiently typing out lots of unfamilar material and forwarding it by email. All contributions are welcome, however, even those hand-written or typed. If submitting diagrams or charts, please do not plot them on grey grid graph paper - either blue or orange grids can be 'lost' in reproduction, grey cannot and the result is often an unreadable diagram that has to be redrawn before reproduction. The Editor cannot guarantee to redraw all unsuitable diagrams immediately, so this may cause considerable delay in the contribution being published. Please use a ruler to obtain straight lines! All annotation (i.e. letters and figures) may be omitted from diagrams or charts - you may like to indicate it in pencil or mark up a photocopy - as it may be added easily at the layout stage.

UK Nova/Supernova Patrol Report Guy Hurst

The list of stars at the end of this note provides the basis for our 1989 programme and replaces that given in VSSC 66 (p.14-15). I have now included selected stars below declination -10 degrees, in response to an increasing membership of patrollers abroad. I have retained the criterion of only including stars that reach magnitude 14.0 or brighter at maximum but if anyone with a large telescope wishes to tackle even fainter stars I can supply more information.

I have found that increasingly we are asked by professional astronomers to monitor stars on the recurrent list and alert them if any are seen in outburst so it is clear that this work is valuable. Additionally there are some stars which have been totally neglected since discovery. Once we have studied these it may be they will be dropped, if seen frequently, in favour of other objects needing attention.

Charts can be ordered from myself for 12p per chart i.e. a set of A,B,C charts for one object costs 36p. A description of the different types of charts appeared in VSSC 66. When ordering please add 50p per order to cover postage and packing and make remittances payable to 'G.M.Hurst'. A complete set of 92 different charts can be supplied for $\pounds 11.00$ post paid. For overseas orders please add 20% to cover additional postage costs.

The list forms part of an extensive paper version of the recurrent objects catalogue (1989 January edition) which costs £2.00 post paid. This includes guidance notes on observing these objects and some seven pages giving notes about the original discovery and observed maxima of each star.

Anyone wishing to join the patrol and take up this task as a supplement to their main VSS observing programme is invited to send an S.A.E. to the Coordinator.

Recurrent Objects Programme

Variable RA	(1950) DE	EC	Mag Range	Туре	Char	ts		Seql	Qu	Rev
HP And	00 16.5	+41 11	10.5-(14.5p	UG:	A19	в	с	13.0	3	880219
LS And	00 29.5	+41 42	11.7-20.5p	N?	A19	В	С	16.4	1	880219
LL And	00 39.2	+26 21	13-(17v	UG:	Ν	N	Ν			
V452 Cas	00 49.4	+53 36	14-17.5:	UGSS	N	В	С	12.5	3	880221
HT Cas	01 07.0	+59 48	12.6-19.3V	UGSS	Ν	N	С	16.6	3	850120
XY Psc	01 07.6	+03 17	13.0-(20p	UG:	Ν	Ν	С	F	4	881224
FN And	01 09.3	+34 59	13.5-17.5p	UG	Ν	Ν	Ν			
WX Cet	01 14.6	-18 12	9.5-18p	UG?	A	В	С	13.9	1	830923
UV Per	02 06.7	+56 57	11.0-17.5v	UGSS	Ν	Ν	С	16.5	1	881228
UW Per	02 08.9	+56 52	13.5-18.8p	UG?	N	В	С	16.0	2	871026
NSV 00895	02 39.0	+43 09	11.7-(20p	UG?	N	N	с	16.2	3	860824
SV Ari	03 22.2	+19 39	12-22pg	N?	N	В	С	16.7	3	881129
GK Per	03 27.8	+43 44	0.2-14.0v	NA	Α	В	С	15.9	2	881222
HW Tau	05 00.6	+26 19	11.5-(17p	UGSS	N	Ν	С	12.9	3	881223
V616 Mon	06 20.2	-00 19	11.2-20.2B	XND	A8	В	С	14.8	1	890109
SW UMa	08 33.0	+53 39	9.7-16.5v	UGSU	BAA	vss	Ν	14.7	1	019.02
EG Cnc	08 40.1	+28 02	11.9-17:V	NL	Ν	В	Ν	9.5	3	881230
BZ UMa	08 49.9	+58 00	10.5-15.3B	UG	N	В	Ν	16.8	3	881223
AK Cnc	08 52.6	+11 30	13-(17 _P	UG	N	В	Ν	F	4	881224
Т Рух	09 02.6	-32 10	7.0-15.7B	NR	N	В	С	14.4	3	880403
TU Leo	09 27.0	+21 37	11.7-15.2B	UG:	N	B66	С	14.9	3	880218
DV UMa	09 43.4	+45 01	14-19.8B	UG	N	В	Ν	9.3	3	881223
CY UMa	10 54.0	+49 57	11.9-17p	UG	N	В	С	12.5	3	880131
RZ Leo	11 34.8	+02 06	10.5-17.5p	UG:	Ν	B80	С	15.0	2	880619
DO Dra	11 40.8	+71 58	10.0-15.1B	UG	Ν	В	Ν	12.4	3	860118
BC UMa	11 49.7	+49 31	10.9-18.3B	UG	Ν	В	Ν	15.8	3	880530
AL Com	12 29.9	+14 37	13.0-20.0p	UGSS	Ν	B 3	Ν	19.5	2	830403
GO Com	12 54.2	+26 53	13.1-20p	UGSS	Ν	Ν	С	F	4	881224
HV Vir	13 18.5	+02 09	11.0-20.5B	N?	Α	В	С	6.3	3	880529
CR Boo	13 46.4	+08 12	13.0-17.5v	AM:	N	B11	N	F	4	850323
N.B0062	14 40.9	+13 55	10.5-20p?	N?	N	в	С	9 .0	3	881224
UZ Boo	14 41.7	+22 13	11.5-(16.1v	UG	Ν	B	С	16.5	1	881224
LX Ser	15 35.8	+19 02	13.3-17.4B	UG	Ν	В	С	14.2	3	881230
SS UMi	15 51.3	+71 55	12.6-17.6	UG	Ν	В	С	13.0	3	880228
T CrB	15 57.4	+26 04	2.0-10.8v	NR	BAA	vss	N	10.5	1	025.01

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Recurrent Objects Programme (cont.)

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Variable RA	(1950) DEC	2	Mag Range	Туре	Chart	is i		Seql	Qu	Rev
U Sco	16 19.6	-17 46	8.7-19.3V	NR	A5	B	С	14.2	2	870516
V592 Her	16 28.8	+21 23	12.3-(20p	XND?	N	B	N	15.4	3	881227
RS Oph	17 47.5	-06 42	4.3-12.5v	NR	BAA	VSS	N	13.8	1	024.01
PR Her	18 06.5	+38 47	14.0-18.5p	UG	N	N	N			
V1017 Sgr	18 28.9	-29 25	6.2-14.9B	ZAND	A	B	С	14.5	3	861018
N.Sct81	18 44.2	-05 00	8.0v-(22?	N7	A	B	N	11.9	3	810726
CI Aql	18 49.5	-01 32	11.0-15.5р	N:	N	N	N			
DM Lyr	18 56.8	+30 12	13.6-18p	UG	N	B	N	14.2	3	881229
V1113 Cyg	19 21.4	+52	38 14-(17p	UGSS	N	N	N			
HN Cyg	19 31.7	+28 49	13.3-16.0p	UG:	N	N	С	16.2	3	881227
V795 Cyg	19 32.6	+31 26	13.4-(17.9p	UGSS	N	N	С	17.9	3	881229
V542 Cyg	19 48.3	+58 22	13.0-18.3:p	UGSS	N	B	Ν	13.9	3	881227
V1454 Cyg	19 51.8	+35 11	13.9-(17.0p	UGSS	N	N	C	F	4	881229
EY Cyg	19 52.7	+32 14	11. 4-15.7 p	UGSS	N	B	С	15.7	2	870 704
V725 Aql	19 54.3	+10 41	13.7-16.2p	UG	N	N	N			
AW Sge	19 56.3	+16 33	13.8-(17.5p	UG	N	N	C 51	14.5	2	881227
V1028 Cyg	19 59.8	+56	48 13.0-18p	UGSS	N	N	С	17.5	3	881223
WZ Sge	20 05.3	+17 34	7.0-15.5B	UGSU	BAA	vss	N	14.9	1	023.01
TY Vul	20 39.6	+25 25	14-19:p	UG	N	N	N			
UY Vul	20 53.7	+26 29	13.0-(16.0р	UG:	N	B	N	9.0	3	881231
UZ Vul	20 54.6	+23 23	14-(1бр	UG:	N	B	N	F	4	881229
V1060 Cyg	21 05.8	+37 02	13.5-18p	UGSS	N	N	N			
VY Aqr	21 09.5	-09 02	8.0-17.2p	UGSU	A	B	С	15.5	2	880723
EF Peg	21 12.7	+13 52	10.7-(17p	UG	N	N	С	12.8	3	880515
V632 Cyg	21 33.9	+40 12	12.6-17.5p	UGSS	N	N	C50	16.8	1	881226
V1251 Cyg	21 39.0	+48 26	12.5-(15p	UG:	N	B6	Ν	15.2	3	820411
Scovil Cyg2	1 40.8	+31 20	12.8-(15	UG?	N	B 7	N	14.8	3	860118
EG Aqr	23 22.7	-08 35	14.0-18.5p	UG	N	N	N			
DX And	23 27.3	+43 28	10.9-16.4p	UGSS	N	B	С	14.4	3	890109
V630 Cas	23 46.5	+51 11	12.3-17.1p	UG?	N	B	С	17.3	3	880219

Forthcoming VSS Reports

Mira Stars - IV: R Lyn, W Lyr, RY Oph, R Peg, X Peg and R Per (J.E. Isles and D.R.B. Saw)

Some 36 000 visual observations of six Mira stars, observed for between 65 and 70 years, are analysed, and the results are compared with catalogue data. A number of interesting correlations are found among features in the light curves. R Lyn and W Lyr vary slowly in amplitude. No evidence is found for variation in the mean periods; but W Lyr shows short-term oscillations of cycle length about the mean. These oscillations, and similar behaviour previously noted in X Aur, R Boo and T Her, may represent phase jitter due to an imperfect coupling with the mechanism within the star driving the variations.

Visual Observations of Alpha Comae Berenices in 1989 February

Tristram Brelstaff

Alpha Comae Berenices was found to be a close double star by F.G.W. Struve in 1827. Further observations showed it to be a binary system with a period of 26 years and an orbital inclination close to 90 degrees. This means that we see the orbit edgeon and at intervals of 13 years the components are so close together that they cannot be separated even with the largest telescopes. The possibility that the components might actually eclipse each other on these occasions has frequently been mentioned by has generally been discounted because of the inaccuracy of the orbital inclination determined from visual measures and the relatively small size of the F-type dwarfs which make up the system. However, in recent years the technique of speckle interferometry has been used to determine the orbital elements of close double stars with much greater accuracy than was previously possible, B. Hartkopf (IAUC 4678) recently reported new high-precision orbital elements for Alpha Comae based on such observations carried out by himself and M. McAlister over the past 12 years. He derived an orbital inclination which was closer to 90 degrees than the previous estimates and predicted that an eclipse of depth 0.1 mag and duration 1.3 days could occur near 1989 Feb 15 (±2 weeks). This sort of eclipse would be too shallow to be detected visually but, within the error limits of the inclination, it was possible for the eclipse to be either central, and hence have a depth of 0.8 mag, or else to miss altogether, and hence have a depth of 0.0 mag.

Thus there was a small, but distinct, possibility that Alpha Comae would be noticeably fainter than normal for one or two days in 1989 February. There were two questions which visual observations could be of use in answering. The first was 'Do the eclipses occur at all?' If Two or more independent visual observers were to record a marked fade on the same night then it would be possible to claim that they had observed the eclipse and hence to conclude that the eclipses did occur. If would be much harder to use visual observations to demonstrate that eclipses did not occur because of gaps in the coverage and because the eclipse could be too shallow to be detected visually. The second question which visual observations could be used to answer is 'What is the precise period of the system?' A confirmed observation of an eclipse now and another one in 26 years' time would give the period accurately enough to allow the eclipse 52 years from now to be predicted to within a day or two.

Several active observers were contacted and asked to Alpha Comae to their programmes for the month of February. However the star was not well-placed, only rising late in the night and being best seen in the early hours of the morning, so only six of the observers managed to get good runs of estimates. These are listed below.

Observer	No. of Obs.	Correction
T. Brelstaff	28	0.0 mag
B.R.M. Munden	8	+0.1
M.J. Nichols	4	+0.1
M.D. Taylor	16	+0.1
P.J. Wheeler	6	-0.2
W.J. Worraker	5	0.0
Total	67	

There were clear systematic differences in the estimated magnitudes between the observers and the magnitudes have been adjusted to remove these by adding the indicated corrections. This procedure is valid in this case because we can safely assume that the star was constant for most of the time, and as each observer made several well-spaced observations it is very unlikely that the shape of the light-curve will have been distorted by these adjustments.

These adjusted magnitudes have been used to plot the accompanying graph. All of the estimates except one fall in the range 4.2 - 4.4 and the one exception is too bright rather than too faint and so can be discounted as evidence for an eclipse. Indeed, there is no clear evidence for any eclipse having occurred at all, but it is possible that one could have fallen in one of the unobserved gaps or else that the eclipse could have been less than 0.2 mag deep and so is lost in the observational scatter.

Although the only results have been negative, the writer does not feel that this project has been a waste of effort. The possibility of using crude eye-estimates to confirm precise measurements and calculation seemed too good an opportunity to miss and this opportunity will not recur until early in the next century. Our negative results do put some constraints upon what did happen. If any other observers have any more estimates of this star that will close some of the gaps in our coverage then please send them to the writer at: 4 Leiston Close, Lower Earley, Reading, Berks. RG6 3UE.

The writer would like to thank Melvyn Taylor for his help and also the observers who supported this project, both those who managed to get observations and those who were clouded out.



The VSS Programme

The following letter has been received from Norman Kiernan:

In Circular 68 the Director invited readers to send their suggestions for the development of the VSS programme.

With his own proposals, designed to extend the scientific value, I am in agreement, but there is another aspect - the pleasure which Section members derive from taking part. Why does an amateur get out of bed in the middle of a winter's night to observe variable stars? I suggest that the advancement of science is not the major factor. The observer is motivated by the interest he derives from understanding the changes going on in the star he observes; he is able to interpret the significance of the observations he so carefully makes.

On this basis the choice of stars for the programme is out of balance. 122 stars (almost 60%) are semiregulars or irregulars showing little or no behavioural pattern to interest the observer - or anyone else perhaps, for they are rarely the subject of Section reports. 15% are Miras, not a particularly interesting class for one is much like another and there are few reports on them. These two classes make up virtually the total diet of binocular observers.

Out of the BAA's 3000 members only 60 make regular observations of variables, a regrettably small band. Presumably others have given variables a try and found them insufficiently interesting.

As far as the value of his observations is concerned the amateur is encouraged when he reads a report on one of the stars he is observing. He is not filled with enthusiasm at the thought of his observations joining the two million others which may, but probably will not, be of use in decades to come. The potential value of a prolonged series of observations is, of course, obvious, but even so it seems to me that the Section is unduly reluctant to give a star up, even in the case of stars so underobserved that the observation can be of little value.

My inclination, therefore, is towards:

A smaller programme

A smaller percentage of semiregulars, irregulars and Miras

A bigger percentage of stars covered by reports

A better spread of stars in RA (the area 9 hours to 14 hours is under-represented)

Articles in Journals, Newsletters, etc. extolling the interest of variable-star work with a view to increasing the number of observers.

[Rather than give 'official' comments to these points, we should be pleased to know what other members think. Letters may be sent to John Isles or Storm Dunlop.]

Publication of Eclipsing Binary Report: 1987

John Isles would like to apologize for the delay, caused by various factors, in preparing the 1987 Eclipsing Binary Report. This should, however, be completed in time for the next issue of the *Circular*.

VSSC 68 - Errata and Notes

Regrettably, an editorial disaster occcured affecting the report of the Professional-Amateur Meeting that appeared in VSSC 68. Because of a misunderstanding - or especially malevolent gremlins - *all* the illustrations were incorrect. We particularly apologize to the contributors for this error. The correct illustrations are reproduced in this issue. The following correction should be made to the text:

p.18 Delete reference to Fig.5 in paragraph 3

Lack of space also precluded the photograph of the participants at the Meeting from being included, so it is also reproduced here.

For some unknown reason, the computer program removed the underlining from the photoelectric measurements on pp.32-36, when the file was transferred between machines. However, the photoelectric O-C values may be recognized by the fact that they are given to 4 decimal places, all others being given to 3 places.

On p.33, for the first value against IQ Per, the O-C should read: '6112.3767' - i.e. it is a photoelectric result

On p.41, an error altered the name of one star. For 'AK Ori' please read 'CK Ori'.

Tristram Brelstaff's name was accidentally omitted from the contents list as author of the item 'Observing Suspected Variable Stars', for which we apologize.



Fig. 1 Residuals of times of minima of V526 Sagitarii as determined and plotted by O'Connell (1971). Closed circles represent times of primary minima, and open circles secondary minima. The orbit has an appreciable eccentricity (e = 0.244). (See VSSC 68, p.15)



Fig. 2 Residuals of times of minima of U Cephei since its discovery as a variable star. Some individual minima have been omitted in crowded portions of the plot. The adopted period is 2^4 .4929005. The observations indicate that the present period is 2^4 .49302. The period has increased continually (but not steadily throughout 90 years of observation. Most times of minima before E = 11,000 were collected by Svechnikov (1955). The remainder have been collected from many sources, some unpublished.



Fig. 3a. Observed minus calculated residuals for 62 maxima of V452 Her (also designated $BD+13^{\circ}3224$). The lower plot is for cubic elements; the upper plot is for the best-fit quadratic with the same 'n' values as the cubic. The solid line is the difference (cubic minus quadratic) between the two solutions. (See VSSC 68, p.17)



Fig. 3b. B-light-curve of V652 Her obtained on 1985 August 5th/6th. (See VSSC 68, p.17)



Fig. 4. Forms of variation in cataclysmic variables (See VSSC 68, p.18)



Fig. 5. Continuous orbital light-curve of CN Ori during quiescence (See VSSC 68, p.18)



Fig. 6. Long-term monitoring of CN Ori. (See VSSC 68, p.18)



Books on Variable Stars Storm Dunlop

This list of books on variable stars has been compiled in response to frequent requests from members for such information. The details are intended to give some idea of the contents and their potential interest to amateurs, but must be understood to be personal comments. A few interesting books in languages other than English are also included. Any further similar notes from members about books not mentioned here will be welcomed.

There are a large number of published *Proceedings* of IAU Colloquia and Symposia. As these are generally very specialized, they are not listed here. Members will find it best to check these particular books in a major astronomical library, such as that of the Royal Astronomical Society.

The Classical Novae, Bode, M. & Evans, A. (eds.), Wiley, 1989. This has not yet been examined in detail, but is likely to be of high standard. It is unfortunately, very expensive (£70).

Interacting Binary Stars, J.E. Pringle & R.A. Wade (eds), C.U.P., 1985. Technical, comprehensive, good, and very strongly recommended.

Observing Variable Stars, Levy, D., C.U.P., 1989. Introductory work, with constellation by constellation descriptions of specific variables. Primarily concerned with AAVSO material and methods.

A reference Catalogue and Atlas of Galactic Novae, by H.W. Duerbeck, D. Reidel, 1987. Highly specialized, containing descriptions and finding charts for all known novae. It is likely to become the standard reference work for this field.

Soleils Eclatés by T. Montmerle & N. Prantzos, Presses du CNRS, Paris, 1988. An excellent book on supernovae, including a large amount on SN 1987A. Strongly recommended.

The study of variable stars using small telescopes, J.R. Percy, C.U.P., 1986. Intended for both professional and amateur users of moderate-sized equipment. Some very useful material.

Supernovae by P. and L. Murdin, C.U.P., 1985. This is only at an introductory level, but is useful for its overall coverage.

The symbiotic stars, S.J. Kenyon, C.U.P., 1986. An excellent review of this interesting class of objects. Technical, but highly recommended.

Variable Stars by C. Hoffmeister, G. Richter & W. Wenzel, Springer-Verlag, 1985, is undoubtedly the best recent, comprehensive book. It is moderately technical in places, particularly in the discussion of discovery probabilities, and perhaps slightly complex if you are not very familiar with the field.

Variable Stars by M. Petit, Wiley, 1987. Regrettably, rather poorly translated from the French edition of 1982, with few changes, so somewhat out of date. Not recommended unless you are familiar with the general field, and can thus recognize the mistakes in translation. (The French edition, *Etoiles Variables*, Masson, Paris, 1982, is obviously more accurate.)

[Some older works have, in some cases, become 'classics'. In addition, certain books not specifically dealing with variable stars alone contain useful material.]

The relevant passages in the Cambridge Atlas of Astronomy are worth reading.

The Historical Supernovae, D.H. Clark & F.R. Stephenson, Pergamon, Oxford, 1977. An excellent, and now standard work, but restricted as the title suggests.

Interacting Binary Stars, J. Sahade & F.B. Wood, Pergamon, 1978. Its coverage is as suggested by its title. It is technical and a standard reference.

Observer Les Etoiles Variables: Comment, Pourquoi?, compiled by the Association Francaise d'Astronomie, Paris, 1980. A useful summary of observing methods, suitable objects and the basic causes of variation.

Stars and Clusters by C. Payne-Gaposchkin, Harvard U.P., 1979. This is not specifically about variables, but discusses many classes. It very good on some of the minor pulsating classes, although - perhaps surprisingly - does not give much coverage to eruptives. It is generally sound.

Stars: Their Birth, Life, and Death, I.S. Shklovski, Freeman, San Francisco, 1978. This is not variable-star orientated, but contains some useful material.

Le Stelle Variabili by L. Rosino, Collana Rivista Coclum, Bologna, 1979. A collection of a series of papers (in Italian) by Prof. Rosino, that originally appeared in the journal *Coelum*.

Pulsating Stars, B.V. Kukarkin (ed.), Wiley, 1975. A translation of the original Russian version of 1970, so therefore somewhat dated, although a standard reference.

Eclipsing Variable Stars and *RR-Lyrae Stars*, V.P. Tsesevich (ed.), Wiley, 1973. As previous item.

Variable Stars, W. Strohmeier, Pergamon, 1972. Useful, but somewhat derogatory of amateur work - which is ill-considered, because he actually makes use of amateurs' results, perhaps without realizing it.

The Galactic Novae, C. Payne-Gaposchkin, Dover, New York, 1964. (There was a previous printing by North-Holland in 1957.) The standard work for many years, now (only partly) superseded by Duerbeck's A Reference Catalogue... (see above).

Variable Stars and Galactic Structure, C. Payne-Gaposchkin, Athlone, 1954. Overtaken by later research, but the only work entirely devoted to the subject. The Story of Variable Stars, L. Campbell & L. Jacchia, Blakiston, Philadelphia, 1947. A standard work, still worth reading and possessing.

Spectra of Long-Period Variable Stars, P.W. Merrill, Chicago, 1940. Specialized, but again sound for its time.

Variable Stars, C. Payne-Gaposchkin & S. Gaposchkin, Harvard U.P., 1938. Quite outdated and outmoded, but a standard reference and a book that is worth obtaining, if possible.

The Nature of Variable Stars, P.W. Merrill, Macmillan, N.Y., 1938. Introductorylevel book, sound for its time.

An Introduction to the Study of Variable Stars, C. Furness, Houghton Mifflin, N.Y., 1915. Old-fashioned, of course, but quite excellent for its time and well worth having.

J.S. Glasby wrote three books that unfortunately contain many errors, but which are certainly readily understandable: Variable Stars, Constable, 1968; Dwarf Novae, Constable, 1970, and Variable Star Observer's Handbook, Sidgwick & Jackson, 1971. These cannot be really recommended, as all descriptions (and light-curves) of specific stars' behaviour are suspect. They are mentioned for the sake of completeness. They do give an overall feel of the field. The same author's Nebular Variables is too bad to be considered.

BAA Journal papers on variable stars

(Compiled by Storm Dunlop)

The following reference list gives brief details of all papers and letters regarding variables that have appeared in the BAA *Journal* since 1972. All are available in reprint (or photocopy) form on request from Storm Dunlop.

Individual stars:

R And	Faint max.	83 (2) 135, 1973
RX And	1926 -1973	87 (4) 395, 1977
UU Aql	1963-1969	86 (5) 412, 1976
V1229 Aql (N.1970)		88 (2) 180, 1978
SS Aur	A Z-Cam Star?	83 (3) 179, 1973
	1920-1969	87 (2) 176, 1977
Epsilon Aur	1982-4 ecl.	96 (3) 148, 1986
- U Boo	1940-1969	82 (6) 464, 1972
	Periodogram	86 (5) 379, 1976
RX Boo	e	97 (5) 277, 1987
Z Cam	1926-1950	85 (5) 438, 1975
	1951-1972	89 (2) 169, 1979
	1973-1977	89 (6) 597, 1979

PRO-AM LIASON COMMITTEE (PALC-VS) NEWSLETTER No.2

Response to the Questionnaire

Following the formation of the PALC-VS, as announced in Newsletter No.1 and the subsequent distribution of the Questionnaire to ascertain the level of support, by 1989 May 31 43 questionnaires had been returned, 15 from professionals and 28 from amateurs. These have included questionnaires from such diverse places as Cyprus (only to be expected!), but also India, Malta, East Germany and Canada.

The types of variable star observed by the amateurs covered just about all types, as might be imagined, but particular emphasis was placed on CVs, N, R CrB stars and SR. EBs were also popular (both visual and PEP).

Similarly, professionals observe many types of variable star, but here Flare Stars, EBs, Cepheids (and RR Lyrae stars) R CrBs (and anti) as well as very young and very old stars and CVs are most frequent.

Eight amateurs stated their interest in PEP, with five currently owning operational equipment and another three hoping to obtain equipment in the future.

Some comments of general interest made by amateurs are given below:

- 1) That collaboration should not be limited to PEP and other advanced techniques.
- 2) It would be stimulating to know when professionals make use of amateur's visual data.
- It is more stimulating to observe for a specific research project, rather than just for the sake of building up a data bank.
- 4) Hold more meetings especially in the North of England.

Comments from the professional side included the following:

- 5) This could become an invaluable co-operation; strongly supported.
- 6) Keep in touch with similar groups in Europe and the US.
- 7) Back-up observations for space based astronomy would be extremely useful as for example during the first 6 months' survey of the Rosat X-ray satellite.

Some of the points raised can be answered now.

- 1) Although the questionnaire was formulated with a view to finding out what support there was for PEP, it is certainly not intended that visual observations should be excluded from the committee's area of interest. Indeed it is likely that this will be the main area of collaboration between professionals and amateurs for a long time to come. However, it is to be hoped that PEP will play an everincreasing role as more amateurs become active in this field. For pure PEP the IAPPP already exists, of course, although as far as the UK is concerned more direct help from professionals would help to continue the initial impetus.
- 2) Perhaps all professionals will advise the committee whenever they use amateur's visual data so that an occasional list of such use can be reported in the Newsletter.

- 3) It is possible that many amateurs may feel more motivated to observe if it is with a specific objective in mind, and that with greater collaboration more professionals will be calling for specific observations. However, amateurs must ensure that these requests are fulfilled, otherwise this area of potentially closer collaboration could lead to a decline in the call for amateur assistance.
- 4) It is up to the people 'Up North' to organise any meetings both professionals and amateurs can get together on this. However, those amateurs in the south, who have more experience of organising PEP meetings, would be keen to assist in any way they can.

The Committee would be grateful to receive any Questionnaires from those who have not yet returned them. The following list of respondents may perhaps encourage them to do so.

Professional

Dr Don Pollaco, St. Andrews Mr Stephen Boyle, UCL Dr Nye Evans, Keele Dr Robert Smith, Sussex Dr Dave Stickland, RAL **Dr Gordon Bromage** Dr Martin Barstow, Leicester Dr John Fernley, Mill Hill Dr Roger Griffin, Cambridge Dr John Percy, Toronto Mr John James March Dr Barbara Hassell, Cambridge Dr Derek Jones, RGO, La Palma Dr Constanze la Dous, Cambridge Dr Phil Hill, St Andrews Dr Helmut Busch, Hartha, D.D.R.

Amateur

Roger Pickard - PEP John Watson - PEP Gary Poyner Ian Middlemist Mike Gainsford **Geoff Kirby** Stephen Lubbock Denis Buczynski John Isles Dr Bill Worraker Melvyn Taylor Peter Ells Hedley Robinson Steve Marriott S.R. Srinivasan George Hawkins Norman Kiernan **Brian McInnerny Tony Tanti** Paul Leyland Chris Braines **Dick Chambers** John Howarth John Toone Jack Ells **Rhona Fraser Guy Hurst Dr Richard Miles - PEP**

Erratum - PALC NL.1

p.iii, line 3:

for '... are interest in ... ' read '.. are interested in ... '

Other items concerning Professional/Amateur cooperation

Lack of space prevents three items from being included in this newsletter, but readers will find these contributions on 'Fadars' (by Dr David Pike), ζ Aurigae stars (by Dr Roger Griffin), and Guy Hurst's list of the Professional/Amateur collaborations over a period of six months in 1988 given in full in the accompanying VSS *Circular* 69.

Hewitt Satellite Camera archive Roger Pickard

The Hewitt Satellite Camera archive comprises some 20,000 photographs of satellite trails obtained since 1978 for determining their positions against the star background. Each photo shows a field of 10 degrees diameter, to a limiting stellar magnitude that varies between 10 and 13.

On average, each piece of sky has been photographed 40 times. The archive is of considerable potential value for research into variable stars, and possibly also artificial satellites, meteors, minor plants and comets.

The Hewitt Camera programme is due to close by April 1990, and the RGO would like to hand the archive over to the BAA so that it can be exploited, particularly for variable star research, and made accessible to other potential users. Subject to confirmation by the SERC, the following has been agreed:

- 1) The archive will become the property of the BAA. The BAA will maintain the archive intact in a location, where it will be stored safely, indexed and available for access by responsible persons on application to the VSS.
- 2) The photographs and documentation will for the time being be held on behalf of the VSS by Crayford Manor House Astronomical Society (CMHAS) who have suitable secure accommodation.
- 3) CMHAS will compile the index to the photos using a micro-computer system. The data volume will be about one million characters and the file will fit on a single floppy disk. Copies of the index will be held in several places and made available on request, at cost.
- 4) When the archive is ready to be made accessible to others, a paper describing it will be prepared for the BAA *Journal*.

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Other fields concerning Frofessional Amateur cooperation

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> Hewitt Satellite Camera archive: Roger Pickant

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Individual stars (cont.):		
Gamma Cas	1936-1976	89 (4) 378, 1979
IV Cep (N.1971)		88 (2) 180, 1978
R CrB	1961-1970	83 (5) 368, 1973
	1971-1975	87 (5) 509, 1977
T CrB	1948-1971	84 (3) 203, 1974
		85 (3) 217, 1975
	Letter	86 (1) 84, 1975
SS Cyg	1969-1975	87 (6) 611, 1977
	1896-1975	88 (5) 458, 1978
CI Cyg	Letter	87 (1) 88, 1976
V1500 Cyg	Prelim. 1-c.	86 (3) 245, 1976
	Final report	90 (2) 173, 1980
HR Del	1967-1971	85 (1) 55, 1974
AB Dra	1969-1975	88 (3) 292, 1978
U Gem	1956-1969	86 (4) 327, 1976
	1970-1979	92 (3) 127, 1982
CP Lac (N.1936)		88 (6) 608, 1978
X Leo	1920-1944	83 (2) 128, 1973
	1970-1979	92 (5) 220, 1982
AY Lyr	1931-1975	88 (1) 79, 1977
	Letter	88 (3) 303, 1978
U Mon	1964-1973	85 (2) 156, 1975
RS Oph	1963-1971	84 (3) 203, 1974
CN Ori	1963-1975	88 (3) 292, 1978
CZ Ori	1930-1969	86 (5) 412, 1976
RU Peg	Letter	86 (1) 84, 1975
	1970-79	93 (2) 70, 1983
S Per	1920-1969	83 (4) 291, 1973
	Periodogram	86 (3) 210, 1976
	Periodic nature of,	87 (3) 264, 1977
TZ Per	1959-72	84 (6) 451, 1974
UV Per	1926-69	85 (6) 528, 1975
		89(1) 47, 1978
TPsc	1926-60	84 (4) 287, 1974
51/ 0	Periodogram	86 (5) 379, 1976
RY Sgr		88 (2) 145, 1978
RU Sex	RR star?	97 (1) 23, 1986
V 308 Sct (N.1970)		88 (2) 180, 1978
FH Ser (N.1970)	1050 1050	88 (2) 180, 1978
RV Tau	1950-1973	85 (2) 156, 1975
SU Tau	1962-1975	88 (4) 402, 1978
BV & GR Tau		96 (2) 98, 1986

Individual stars (cont.):		
CSV 6110 Tau		90 (1) 69, 1979
V UMa	1934-1972	84 (4) 287, 1974
	Periodogram	86 (5) 379, 1976
SU UMa	1926-1954	84 (5) 365, 1974
	1955-1969	85 (4) 346, 1975
	1970-1979	96 (4) 217, 1986
	Supercycles of,	97 (5) 274, 1987
SW UMa	1963-1969	85 (6) 528, 1975
CH UMa	:	85 (2) 120, 1975
LV Vul (N.1968 No.1)		83 (1) 44, 1972
Classes of variable:		
Eclipsing Binaries:		
And to Cam	1972-1983	96 (1) 27, 1985
Cnc to CrB	1972-1984	96 (5) 294, 1986
Cyg to Hya	1972-1985	98 (4) 200, 1988
Lac to Ori	1969-1986	99 (1) 14, 1989
Final Decline in Novae		85 (1) 59, 1974
IAU Flare Star Patrol		82 (4) 298, 1972
Minima of Eclipsing Binaries:	1972	83 (6) 452, 1973
	1973-4	85 (5) 443, 1975
	1975	87 (1) 79, 1976
Mira stars - I:		
R Ari, R Aur, X Aur, R Boo & S	Boo	97 (2) 106, 1987
Nova Search Programme 1973-4		85 (3) 278, 1975
Period-Amplitude Relationships for	87 (5) 488, 1977	
Photoelectric and Visual Comparis	on Star Sequences:	
Ι	-	89 (3) 265, 1979
П		90 (3) 265, 1980
Possible New Variable in Perseus		88 (3) 274, 1978
Rate of Decline from Dwarf Nova	Outbursts (Bailey)	86 (1) 30, 1975
SN 1974 in NGC 4414		85 (4) 352, 1975
SN 1980K in NGC 6946		96 (2) 102, 1986

What's in a name? that which we call a fadar By any other name would be as variable! (with apologies to WS)

Sometime ago, one cloudy night on La Palma, Don Pollacco, a visiting observer from St Andrews, drew my attention to a group of early-type variable stars which Soviet observers had termed the "anti-flare" stars. They had singled these stars out from amongst the plethora of nebular variables and named them this because of the form of their light curves. These are characterized by lengthy periods at or near maximum light which are sporadically interrupted by rapid fadings of up to 2 magnitudes in the V-band. These declines typically occur at intervals from 2-60 days and the recovery is quite rapid taking only from 10-50 hours. Without continuous coverage it is therefore quite easy to miss even the largest declines. With tongue somewhat in check we have tended to refer to these objects as FADARS to bring the terminology more in line with that used in other areas of astronomy!

The cause of the fadings is not known with certainty but is probably due to circumstellar material since these objects are associated with nebulosity and are likely to be still in the pre-main-sequence stage of evolution. They are all of early spectral type and must be closely related to the Herbig Ae/Be stars. Last year, in an attempt to illucidate the nature of these stars, we obtained spectroscopic observations and to our surprise about half the sample appeared especially interesting in that they showed evidence that some of the circumstellar matter was falling back onto the star. Usually only indications that the circumstellar material is being expelled from the stellar environment are seen. This subset of the fadars may therefore be the early-type counterparts of the YY Ori stars.

Further spectroscopic observations are planned for mid-August this year but in addition we would very much like to continue to study their photometric behaviour. There have been suggestions of both irregular and regular (periodic?) photometric variations when the stars are at maximum light. Accurate photoelectric photometry is needed to study these changes. But of equal importance is a complete knowledge of the frequency, duration and strength of the major fadings. This can be obtained through regular visual estimates and is therefore (yet another!) project ideal for amateur astronomers with even modest instruments.

We have an initial list of six targets, four of which are in Orion, that hotbed of premain-sequence activity. We hope an intensive campaign on those stars will be possible next season but of more immediate interest are the two stars we will be observing in August.

These are SV Cep (V = 10.3 - 13.3) and VX Cas (10.3 - 12.1). Don't worry if the minima appear too faint for you to obtain reasonable estimates - we would still be

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interested in any observations which just indicate that the object is well below its "normal" brightness. And if anyone knows of any (maybe non-astronomical) way of ensuring that the objects undergo a decline while we are observing them spectroscopically!

Any observers willing to keep a regular eye on these stars would be more than welcome to join the project. Finding charts and further details are available from myself or Guy Hurst.

ζ Aurigae Binary Stars R.F. Griffin

(Aurigae binaries form a small and particularly interesting group among the doublestar systems known as composite-spectrum binaries. Such systems appear in the telescope as single stars (or in some cases as very close pairs), but are shown by spectroscopy to consist of two stars of dissimilar spectral types. Binaries consisting of two ordinary main-sequence stars do not show composite spetra; if the components have very dissimilar spectra they necessarily have very dissimilar magnitudes as well, and the spectrum of the fainter one is overwhelmed by that of its companion. In a typical composite-spectrum system there is a cool star, which is a late-type giant or supergiant, and a hot star, which is on or near the upper part of the main sequence. In spectroscopic notation, the cool star is normally of type G. K or M with a luminosity class of Ib, II or III, while the hot one is of type B or A luminosity class V. Depending upon the exact combination of types, the spectrum at a given wavelength may be dominated by one or the other component; but because of the redness of the cool star and the consequent rapid variation of its brightness with wavelength, among recognised composite-spectrum binaries there is normally some wavelength at which the luminosities are equal. Shortward of the wavelength the main-sequence star dominates the spectrum; longward, the spectrum looks increasingly like a normal late-type one.

Since the luminosities of both components are high, composite- spectrum binaries can be seen at great distances and are quite common among the naked-eye stars. Examples are α Equ, β^1 Cyg, γ Per and δ Sge. Perhaps because of the confusing nature of their spectra, in which the superposition of the two components creates difficulties for the measurement of either of them, few of the systems have attracted much attention. Among the few that have been carefully studied are the ζ Aur systems. In such systems the orbit plane lies so nearly in the line of sight that the hot star is eclipsed by its companion once in every revolution in the orbit. The classical ζ Aur systems are ζ Aur itself, 31 and 32 Cyg, and VV Cep; comparitively recently t Per, HR 2554, HR 6902 and 22 Vul have been recognised as members of the class. Some data on the systems are given in the table overleaf.

				Eclipse	
Star	HR	Sp.types	Period	Lasts	f(m)
			(days)	(days)	(M _o)
ζAur	1612	K4Ib + B6V	972	40	0.92
31 Cyg	7735	K4Ib + B4V	3784	64	1.00
32 Cyg	7751	K3Ib + B8V	1148	20:	0.51
VV Cep	8383	M2Ia + 08V:	7430	550:	4.6
τ Per	854	G8III + A3V	1516	2	0.34
	2554	G6II + AOV	195	:	0.31
	6902	G9II + B7V	385	9	0.55
22 Vul	7741	G3Ib-II+B9V	249	11	0.50

Owing to the large sizes of the stars involved, eclipses in ζ Aur systems tend to be quite leisurely affairs. At typical orbital speeds it takes a day or so for the hot star to go into (or out of) eclipse, and the total phase of the eclipse may last for days or weeks. During totality, the spectrum of the cool component is seen alone, making it relatively easy to study. The spectrum observable immediately before and after the eclipse shows, in addition to the normal spectra of the two stars, a third contribution of great interest. At those times the light of the hot star, on its way to us, has to pass through the cool giant's extensive and tenuous atmosphere (the chromosphere), which adds its own absorption lines to the spectrum. Spectroscopy at such times enables us to find out a lot about the chromosphere, which is otherwise almost unobservable except by satellites in the far ultraviolet.

For some years now, my wife and I have been making a fairly systematic study of composite-spectrum binaries. We have developed ways of separating the two spectra, and our procedures also allow us to isolate the chromospheric component in ζ Aur near-eclipse spectra and thereby to study the chromospheres much more effectively than was possible before. As part of our investigation, most of the known composite systems brighter than apparent magnitude 8 in the northern sky have been under observation with the Cambridge radial-velocity spectrometer (*Astrophys.J.* 148, 465, 1967). Radial-velocity changes have been seen for many of the systems, and orbits have been derived for quite a few of them.

An orbit determined from radial velocities tells us the times of conjunctions, at which eclipses must take place if the orbit is seen sufficiently nearly edge-on. Unfortunately it does not tell us the inclination of the orbit to the line of sight, so we cannot tell from radial velocities alone whether there is an eclipse or not. The orbit does give us a clue in the form of the 'mass function'', which is a rather awkward function of the masses of the two component stars multiplied by $\sin^3 i$, where i is the inclination (i = 90° if the orbit is seen edge-on):

Mass function $f(m) = m_2^3 \sin^3 i / (m_1 + m_2)^2$

The sin³i term has a maximum value of unity when $i = 90^{\circ}$, so the larger the mass function the more optimistic one may feel about the possibility that i is near enough to 90° that there will be an eclipse. However, away from 90° the term decreases only slowly to begin with, so one can never be VERY optimistic about the given system. The mass functions of the known ζ Aur stars are listed in the table above, which suggests that values above 0.3 are of interest in systems containing a normal giant, but larger values are necessary for more luminous stars (in accord with what one might expect on the grounds that steller luminosities generally increase with mass). However, δ Sge, a system with types M2II + B, has a mass function of only 0.14 M_{\odot} although its orbit is seen sufficiently nearly edge-on that chomospheric effects though not an actual eclipse, so far as is known - occur around the time of conjunction. Thus the mass function is a very blunt instrument for gauging the likelihood of eclipses.

It is at this point that the value of photometry becomes apparent! With the time of conjunction known from the radial-velocity orbit, often within a few days, intensive photometric coverage is a practical proposition as a means of determining the presence or absence of an eclipse. In the absence of the orbital data, it is virtually hopeless to look for an eclipse in a system whose period may well run into years and which may not show any appreciable orbital motion at all. Thus we in Cambridge (a) identify the promising candidates from among the composite-spectrum systems. and (b) provide the times of conjunction. We then do some spade-work by selecting photometric comparison stars and producing finding charts that are as helpful as we know how to make them, and we appeal to people such as the readers of this newsletter to observe the object at the critical times. If there are additional ζ Aur systems among our candidates, between us we shall surely find them. So far our search has met with disappointment; as far as we have yet heard, no eclipse was seen in 9 Cyg (mass function 0.42 M_a) or even in 45 Cnc (0.56 M_a), both of which came to conjunction earlier this year, notwithstanding that those systems ought to have been better bets than τ Per (0.34 M_a) which actually does show brief eclipses (see the table above).

It may be pointed out that the disparity in colour of the stars in composite systems implies that any eclipse gets rapidly deeper towards shorter wavelengths. Photometry in B, and especially in U, has in principle more sensitivity than that in V, though in poor climates the advantage may be negated by the increased trouble from sky variations at the shorter wavelengths.

At the risk of asking too much too often, we expect soon to propose for observation a few additional objects which may prove to be of photometric interest - either potential eclipsing binaries consisting of pairs of main sequence stars, or systems which may show star-spots (BY Dra or RS CVn variables). Encouragement is provided by a recent 'success' with HD 116093, a main-sequence pair whose orbit we gave in the Indian journal J. Astropys. Astr. (9, 205, 1988): the conjunction predicted for 1989 March 19.61 was drawn to the attention of observers in Japan, who duly observed an eclipse within an hour of the predicted time.

[As an indication of the amount of cooperation between amateurs and professionals that already takes place, Guy Hurst has provided the following list. Readers should note that this covers both activity for *The Astronomer* and Guy's work with the VSS - anyone interested should see VSSC 66 pp.6-7 for details.]

Professional-Amateur Exchanges 1988 June-Dec Guy Hurst

The following list gives details of exchange of major information between professional and amateur astronomers in the period 1988 June to Dec, mainly via STARLINK.

Professional worker concerned Date Subject Nova And 1988 1) 880629 M.Kidger Precise position of outburst image provided to astronomers in Tenerife at Instituto Astrophysicas Canarias. 2) 880707 Novae M.Kidger Bibliography references on novae light curves supplied to Dr Kidger. 880707 Nova And 1988 G.Waddington 3) Examination of POSS at Oxford University by G.Waddington for possible duplicity. 4) 880711 SN 1987N M.Kidger Nine visual and photovisual estimates of SN1987N supplied to Dr Kidger showing a possible maximum around 1987 Dec 23 at 13.4pv. 5) 880717 Nova And 1988 R.A.Wade Spectral confirmation of Nova received from Dr Wade, Steward Observatory. **B.G.Marsden** 6) 880719 Nova And 1988 Astrometric data supplied to Central Bureau for Astronomical Telegrams. 880721 Fade R CrB **B.G.Marsden** 7) Message of fade noted by Bone relayed to Central Bureau. 880722 AH Her Maria Jesus 8) Bright maxima details supplied to Maria Jesus, Tenerfie who requested intensive coverage. 9) 880801 Chart Project P.Leyland First of regular exchange of data with Paul Leyland at Oxford University on improvements to variable star and supernova search charts used by amateur astronomers. 10) 880814 Alpha Orionis N.Epstein and A.Mampaso Fade reported by John Isles, Cyprus relayed to astronomers at La Palma M.Kidger Mars 11) 880819 Detailed report of Mars with CCD camera received from Mark Kidger for comparison with notes of unusual features reported by various amateur astronomers. 880822 12) 3C 446 E.Perez/B.G.Marsden Following appeal from Dr Perez, Tenerife, report sent to Dr Marsden that Brian Manning, Stakenbridge photographed the quasar at mag 15.8pv 1988 Aug 21 confirming that it is in outburst. Published in IAUC.

Professional worker concerned Date Subject 13) 880825 SS Cvg/RU Peg **R**.Smith Magnitude estimates Aug 1-25 by amateurs supplied to Dr R.Smith re preparation of observing run at La Palma Aug 29-Sept 1. 880831 B.G.Marsden 14) VY Aar Details of outburst detected by John Isles relayed to Central Bureau and published in IAUC. 15) 880914 3C 446 E.Perez Magnitude estimates from photo results by R.Stuart relayed to Dr Perez in La Palma confirming continuation of outburst. 16) 880918 Asteroids Minor Planet Center Astrometric data of asteroids on critical list obtained by Roger Chanal, France relayed to MPC. 17) 880921 Chart Project P.Leyland Computerised chart formats discussed with Dr Leyland. 880922 V482 Cyg P.Leyland 18) Computer format of chart for V482 Cyg supplied by Paul Leyland. 881003 HT Cas **P.Charles** 19) Information on HT Cas (potential prog star for La Palma Cataclysmics) supplied to Phil Charles showing that results by amateurs proved GCVS details erroneous. This resulted in the star being dropped from the programme. P.Charles/M.Kidger 20) 881003 Cats. Prog Regular exchange of observations agreed for Cats.Prog at La Palma. 3C 446 E.Perez 21) 881006 Details of photography by Brian Manning supplied to Dr Perez. 22) 881009 3C 446 M.Kidger Magnitude estimates from photos by R.Stuart and B.Manning supplied. SS Cvg/RU Peg Malcolm Friend. 23) 881013 Magnitude estimates by amateurs Aug-Sept supplied to Malcolm Friend. 881019 M.Kidger 24) IP Peg Outburst detected by John Isles relayed to Kidger 25) 881022 **BZ UMa** P.Charles/M.Kidger/B.G.Marsden Possible outburst detected by John Isles relayed to Tenerife/La Palma/Central Bureau. (Oct 22.12UT, 12.0) 881026 **BZ UMa** Derek Jones 26) Derek Jones advises that observed Oct 26 and a little fainter than on POSS. 881029 Variables P.Charles/M.Kidger 27) Maxima of U Gem obtained by amateurs supplied to La Palma together with data on EM Cyg, RX And, BZ UMa. 881101 28) Satellite trails **Russell** Eberst Russell (ROE) identifies trails on photo in 1988 Oct issue of 'The Astronomer' by NJames as four of six 'Whitecloud' USA satellites.

881106 29) Kalvpso Graeme Waddington Details of occultation event (881109) supplied by G.Waddington, Oxford University relayed in E-Circular to amateur astronomers. 881108 M.Kidger/P.Charles 30) SS Cyg Details of outburst found by P.Schmeer, Germany relayed to Tenerife at their request. M.Kidger/AAVSO 31) 881113 V503 Cyg Outburst found by G.Hurst in alternative position 'a' on Nov 12 (mag 13.4) supplied to Tenerife and AAVSO. 32) 1980 PA 881115 B.G.Marsden Astrometry by D.Buczyznski supplied to Central Bureau. Nova And 1988 33) 881120 Graeme Waddington Blow-ups of POSS field supplied to us by Graeme. 881123 Cats Prog M.Kidger 34) Mutual observations of SU UMa, YZ Cnc, U Gem and RX And agreed until end of 1989 Feb. (Note: This resulted in almost daily exchanges from 881201 to 890228 not listed separately here.) E-Directory 35) 881205 Chris Benn Directory of amateur astronomers on Telecom Gold supplied to RGO for inclusion in future RGO E-Directory. 36) Possible asteroid B.G.Marsden 881206 Astrometry on possible asteroidal discovery near (724) Hapag supplied to Central Bureau. 881206 U Gem 37) P.Charles Outburst found by G.Comello supplied to La Palma. 38) 881207 (504) **B.G.Marsden** Brian Marsden supplies (504) as ID for item (36) above. 881208 Variables D.Pike 39) Dr D.Pike, ESA, requests monitoring of Orion variables by amateurs and an appeal is routed via Telecom Gold E-Circulars. M.Kidger/P.Charles 40) 881209 SU UMa Telex by Mikuz, Yugoslavia of outburst relayed to La Palma. 41) 881209 SU UMa Tim Navlor Request to monitor SU UMa arranged on request from Vilspa (IUE). **BZ UMa** B.G.Marsden/M.Kidger/P.Charles 42) 881214 Outburst found by S.Lubbock (Dec 12.98UT, 14.8v) relayed to Central Bureau and others. 43) 881226 Erup Object in Crater **B.G.Marsden** Further outburst of recently discovered UG star by R.Fleet, Zimbabwe relayed to

Central Bureau.

The above list gives only the main messages. It is estimated that over 100 messages were handled on PRO-AM matters during this period.

European Meeting of the AAVSO in Brussels, 1990 July 24-28

The AAVSO has announced that it is to hold its first meeting outside North America in Brussels on 1990 July 24-28. The venue will be the the Vrije Universiteit Brussel, and accomodation will be available on the campus.

This is seen as an ideal opportunity to promote international cooperation and coordination between the various variable-star organisations and members of many European groups will be attending and have begun to make preparations. It is probable that many of the groups' results will be presented as part of the meeting. (We would hope to present some of our own findings.) Some of our own members, who have heard about the meeting, have expressed an interest in attending, and when details are available, we hope that the programme will attract a good contingent from the VSS.

In addition to the Local Organizing Committee, a Regional Organizing Committee will probably be formed with representatives from the various European groups, to help to co-ordinate arrangements.

We hope to have further details soon, including information about whether VSS members make make reservations as a group, methods of simplifying payments, etc. As soon as we have more details we shall ensure that they reach members as quickly as possible. In the meantime, members interested in attending should make a note in their diaries of the dates and can obtain preliminary details from Storm Dunlop.

V Arietis

The report on p.37 of VSSC 68 pointed out that this object had been underobserved. A chart is therefore given overleaf, in the hope that this will encourage observers to make more observations in the coming months.



8 78 E 8.8

C 7.9 F 9.1

MIRA 2.0-10.1, Lpv, 351d

Telescopic stars - 1987 totals D.R.B. Saw

About 50 observers made over 25,600 observations during 1987. Of the leading observers Stephen Lubbock and John Isles made over 4,000, Dave Stott over 3,000, Mike Gainsford and Robert Paterson nearly 2,000, John Toone and Shaun Albrighton well over 1,000 and Len Brundle nearly 800 observations. These eight observers contributed over 3/4 of the total. Other useful data were received from Dick Chambers, R. Dryden, Rhona Fraser, J. Howarth, David Swain, Melvyn Taylor and Peter Wheeler - with apologies to any observers who feel that they should be included in this list. The telescopic star totals are as follows:

R And	246	T CrB	620	W Lyn	19
W And	261	V CrB	227	X Lyn	43
RW And	187	W CrB	240	AY Lyr	477
RX And	552	R Cyg	190	U Mon	298
OS And	268	S Cyg	166	RS Oph	294
VY And	250	V Cyg	243	U Ori	266
R Aql	227	W Cyg	379	CN Ori	282
UU Aql	181	SS Cyg	632	CZ Ori	361
UW Aqi	113	BC Cyg	185	RU Peg	406
V603 Aql	31	BI Cyg	186	S Per	180
SS Aur	551	CI Cyg	385	RS Per	237
U Boo	202	V1819 Cyg	234	TZ Per	615
V Boo	141	χCyg	300	UV Per	599
V Cam	170	HR Del	356	BU Per	239
X Cam	194	T Dra	140	GK Per	427
Z Cam	519	AB Dra	420	WZ Sge	406
XX Cam	465	U Gem	430	R Sct	355
SU Cnc	21	IR Gem	391	R Ser	194
UCVn	25	RU Her	195	RV Tau	176
RT CVn	19	SS Her	157	SU Tau	296
NGC4151 CVn	179	AC Her	413	T UMa	216
S Cas	164	AH Her	532	SU UMa	361
T Cas	210	N Her 1987	145	SW UMa	375
UV Cas	285	R Hya	87	CH UMa	445
γ Cas	638	SU Lac	168	Mark. 421	108
ρ Cas	486	X Leo	290	3C 273 Vir	91
o Cet	338	RS Leo	34	V Vul	237
R Com	35	RY Leo	54	PU Vul	230
R CrB	1062	U LMi	49	PW Vul	26
S CrB	288	W LMi	15	QU Vul	187
				N Vul 1987	169

[In addition, observations were received for 15 objects including stars that have now been dropped from the VSS programmes; some possible future additions; novae no longer visible; and a few objects never on any VSS programme. The observations are included in the overall total mentioned earlier, but not in the preceeding list.]

Thanks are due to all observers contributing to the these numbers. They are such that reasonable light-curves should be able to be drawn for nearly all the stars (except perhaps when they are early-morning objects - observations then are especially valuable.)

Some stars, such as Gamma Cas, Rho Cas and R CrB are grossly over-observed and this is clearly leading to bias in the observations. The first two of these stars should not be observed more often than once per week, unless of course there is reason to suspect that they are changing. R CrB can probably be observed daily, but observers should take particular care to ensure that they are not affected by bias.

Although not wishing to stop observers from looking at any star, it is not worthwhile for any observer with an aperture of less than 200 mm to observe SS Cyg. The minimum for this star is less than one mag brighter than their minimum attainable magnitude and their data at minimum are much more erratic and variable than the data of observers with larger apertures.

Observers should be very careful to check the magnitude of their stars when the Moon is bright. The mags then tend to be too bright, because of the reduced contrast between the sky background and the star.

It is hope that more observers will add the 'new' stars between 8 and 14^h RA to their programmes. The periods for a lot of these stars are not known at all accurately.

Meantime, good observing to all; without your results there would be no VSS!

For Sale

General Catalogue of Variable Stars, 3rd edn, Eds. Kukarkin, B.V., et al., Moscow, 1969-76. (Volumes 1-3, with 1st, 2nd and 3rd Supplements)

Although this, the third edition, has now been replaced by the fourth edition, currently being published, it still contains much useful material, particularly in the remarks concerning individual stars, many details having been omitted from the later edition. The most important information no longer included in the current edition, which these volumes contain, probably concerns the mean magnitudes of maximum and minimum.

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