

Observations of Variable Stars in 1882.

By *Edwin F. Sawyer.*

The following observations of variable stars were made during the year 1882, at Cambridgeport, Mass. U. S. A. In making the observations, Argelanders method of step-estimations was used, and his comparison stars were generally employed, although their light values were in the majority of cases independently determined from my observations, and the corresponding light of the variables deduced from these. A low power opera-glass was used throughout the series. The stars have generally been observed in focus, but in the case of a few stars, it has been found best, after repeated trials, to observe them out of focus, this method appearing to give the best results. An * is used to denote moonlight.

1. R Coronae Borealis.

This star was subject to slight variations of light while under observation from Apr. 15 to Oct. 3, at times, notably from July 16 to 23 and from Aug. 3 to 14, it was found to be nearly equal in brightness to π Cor. Bor.; while from Apr. 25 to June 1, and Aug. 28 to Oct. 3, it was some 3 or 4 steps fainter. The series of observations was interrupted at times.

2. R Leporis.

This very red star was observed from Jan. 7 to Mar. 19; but unfortunately the observations were not undertaken early enough to secure a good determination of the light increase, although a slight increase is certainly shown. A maximum is indicated about Jan. 25. The light values for each evening expressed in my light scale are as follows:

Jan. 7 = 5.4	Jan. 27 = 7.4*	Feb. 15 = 4.8
9 = 6.0	29 = 7.4*	17 = 5.4
11 = 6.0	30 = 7.4*	18 = 5.0
12 = 6.5	Feb. 1 = 6.9*	23 = 5.3*
14 = 6.4	2 = 7.4*	Mar. 6 = 3.8
15 = 6.4	3 = 7.4*	13 = 3.3
17 = 6.2	6 = 5.6	17 = 1.8
19 = 6.2	8 = 5.9	19 = 0.9
22 = 7.4	11 = 6.0	
23 = 7.2	14 = 5.5	

Light Scale.

$a = 8$ Leporis RA. $4^h 58^m 10^s$ Dec. $-14^\circ 32' 8''$ (1875) = 10.3
$b = 9$ " " 4 58 14 " $-14^\circ 44.0'$ " = 6.0
$c =$ " " 4.52 55 " $-14^\circ 59.0'$ " = 1.6

3. R Scuti.

This star (which was observed from Apr. 15 to Nov. 9) appeared to be subject to very slight changes of light. The observations when charted show several minor fluctuations in the light curve indicating maxima May 25,

and Aug. 1, and minima Apr. 30, Juni 17 and Sept. 30. The observations were much interrupted however. The light values for each evening expressed in my scale (A. N. 2438) are as follows:

Apr. 15 = 17.2	June 26 = 16.4*	Aug. 18 = 16.6
17 = 16.9	27 = 16.2*	19 = 16.6
21 = 16.2*	28 = 16.2*	20 = 16.6*
22 = 16.2	July 6 = 16.9	22 = 17.2*
24 = 16.2	15 = 16.9	29 = 18.0*
25 = 15.9	16 = 16.9	Sept. 7 = 17.4
30 = 16.6*	17 = 16.9	15 = 16.9
May 7 = 16.4	19 = 16.7	17 = 16.9
25 = 18.0	23 = 17.2*	26 = 16.9*
June 6 = 16.9	25 = 17.0*	Oct. 1 = 16.2
9 = 16.2	29 = 18.9*	2 = 16.4
12 = 15.2	Aug. 4 = 18.9	3 = 16.4
13 = 15.2	5 = 18.6:	9 = 16.9
16 = 14.9	6 = 17.4	20 = 17.4
20 = 15.2	9 = 17.4	28 = 18.0
21 = 15.4	11 = 17.4	Nov. 9 = 15.7
22 = 15.6*	15 = 16.9	

4. T Monocerotis.

Occasional observations of this interesting star were made from Dec. 24.81 to Mar. 6.82.

Maxima are indicated as occurring Dec. 31.81 and Jan. 27.82, and minima Dec. 24.81, Jan. 18, and Feb. 15.82. The following are the light values for each evening given in my scale:

1881-82		
Dec. 24 = 1.5*	Jan. 14 = 7.8	Feb. 3 = 8.9*
25 = 2.0*	17 = 2.0	6 = 7.1
30 = 9.9*	19 = 2.0	8 = 7.2
31 = 12.6*	27 = 12.3*	14 = 4.0
Jan. 2 = 11.7*	29 = 11.3*	17 = 3.0
7 = 9.3*	30 = 11.4*	18 = 5.0
11 = 9.3	Feb. 1 = 8.9*	Mar. 6 = 6.8
12 = 6.3	2 = 8.9*	

Light Scale.

$a = 182$ Orionis RA. $6^h 10^m 39^s$ Dec. $+5^\circ 8' 1''$ (1875) = 12.3
$b = 60$ Monoc. " 6 30 42 " $+6^\circ 14.3'$ " = 9.6
$c^*) = DM. \left\{ \begin{array}{l} 7^\circ 13' 12'' \text{ } 6 \text{ } 23 \text{ } 5 \text{ } \text{ } +7^\circ 13.1' \text{ } \text{ } \end{array} \right\} = 5.0$
$d = DM. \left\{ \begin{array}{l} 7^\circ 13' 14'' \text{ } 6 \text{ } 23 \text{ } 12 \text{ } \text{ } +7^\circ 12.5' \text{ } \text{ } \end{array} \right\} = 1.0$

*) Combined light.

5. η Aquilae.

The observations of this star were made from Apr. 22 to Nov. 15. The light values for each evening expressed in my light scale (A. N. 2438) are as follows:

Apr.	21	14 ^h 0 ^m	=	6.4
	22	15 10	=	2.3:
	24	15 15	=	4.7
	25	14 15	=	9.9
	30	15 15	=	2.6*:
June	9	9 50	=	5.7
	12	9 30	=	3.6:
	13	9 50	=	1.7
	16	12 50	=	8.0
	20	9 30	=	2.1
	21	9 40	=	6.7*
	22	9 15	=	9.9*
	25	8 40	=	4.9*
	26	8 40	=	4.7*
	27	10 0	=	2.1*
	28	11 0	=	5.4*
	29	9 0	=	9.4*
July	2	9 20	=	5.7*
	3	8 45	=	5.7:
	6	9 10	=	9.9
	10	9 0	=	5.7:
	11	10 0	=	1.6
	12	9 0	=	2.1
	13	9 20	=	9.9:
	15	10 55	=	5.7
	16	10 30	=	6.1:
	17	9 40	=	4.4:
	19	9 20	=	2.1
	20	8 55	=	6.7*
	21	9 0	=	11.1*:
	23	9 0	=	6.7*
	24	9 25	=	4.7*
	25	10 0	=	3.9*
	26	11 0	=	2.6*
	27	10 10	=	3.9*:
	29	11 40	=	7.7*
	30	9 15	=	8.1*:
	31	10 18	=	6.2*:

By means of a chart of the light values, having regard to the known form of light curve, the following times of max. and min. have been deduced:

Maxima.	Minima.
June 22.8	June 13.5
30.0	20.6
July 7.2	27.4
14.3	July 12.1
21.5	19.3
28.6	26.1
Aug. 4.6	Aug. 9.6
11.9	Sept. 7.4
19.2	Oct. 5.5
Sept. 2.8	
16.8	
Oct. 1.5	

This star was observed out of focus.

Aug.	3	8 ^h 45 ^m	=	5.6:
	4	9 15	=	10.7:
	5	10 45	=	9.1:
	6	8 45	=	6.7
	9	8 50	=	1.6
	11	8 45	=	10.9:
	12	11 0	=	9.9
	13	8 40	=	7.2
	15	8 45	=	4.9
	17	10 45	=	4.7
	18	10 0	=	9.9:
	19	9 30	=	10.9
	20	8 40	=	9.2*
	22	9 50	=	2.1*:
	28	9 0	=	6.4*:
	29	8 0	=	3.1*:
Sept.	1	7 40	=	6.2
	3	8 15	=	9.2:
	4	8 40	=	10.2:
	5	8 45	=	5.2:
	7	7 50	=	0.7
	12	9 35	=	4.7
	15	7 25	=	5.2
	16	10 55	=	10.9
	18	11 30	=	6.4:
	26	8 0	=	6.2*:
Oct.	1	6 50	=	10.2
	2	6 45	=	9.9:
	3	7 0	=	6.9
	4	7 15	=	2.1:
	8	7 0	=	9.9
	9	7 0	=	9.9
	10	7 5	=	6.2
	26	6 45	=	4.4*:
Nov.	2	6 50	=	2.1
	9	6 10	=	4.4
	15	7 20	=	6.2*

6. χ Cygni.

A very good series of observations of this interesting variable was obtained from July 13 to Nov. 15. The observations when charted fix a maximum with considerable precision, as having occurred on Sept. 3.5. This star at its max. appeared considerably brighter than last year. The light values for each evening expressed in Argelander's scale (his light scale practically coinciding with mine) are as follows:

July	13	=	7.5	Aug.	9	=	24.6	Sept.	17	=	28.6
	15	=	9.1		11	=	25.1		18	=	28.6:
	17	=	9.6		12	=	25.7		26	=	24.4*:
	19	=	9.6		13	=	26.3	Oct.	1	=	21.8
	20	=	9.9*		15	=	26.8		2	=	21.6
	21	=	9.9*		17	=	28.6		3	=	21.3
	22	=	10.6*		18	=	28.6		4	=	20.6
	23	=	10.6*		19	=	28.6		7	=	20.8
	24	=	10.9*		20	=	28.6*		8	=	21.1
	25	=	10.9*		22	=	28.6*		9	=	19.8
	26	=	11.7*		28	=	28.6*		10	=	19.6
	27	=	13.1*:		29	=	28.6*		20	=	16.4*
	29	=	15.8*	Sept.	1	=	29.0		28	=	11.8
	30	=	16.5*		3	=	29.3:		30	=	10.6
	31	=	17.9*:		4	=	29.3	Nov.	2	=	10.6
Aug.	3	=	20.3:		7	=	29.3		3	=	10.3
	4	=	20.8:		12	=	28.9		9	=	9.6
	5	=	21.8		15	=	28.9		15	=	5.5*
	6	=	22.1		16	=	28.6				

7. γ Herculis.

This star was observed from July 16 to Oct. 9. A maximum is indicated as occurring Aug. 9, and a minimum Sept. 7. Obsd. out of focus.

8. W Sagittarii.

This star was occasionally observed from June 13 to Oct. 9. The star was near maximum in the following dates: June 16.5, July 17.3, July 23.5, Sept. 15.3, Oct. 1.3 and Oct. 9.3. and near minimum Aug. 13.3.

9. β Lyrae.

Observed from May 6 to Nov. 15. The light values for each evening expressed in my light scale (A. N. 2438) are as follows:

May	6	10 ^h 30 ^m	=	12.5*	June	21	9 ^h 40 ^m	=	13.8*
	7	9 0	=	13.1		22	9 15	=	13.5*
	16	10 0	=	12.5		25	10 0	=	4.9*:
	23		=	12.6*		26	8 40	=	12.8*
	25	9 0	=	12.6		27	10 0	=	13.1*
	29	9 0	=	12.1*		28	11 0	=	12.8*
June	1	9 0	=	12.8*		29	9 0	=	12.8*
	6	9 0	=	12.1	July	2	9 20	=	12.1*
	9	9 50	=	13.1		6	9 10	=	12.3
	12	8 45	=	9.0:		10	9 0	=	12.6:
	20	9 10	=	13.8		11	10 0	=	13.3

July 12	9 ^h 0 ^m = 13.1	Aug. 13	8 ^h 40 ^m = 13.1
15	10 55 = 13.1	15	8 45 = 5.3
16	9 45 = 13.8	17	10 45 = 12.1
17	9 40 = 13.3	18	10 0 = 13.8
19	11 0 = 13.3	19	9 30 = 13.5
20	8 55 = 9.0*	20	8 40 = 13.1
22	10 55 = 12.8*	22	9 50 = 11.3*
23	9 0 = 13.1*	28	9 0 = 7.0*
24	9 35 = 13.3*	29	8 0 = 5.3*
25	10 0 = 12.6*	Sept. 1	7 40 = 13.1
26	11 0 = 12.3*	3	8 30 = 12.1
27	10 10 = 11.1*	4	9 40 = 9.0
29	11 40 = 13.5*	7	7 50 = 13.1
30	9 15 = 13.1*	12	9 35 = 13.1
31	9 10 = 12.8*	15	9 25 = 12.8
Aug. 3	8 30 = 9.5	16	10 55 = 12.1
4	9 15 = 12.1	17	9 45 = 11.8
5	10 45 = 13.3	18	10 30 = 12.8
6	8 45 = 13.8	26	8 0 = 13.1*
9	8 50 = 12.1	Oct. 1	6 50 = 12.1
11	8 30 = 13.1	2	6 45 = 12.8
12	11 0 = 13.8	3	9 30 = 13.8

Oct. 4	7 ^h 15 ^m = 13.1	Oct. 28	6 ^h 40 ^m = 13.1
7	10 0 = 10.5	30	6 45 = 13.1
8	6 35 = 12.8	Nov. 2	6 50 = 8.0
9	8 10 = 13.8	3	7 30 = 13.1
10	9 20 = 13.1	9	6 10 = 12.8
20	10 30 = 11.8*	15	7 20 = 10.0*
26	6 45 = 11.8*		

The following times of minima have been deduced from the charted observations, having regard to the known form of light curve:

June 25.4	principal	July 28.0	secondary
Aug. 3.5	»	Sept. 4.5	»
16.2	»		
29.3	»		

This star was observed out of focus, and the observations were much interrupted. Some suspicion having been entertained that either the comparison star α or θ Herculis was variable a series of observations of these stars was made, but not the least trace of variability could be detected.

Cambridgeport, Mass. 1883 Apr. 9.

E. F. Sawyer.

Observations of Comet 1883 Brooks-Swift on the Equatorial of Morrison Observatory, Glasgow, Missouri.

1883	M. T. Glasg.	$\Delta\alpha$	$\Delta\delta$	Comp.	α app.	$\log p. \Delta$	δ app.	$\log p. \Delta$	*
Feb. 26	7 ^h 24 ^m 36 ^s	— 2 ^m 20 ^s 38	+0' 12" 97	5	23 ^h 26 ^m 50 ^s 97	9.726	+31° 11' 39" 36	0.711	1
27	7 24 41	+ 6 40.38	—5 2.80	3	23 36 23.58	9.728	31 28 4.84	0.702	2
28	7 21 23	— 6 52.10	—2 36.30	4	23 45 59.46	9.729	31 41 18.04	0.689	3
Mar. 2	7 24 21	+ 0 32.15	—3 56.47	7	0 5 18.59	9.732	31 57 52.79	0.676	4
3	7 34 23	+10 14.15	—0 15.03	3	0 15 0.59	9.732	32 1 34.11	0.682	5
6	7 58 6	+ 7 48.61	—5 38.32	3	0 43 35.97	9.731	31 52 38.61	0.692	6
7	7 30 24	— 0 1.63	—5 32.08	7	0 52 42.11	9.729	31 44 0.46	0.645	7
7	8 8 23	+ 3 16.31	+1 9.74	3	0 52 55.36	9.729	31 43 48.24	0.650	8
8	7 24 29	+ 2 1.28	—0 51.90	7	1 1 46.94	9.725	31 32 33.23	0.629	9
10	7 43 43	+ 3 55.76	—3 47.40	6	1 19 35.25	9.725	31 1 51.52	0.646	10
10	8 19 54	+ 0 47.95	+4 50.71	5	1 19 48.07	9.726	31 1 28.56	0.698	11
11	7 18 50	— 0 53.67	+2 14.46	9	1 27 59.21	9.715	30 43 39.14	0.602	12
12	7 31 44	+ 0 7.30	—3 19.98	14	1 36 24.82	9.717	30 22 55.21	0.619	13
13	7 52 1	+ 0 42.97	+6 44.02	15	1 44 39.10	9.720	30 0 16.94	0.645	14
14	7 31 45	— 3 17.60	—5 37.32	6	1 52 26.34	9.719	29 36 56.11	0.657	15
15	7 29 24	— 0 46.52	+0 24.22	13	2 0 5.99	9.705	29 11 35.12	0.606	16
16	7 48 25	+ 2 0.11	+5 29.13	9	2 7 38.02	9.710	28 44 40.65	0.632	17
17	8 3 7	+ 0 52.45	+4 59.66	8	2 14 55.38	9.711	28 16 56.32	0.651	18
19	8 8 48	+ 4 55.18	+2 21.19	7	2 28 45.30	9.710	27 19 5.90	0.671	19
20	7 48 48	— 7 56.89	+3 35.18	3	2 35 9.63	9.697	26 50 16.95	0.629	20
21	7 30 53	+ 1 1.84	+5 37.35	7	2 41 24.57	9.685	26 20 32.60	0.605	21
23	7 50 51	— 5 6.08	—5 42.20	9	2 53 32.38	9.690	25 19 5.74	0.634	22
Apr. 2	8 8 56	+ 6 27.84	—2 41.28	9	3 43 18.12	9.678	20 18 1.92	0.673	23
7	8 0 6	+ 0 59.92	—1 6.24	8	4 2 59.68	9.667	17 59 36.79	0.678	24
8	7 54 25	+ 0 41.72	+1 21.97	7	4 6 37.10	9.664	17 33 13.49	0.676	25
9	8 27 49	— 0 57.51	+0 3.76	7	4 10 13.61	9.676	+17 6 41.01	0.704	26