2815. *U Geminorum.*

The following observations of the May maximum were secured.

Gr. Time.		Gr. Time.	
1898 April 26.60	<13M	1898 May 11.59	11M.0
May 7.58	9.85	16.62	<13

Taken in connection with the observations of Mr. ZACCHEUS DANIEL, published in *Popular Astronomy* for June, 1898, page 248, it appears that the maximum occurred about May 6.

4471. *T Canum Venaticorum.*

A series of sixteen observations, beginning 1897 Oct. 25 and ending 1898 May 21, show a maximum at 8M.6, 1898 Feb. 20. The curve was rather flat at maximum and the time say 10 or 15 days in error. A comparison with last season's observations (*A.J.* 426) suggest a period of nine or ten months. The magnitudes were 11M.0 and 10M.5, at the first and last dates respectively.

5601. *S Ursae minoris.*

This star fell from 8M.7, 1897 Dec. 29, to a minimum, 11M.3, 1898 April 14, then rose to 9M.3 at the last observation, June 17.

5798. *RU Herculis.*

After the minimum recorded in *A.J.* 426 this star rose rapidly to a well defined maximum, 8M.5, 1898 March 13, then fell more slowly to 9M.8, May 16. I have 11 observations between 1898 Jan. 18 and May 16. At maximum it was about equal to DM. +25°3036 and 3042, and fainter than +25°3031.

6100. *RV Herculis.*

This star has been followed closely since the minimum recorded in *A.J.* 434, and a maximum observed at 9M.75, 1898 March 12 (possibly 10 days earlier). The last observation with the 6.2-inch was May 7, at 12M.5, at which time the fall was rapid. The interval between the descending branches of the light curves at the last two maxima is about 213 days.

Yerkes Observatory, 1898 *July* 8.

7085. *RT Cygni.*

A series of 17 comparisons between 1897 Dec. 29 and 1898 June 27 yields a maximum at 7M.15, Feb. 16 (time uncertain by perhaps 10 days), and a well defined minimum, at 11M.7, May 23. At the last observation the star had risen to 10M.0.

7458. *V Delphini.*

After the maximum of 1896 November (*A.J.* Nos. 393, 394 and 397), I followed it till 1897 Jan. 28, finding it 11M.3 at the last observation. It was looked for without success 1897 May, July, Aug. and Oct., and 1898 Feb. and March, and was glimpsed uncertainly at 12M.2 Mar. 23. Four comparisons were then secured up to June 21, the resulting curve agreeing with the ephemeris maximum, 1898 May 12. The observations were too few to determine the magnitude at maximum.

7492. *RZ Cygni.*

A fairly defined maximum, at 10M.5, is indicated for 1898 March 7, by 15 observations between 1897 Oct. 19 and 1898 June 25. The rise was a little faster than the decline, and the magnitudes at first and last dates were 12M.7 and 11M.8, respectively.

7792. *SS Cygni.*

The "long" maximum recorded in *A.J.* 434 was followed by a 44-day period of normal light. The star then began to rise 1898 March 20, a maximum at 8M.5 was passed March 22.6, and normal light was reached April 2, giving a typical "short" maximum. This was followed by a 45-day period of normal light, ending May 17 with a rise to a maximum, 8M.5, which was passed May 22.2. Normal light was reached June 6, giving a typical "long" maximum, lasting 20 days. These two maxima were covered by 16 observations.

PRESENT ROTATION-PERIOD OF THE FIRST SATELLITE OF *JUPITER* AND ITS CHANGE IN FORM AND PERIOD SINCE 1892,

BY A. E. DOUGLASS.

Observations of this satellite, made in the last two weeks, entirely confirm the period of rotation obtained by the writer a year ago, 12h 25m.8, and recently communicated to the *Astronomische Nachrichten*. The period is obtained from the changes in form of the satellite, such as were first discovered by Professor W. H. PICKERING, at Arequipa, in 1892. The method now used in measuring the oblateness is his, and consists in a constant comparison of the telescopic image with a "scale of ellipticities" fastened to the telescope-tube at a suitable distance from the eye. Care is taken that the conditions of viewing the scale simulate as closely as possible the conditions of observation at the telescope.

The scale is a piece of black cardboard, with a series of white paper ellipses pasted upon it. Each ellipse has a polar diameter of 10 mm.; their equatorial diameters increase by intervals of 0.4 mm. in succession from 9.6 mm. to 15.2 mm. In assigning a numerical quantity to any given form, the polar diameter is considered constantly 100, and it is only necessary to record the equatorial diam-

eter on that basis. Thus, form 100 is a perfect circle; form 120 has the equatorial diameter 20 per cent. greater than the polar.

In 1892 and 1893, Professor PICKERING did not use this scale, but at that time the phase of minimum ellipticity was almost a perfect circle, and as the circular form is something very definite to observe, he obtained very precise results. His period was $13^h\ 3^m\ 9^s$ or 25^s, and his range of ellipticity was from 100 to 110. His observations obtained with the scale in 1894, not yet rigorously reduced, proved the period to be approximately the same at that time, and the range of ellipticities to extend, roughly, from 108 to 120.

Observations by the writer, at Mexico, in the spring of 1897, though not made specially for this purpose, disclosed, on reduction, a period of $12^h\ 25^m.8$, and a range of ellipticities from 115 to 125. A slight feeling that there was a chance for error in this result was felt until the present observations proved the present period to be closely $12^h\ 25^m$, and the range of ellipticity to be from 112 to 121. These observations have been made for the purpose of determining this period; the minima have been extremely well marked, and the time of each depends upon fifteen to twenty comparisons distributed within the sixty to eighty minutes of rapid change. Therefore, it apparently becomes known to within a minute or two, but the very latest observations show that the period may be even shorter, a fact hard to explain, unless it is undergoing some further change, or is subject to a regular fluctuation.

The first minimum obtained was 1898 April $27^d\ 17^h\ 6^m.5$ G.M.T.; the second was May $5^d\ 17^h\ 35^m.0$; fifteen and a half rotations between these dates give a period of $12^h\ 25^m.1$. The third minimum was on May $6^d\ 18^h\ 26^m.5$, giving from the day before a period of $12^h\ 25^m.8$, but the fourth one observed was on May $10^d\ 15^h\ 9^m.5$, giving from the preceding a period of $12^h\ 21^m.7$. This either indicates a change in the period, or some error of observation, but, even if it is the latter, a close agreement with this satellite's period in 1897 remains.

This, then, is the most rapid change in rotation-period of a heavenly body yet discovered. The only other known change has occurred in the equatorial zones of the planet *Jupiter*, whose period now seems to be a fraction of a minute longer than in 1879.

The evidence of change in form of this satellite is not so "orthodox" in character, yet there can be no question about the circular form occurring in 1892–3, and there is no question now but that, during its minimum phase, it is never seen to become anything less than conspicuously elliptical.

There is some evidence that it has diminished markedly in mean diameter since 1892–3, which will be discussed when new evidence is obtained to confirm or deny it. If such diminution has occurred it will help vastly in explaining by known mechanical laws the other changes already observed.

Lowell Observatory, Flagstaff, Arizona, 1898 *May* 12.

NOTES ON VARIABLE STARS, — No. 25,

BY HENRY M. PARKHURST.

RESULTS OF OBSERVATIONS.

No.	Star	Phase	Observed Date		E	Corr.	W	Mag.	Factors			Remarks
			Julian	Calendar 1897–98							d	
2404	*X Geminorum*	Min.	4388	Apr. 8	–	–	2P	–	–	–	–	Magnitudes provisional
2478	*R Lyncis*	Min.	4320:	Jan. 30:	23	−59:	1	–	–	–	–	Invisible more than 3 months
2539	*R Canis min.*	Max.	4274	Dec. 15	42	+ 2	5P	7.8	–	–	–	Very long intervals
2625	*V Geminorum*	Max.	4375	Mar. 26	24	− 3	9	8.93	0.85	0.60	24	
2684	*S Canis min.*	Min.	4369	Mar. 20	39	+10	8	11.92	1.64	2.30	57	
2689	*Z Puppis*	Max.	4001	Mar. 17	–	–	3	8.21	0.50	0.50	17	1897. See *A.J.* 428
"	"	Min.	4344	Feb. 23	–	–	9	10.97	0.68	1.40	30	
"	"	Min.	4339	Feb. 18	–	–	6P	11.1	–	–	–	
2690	*X Puppis*	Max.	4344	Feb. 23	–	–	3	8.3	–	–	–	An uncertain maximum
2946	*R Cancri*	Max.	4263	Dec. 4	46	− 4	6P	6.7	–	–	–	Very long intervals
2976	*V Cancri*	Max.	4361	Mar. 12	36	− 2	9	7.86	4.0	2.0	28	Curve flat for 40 days
3060	*U Cancri*	Max.	4418	May 8	54	−14	9	8.92	0.58	0.81	15	
3170	*S Hydrae*	Min.	4374	Mar. 25	59	−19:	1	–	–	–	–	
3184	*T Hydrae*	Min.	4323:	Feb. 2	51	–	E	–	–	–	–	Assumed midway
3264	*W Cancri*	Max.	4381	Apr. 1	7	+20	6	9.8	–	–	–	Perhaps earlier
3493	*R Leonis*	Min.	4374	Mar. 25	165	− 1	8P	9.86	2.0	3.0	45	
3518	*Y Hydrae*	–	–	–	–	–	–	–	–	–	–	*A.J.* 392. Diminishing
3567	*V Leonis*	Max.	4277	Dec. 18	21	− 8	3	–	–	–	–	Approx. from factors [Catal.
3890	*W Leonis*	Max.	4299	Jan. 8	24	–	E	–	–	–	–	Much earlier than my ele. Second
3994	*S Leonis*	Max.	4397	Apr. 17	72	−51	6	10.5	–	–	–	Correction increasing
"	"	Max.	4393	Apr. 13	72	−55	4P	–	–	–	–	Interpolation with my factors