OBSERVATIONS OF VARIABLE STARS IN 1891,

By EDWIN F. SAWYER.

1072 ρ *Persei.*

This star was under observation from 1890 September 18 to 1891 April 9, the observations numbering 22. When first seen, September 18, ρ was nearly at its normal brightness or 3 steps $>\kappa$ *Persei*. A slight depression occurred about October 1 representing a bright minimum. The star brightened after October 12, the light remaining nearly constant until February 27, when the light again faded and a second bright minimum was passed about March 23. On April 9, the date of the last observation, ρ had brightened slightly.

2100 *U Orionis.*

Twenty observations of this star were obtained, extending from 1890 December 18 to 1891 March 30. When first seen on December 18, U was $\frac{1}{2}$ step $>$ DM. 20°1168 and 5 steps $<$ DM. 20°1171, or 8^{M}.6. The increase of light was rapid and a maximum was passed about 1891 January 27.

(Observations interrupted from January 13 to 30). Observed maximum brightness was 4 steps $>$ DM. 19°1106 and two steps $<$ DM. 20°1156, or 6^{M}.9; this representing a rather faint maximum. The light remained apparently constant from about January 12 to February 10, or 29 days. The decrease was slow and very uniform, and when last seen, on March 30, U was = DM. 20°1168, or about 8^{M}.6.

4940 *W Hydrae.*

Although my discovery of the variability of this star was announced in 1889, no good determination of a maximum phase has yet been secured, owing to the fact that the period is very nearly one year, while the present series of maxima occur in the spring, when the star can only be observed in the early morning hours. The star was first detected this year on the morning of March 5 and estimated, from a comparison with the neighboring star, 18788 of Gould's General Catalogue, to be about 7^{M}.2. It had increased in brightness 2 or 3 steps on March 10; and on March 30 it was estimated at about 6^{M}.8. On April 9 the star had faded to 7^{M}.0, and on May 3, the date of the last observation it had reached 7^{M}.5.

A maximum is indicated about March 21? The few observations, 7 in number, secured in 1890, and extending from March 17 to May 11, give a maximum for March 25?

5667 *R Coronae.*

The observations on this star number 8, and extend from April 9 to June 3.

When first seen on April 9, R was at about its normal brightness or midway between the stars DM. 32°2621 and DM. 30°2682, or 6^{M}.3. On April 27, R had faded to 6^{M}.6, and continued to grow fainter until June 3, the date it was last observed, when it appeared very faint in the field-glass and was estimated to be 8^{M}.7. It has not been seen since then, although occasionally looked for.

5912 *g Herculis.*

A fair series of observations, 30 in number, was obtained on this star, extending from April 9 to November 2. These observations when charted exhibit two maxima and two minima. The first maximum was a faint one and was passed on July 7. The second, a bright one, was reached on September 25.

The interval between the maxima was 80 days. The first minimum, indicated by a slight inflection only, was reached on June 10. The second, a faint one, was passed on August 14. The interval between the minima was 65 days.

6189 *U Ophiuchi.*

The following minima of this star have been determined since the publication, in No. 177 of this Journal, of my definitive discussion of all my observations to 1888. The times have all been calculated by means of the mean light-curve, by Argelander's method; and the comparison in the O—C column is with Dr. Chandler's definitive elements.

Epoch	Observed Minimum Boston M.T.	Light Equat.	Wt.	O—C
	d h m	m		m
2994	1888 June 1 9 55.2	+7.6	4	—10.1
3006	11 11 27.7	+7.6	3	— 9.8
3025	27 9 53.0	+7.2	1	—10.6
3100	Aug. 29 7 56.6	+1.4	1	+11.6
3131	1888 Sept. 24 7 47.4	—2.0	4	+ 0.9
3465	1889 July 1 10 33.4	+7.1	4	+14.1
3565	Sept. 23 7 12.5	—1.6	2	— 2.6
4420	1891 Sept. 10 8 48.4	—0.2	5	+19.7

6733 *R Scuti.*

This star was observed from June 3 to November 27, 44 observations. The charted observations exhibit only one maximum and two minima. When first seen, on June 3, R was quite bright, having evidently but recently passed a maximum. R faded quite slowly until after July 16, when a more rapid decline occurred, and a faint minimum was passed on August 23; light = 5.0. The rise was very rapid and uniform, and a very bright maximum was reached October 1; light = 24.3; this being the brightest observed maximum since April 1883. It remained at maximum but a few days, rapidly declining and passing a second and bright minimum about November 9. When last observed, November 27, R was evidently brightening again.

7120 χ *Cygni.*

This star was observed on 20 nights from July 16 to October 5. When first seen on July 16, χ was 4 steps $<$ DM.

33°3602, or about 7ᴹ.3. The increase was very rapid, a maximum being passed August 14. Maximum brightness 4 steps < DM. 33°3587, and 3 steps > DM. 32°3531 or 5ᴹ.8. The decrease was slow and uniform, and when last observed on October 5, χ was 5 + steps < DM. 33°3602 or about 7ᴹ.5.

Brighton, Mass., 1892 *May*.

LIGHT-VARIATIONS OF *S PERSEI* AND *T ARIETIS*,

By J. G. HAGEN, S. J.

In a former article with a similar title (*A.J.* No. 231, p. 115) a series of observations of these two stars between the years 1883 and 1888 was discussed by the writer. The results showed great irregularities in both periods, and owing to this circumstance a watch was kept on these stars for the last two years, although they lie outside the present plan of work in our observatory.

During the five years preceding 1888, the period of *S Persei* proved to be the longest of all yet known, and that of *T Arietis* showed a decided decrease.

From the present discussion it will appear that *S Persei* is maintaining its long period, although the light-curve has been very irregular, and that the period of *T Arietis* has kept decreasing at a uniform rate.

I. *S Persei.*

In the article referred to it was stated (p. 116), that the light of this star had only two maxima and three minima between the autumns of 1883 and 1888, and that this fact, though in discord with the elements of previous observers, was placed beyond doubt, as the star had been "followed almost throughout the whole year and the time of its invisibility was frequently recorded." This statement was confirmed by two other observers, — Šafařik and Hartwig.

The former found the period between the years 1880 and 1889 to range from 814 to 952 days (*A.N.* Bd. 126, p. 168), the latter found the intervals between succeeding maxima from 1879 until 1888 to be respectively 356, 667, 863 and 829 days (*V.J.S.*, 1891, p. 236).

A careful discussion of my own observations, extending over five years, gave the two well-determined maxima:

1885 March 11, and 1887 July 11,

with the interval of 852 days.

No observations of this star seem to have been published since, except a very interesting statement by Prof. Šafařik in this Journal (No. 261, p. 167), that the star reached nearly its full light unexpectedly early, and kept shining with almost constant brilliancy from July 1891 until March 1892.

My own observations were resumed in the autumn of 1890, when the star was near disappearance, and after its reappearance, they extend from September 1891 until the end of April of this year, when the light was again declining.

A preliminary reduction of the 22 observations showed some resemblance of the light-variations to those in 1884, and a comparison between the plotted curves gave with some degree of probability a *maximum about the beginning of March, 1892*, with the magnitude 7.9 of the DM. scale.

The interval from the last observed maximum, 1887 July 11, until 1891 March 2, and the day marked on the curve as the time of maximum, is

$$1696 = 2 \times 848 \text{ days.}$$

There was one intermediate maximum, which was put by Prof. Šafařik 1889 December 4.

The close agreement of the interval 2×848 with the one given in the former article, viz. 852, may be partly accidental; though it must be stated, that when determining the time of the last maximum no previous knowledge was had as to when it was to be expected.

It follows then, that although the light-curve of the last maximum was very irregular, the period does not seem to have changed much for the last eight years.

II. *T Arietis.*

The gradual decrease of period which was stated in the article already mentioned (p. 117), was not only confirmed by later observations, but proved to be uniform for the space of the last twenty years.

Observations of this star were resumed in October, 1890, and continued until the middle of March, 1892, with an interruption during the summer months, when the star was near the sun.

A preliminary reduction of all the 38 observations gave a light-curve with two maxima, one of which could be well determined.

This latter falls on 1892 January 16, whilst the other cannot be far from 1891 March 5.

The *inflection*, mentioned on page 118 of the former article, has again appeared before both maxima.

Table I will exhibit all the *maxima* that have come to notice (see this Journal, No. 231, p. 117, where the first column of Schönfeld's observations should be headed: *Minima*).

Table I.

E	Maxima	Jul. Day	Obs'r	Intervals
—11	1873 Mar. 11	2 405 229	Sch.	
				323^d
—10	1874 Jan. 28	2 405 552	Sch.	
				322
— 9	1874 Dec. 16	2 405 874	Sch.	
				315.5×15
+ 6	1887 Dec. 1	2 410 607	H.	
				301.4×5
+11	1892 Jan. 16	2 412 114	H.	