NOTES ON VARIABLE STARS.

By J. A. PARKHURST.

THE forthcoming publication of a new catalogue of variable stars by the commission appointed by the *Astronomische Gesellschaft*, is the occasion of the following preliminary report of observations made with a 6½-inch reflector and the 12- and 40-inch refractors of the Yerkes Observatory. The final reduction is reserved till the completion of the work, now in progress, of finding the photometric magnitudes of the comparison stars. The approximate magnitudes here assigned are based on the assumption for the limits of the apertures used, of 12.8 magnitude for the 6½-inch; 14.0 magnitude for the 12-inch, and 17.0 magnitude for the 40-inch. The notation of Dr. Chandler is followed; for stars not in the *Third Catalogue* the provisional number, in parenthesis, being one-tenth the Right Ascension for 1900, expressed in seconds of time. The dates of maxima and minima are only roughly indicated, the more definite determination being reserved for the final reduction. This report is a continuation of those in the *Astronomical Journal*, **21**, 11, and the ASTROPHYSICAL JOURNAL, **12**, 52.

103. *T ANDROMEDAE.*

Minima were passed late in December, 1899, and early in October, 1900. The magnitude at minimum was about at the limit of the 6½-inch, but an examination of the field with the 40-inch showed no stars liable to be mistaken for the variable when faint, those nearer than 4′ being of the fourteenth magnitude or fainter. The variable was not far from maxima in May, 1900, and February, 1901. These data result from twenty-eight observations.

243. *U CASSIOPEIAE.*

This star faded from the tenth to below the fourteenth magnitude between 1898, June 27 and August 17; also from the

eleventh to the fourteenth magnitude between 1900, January 21 and February 22; but the observations, nine in number, do not suffice to fix the minimum in either case.

267. *V ANDROMEDAE.*

After the minimum reported in this JOURNAL, **12**, 52, the variable passed a maximum at the ninth magnitude in May, 1900, and a minimum at the fourteenth magnitude in October of the same year.

294. *W CASSIOPEIAE.*

A maximum at 8½ magnitude was passed in December, 1899, and a minimum about the twelfth magnitude, in June, 1900.

466. *U PISCIUM.*

This star was twelfth magnitude, 1900, January 21, and had faded to less than fourteenth magnitude when last seen, February 22. There were no stars brighter than the fourteenth magnitude noticed with the 40-inch, within less than 2′ of the variable.

659. *X CASSIOPEIAE.*

This intensely red star (spectral type III, b; Dunér) remained with slight fluctuations near the twelfth magnitude during 1899, and passed a poorly defined maximum about the tenth magnitude in February or March, 1900. As there are forty well-distributed observations during this period the presence of any considerable minor maxima or minima is rendered very doubtful.

678. *U PERSEI.*

Minima were passed, a little fainter than the twelfth magnitude, late in December, 1899, and early in November, 1900; also a seventh magnitude maximum in May, 1900.

(787)—*ANDROMEDAE.*

The discovery by Anderson was announced in *A. N.*, **147**, 175. The position, found by micrometer comparisons with *Bonn A. G. Cat.*, 1887 and 1939, is—

R. A. $2^h\ 8^m\ 24^s.7$, Decl. $+43°\ 37'\ 46''$ (1855)
$11\ 14.1$ $50\ 26$ (1900)

A chart of the neighboring stars brighter than the thirteenth magnitude will be found in *Popular Astronomy*, **8**, 162.

My first observation was 1899, February 6, when the variable was found at 10.0 magnitude. It faded steadily, passing below the limit of the 6½-inch in April, and remaining invisible in that instrument till August 30, when it was found at 12.0 magnitude. It then increased in light and passed a maximum at 7.0 magnitude about the first of December, 1899. The following minimum, at 14.0 magnitude, the last of July, 1900, was observed with the 12- and 40-inch telescopes.

(1922)—*A URIGAE.*

Discovered by Madam Ceraski (see *A. N.*, **147**, 15). The position found by micrometer comparisons with *DM.* + 36° 1141 (place from the Lund Zones) is—

R. A. 5^h 17^m $6^s.0$, Decl. + 36° 46′ 11″ (1855)
20 8.6 48 53 (1900)

After the minimum reported in this JOURNAL, **12**, 54, it was found at the tenth magnitude in August, 1900, and at 11.5 magnitude in February, 1901. The identification in its faint stages presents no difficulty, a wide pair of fifteenth magnitude stars 1′ south aiding materially.

2013. *U AURIGAE.*

When first seen, 1899, January 8, this star was 10.5 magnitude. It faded steadily and passed below the reach of the 6½-inch the last of March, and could not be seen when looked for in April and May. It had risen to 8¼ magnitude in November, and passed a maximum about eighth magnitude early in December, 1899, and had fallen to the eleventh magnitude in April, 1900. There is a fourteenth magnitude star 20″ south following, which will aid in identifying it in its faint stage.

2376. *S LYNCIS.*

This star passed a maximum a little brighter than the ninth magnitude in May, 1900.

2742. *S GEMINORUM.*

The observations of 1900 began too late to fix the minimum, but the star was found between the twelfth and thirteenth

magnitude in January and February and had risen to tenth magnitude April 17.

2404. *X GEMINORUM.*

A maximum at the eighth magnitude was passed in December, 1899, and a minimum at the twelfth magnitude in April, 1900. It was little, if any, past a minimum early in February, 1901.

4471. *T CANUM VENATICORUM.*

This star passed a maximum, rather brighter than the ninth magnitude in September, 1899, and a twelfth magnitude minimum in February, 1900.

4315. *R COMAE.*

After passing a ninth magnitude maximum about 1900, July 25, and fading half a magnitude, the star again brightened, and when last seen, August 18, it was as bright as at any time in July. The strong twilight rendered these estimates of small weight.

5070. *Z VIRGINIS.*

This star was again brightening during the spring of 1901, being thirteenth magnitude May 18, and twelfth magnitude June 3.

5798. *RU HERCULIS.*

The minimum of 1900 was followed with the 12- and 40-inch telescopes. The star was fainter than the thirteenth magnitude from the last of February to the first of May, the minimum, a little brighter than the fourteenth magnitude, being passed about the first of April.

5830. *R SCORPII.*

A maximum about 10.5 magnitude, was passed in August, 1900. The star was fainter than the thirteenth magnitude 1901, June 7, and fainter than the fifteenth magnitude July 8.

5831. *S SCORPII.*

This star passed a tenth magnitude maximum in May, 1900, and was found at the thirteenth magnitude and fading in June, 1901.

5601. *S URSAE MINORIS.*

This star passed an eighth magnitude maximum the latter part of June, 1900, and was again near minimum in November and December of the same year.

6100. *RV HERCULIS.*

A faint maximum, about tenth magnitude, was passed in June, 1900, and a sixteenth magnitude minimum in September of that year. It was 13.5 magnitude 1901, May 18, and 11.5 June 3.

6449. *T DRACONIS.*

After the maximum of 1899, August 15, this star faded slowly and remained fainter than its 10.5 magnitude companion from the first of December, 1899, to the last of June, 1900. It then rose to 8.5 magnitude by the middle of September, and remained at that brightness, with some fluctuations, the rest of the year.

(6452)—*HERCULIS.*

The discovery by Anderson is noted in *A. N.*, **150,** 325. The position, based on micrometer comparisons with the neighboring *Berlin A. G. Catalogue* stars, is

R. A. $17^h\ 53^m\ 27^s.7$, Decl. $+19°\ 29'\ 41''$ (1855)
$55\ \ 24.7$ $\qquad\qquad 29\ \ 20$ (1900)

It passed eighth magnitude maxima about the first of March and the last of October, 1900, and a minimum between 13.5 and fourteenth magnitude, the latter part of June of the same year.

(6458)—*DRACONIS.*

The notice of discovery by Anderson is given in *A. N.*, **151,** 307. The position from micrometer comparisons with the neighboring *Cambridge A. G. Catalogue* stars, was found to be

R. A. $17^h\ 55^m\ 24.4^s$, Decl. $+54°\ 53'\ 01''$ (1855)
$56\ \ 17.2$ $\qquad\qquad 52\ \ 45$ (1900)

After the rise noted in this JOURNAL, **12,** 54, the star passed a maximum about 9½ magnitude in July, 1900, and had fallen below the limit of the 6½-inch the last of October of that year.

6549. *W LYRAE.*

Maxima were found, about 8.0 magnitude in December, 1899, and June, 1900; with a twelfth magnitude minimum in March, 1900. It had risen nearly to maximum by the last of December, 1900.

6871. *V LYRAE.*

The first minimum completely observed was that of 1900. The star was 12.0 magnitude January 1, and fell steadily to a minimum about 15.5 magnitude the latter part of June, and rose to a 9.5 magnitude maximum about November 1. By the last of December it had again fallen to 11.5 magnitude. It was below the thirteenth magnitude for nearly six months, from the last of March till September. By the aid of the light curve thus obtained the minimum of the year 1899 can be located near the first of June, since the variable was below the limit of the 6½-inch from the last of February till August 9. The maximum of this year was passed in October at nearly the same brightness as that of 1900. The resulting period of a little less than thirteen months is confirmed by one observation, 1901, July 9, when the variable was found near minimum.

6894. *S LYRAE.*

The minimum reported in this JOURNAL, **12**, 53, was followed by a 9.5 magnitude maximum in September, 1900. The variable is preceded by two fifteenth to sixteenth magnitude stars, the three forming a line about ½′ long.

6899. *U DRACONIS.*

This variable passed a 13.5 magnitude minimum early in March, 1900, at a ninth magnitude maximum late in July of the same year.

7085. *RT CYGNI.*

A twelfth magnitude minimum was passed in December, 1899, a 7.5 magnitude maximum in March, 1900, an eleventh magnitude minimum in June and a seventh magnitude maximum in September, 1900.

7220. *S CYGNI.*

The minima of this star prove to be extremely faint. It was at the limit of the 40-inch in July, 1900, had brightened perceptibly in August, and then rose steadily to 12.5 magnitude by the middle of November. The observations began too late to fix the date of minimum, but it was probably late in July.

(7248)—*AQUILAE.*

Anderson's discovery of this variable is reported in *A. N.*, **147,** 269. Its position from micrometer comparisons with $+12°$ 4255 (*Bonn* VI) is

R. A. $20^h\ 5^m\ 56^s.3$, Decl. $+12°\ 33'\ 46''$ (1855)
$8\ \ 3.1$ $41\ 41$ (1900)

Near its minimum in 1899 it was invisible in the 6½-inch from August 9 to November 22. It passed a maximum too near the Sun for observation, during the interval between 1900, January 2 and March 2; then faded from eleventh magnitude in March to a 14½ magnitude minimum early in June; then rose to an 8½ magnitude maximum in October, and had fallen to the twelfth magnitude at the last comparison, 1900, December 19.

There is a 12½ magnitude star 32″ north of the variable.

(7258)—*CYGNI.*

The discovery by Anderson is noted in *A. N.*, **150,** 325. The position from micrometer comparisons is:

R. A. $20^h\ 9^m\ 44^s.7$, Decl. $+30°\ 37'\ 56''$ (1855)
$11\ \ 32.9$, $46\ \ 3$ (1900)

After the minimum reported in this JOURNAL, **12,** 54, the star rose steadily to a maximum about 9¼ magnitude in October, 1900, and had fallen to the twelfth magnitude by the last of December.

7379. *ST CYGNI.*

After the maximum of 1899, May 30, the star fell steadily and passed below the limit of the 6½-inch the last of September of that year. It was next glimpsed with the 6½-inch 1899, December 5, and rose to a 9½ magnitude maximum about 1900, May 1. The following minimum, observed with the 12- and the 40-inch telescopes, was not sharply defined, the star remaining near 13.5 magnitude during August, September, and October of 1900, and rising to 10½ magnitude by the last of December. As the positions of six of the neighboring stars were measured with the 40-inch and the field made quite familiar, it does not seem that misidentification was to be feared.

7458. *V DELPHINI.*

In continuation of the report in this JOURNAL, **12,** 54, this star remained at or below the limit of the 40-inch during the interval July–October, 1900. There is a sixteenth magnitude star 1′ south and a trifle following the variable.

7492. *RZ CYGNI.*

This star passed a twelfth magnitude minimum in January, 1900, and fluctuated between that brightness and 10.5 magnitude for the remainder of the year.

7502. *X DELPHINI.*

This star remains for several weeks at minimum below the limit of the 6½-inch. It passed a maximum, a little brighter than the ninth magnitude, in the latter part of June, 1899, and had faded to the limit of the 6½-inch at the last comparison of the season, November 27. It was again near maximum 1900, May 1, and faded gradually till the last of October, when it was between 13½ and fourteenth magnitude.

(7579)—*CEPHEI.*

The discovery by Madame Ceraski is reported in *A. N.*, **147,** 142. The position from micrometer measures is

R. A. $21^h\ 6^m\ 39^s.2$, Decl. $+82°\ 28'\ 58''$ (1855)
$3\ 38.5$ $39\ 50$ (1900)

The variable remained below the limit of the 40-inch from 1900, May 29, to October 16. On October 25 it was about sixteenth magnitude, and 1901, January 24, it had risen to fourteenth magnitude, while May 16 it was near maximum, about 10½ magnitude. By the kindness of the then Director Keeler a photograph of the field was taken, with two hours' exposure, with the Crossley telescope of the Lick Observatory, 1900, July 24, which showed the variable about half a magnitude fainter (photographically) than the visual limit of the 40-inch.

(7594)—*AQUARII.*

This is *S. DM.* $-4°$ 5381. Its discovery by Barnard is given in this JOURNAL, **19,** 193. Its place for 1855 is

R. A. $21^h\ 3^m\ 22^s.7$, Decl. $-4°\ 37'.4$

It passed below the limit of the 6½-inch the latter part of October, 1899, and was again past maximum and fading from tenth to eleventh magnitude in April and May, 1900. It was near minimum, rather fainter than fourteenth magnitude, 1900, June 28, and rising steadily passed a tenth magnitude maximum in October of that year.

(7656)—*PEGASI.*

The discovery of this variable by Anderson is recorded in *A. N.*, **147,** 287. Its position from micrometer comparisons with neighboring catalogue stars is

21^h	14^m	$7^s.5$,	Decl. $+13°$	50′	17″ (1855)
16	14.9		14	1	36 (1900)

Minima were observed, about thirteenth magnitude, late in December, 1899, and in July, 1900. Maxima at 8½ magnitude were passed early in March and in October, 1900.

7896. *V PEGASI.*

After the maximum of July, 1899, the variable faded slowly and passed below the limit of the 6½-inch the last of November. It was next seen 1900, May 1, at 9.0 magnitude and passed an eighth magnitude maximum the latter part of May, then faded slowly to fourteenth magnitude when last observed, 1900, October 24.

8324. *V CASSIOPEIAE.*

Minima at about 12.5 magnitude were passed in December, 1899, and early in August, 1900. Maxima at 7½ magnitude were found in March and early in November, 1900.

(8517)—*CASSIOPEIAE.*

R. A. $23^h\ 39^m\ 39^s.9$, Decl. $+56°\ 1'\ 34''$ (1900)

The discovery by Anderson and measures of position by Hartwig are given in *A. N.*, **148,** 79, and **149,** 6, respectively. The variable was 10½ magnitude and fading early in January, 1899. It passed below the limit of the 6½-inch early in April and remained invisible in that instrument the rest of the year. It was found between the fourteenth and fifteenth magnitude

with the 40-inch in January, 1900, rose to a 9½ magnitude maximum in March, and fell to 12.5 magnitude the last of August, 1900.

(8629)—*CASSIOPEIAE.*

The discovery by Mrs. Fleming, and the position for 1900,

R. A. $23^h\ 55^m\ 53^s$, Decl. $+ 54°\ 52.3$,

are given in *Harvard College Observatory Circular* No. 24.

After the maximum of 1899, April 8, the variable faded slowly, passing below the limit of the 6½-inch in September and remaining invisible in that instrument for the rest of the year. A minimum at about 13.5 magnitude was observed with the 12- and 40-inch telescopes in January, 1900, followed by a 9½ magnitude maximum in June. It had passed below the twelfth magnitude in November, 1900.

YERKES OBSERVATORY,
September 6, 1901.