SEVEN NEW VARIABLE STARS.[1]

By M. FLEMING.

SINCE the discovery of eleven new variable stars at this Observatory was communicated to THE ASTROPHYSICAL JOURNAL in a letter dated April 9, 1895, seven other variables have been discovered here. Five of them were found in the examination of the photographs of stellar spectra taken at Cambridge and at the Arequipa Station in Peru, forming part of the work of the Henry Draper Memorial. These stars have spectra of the third type, having also the hydrogen lines bright. This peculiarity led to their being suspected of variability, since many known variable stars of long period possess this class of spectrum. Two were found from a comparison of the photographic chart plates with the maps of the *Durchmusterung*, while selecting and checking the selection of the faint stars for standards of stellar magnitudes. The variables are enumerated in the following table which gives the constellation, the designation, the approximate right ascension and declination for 1900, the catalogue magnitude of the star and the magnitudes when brightest and when faintest, as derived from the photographs:

Constellation	Designation	R. A. 1900	Dec. 1900	Mag.	Mag. Br.	Mag. Ft.
Eridanus....	*C.D.M.* −24° 1960	$3^h\ 51^m.0$	−24° 20′	8.6	7.2	11.0
Orion.....	*B.D.* +0° 939	5 0 .2	+ 1 2	6.0	8.8	10.6
Puppis.....	*Z.C.* 7^h 3056	7 42 .6	−41 57	9½	9.8	12.1
Cancer	.....	9 4 .0	+25 39	—	9.6	<13.5
Hydra.....	*S.D.* − 7°2873	9 37 .7	− 7 38	9.0	9.7	10.6
Libra.....	*S.D.* −14°4228	15 27 .7	−14 59	9.4	8.5	<12.3
Ursa Minor..	.....	15 33 .3	+78 58	—	8.4	11.4

—Eridani. *C.D.M.* −24° 1960. The magnitudes of this star as derived from photographs taken on September 6, October 20,

[1] Communicated by Edward C. Pickering, Director of the Harvard College Observatory.

November 6, 1889; September 13, 1890; January 30, February 1, October 22, December 17, 1891; December 14, 1892; November 18, November 20, 1893; August 13, August 14, September 22, October 27, November 6, November 10, November 16, and December 13, 1894, are 9.8, 7.2, 7.7; 9.1; 9.9, 9.8?, 9.0, 7.9; <9.8; 9.8, 9.6; 8.4, 8.3, 8.0, <8.4, 9.4, 9.8, 9.8, and 11.0 respectively.

—Orionis. *B.D.*+0°939. The variation in the light of this star was discovered by Miss E. F. Leland. It presents an especial interest on account of the apparent length of its period. It was bright in 1879 and again in 1891, and faint in the intermediate years. As, however, all the observations were made at about the same part of the year further observations are required, as it is still possible that the period may be a little less or a little greater than one year. Of the variability there can be no doubt. While it is proved by the photographs, the visual observations alone are sufficient to establish it. Thus four of the excellent Potsdam observations give the results 6.08, 5.99, 5.87, and 6.38. No one who looked at it last winter could doubt that it was fainter than the sixth magnitude. In fact the meridian photometer on six nights gives the results 7.10, 7.23, 7.02, 7.22, 7.13, and 7.22. In 1880 the meridian photometer gives its magnitude as 5.8; in 1881, 6.7; in 1882, 6.8; in 1883, 6.6; in 1885, 6.8; in 1894, 6.8; and in 1895, 7.2. Its magnitudes as derived from photographs taken on November 9, 1885; February 29, September 28, 1888; December 29, 1890; January 26, January 26, December 11, December 11, 1891; January 4, January 8, January 21, December 20, December 22, December 28, December 29, 1892; September 20, October 2, and November 26, 1893 are 10.0; 9.8, 9.6; 9.0; 8.9, 8.8, 10.0, 10.0; 9.8, 9.5, 9.6, 10.3, 10.4, 10.2, 10.3; 10.6, 10.4, and 10.1 respectively.

—Puppis. *Z.C.* 7^h 3056. *C.D.M.* −41° 3363. The magnitudes of this star as derived from photographs taken on October 3, October 22, November 13, 1889; September 27, September 27, October 24, October 24, October 26, October 26, 1893; April 18, October 19, and November 24, 1894 are < 10.6, < 10.8, 9.8;

11.8, 12.1, 10.4, 10.0, 10.0, 9.9; 10.8, 10.7, and 9.9 respectively.

—Cancri. R.A. $9^h\,4^m.0$; Dec. $+25°\,39'$. The magnitudes of this star as derived from photographs taken on December 6, 1889; December 7, December 9, December 14, December 18, December 29, 1890; March 26, 1891; February 15, March 7, April 9, 1892; March 12, March 18, March 31, April 5, November 22, 1893; January 2, January 25, March 30, November 15, 1894; January 23, March 5, May 9, and May 23, 1895, are 11.5; 10.2, 10.2, 10.4, 10.7, 10.7; 11.6; 12.2, 12.8, $<$ 13.5; 11.9, 12.3, $<$ 12.0, $<$ 12.1, 10.6; 9.6, 10.0, 12.0, 11.8; 9.8, 10.0, 12,0, and $<$ 12.1 respectively.

—Sextantis. *S.D.* $-7°2873$. The variation in the light of this star was discovered by Miss L. D. Wells. Its magnitude as derived from photographs taken on January 24, April 9, 1888; December 9, 1889; March 25, 1891; February 15, March 6, March, 14, March 30, 1892; February 24, March 15, November 22, 1893; April 19, December 17, 1894; February 11, February 13, April 10, April 10, April 11, April 11, April 11, April 16, April 16, April 17, April 17, April 18, April 18, April 20, April 23, April 23, April 25, April 25, May 1, May 1, May 2, May 3, May 3, May 6, May 7, May 7, May 9, and May 23, 1895 are 9.8, 9.8; 10.4; 10.6; 9.9, 9.8, 9.9, 9.8; 9.9, 9.9, 9.9; 10.0, 9.9; 9.8, 9,7, 9.9, 10.1, 9.7, 9.9, 9.9, 9.9, 9.9, 9.9, 9.9, 9.9, 9.9, 9.9, 10.2, 10.0, 9.9, 10.1, 10.0, 10.0, 10.0, 10.2, 10.3, 10.2, 10.2, 9.9, 10.2, 10.4, and 10.4 respectively. These results were confirmed by measures made by Mr. O. C. Wendell with a polarization photometer attached to the 15-inch equatorial.

—Libræ. *S.D.* $-14°\,4228$. The magnitudes of this star as derived from photographs taken on February 28, May 17, 1888; July 18, 1890; May 16, May 16, June 3, June 23, June 23, 1891; May 10, May 10, May 10, May 11, 1892; May 7, May 7, July 22, July 27, 1893; May 13, June 14, June 17, June 18, and June 20, 1895 are $<$12.3, 10.8; $<$11.4; $<$11.8, $<$11.0, $<$11.5, $<$11.8, $<$11.9; $<$10.8, $<$10.6, $<$10.4, $<$8.9; $<$11.8, $<$11.7, 10.6, 10.7; 8.9, 8.5, 8.5, 8.6, and 8.7 respectively.

—Ursæ Minoris. R.A. $15^h\,33^m.3$; Dec. $+78°\,58'$. The mag-

nitudes of this star as derived from photographs taken on March 9, August 28, September 29, October 1, November 10, 1890; July 16, 1891; April 11, 1892; August 15, August 15, August 26, 1893; August 17, October 17, November 10, November 12, November 12, December 29, 1894; January 1, January 2, April 23, April 25, May 1, May 2, May 3, May 6, May 7, May 16, May 22, May 23, May 29, June 7, June 14, June 17, and June 18, 1895 are 11.4, 8.4, 8.6, 8.4, 9.3; 8.4; 9.3; 9.8, 9.8, 10.3; 11.2, 11.3, 10.6, 10.7, 10.5, 8.9; 8.9, 8.8, 9.2, 9.4, 9.4, 9.2, 9.03, 9.4, 9.4, 9.4, 9.8, 9.7, 10.0, 10.2, 10.4, 10.4 and 10.4 respectively.

The photographs of the above variables have been examined, and the variability of the stars confirmed by Professor E. C. Pickering.

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