Minor Contributions and Notes.

A LIST OF FIVE STARS HAVING VARIABLE RADIAL VELOCITIES.[1]

In the course of the line-of-sight work with the Lowell spectrograph, the following five stars have been discovered to be spectroscopic binaries. These are additional to those previously announced. Since some of the plates employed in these determinations have been incompletely measured and reduced, the time is given only to the day. The letters S and L before the plate numbers refer respectively to the short and to the long camera.

α Andromedæ ($a = 0^h\ 3^m.2$; $\delta = +28°\ 33'$; Mag. = 2.1).

The following observations of the radial velocity of this bright star show it to be a spectroscopic binary.

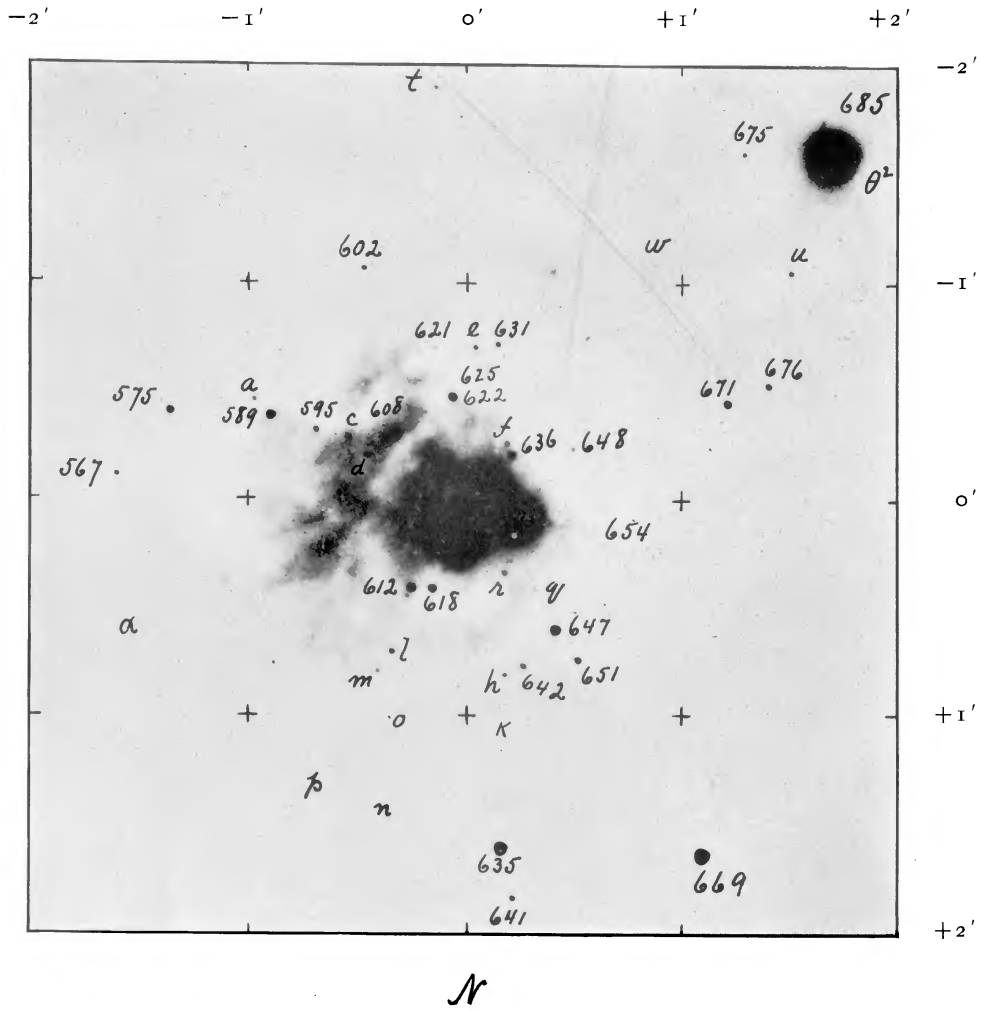
Plate	Date	Velocity
S 470	1902 Oct. 30	−40 km
L 1248	1903 Nov. 25	−42
L 1253	Nov. 26	−40
L 1290	Dec. 1	−34
S 1306	Dec. 14	−27
S 1318	Dec. 19	−24
S 1328	1904 Feb. 10	+16
S 1331	Feb. 11	+20
S 1338	Feb. 17	− 5
S 1341	Feb. 29	−37
S 1347	Mar. 4	−45
S 1349	Mar. 6	−44
S 1402	May 22	+10

These velocities depend principally upon displacements of the hydrogen line $H\gamma$ and the magnesium line λ 4481. The helium line at λ 4472 is measurable on a few of the plates. Owing to the character of the spectrum and the poor quality of some of the plates, these values for the velocity may be in error a few kilometers.

This star was observed by Vogel and Scheiner in 1889.93 to have a velocity of +4.5 km, and when plate L 1248 was found to give a velocity differing by 45 km, the binary character of the star seemed certain. (Plate S 470 had not been previously measured owing to a badly overexposed

[1] *Lowell Observatory Bulletin* No. 11.

PLATE XII.



FAINT STARS NEAR TRAPEZIUM IN NEBULA OF *ORION*.
(The numbers for the brighter stars are Bond's.)

comparison spectrum.) These observations seem to indicate a period of about one hundred days, and a highly eccentric orbit.

α *Librae* ($\alpha = 14^h\ 45^m.4$; $\delta = -15°\ 37'$; Mag. = 2.3).

The observations of this bright star showing the variation in its radial velocity are the following:

Plate	Date	Velocity
S 1406	1904 May 24	−60 km
S 1460	June 21	−20
S 1482	June 27	+ 4
S 1500	July 6	+20

The spectrum of this star is somewhat more advanced than that of *Sirius*, and is quite similar to that of α *Piscis Austrini*. There are numerous metallic lines, but they are poorly defined and not suitable for accurate measurement. The appearance and behavior of the hydrogen line $H\gamma$ suggest that both components are bright.

σ *Scorpii* ($\alpha = 16^h\ 15^m.1$; $\delta = -25°\ 21'$; Mag. = 3.0).

The variation in the radial velocity of this star was discovered from the second plate. The observations are as follows:

Plate	Date	Velocity
S 1451	1904 June 18	−25 km
S 1475	June 25	+25
S 1481	June 26	+17
S 1506	July 7	− 5

The spectrum is of the *Orion* type, and the lines are quite well defined.

X Sagittarii ($\alpha = 17^h\ 41^m.3$; $\delta = -27°\ 48'$; Mag. = 4.9).

This is the visual variable *X Sagittarii*, having a period of seven days. Only two spectrograms of the star have thus far been secured. They give the following values for the radial velocity.:

Plate	Date	Velocity
S 1455	1904 June 19	+ 1 km
S 1464	June 22	−22

This range is not great, but the spectrum contains many well defined lines, and there is no reason for doubting the reality of the variation in the

velocity. The spectrum is intermediate between that of α *Canis Minoris* and that of the Sun.

ϵ *Capricorni* ($\alpha = 21^h\ 31^m.5$; $\delta = -19^\circ\ 54'$; Mag. $= 4.5$).

The variable velocity of this star was discovered in October 1903 from the fourth plate. The observations thus far obtained are the following:

Plate	Date	Velocity
S 1004	1903 Aug. 21	−40 km
S 1015	Aug. 24	−42
S 1046	Sept. 7	−45
S 1166	Oct. 28	−16
S 1170	Nov. 2	−15
L 1233	Nov. 22	−27
S 1469	1904 June 23	−23
S 1499	July 5	+ 1
S 1504	July 6	+ 6

The spectrum of this star is of the *Orion* type and is peculiar. The hydrogen line $H\gamma$ is, in general, very sharply defined, and the determinations depend principally upon the measures of this line alone. On some plates other ill-defined lines appear, and it may be that both components are bright.

V. M. SLIPHER.

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