NOTE ON THE SPECTRUM OF NOVA PERSEI

Spectrograms of Nova Persei were secured at intervals during the fall and winter, up to January 7th. The spectrum remained, without appreciable change, as described by us in BULLETIN No. 8. In that publication attention was called to the presence of the fine dark *H* calcium absorption line; and the opinion was ventured that perhaps the corresponding *K* line was "absent only by reason of the fact that there the calcium vapor has nothing to absorb." To test this point, Mr. Wright made a long exposure,

sufficient to record the continuous spectrum in the *H* and *K* region. The fine dark *K* line is present.

In this connection it would be exceedingly interesting to know whether the absorption lines of calcium, sodium and other elements would be detected in the spectra of well-known gaseous nebulae,—the exposures being long enough to record the continuous portions of their spectra.

W. W. CAMPBELL.

W. H. WRIGHT.

July 1, 1902.

D. O. MILLS EXPEDITION TO THE SOUTHERN HEMISPHERE

The 37½-inch Cassegrain reflecting-telescope mirror, to be used by the Mills Expedition in determining the radial velocities of the brighter stars south of -30° declination, was completed by the John A. Brashear Company on June 20th. The 9¾-inch convex secondary mirror has likewise been completed. Both are en route to Mt. Hamilton. The telescope mounting, designed in general plan by the Director, and in detail by the builders, Harron, Rickard and McCone of San Francisco, has for several months been set up

for trial in the rear of the Observatory buildings. A three-prism spectrograph, designed by the Director, optical parts by Brashear and mounting by our instrument-maker, has been completed and tested. A modern steel dome, 30 feet in diameter, has been constructed by The Warner & Swasey Company. It is hoped that the Expedition may be able to sail in the near future for Valparaiso, to occupy a station near Santiago, Chile.

W. W. CAMPBELL.

July 1, 1902.

A LIST OF SIX STARS WHOSE VELOCITIES IN THE LINE OF SIGHT ARE VARIABLE

The following six spectroscopic binaries, discovered with the Mills spectrograph, are additional to the thirty-two binaries already announced:

ϕ PERSEI ($\alpha = 1^{\text{h}} 37^{\text{m}}$; $\delta = +50^{\circ} 11'$).

The variable velocity of this star was discovered from the second plate. The observations are:

Date.	Velocity.	Measured by
1898 September 5.....	-2^{km}	Reese
1900 December 16.....	+24	Reese
"	+23	Campbell
1901 October 15.....	-10	Reese
November 11.....	-12	Reese

This star has bright hydrogen lines, its bright *H β* having been discovered by Espin (Astr. Nach., No. 2963). The *H γ* line may perhaps be best described as a comparatively narrow absorption line

with very bright borders. The measures refer to the middle of the dark line. No other lines are apparent in the *H γ* region.

η GEMINORUM ($\alpha = 6^{\text{h}} 09^{\text{m}}$; $\delta = +22^{\circ} 33'$).

The observations of this star thus far secured are as follows, the variable velocity having been discovered from the third plate:

Date.	Velocity.	Measured by
1900 January 15.....	+15.8 ^{km}	Reese
"	+14	Stebbins
January 21.....	+15.	Reese
1901 October 13.....	+22.1	Reese
November 6.....	+20.3	Reese
December 4	+22.8	Reese
1902 February 2.....	+25	Reese
"	+23	Stebbins

γ CANIS MINORIS ($\alpha = 7^{\text{h}} 23^{\text{m}}$; $\delta = +9^{\circ} 08'$).

The observations of this star are:

Date.	Velocity.	Measured by
1900 October 29.....	+44 ^{km}	Reese
"	+44	Stebbins
1901 November 6.....	+41	Reese
"	+40	Stebbins
December 22.....	+54	Reese
"	+53	Stebbins
December 30.....	+50	Reese

The fourth plate is underexposed.

ζ HERCULIS ($\alpha = 16^{\text{h}} 38^{\text{m}}$; $\delta = +31^{\circ} 47'$).

Early observations of the radial velocity of this star were obtained by Belopolsky at Pulkowa, Campbell at Mount Hamilton and Newall at Cambridge, as follows:

Date.	Velocity.	Measured by
1893 May 18.....	-68 ^{km}	Belopolsky
May 22.....	-84	Belopolsky
June 2.....	-75	Belopolsky
June 3.....	-67	Belopolsky
June 4.....	-66	Belopolsky
June 14.....	-64	Belopolsky
June 16.....	-69	Belopolsky
Mean.....	-70.4	
1897 April 29.....	-69.1	Campbell
1898 May 11.....	-70.4	Campbell
May 23.....	-70.0	Campbell
August 19.....	-70.9	Campbell
Mean.....	-70.1	
1897 June 14.....	-71.4	Newall
1898 May 16.....	-68.4	Newall
1899 April 29.....	-74.3	Newall
Mean.....	-71.4	

The above observations afforded no evidence whatever of variable velocity.

Recent observations at the Lick Observatory are as follows:

Date.	Velocity.	Measured by
1901 July 1.....	-74 ^{km}	Wright
"	-73.9	Reese
August 6.....	-75.8	Reese
1902 April 13.....	-74.2	Reese
Mean.....	-74.6	

The velocity has therefore changed about 4^{km} since 1898.

This star is a well known visual binary, period about 33 years.

α EQUULEI ($\alpha = 21^{\text{h}} 11^{\text{m}}$; $\delta = +4^{\circ} 50'$).

The variable velocity of this star was detected from the third of the following observations:

Date.	Velocity.	Measured by
1900 June 25.....	-26 ^{km}	Wright
July 18.....	-22	Wright
1901 June 25.....	-2	Wright
September 1.....	-14	Wright
October 15.....	-12	Reese
1902 June 2.....	-26	Stebbins

This star has a composite spectrum, discovered by Miss Maury of Harvard College Observatory.

$\circ$ ANDROMEDAE ($\alpha = 22^{\text{h}} 57^{\text{m}}$; $\delta = +41^{\circ} 47'$).

The following observations of this star have been secured:

Date.	Velocity.	Measured by
1900 October 9	-11 ^{km}	Wright
December 17	-15	Campbell
"	-17	Wright
1901 June 25	-20	Wright
August 12	-12	Reese

These measures depend entirely upon the excellent *H γ* line.

This star has a composite spectrum, discovered likewise by Miss Maury.

Before the discovery of the thirty-eight spectroscopic binaries with the Mills spectrograph, three had been discovered in the same list of stars by Belopolsky, making forty-one binaries in about 350 stars observed. The proportion is therefore one binary star for every eight observed, not taking into account a considerable list of suspected cases awaiting confirmation. The variable velocity of our Sun, due to its revolving planets, has a double amplitude of only a few hundredths of a kilometer. As the work progresses, and the degree of accuracy attainable increases, we shall probably find that there is a regular gradation of double amplitudes from that of the Sun up to those of the spectroscopic binaries already discovered, and it is possible that the star which is not a spectroscopic binary will prove to be the rare exception.

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W. W. CAMPBELL.

July 1, 1902.