structed for each member of the group individually. The theory is based on a development of the disturbing function to the second order of the eccentricities and inclinations. Canonical variables are employed which makes possible a separate treatment of the long and short period terms.

An application was made to (659) Nestor. A preliminary comparison of the theory for Nestor with a numerical integration of the orbit was made and corrections to the assumed values of the arbitrary constants were determined. A correction of $+1.1$ to the coefficient of the libration led to the new value of 10.2 . The assumed coefficient of the free oscillation of period approximately 3600 years in $p = \xi_2 \cos(60^\circ + \pi_0') - \eta_2 \sin(60^\circ + \pi_0')$ and $q = \xi_2 \sin(60^\circ + \pi_0') + \eta_2 \cos(60^\circ + \pi_0') - e_0'$ is 0.131 and the correction $+0.002$. In these expressions ξ_2 and η_2 are the Poincaré variables. The expressions are valid for those Trojan asteroids which follow Jupiter in longitude.

This work was begun at Yale Observatory under the direction of Dr. Dirk Brouwer and continued at the U. S. Naval Observatory. Acknowledgment is also made to the Watson Fund of the National Academy of Sciences for assistance. A detailed discussion will be published in the *Astronomical Papers of the American Ephemeris*.

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Heyden, Francis J., S. J. Colors of seven Cepheid variable stars in Cygnus.

Light curves of seven Cepheid variables in Cygnus, namely, V 386, MW, VY, BZ, TX, SZ and CD Cygni, have been determined in blue-photographic, photovisual and photored light from photometric plates taken at the Harvard Oak Ridge Station. The mean light-curves were derived from observations taken during the summers of 1944 and 1945. Two telescopes were used so that each yellow or red plate was taken simultaneously with a blue one.

Color curves showing the variation of the blue-yellow and the blue-red color indices have been derived from the mean light-curves for each of the seven stars. These color curves show a definite correlation with the spectral curves which have been provided for this program by Dr. Struve of Yerkes Observatory.

Color excesses from the blue-yellow color indices are based on the difference between the observed color index at minimum light and pro-

visional normal color indices for stars of luminosity class Ib in the Morgan, Keenan and Kellman system. These normal colors were prepared by Miss Hagopian at Harvard Observatory. The color index at minimum light was selected because Struve has found¹ the spectra nearest to normal at that part of the light curve. Total photographic absorptions have been computed by multiplying the color excesses by the factor 5. This factor is perhaps too large.

The distance of the stars have been computed from the median absolute magnitude taken from Dr. Shapley's photographic period-luminosity curve, from the median apparent magnitude of the blue light-curves and from the total photographic absorption. The formula used was:

$$5 \log r = m - M - A + 5.$$

The following table contains a summary of the results.

Variable (Cygni)	m (pg)	Sp. (MKK)	M (pg)	C.E. (mag)	A (pg)	Distance (parsecs)
V386	11.00	G1	-1.53	0.91	4.55	395
MW	10.60	G1	-1.64	0.61	3.05	689
VY	10.60	G1	-1.85	0.71	3.55	603
BZ	11.75	G5	-2.02	0.80	4.00	900
TX	11.25	G6	-2.32	0.93	4.65	608
SZ	10.75	K0	-2.33	0.50	2.50	1308
CD	10.00	K0	-2.42	0.10	0.50	2421

The total absorptions found for these seven stars agree very well with those estimated by F. Miller² from star counts in the obscured regions near the North American nebula, and by Oort and Oosterhoff³ from the colors of four Cepheids in the Cygnus star cloud.

1. *Observatory*, 65, 257, 1944.

2. *Ann. Harv. Coll. Obs.* 105, 316, 1936.

3. *B. A. N.* 9, 325, 1942.

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Jehle, Herbert. Statistically independent elements of a stellar system; their significance for stellar dynamics.

Stellar dynamics has yielded many results by studying the motion of stars in a smoothed-out gravitation field. When we come to the problem of studying the interaction terms due to stellar passages, the force fluctuation method has so far been the most successful one. It has its serious limitation in the fact that in order to make calculations about the size, etc., of these force fluctuations, we have to make assumptions about stellar masses, and their distribution in position and velocity space. This difficulty is accentuated by the fact that we usually have a mixture of