were practically negligible; however, the parallax errors contributed about 8 per cent of this total observed reduction. Other characteristics of the velocity ellipsoid were unchanged; i.e., the three axes remained distinctly unequal and a vertex deviation of about 12° persisted.

The incompleteness factors $K(m, \mu)$ used as weights in obtaining the above results were found by taking the ratio of the theoretical $N(m, \mu)$ distribution, giving a total of 400 G8-K2 dwarf stars within the sphere of 20 parsecs surrounding the sun, to the observed $A(m, \mu)$ distribution of the available 60 G8-K2 dwarf stars with parallaxes greater than or equal to $0''.050$. The size of the factors varied from 1 to 12 depending upon the apparent magnitude and the proper motion of the star.

The theoretical $N(m, \mu)$ distribution was calculated by transforming the three dimensional distribution function $\phi(M, T, p)$ to $\Gamma(m, \mu, p)$ and integrating this with respect to p . The assumptions underlying this solution were that in the homogeneous, infinitesimal volume of space and for the small group of physically similar stars considered, M and T are stochastically independent of p and of each other, and that, to 20 parsecs, the stars are uniformly distributed, so that $\phi_p(p) = c/p^4$. The distributions $\phi_M(M)$ and $\phi_T(T)$ were calculated from the original data and later recalculated when approximate incompleteness factors had been found. The third approximation of the velocity ellipsoid derived with revised weights differed little from the second and was adopted.

The effect of observational errors was taken care of by correcting the first and second order general moments of the space velocities and of the $\phi_M(M)$ distribution. These corrections were approximately evaluated by series development and neglect of higher order terms.

The basic parallax, radial velocity, and proper motion data were obtained from the Yale 1952 Parallax Catalogue, from the Mount Wilson 1950 Radial Velocity Catalogue, both as yet unpublished, and from the *General Catalogue of 33,342 Stars*.

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Rodgers, R. F. Relative incidence of binaries among Be and B type stars.

It has been felt by Struve¹ and others that there is a lower incidence of spectroscopic binaries among Be stars than among B stars without

emission lines. It was realized that this might have been caused by observational effects; that is, observers might have been reluctant to assign Be stars to the spectroscopic binary class, or might have avoided attempting orbit solutions due to the nebulous character of the spectral lines shown by most Be stars. This investigation is a systematic attempt to compare the incidence of binaries among Be stars with the incidence among B stars. All the pertinent data found in the following sources are used: Merrill and Burwell's Catalogue (with supplements) of Be stars, Aitken's *Double Star Catalogue*, Kukarkin and Parenago's *General Catalogue of Variable Stars* and Plaskett and Pearce's Catalogue of Radial Velocities of O and B Type Stars.

The numbers of eclipsing and visual binary systems among the Be stars, predicted from the number of Be stars relative to B stars, are compared with the numbers actually found. The results are that out of 113 eclipsing binary B stars, 8 are found to be Be stars as compared with 7 predicted, and out of 493 bright visual binary B stars, 25 are found to be Be stars as compared with 25 predicted. The conclusion is that the incidence of eclipsing and visual binaries among Be stars is the same as among B stars. A general analysis, for radial-velocity variations, of 96 Be stars compared with a similar selection of B stars, without differentiating between sharp- and nebulous-line spectra, also leads to the same conclusion for spectroscopic binaries.

A more detailed analysis of velocity variations is made of all Bne stars found in the Victoria Catalogue and in the *Publications of the David Dunlap Observatory*, amounting in all to 71 stars. These stars are put into groups according to spectroscopic subclass and their velocity variations are compared with the velocity variations of similar groups of Bn stars, using a simplification of the method of analysis used by Heard.² So grouped, the Bne stars show significantly smaller velocity variations than the Bn stars. Since the velocity variations in Be stars are known often to arise from causes other than simple orbital motion, it can be concluded that the incidence of spectroscopic binaries among Bne stars is less than among Bn stars. The incidence of binaries among Bs stars must be very small in order to reconcile this latter result with the one stated earlier, that the incidence of binaries among Be stars in general is the same as among B stars. The Be stars are known to be the most rapidly rotating of the B stars, hence