indicates that, in many instances, atoms of these elements are set in motion by the eruption.

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Vyssotsky, A. N. and Emma T. R. Williams.
Giant-dwarf ratios for various spectral types
from secular parallaxes of stars of 9th, 10th,
and 11th magnitude.

An examination of the secular parallaxes derived from the McCormick general proper motion program indicates that the FK3 system, which is now used as a reference framework, is greatly to be preferred to the GC system which was used previously. Parallaxes derived from mean motions in right ascension are in good agreement with those derived independently from mean motions in declination and also with those obtained from peculiar motions.

The secular parallaxes of the A stars are: $0''.0090 \pm .0009$, $0''.0068 \pm .0007$, and $0''.0056 \pm .0005$ for 9th, 10th and 11th photovisual magnitudes, respectively, reflecting the presence of absorption. In the case of the F stars, however, the values of $0''.0173 \pm .0017$, $0''.0101 \pm .0011$ and $0''.0071 \pm .0008$ for the same three magnitude groups, with no apparent dependence on galactic latitude, indicate that they are relatively little affected by absorption. For the G stars the parallaxes are still larger and indicate that dwarfs constitute possibly 50 per cent of the 9th magnitude group and approximately 80 per cent of those of 11th magnitude. The G5 stars show that about 25 per cent are dwarfs at 9th magnitude and something like 50 per cent at 11th. For the K0 and K2 stars the percentages are five per cent and 25 per cent and for the K5 and M stars they turn out to be about one per cent and 15 per cent.

For stars of classes M0 and later it is possible to distinguish the dwarfs by their appearance on the spectroscopic plates. When these are excluded, the secular parallaxes of the remaining M stars are considerably smaller than those of the A stars, from which we conclude that the number of intermediate M stars must be relatively small. This spectroscopic method of separation indicates that among stars of classes M0 to M8 the dwarfs constitute one per cent, five per cent and twelve per cent of the 9th, 10th and 11th magnitude groups.

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Wagman, N. E. Parallaxes of bright stars
photographed through a neutral filter.

The parallaxes of eight bright stars have been obtained with the Thaw refractor of the Allegheny Observatory using a filter that absorbs seven magnitudes to aid in the reduction of the light of the bright stars to about magnitude 12.5. The average deviation of the parallaxes from those given in the *Catalogue of Bright Stars* is $.019$; the greatest deviation, $-.036$ for α Cephei, is six times the probable error. The deviations are about equally divided between plus and minus.

Comparison of the probable errors for the eight bright stars with those for the average Allegheny parallax star indicates an increase of 15 per cent for the stars taken through the filter. The same increase in error is found for 15 bright stars whose brightnesses were reduced by a sector so narrow that the images were elongated by diffraction. However the parallaxes derived in this way do not exhibit wide differences from the accepted values, the average deviation being $.008$.

From 26 pairs of plates of Algol—one ordinary and one filter plate taken consecutively—a systematic shift of the parallax star by the filter is indicated. In right ascension the shift is $+.018 \pm .016$ and in declination $+.035 \pm .015$.

One of the stars under investigation, α Ophiuchi, proved to be moving in an orbit with a period of over eight years and semi-major axis of $.09$. The present series of observations extends 11 years. The result is confirmed by an earlier series extending from 1918 through 1921. A companion similar to the sun in an orbit of $0''.4$ semi-major axis is indicated. Spectroscopic observations do not make certain whether the bright star is a spectroscopic binary or not.

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Whipple, Fred L. Photographic orbits of sporadic meteors.

Among 28 meteor orbits so far determined from photographs taken at two stations with cameras operated with rotating shutters, 12 orbits are of sporadic meteors. Of these, 5 are similar to the Jupiter-family comet orbits, with low inclination, 2° , 4° , 16° , 18° , 22° and mean q , 0.86. One is of the Saturn-family type, $i = 17^\circ$ and $q = 0.71$. Five are long period, with random inclinations, 7° , 28° , 36° , 114° and 158° and