Walker, Merle F. The color-magnitude diagram of NGC 2264.

Three-color photoelectric and photographic observations of the nebulous cluster NGC 2264 have been obtained to $V = 17$ in order to investigate the color-magnitude diagram of a cluster containing both O and B stars and T Tauri stars. NGC 2264 is one of the most favorable objects of this type for investigation since, even though the stars are associated with an extensive dark cloud, the total interstellar absorption is small and fairly uniform.

The reduction of the observations is not yet entirely complete. However, the main features of the color-magnitude diagram appear to be well established. The diagram indicates that there is a continuous sequence of stars connecting the O and B stars and the T Tauri stars, the latter appearing abruptly at $V = 13$. However, below Ao the sequence departs from a standard main sequence by first rising $1\frac{1}{2}$ magnitudes and then extending as a broad band, 2 magnitudes wide, parallel to and about 2 magnitudes above the normal main sequence. The reality of the $1\frac{1}{2}$ magnitude rise has been confirmed by spectroscopic observations. Below $V = 13$ the maximum departure of the stars from the main sequence increases, reaching about 6 magnitudes at $B-V = 1.6$. Whether the mean line also diverges is not clear owing to the incompleteness of the observations. The luminosity function, which is complete to $V = 17$, shows a peak at $V = 15$.

The cluster is also peculiar in that it contains five yellow giants. The giant character of these stars has been confirmed spectroscopically.

From the three-color photoelectric observations, the reddening of the cluster was found to be 0.1 mag., and using the stars earlier than Ao, the distance modulus is 10.4 mag. or 1200 parsecs. About 30 new variable stars have been found in the cluster during this investigation, bringing the total number of known variables to about 60.

It is possible that the fainter stars in this cluster are still contracting from the pre-stellar medium and have not yet reached the main sequence. Calculations by Salpeter indicate that if the stars brighter than Ao have reached the main sequence, the age of the group is about 10^6 years. This is consistent with the age inferred from the existence in the cluster of the O7 star S Mon. The proper motion data available at this time are not adequate to attempt to determine the age of the cluster by possible motions of expansion.

Recent calculations by Henyey of the evolutionary tracks of gravitationally contracting stars indicate that the brightness of the stars decreases just before they reach the main sequence. As yet, the calculations have been carried out only for stars of about one solar mass. However, it is conceivable that this phenomenon is related to the observed $1\frac{1}{2}$ magnitude rise in brightness at the point where the cluster sequence departs from the standard main sequence.

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Wehlau, William H. The ratio of early and late M stars in the galaxy.

The aim of this investigation is to compare the distribution of the early and late M stars. This was accomplished by studying the ratio of these stars in three regions approximately 5° wide, extending from $b = -18^\circ$ to $b = +18^\circ$ at $l = 24^\circ$, 45° , and 66° . The survey was carried out with infrared plates taken with the 4° prism attached to the Schmidt telescope of the Case Observatory. The total number of stars included to an approximate limiting infrared magnitude of 8.8 is 1752. The stars were classified according to the criteria given by Nassau and van Albada.¹ These classifications were used to place the stars in two groups, the early M's including those from M 2 to M 4.5, and the late M's from M 5 to M 8. The interstellar absorption will have an effect on the ratio of early to late M's only if there is a difference in the infrared absolute magnitudes of the early and late M's. The evidence available now indicates that this difference is small.

The ratio of the number of early M's to the number of late M's was found to be 2.5. This value differs considerably from that furnished by Nassau, Blanco, and McCuskey from unpublished material for the M stars in the galactic nucleus where the ratio is apparently less than one. The ratio appears to be the same in the direction of the spiral arm at $l = 45^\circ$ as it is for $l = 66^\circ$ and for the interarm region at $l = 24^\circ$. The relative frequency of the M stars as a function of spectral type was found to be the same for the three longitudes and also appears to be independent of the magnitude. The limiting magnitude of the survey is too bright to insure that the ratio is independent of the spiral arm. These data indicate that the early M stars are distributed in a disk similar to that of the late M