# HYPOTHESIS TO ACCOUNT FOR THE SPECTRAL CONDITIONS OF THE STARS

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The peculiar behavior of double stars in the near and relatively distant regions of the galaxy, which has just been discovered (these Proceedings, **4**, 1918, 71), together with the well known preference of the stars of type B for the Milky Way and the general preference of the later types for the nearer regions of space, suggest the conclusion that spectral class depends largely upon external causes.

Further study of the brightnesses and spectra shows that there is a strong similarity between the brighter stars of early type if arranged in the order B, O, gaseous nebulae, and the changes in the novae in their early stages. As is well known, all of these objects are confined to relatively distant regions in the direction of the galaxy. There is also reason to think that the same cause which is believed to underlie the phenomena of the outbursts in the novae may be a vital factor in the determination of spectral class among the ordinary stars.

As a result of these investigations the following general hypothesis has been formulated to account for the present classes of stellar spectra.

*Hypothesis.*—The cause is dual, depending upon the amount of cosmic matter and upon phenomena of radiation and condensation. Many of the A stars, the B and O stars, the planetary and irregular gaseous nebulae, the novae and perhaps the Cepheid variables, are confined to the galaxy because there the matter is sufficiently plentiful to cause an increase of energy, the energy from the matter swept up being in excess of that lost by radiation. The direction of spectral change under such conditions in *toward the nebulae.*

In the regions (distant or near) where there is little or no cosmical matter, radiation will be in excess of the energy received from external sources and the direction of change will be *toward the late types.*

In a considerable portion of the system the changes of spectral class may be due simply to retardation.

The hypothesis may be further generalized as follows—

The spectral condition of a star depends chiefly upon its size and mass and the external conditions of density of cosmical matter and relative velocities of star and matter.

Upon this hypothesis the stars are probably all pursuing one definite course of very slow change toward extinction, but each individual star will be pursuing a course which may have many whole or partial cycles due to varying external causes.

Details of this investigation are given in a paper which has been sent to the *Astrophysical Journal.*