Eclipsing stars are not intrinsic variables; their variations are due to the eclipse of one component of a close double by the second component during their revolution around a common centre of gravity for the system. They have proved extremely important in unravelling many of the problems of stellar structure. They are best studied by photo-electric methods, which enables precise determination of their changes. In turn these data provide information on the complex processes that take place in stellar atmospheres and the envelopes around them.

Their light between minima is almost, but not quite constant. This can be caused by physical effects in the atmospheres of the components. Periods for this type range from four and a-half hours to many years. This wide difference appears to depend on the nature of the components, which may be any kind from subdwarfs to supergiants. The components have the form of slightly flattened spheroids.

Beta Lyrae eclipsing stars have curves showing that the light variations are continuous between minima. Their periods are from half a day to about 200 days. It is probable that their components have complicated figures so that their projected surfaces as seen by us change continuously as the components revolve around the common centre.

With very short periods of from six-hundredths of a day to one day, the W Ursae Majoris variables also have a continuous light variation. These stars have figures very much the same for both components and are also in direct contact with each other.

Variable Stars and Stellar Evolution

Naturally there are a host of questions that can be asked concerning variable stars once we have determined their nature. Is their instability due to passing through some stage of transition in the life history of a star? How do they indicate the stage reached in their life history?

Modern theories of stellar evolution suggest that stars originate in a cloud of dust and gas which condenses into a group of stars. They spend a short time, comparatively speaking, at a phase when they are subject to gravitational contraction. This phase is terminated when sufficient heat has been built up within the star to produce pressure that will withstand gravitational contraction. The star then enters on a long life as a star of the main sequence. The actual mass of the star determines its position on the main sequence.

In young galactic clusters, the fainter stars of O and B types are already on the main sequence. Within the cluster other still fainter stars may be found not yet on the main sequence. Such clusters are associated with interstellar clouds. The RW Aurigae and T Tauri type stars exist in these associations and are above the main sequence. That means that such stars are extremely young and are still contracting.

When a star is on the main sequence, its intrinsic brightness (or mass) controls how rapidly it burns up its hydrogen. The stage at which stars leave the main sequence is dependent on the luminosity of the star, so that we may find supergiants, giants and subgiants off the main sequence. Variability is a distinguishing mark of instability in the life of a star.

A useful method of discussing points about stellar evolution is by use of what is known as the H-R diagram as I have already pointed out. Naturally such diagrams show marked differences between various parts of the Universe. That is due to the age and composition and type of stellar population that makes up the parts of the various clusters and nebulae.