AN OBSERVATIONAL APPROACH TO THE EARLY STAGES OF STELLAR EVOLUTION

V.A. Ambartsumian and L.V. Mirzoyan
Byurakan Astrophysical Observatory, Armenia, USSR

During last three decades an observational approach was being applied at the Byurakan Astrophysical Observatory to the problems of the evolution of astronomical bodies and systems. In contradiction to the views developed by many theoreticians who postulate as an initial state of each body or system a gaseous nebula of some kind and suppose that the processes of condensation are dominant in the Universe this approach makes use of the observed predominance of expansions, ejections and explosions.

The observational approach has led in the past to the prediction of expansion of some stellar associations confirmed later by the analysis of observations. It became clear that the stellar associations should be regarded as very young systems where the star formation processes is still continuing in our days. The new approach has brought to the discovery of many phenomena in the galaxies and presented the problem of the evolution of galaxies in a new light.

Instead of trying to derive the origin of stars from condensation of nebular matter the new approach considers as the phenomenon of the primary importance the formation of nebulae as a consequence of the activity of dense bodies (nebulae surrounding the novae, planetary nebulae, supernovae remnants, cometary nebulae and the diffuse nebulae in O-B associations).

The new approach in application to the early stages of stellar evolution is discussed. The T Tauri stage is considered as a phase following the more dense protostellar state. Developing the idea, expressed by Haro, the flare stars are regarded as the next phase of evolution. Each star of a small mass passes through these two evolutionary phases. The phenomena of fuors (FU Ori-type brightenings) can be considered as an expression of the same tendency (the transformation of dense matter into rarefied state). The observational data relating to the common origin of giant and dwarf stars in stellar associations can provide the clue to an understanding of the evolution of high luminosity stars.

D. Sugimoto, D. Q. Lamb, and D. N. Schramm (eds.), Fundamental Problems in the Theory of Stellar Evolution, 101–102.

DISCUSSION

Mouschovias: I think that all of us would agree with you that stars die and return their matter to the interstellar medium, and that this matter will eventually find itself in one cloud or another. However, did you also claim that a massive cloud or cloud complex ($M \sim 10^5\ M_\odot$) results from the death or mass loss of local stars?

Mirzoyan: We consider mass loss as an important property of young stars (for example, O-B stars, T Tauri stars etc.) which are in their early stages of evolution. Therefore, it is natural to assume that the diffuse matter coexisting with these young stars is a result partly of the mass loss from them. It is equally natural to regard the remaining part of the mass of the diffuse matter of the nebulae (perhaps the greater part) as being ejected from the initial dense protostar at the time of its disintegration into separate stars. Thus the hypothesis of dense protostars provides a common origin for the stars and for the diffuse matter.