INTRODUCTION

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As a prelude to a detailed discussion of star formation it may be helpful to view the subject in historical perspective, and to survey very briefly progress that has been made during the last 20 to 30 years. While we are presumably far from our goal of understanding in detail how stars form from interstellar clouds, the advances made during the last quarter of a century are impressive.

Some 25 years ago our knowledge of the physical conditions of the interstellar medium was very rudimentary. The large differences between H I and H II regions were understood, as was the general tendency for gas and dust to be concentrated in clouds. However, there was very little information on the state of the dense clouds where star formation might occur. The only really persuasive evidence that stars were currently forming from interstellar gas was the observational correlation between bright early-type stars and dust clouds in the spiral arms of other galaxies. These stars must be relatively young, in view of their rapid consumption of their nuclear energy supply. Hence this observational work, especially by Walter Baade, provided indirect evidence that stars are forming from interstellar clouds.

In the intervening period knowledge has accumulated at an accelerating rate. The distribution of temperature and density in the interstellar medium has been explored, the presence, strength, direction and dynamical influence of the magnetic field has been studied, the chemical composition of the gas has been measured and the equilibrium between the atomic gas, free electrons, the dust grains and the many types of molecules detected has been analyzed. These studies have greatly increased our knowledge of physical conditions in the clouds where gravitational collapse can presumably begin. These results are important in setting the stage on which various scenarios for star formation can be developed by the theorists.

Especially during the last few years, measurement programs are yielding information on the dense region where formation of massive stars is underway. Thus research in the infrared and at both long and

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short radio wavelengths provides new data on the compact H II regions where star formation is believed to have occured very recently. Molecular line studies and infrared observations are beginning to provide infomation on the dense dark clouds where no stars have formed as yet but where gravitational collapse may be proceeding. Thus observationally we may be starting to come to grips directly with star formation at it occurs.

As a student who had the privilege of working under Sir Arthur Eddington I have been trained to distrust observations which have not yet been confirmed by theory. Certainly the active theoretical research now underway on star formation is vital for progress in this field. Nevertheless it is clear that observational guidance in this complex field of research is completely vital, and that the current new observational programs promise to increase very substantially our knowledge of the interstellar medium in general and of star formation possibilities in particular. Since we may be on the threshold of important advances in understanding star formation, the present time seems a very appropriate one for this Symposium.

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