resulting from this is used in a survey of the inner and outer radiation belts and of the origin of the particles trapped in each. The book ends with accounts of the contributions that space exploration has made, and may make in the future, to knowledge of the Moon, Venus and Mars.

This book can be strongly recommended to anybody who is interested in getting a broad general understanding of this extensive new branch of knowledge.

M. J. LIGHTHILL

LECTURES ON SPACE RESEARCH

Scientific Research in Space

Eight Lectures delivered by Members of the Department of Physics at University College in the University of London. By Prof. Sir Harrie Massey, M. O. Robins, Prof. R. L. F. Boyd, Dr. G. V. Groves and Dr. D. W. O. Heddle. Pp. 194. (London: Elek Books, 1964.) 37*s*. 6*d*.

SCIENTIFIC Research in Space is a written version of a series of eight public lectures on space research given by the staff of the Physics Department of University College, London, in 1962. Additions have been made to bring the material up to date at the time of publication (August 1964).

Some of the topics covered are of general interest, others of rather specialized interest, the specialized contributions being concerned in large measure with fields being actively studied in the Physics Department of University College, although, of course, there is no attempt to make the results of this group of workers the main part of these sections. The individual contributions are quite excellent, although one feels a little bit uncertain about the nature of the public to whom they are addressed. All are of a rather technical character and presuppose some knowledge on the part of the reader of the individual subjects dealt with, particularly those dealing with the more specialized topics (the "Neutral Atmosphere of the Earth", by G. V. Groves, the "Ionosphere and Solar Electromagnetic Radiation", by R. L. F. Boyd, and "Corpuscular Radiation and the Interplanetary Medium", by Sir Harrie Massey). These give accounts of their subjects to specialists in these fields showing what space research techniques have contributed or can contribute to their fields. The remaining chapters fall into two groups, those dealing with technical matters of a wider character ("Space Vehicle Technique", by R. L. F. Boyd, and "Orbits of Space Vehicles and Their Interpretation", by G. V. Groves). These are excellent in their particular fields and will be of interest to those wanting to know something of the techniques of space research or to those contemplating entering the field. The chapters on the Moon and planets, by Sir Harrie Massey, and astronomy from space vehicles, by D. W. O. Heddle, deal with rather wider subjects and are interesting and informative. These two chapters and particularly the former tend to be concerned to a considerable extent with future possibilities rather than present achievements.

Books of this kind made up of contributions by a number of authors tend to suffer from the drawback that the whole tends to add up to less than the sum of the parts, and although this is minimized in the present instance by the obvious collaboration between the contributors, none the less, one's feeling is that this disadvantage still exists. The subject of scientific research in space is, of course, developing at present at a very great pace, and it is inevitable that discovery should out-pace the rate at which books of this character can be passed through the press. This is particularly evident in the chapter on the Moon and planets, where much (including the ultimately successful *Ranger* launchings) has taken place since publication. Nevertheless, the book taken as a whole gives a useful survey of available techniques and achievements in particular fields, and as well as being of interest to those with specialist interests and to newcomers to the field it can probably be read or consulted with profit by physics students in the final year of a degree course. The book is quite well produced but is printed from off-set type, which results in the somewhat irritating variation in the length of printed line. This was done presumably to keep the production cost down, resulting in a price of 37*s*. 6*d*. One wonders how expensive it would have been if it had been produced by conventional methods!

E. A. STEWARDSON

STAR EVOLUTION

Proceedings of the International School of Physics "Enrico Fermi"

Course XXVIII: *Star Evolution*, Varenna, 1963. Edited by L. Gratton. Pp. 488. (New York and London: Academic Press, 1964.) 132*s*.

ACCORDING to legend, the 'Tower of Babel' was never finished because of a breakdown of communication between the builders, and a growing number of people are beginning to be aware of the possibility that twentieth-century science may share a similar fate. However inevitable in the long run, there are good reasons why we should try to postpone this misfortune as long as possible. Among the remedies being tried to alleviate the difficulties that in some measure are already with us is the specialist summer school, commonly planned for young research workers. This book contains the talks given at one of these, in 1962, and, as is often the case, it forms a mixed bag.

A summer school is neither a symposium of eminent experts discussing their latest research, as it were with no holds barred, nor is it a formal course of lectures aimed at building up, step by step, a complete, logical picture of the subject. This, therefore, is neither the latest exciting research report nor a complete text-book. The standard of difficulty is varied. Some chapters can be recommended for a beginner; for example, A. R. Sandage and L. Gratton's "Observational Approach to Stellar Evolution" (but Fig. 1 is poor, with several misprints), or M. H. Wrubel's "Construction of Stellar Models", with its emphasis on the opacity problem, physically still one of the more difficult parts of the subject, and on electronic computer methods. In view of the speculative character of much work in this field and the uncritical euphoria it seems to arouse in some astronomers, one is grateful for the down-to-earth tone of these two articles. For example, Wrubel writes: "The ultimate aim of the stellar model approach is to describe the internal structure of the star, beginning with its formation from the interstellar medium, through all its changes in luminosity and radius, until its ultimate extinction, or its cataclysmic annihilation as a supernova. Unfortunately, this goal is still quite remote. . . . At this juncture questions remain in every region of the color-magnitude diagram".

More experienced workers as well as beginners may find useful material in a review by G. Burbidge, reprinted from the 1962 *Annual Review of Nuclear Science*, of present ideas on relevant nuclear processes, including discussions of extreme problems, for example of the 'burning' of heavier elements, and of the behaviour of material at temperatures greater than 10^9 deg., as well as of other important matters such as neutrino losses. There is as usual a good deal of emphasis on supernovae explosions as an essential mechanism in our picture of the formation of the elements, the evolution of stars and of galaxies, etc. Our observational knowledge of supernovae is still extremely meagre, although F. Zwicky and his colleagues are gradually adding to it, but it may be that these objects will now be replaced by 'quasars' (quasi-stellar radio sources, possibly formed by the collapse of very large gas masses) as the fashionable resort of specula-