Book Reviews

Advances in Space Science. vol. 1, *1959*. Frederick I. Orday, III, Ed. Academic Press, New York, 1959. xii + 412 pp. Illus. $12.

This book is the first volume in a new series of the *Advances* that have proved to be extremely useful in keeping scientists and engineers abreast of research and development. In reviewing this book, perhaps it is appropriate to give first a definition of the subject, space science (or astronautics). The view that emerges from this collection of articles is that space science is an extremely broad subject encompassing selected aspects of many basic sciences. In particular, it comprises those aspects of physics, chemistry, mathematics, biology, geology, and astronomy, as well as the engineering disciplines, which are grouped together and coordinated for the purpose of the study and exploration of the universe beyond the confines of the earth's atmosphere. The scope of the subject is well illustrated by the topics covered in this volume.

The first chapter, "Interplanetary rocket trajectories" (D. F. Lawden), is concerned with the mathematical problem of determining the optimal track for sending a rocket vehicle from a launching point on the surface of one planet to a designated point on the surface of another planet. The material, treated from the sophisticated standpoint of a calculus of variations problem of the Mayer type, discusses many interesting cases in detail.

In the next chapter, "Interplanetary communications" (J. G. Pierce and C. C. Cutler), the authors discuss many well known scientific and engineering laws of communication as well as recent advances which might lead to communication systems that are needed for transmitting data over lunar, planetary, and stellar distances.

The environment of space, power requirements of space vehicles, primary power sources, conversion techniques, and complete power systems are discussed in "Power supplies for orbital and space vehicles" (J. H. Hughes). Many of the topics touched on here are clearly in their infancy; despite the difficulty inherent in a subject that ranges over so many disciplines, the author makes admirable attempts at extrapolations.

In "Manned space cabin systems" (E. B. Colletti), the author first reviews the entire subject for both the interested nonspecialist and the specialist. Topics discussed include the human factor, flight support systems, and present and future manned systems. This review contains a very interesting commentary on the motivating forces in human beings, particularly as they are related to space exploration. This provides grounds for understanding the man-in-space programs and points clearly to the need for cooperation between design engineers and life scientists to accomplish the exploration of space.

The next chapter, "Radiation and man in space" (H. T. Shaeffer), contains an evaluation of the ionizing radiations in space in terms of the possible exposure hazards to man. Included are very detailed discussions of the primary cosmic radiation and its transition in the atmosphere, time variations of cosmic ray intensity, high-intensity radiation in fuels in space, and finally, a discussion of the avenues of radiobiological experimentation which must be followed to fill the many gaps in our present knowledge.

"Nutrition and space flight" (G. Fisher) is concerned with space feeding; this subject has many aspects, some of which are but extrapolations of air feeding techniques. Here again it is clear that an understanding of all phases of life processes is essential to the subject.

An appendix (by H. H. Koelle) contains a helpful decimal classification system, adopted by the International Astronautical Federation, for filing references, technical papers, and other material.

Each chapter contains an extensive list of references comprised mainly of articles on space science which have been published since 1955. The advances in the subject represented by these extensive references are truly spectacular.

Because of the tremendous scope of this subject as well as the breadth of knowledge related to space science and, at the same time, the depth of knowledge required to make new contributions to the specific branches of science represented, we do not have men who can truly be called space scientists. Alas, even Leonardo da Vinci would be overwhelmed! Instead, the scientists who function in this field must be competent specialists who have a moderately complete knowledge of the subject as a whole. *Advances in Space Science* should be extremely helpful to specialists for securing information concerning recent contributions made in their specialty to astronautics as well as for obtaining a general picture of the subject as a whole.

The challenge of space exploration and study should excite the imagination of all adventurous and inquisitive men. Perhaps it will be an all-consuming outlet for the excessive energies and ambitions of the human species and, thus, serve as a substitute for war. In the last analysis, this might well be the greatest advance associated with "advances in space science" from the standpoint of mankind as a whole.

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The Study of Elementary Particles by the Photographic Method. An account of the principal techniques and discoveries illustrated by an atlas of photomicrographs. C. F. Powell, P. H. Fowler, and D. H. Perkins. Pergamon Press, New York, 1959. xvi + 669 pp. Illus. $40.

C. F. Powell was awarded the 1950 Nobel prize in physics for his development and application of the nuclear emulsion technique as a quantitative tool for studying nuclear processes. He now has collaborated with two of his colleagues at the University of Bristol