

BOOK REVIEWS

ROAD TO SPACE

Voices from the Sky

Previews of the Coming Space Age. By Arthur C. Clarke. Pp. viii + 241. (London: Victor Gollancz, Ltd., 1966.) 25s. net.

THE best of the science fiction writers have either prepared us for the future, as in the case of Jules Verne and H. G. Wells, or have given us insight into the foibles of the present, as with Jonathan Swift and such contemporaries as Ray Bradbury. Arthur C. Clarke offers us both, as shown in this volume of essays, most of which first appeared in a variety of publications, ranging from *Playboy* (a magazine for men) to *Playbill* (the programme magazine of Broadway theatres). There is great diversity. For example, in an article on "The Playing Fields of Space" he discusses sports suited to a permanent colony on the Moon—a development he believes must come to pass. Assuming that it is inside an air-filled dome, he points out that the low lunar gravity will permit residents to fly merely by attaching wings to their arms.

In another selection, entitled "The Meddlers", he writes bitterly of actions that have altered the environment for no constructive purpose—nuclear weapons testing, for example, and the American project to encircle the Earth with a belt of orbiting, hair-like dipoles to reflect military radio traffic.

He presents a fictitious Press release in which the Pentagon, in 1990, tells of its plan to extinguish the Sun for an estimated 30 min by injecting "polarized neutrinos" into a sunspot. Opposition by such figures as "Lord Lovell of Jodrell and Sir Fred Hoyle" is rejected by the Pentagon as politically motivated.

Mr. Clarke writes of things some sober citizens will find hard to accept as real prospects—extracting food from lunar rocks, the spreading of man through the solar system and the ultimate possibility of interstellar travel. His visions of the future may not be entirely correct, but he writes with *élan*, humour and remarkable imagination. He provides stimulation and perspective sorely needed in our parochial and divided world.

Authors of this sort, gifted with unusual knowledge and imagination, are apt to be prophets. Verne foresaw manned voyages to the Moon and accurately described weightlessness. Clarke, before the first *Sputnik*, wrote of a system of communications satellites that has since become fact. His pride in this crops up at various points in the book (his 1945 paper on the subject is an appendix). There are other repetitions, arising from the separate original appearance of the articles. Some were written as early as 1961 and so contain material which is dated because of swift developments.

These are minor drawbacks. The essays should be read in the context of the time and place in which they appeared. A number of them are delightful. Some are noble in their outlook. In "Science and Spirituality" Clarke discusses the increasing unity of mankind that must grow out of the global contacts made possible by relay satellites. He also cites the unifying effect of a discovery that, in distant worlds, there are creatures superior to ourselves.

It is ironic, he says, that the current space programmes of the great Powers are leading us towards such developments, despite their materialistic, nationalistic goals.

"The illusions of our day", he writes, "cannot survive the fierce, hard light that beats down from the stars".

"Though men and nations may set out on the road to space with thoughts of glory or of power, it matters not whether they achieve these ends. For on that quest, whatever else they lose or gain, they will surely find their souls".

W. SULLIVAN

COSMIC RAY PHYSICS: A BIOGRAPHY

Cosmic Rays

By Bruno Rossi. Pp. viii + 268. (London: George Allen and Unwin, Ltd., 1966.) 30s. net.

"At six o'clock on the morning of August 7, 1912, a balloon ascended from a field near the town of Aussig, in Austria. In the gondola of the balloon were three men: a navigator, a meteorologist, and a physicist." So begins Bruno Rossi's highly readable and authoritative account of the development of cosmic ray physics. The physicist and leader of the balloon crew was Victor F. Hess; the outcome of the flight was the discovery of cosmic rays.

This book traces in simple terms the history of the subject now known as cosmic ray physics from its beginning in the field at Aussig to the most recent developments involving the use of Earth satellites and space probes. Rossi has been personally engaged on cosmic ray research from the very early days up to the present time, and has himself been directly involved in many of the major developments in this field, with the pleasing consequence that much of the book is written in the first person.

The discoveries made during the past half-century as a direct result of cosmic ray research have revolutionized our knowledge of fundamental particles, provided the basic link between astrophysics and radio astronomy, revealed the Sun as an important local source of high-energy particles, and led to the discovery of the Earth's radiation belt.

The discovery of the positron, the unravelling of the complex phenomena associated with high-energy electromagnetic cascades and the discovery of the meson and hyperon particle families are all described in considerable detail. Also included are chapters on the Van Allen particles, on large cosmic ray air showers and on cosmic rays from the sun. Activity in cosmic ray research is still on the increase and there are no doubt more surprises and important discoveries to come. It is appropriate, therefore, that the book should end with a chapter on the still unsolved problem of the origin of the radiation.

The book is extremely successful in conveying to the reader the excitement of scientific discovery, and it will undoubtedly provide pleasant and instructive reading for the expert in cosmic rays as well as an accurate and up-to-date account of the major discoveries in this field which will be comprehensible to anyone with a limited scientific knowledge. According to the publishers' note it is intended to be understandable to the layman, and a real effort has been made to explain the meaning of technical terms as they appear. Some of these, like mass per unit area, the neutrino, electron volt, and energy and momentum, are amplified in short appendixes. It is a little hard to believe, however, that the appendix devoted to "powers of ten" will be needed by anyone able to read this book with profit.

H. ELLIOT