

more readily and in greater detail. No scientist or technologist could well ask of a Minister for Science a more forward-looking mind than Lord Hailsham revealed in the debate, or clearer indication of readiness to act where necessary, while respecting the practices and traditions which have proved their value in scientific and academic work. He obviously looks to the research associations to play an important educational function in industry apart from any actual contribution to research, and the debate should dispose of any uneasiness as to the future of the research associations as a whole. Specifically, in reference to an instance mentioned by Lord Pethick-Lawrence, of a scientist who had left Britain for America because he was unable to obtain the equipment he needed here, Lord Hailsham undertook to examine any similar instance in which some particular aspect of science was not properly cared for by the provision of apparatus if the matter were brought to his notice. The keen awareness of the importance of scientific and technical education at all levels, and perhaps especially of that designed to provide the supporting technicians needed in the universities, as well as in industry and Government departments and institutions, was a most encouraging feature of a notable debate.

THE NEWER COSMOLOGY

The Nature of the Universe

By Prof. Fred Hoyle. New and extensively revised edition. Pp. vii+103+6 plates. (Oxford: Basil Blackwell, 1960.) 8s. 6d. net.

THIS is a revised edition of the well-known book of some ten years ago in which Prof. Hoyle recorded his very popular broadcast talks on what he described as "The New Cosmology". The order of presentation and general style are unchanged, but there are, of course, revisions of certain details. Chief interest, however, will centre on the substantial changes, and these are considerable.

The estimated density of interstellar matter has been reduced a thousandfold, thus annihilating important effects formerly ascribed to the 'tunneling' of stars through this medium. The number of planetary systems in a galaxy is now at least 1,000 and perhaps 100,000 times greater than before, while the age of our Galaxy, previously given as "quite definite and precise" is now increased fourfold and has become "reasonably definite and precise".

The greatest change, however, concerns the origin of the planets. In the earlier book it was shown that the idea that these originated from solar material "must be wrong", "hopelessly wrong", and that the planets "must have" originated in the explosion of a companion of the Sun. Now, however, it appears that the planets did originate from solar material, the companion having been non-existent. "There is no idle speculation here." Prof. Hoyle's faith that the cosmology of 500 years hence will appreciably resemble the particular cosmology of to-day which he now favours remains unshaken.

It is very remarkable that such fertile imagination and mathematical skill can accompany such credulity and lack of critical power in one person. The

general reader may decide what weight to attach to the astronomical conjectures from the "personal view" at the end concerning "continued existence after death", for here he is not menaced by the fear of incommunicable mathematics in the background which elsewhere confounds his judgment. "My own answer would be that mind is an intricate organization of matter. In so far as the organization can be remembered and reproduced there is no such thing as death. If ordinary atoms of carbon, oxygen, hydrogen, nitrogen, etc., could be fitted together into exactly the structural organization of Homer, or of Titus Oates, then these individuals would come alive again exactly as they were originally. The whole issue therefore turns on whether our particular organization is remembered in some fashion. If it is, there is no death. If it is not, there is complete oblivion."

Suppose Prof. Hoyle were regrettably to die tomorrow, and someone fitted the atoms into the necessary structure: which view of the origin of planets would the resurrected mind, "as it was originally", take? If the structure changes from moment to moment while we live, to take account of growing experience, is it not strange that it never by accident gets shaken into a configuration that knows the future, and that so many otherwise quite diverse organizations all happen to be aware of the Suez crisis, say—now that it has occurred, of course? But perhaps, after all, our knowledge of these matters, as of some others, is not yet quite definite and precise.

HERBERT DINGLE

SPACE RESEARCH

The Exploration of Space

A Symposium on Space Physics, April 29-30, 1959. Edited by Robert Jastrow. (Sponsored by the National Academy of Sciences, the National Aeronautics and Space Administration, and the American Physical Society.) Pp. v+160. (New York and London: The Macmillan Company, New York, 1960.) 5.50 dollars; 38s. 6d.

THIS book is the record of the papers presented at the symposium on "Space Physics" held at Washington during April 1959, and of the 'round-table discussions' which concluded each session. The first three papers show how much has still to be learnt about interplanetary space, or the 'Sun's outer atmosphere' as it is now sometimes called. F. L. Whipple surveys our present knowledge of solid particles in the solar system, remarking that "the general subject of meteoritics is in a sorry plight". T. Gold deals with the ionized particles and magnetic fields, and stresses the importance of electromagnetic effects. E. Parker, looking at the same region with a different bias, emphasizes the hydrodynamic expansion of the solar corona, as it streams into space at speeds of around 500 km./sec. Next, the radiation zones are described by their discoverer, J. A. Van Allen, and the *Argus* experiment by its proposer, N. C. Christofilos. H. E. Newell reviews the United States plans for future space-vehicles, G. de Vaucouleurs summarizes what is known about Mars and Venus, and G. P. Kuiper discusses the Moon, contending that the craters are caused both by volcanic action and by meteoritic impacts. H. C. Urey, in a paper entitled "Primary and Secondary Objects", suggests that