

Books

Realities of Space Travel: Selected Papers of the British Interplanetary Society. Edited by L. J. Carter. 431 pp. Putnam & Co. Ltd., London, England, 1957. £1.15. *Reviewed by J. J. Coupling.*

These 24 selected papers of the British Interplanetary Society, by 16 authors, cover almost all aspects of space travel. They suffer from the usual faults of collections. At one moment we are at a beautiful level of simplicity and first principles, and at the next we are confronted with aerodynamic and thermodynamic equations which spring from nowhere to confound us. In most chapters we encounter metric units, but English units are used in some. The book does not have the uniformity, balance, and economy of the work of a good single writer.

I think that we have to put up with this in these days of space travel. Perhaps only an individual with the prodigious energy and acumen of Willy Ley can keep reliably informed concerning all parts of the subject, and even he cannot pursue in detail every matter covered in this book. Too, the contents of this book represent largely the original work of the members of the British Interplanetary Society. They perform a laudable function in thinking about and writing about the various aspects of space travel diligently, if not always brilliantly, and the Society is invaluable as a focus for such activities.

Here the interested novice can learn some of the basic facts of rockets, rocket engines, and interplanetary orbits. He can go on to the consideration of winged re-entry of the atmosphere. He can become acquainted with satellites and learn something about their possible uses and a little about the Vanguard program. He can read about the limitations of chemical rockets and some of the possibilities of atomic rockets. He can inform himself concerning meteor hazards, cosmic rays, weightlessness, food, and air purification. There are chapters on the Inyokern and Woomera test stations, and one on the history of European rocketry after World War I.

Who am I to judge material in so wide a field? I do have favorites, though. It seems to me that H. Preston-Thomas gives a very sensible discussion of the use of extremely low-acceleration ion rockets in interplanetary flight, and that N. J. Bowman treats the problem of dehydrated food and chemical air purification versus growing algae for food and air very clearly. It is good to have Dornberger's historical notes on rocketry. The

material on the moon and Mars is interesting, but this sort of thing has appeared before.

Some of the chapters are informative but rather pedestrian. In some cases it seems to me that there is more to be said. Nothing is said, for instance, about sailing between planets by light pressure. More could be said in the cases of ion rockets and relativistic effects. In the latter case, the large fraction of the mass which must be consumed to reach a velocity at which time contraction is noticeable is not properly noted, nor is the possibility of using interstellar hydrogen as fuel discussed. Current arguments concerning time contraction in accelerated motion are not mentioned either, though the pertinent chapters antedate most of these.

In all, there is much in the book that is interesting and useful. One can easily imagine a better book, but none of the scope of this volume has appeared.

Philosophy of Science: The Link Between Science and Philosophy. By Philipp Frank. 394 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1957. \$5.75. *Reviewed by Philip J. Davis, National Bureau of Standards.*

After quoting Ortega y Gasset to the effect that the average scientist is a "learned ignoramus, which is a very serious matter, as it implies that he is a person that is ignorant, not in the fashion of the ignorant man, but with all the petulance of one who is learned", Professor Frank begins his book which is dedicated to breaking down the present barriers between science, metaphysics, and philosophy. The current situation where "the great majority of today's physicists have been successfully trained to keep their special fields as separate from philosophy as they can" is unsatisfactory inasmuch as it relieves them of the necessity of locking horns with some of the knottiest political, moral, and spiritual problems that the world has faced.

The book proceeds on several levels. On the first level, Frank gives us a description of the making and breaking of scientific theories since the Greeks. Euclid vs. Lobatchewsky, Aristotle vs. Galileo, Ptolemy vs. Copernicus, Newton vs. Einstein, particles vs. waves, destructibility of matter vs. indestructibility, the rise and fall of causality. This is perhaps the most familiar aspect of the book, but what is noteworthy here is the clarity with which the dynamics and the logic of the process are exhibited.

On the second level, the author describes the relationship between physical theories and philosophical systems. Originally, there was a strong link in the minds of scientists between science and philosophy. But then, technology became scientific, and "the union of science and technology was responsible for the separation between science and philosophy". The "tough-minded" scientist was born. Does the theory describe the facts? Does it have predictive value? Then, this is all he wants, and away with irrelevant and obfuscating speculations which relate his science to philosophy or metaphysics or to religion or politics or ethics. Away with