

membership of any such committee may bring a scientist within the operation of the Official Secrets Act, with all its effects in his contacts and relations with professional colleagues outside the committee. Such issues are only just touched on in the report; but both report and broadsheet display a range of problems which touch the scientist and technologist closely indeed, and call for further study and independent thinking both by individuals and by their professional associations.

THEORETICAL HYDRODYNAMICS

Theoretical Hydrodynamics

By Prof. L. M. Milne-Thomson. Fourth edition. Pp. xxi+660+4 plates. (London: Macmillan and Co., Ltd.; New York: St. Martin's Press, Inc., 1960.) 65s. net.

THE book under review is the fourth edition of one which appeared for the first time in 1938. In the pages of *Nature* (142, 1136; 1938) I discussed a number of text-books on hydrodynamics before dealing specially with the first edition of Prof. Milne-Thomson's book. In that review I ventured to suggest that the mathematical approach to hydrodynamics followed in the book might well have been amplified by a more physical approach. That is still my view, but I must add that Prof. Milne-Thomson's book has had a resounding success during the twenty-two years that have elapsed since it first appeared. I have come across many experts, both in Britain and abroad, who have spoken very highly of "Theoretical Hydrodynamics" and of the approach adopted in the book. To that extent I misjudged the need for a comprehensive book of the kind planned and written by Prof. Milne-Thomson. Each successive edition has been amplified to some extent and has incorporated new material.

There is no unique road to the study of hydrodynamics. There is the approach of the physicist who treats the subject as a branch of physics in which there are discussed the forces which act on liquids, and which are exerted by them. There is also the approach of the engineer, who is concerned mainly with applications, though some of the modern applications of hydrodynamics to engineering are compelling experts to try to obtain a deeper insight into fundamental processes than appears to have been necessary in the past. Then there is the 'express route' to trans-sonic, supersonic and hypersonic flow, which appears to be much favoured nowadays, avoiding the gaps in our existing knowledge of subsonic hydrodynamics. Prof. Milne-Thomson has taken none of these paths—his is the road of the mathematician. Clear physical statements are transformed into mathematical assumptions, and the mathematics of hydrodynamics is developed with clarity and economy. The practical and theoretical sides of the subject are made to supplement each other, but the emphasis remains that of the mathematician. The virtue of this method is that as "a scientific theory becomes more exact, so does it of necessity tend to assume a more mathematical form", and Prof. Milne-Thomson's approach seems to have found considerable support. In 1938 his method, which is based consistently on vector methods and notation, was considered to be a departure from the traditional approach, but it is now

generally accepted and is followed by many applied mathematicians.

Chapter 1 of the book is concerned mainly with inferences which may be drawn from the 'pressure theorem' of Daniel Bernoulli, who may justly be considered to be the father of hydrodynamics—the word 'hydrodynamica' was first used by him about 1780. Chapter 2 discusses those properties of vectors which are essential for the analysis of the motion of a fluid element and for the formulation of the equations of hydrodynamics. In Chapter 3 there are discussions of the general basic properties and equations of fluid motion. Chapter 4 is concerned with the mathematical properties of two-dimensional motion in so far as they can be treated without the complex variable. Chapter 5 introduces the complex variable, and conformal mappings are treated in some detail.

Chapters 6–14 treat two-dimensional motion from the unified point of view of the complex variable. In Chapter 6 there is a discussion of streaming motion followed, in Chapter 7, by a consideration of Joukowski aerofoils, while sources and sinks are dealt with in Chapter 8. In Chapter 9 the motion of a moving cylinder is treated in detail and Chapter 10 discusses specialized aspects of conformal mapping and their applications. Chapters 11 and 12 contain important applications to the discontinuous motion of jets, currents and cavities. Chapter 13 concerns itself with the motion of vortices, and the drag associated with a vortex wake. Chapter 14 deals with two-dimensional wave motion.

In Chapter 15 the Stokes stream function is introduced, and the general motion of spheres and ellipsoids is treated in Chapter 16. In Chapter 17 Milne-Thomson derives Kirchhoff's equations in vector form. Chapter 18 discusses vortex motion in general, with special application to aerofoils of finite span. Chapter 19 gives an outline of the application of vector methods to viscous fluids and a brief description of boundary layer theory. Chapter 20, the final chapter of the fourth edition, is designed as an introduction to the theory of flow of a compressible fluid at subsonic and supersonic speeds.

The presence of well-graded sets of exercises at the end of each chapter is much appreciated by many of those who teach hydrodynamics to mathematicians in British universities. The appearance of the book is clear and attractive, and the text is lavishly illustrated with line drawings and photographs which have been chosen with discretion.

Prof. Milne-Thomson's book has stood the test of time and has, in fact, been accorded increased recognition with each successive edition. Within the limitations which Prof. Milne-Thomson set himself, and which are clearly stated in the preface, his book on theoretical hydrodynamics may be described as being 'of the first water'.
L. ROSENHEAD

LOGIC AND SCIENCE

An Introduction to the Logic of the Sciences

By R. Harré. Pp. viii+180. (London: Macmillan and Co., Ltd.; New York: St. Martin's Press, Inc., 1960.) 21s. net.

THIS is a very welcome book. It should be said at the outset that the author's intention to write largely for undergraduates in science may prove a little on the modest side, since many students working for higher degrees would probably produce