BOOK REVIEWS

SCIENTIFIC REVOLUTION

Metaphysics and Measurement

Essays in the Scientific Revolution. By Alexandre Koyré. Pp. x+165. (London: Chapman and Hall, 1968.) 42s.

THE late Alexandre Koyré (1892–1964), born in Russia, educated principally in France, and active as a scholar both in France and the United States, ranks as one of the most distinguished historians of early modern science of our time. A truly international figure, he wrote in German, French and English on a wide range of topics of intellectual history stemming from many national traditions. In his many publications he was able to illuminate significantly many developments in the physical sciences during the formative period of the sixteenth and seventeenth centuries. Bringing to his field of research a thorough knowledge of the philosophical traditions from which early modern science sprung, Koyré could deal with the evolution of the key concepts of physical science in a way which few other historians could match. His training was primarily in philosophy and it was as a historian of philosophy that he began his scholarly career. Only after the late 1930s did Professor Koyré turn more and more to the study of the history of science. His first important publication in that field, however, the *Études galiléennes* (1939), still remains probably the most noteworthy single work on Galileo to come after the fundamental researches of Favaro and Olschki. He later extended his range of study to a variety of other significant figures who took roles in the so-called scientific revolution.

The present volume, edited by Dr Michael Hoskin of the University of Cambridge, collects six of Koyré's most characteristic papers, three of which appear for the first time in English translation. More than half of the volume is given over to three important articles on Galileo. Two of these—first published in the United States in 1943—essentially give an English summary of some of the results of the *Études galiléennes* and the third (1960)—here translated for the first time—gives some of Koyré's later thoughts on the same topics.

Koyré's rather personal interpretation of what science is, of course, well known. According to him, real scientific revolution is little else than a conceptual revolution in which the mode of "seeing" the world is essentially altered. His view is probably best summarized by the following: "Good physics is made *a priori*. Theory precedes fact. Experience is useless because before any experience we are already in possession of the knowledge we are seeking. Fundamental laws of motion (and of rest), laws that determine the spatio-temporal behaviour of material bodies, are laws of a mathematical nature. Of the same nature as those which govern relations and laws of figures and of numbers. We discover them not in Nature, but in ourselves, in our mind, in our memory, as Plato long ago has taught us (page 13)". The reference to Plato is perhaps the key here. Koyré saw the real developments in science taking place within a platonic, mathematical framework of thought, rather than through experiment and observation of the physical world. At best, experiment can merely provide confirmatory evidence for adhering to a particular scientific theory; at worst, it can be positively misleading. Moreover, experience or experiment can never be responsible

for the formulation of the theory itself. Koyré was able to cite an imposing array of evidence for his position, and even those who would reject his conclusions must admit that he has been able to uncover a substantial amount of primary source material, which indicates that scientific change and progress involve somewhat more than the positivistic tradition of history and philosophy of science would lead us to believe.

One of the most striking things about Koyré's essays on Galileo is that, even today, twenty-five years after their original publication, they can still be read with profit and still must be considered as being among the most forceful arguments in defence of an "idealistic" view of science, a view which has had few defenders in recent decades, especially in the English-speaking world. This is not to say that there are no criticisms to be brought against Koyré and his work. His own idealistic ideology is constantly in evidence and sometimes seems to give a somewhat contrived interpretation of scientific development (nearly as obtrusive as the Marxist ideology of other historians of science), particularly when he discusses a thinker such as Pierre Gassendi. To this reader at least, Koyré consistently appears to underestimate Gassendi's importance simply because he does not fit the platonic, mathematical conception of a scientist; Gassendi was, rather, empirically and probabilistically oriented, as Tullio Gregory's book shows so well. Moreover, Koyré seems to consistently underestimate—or neglect entirely—the significance of social, political and technological factors which affect scientific change, being content to focus on the metaphysical and purely intellectual elements. Koyré's failure to give more serious consideration to the biological and medical sciences will strike some as a serious shortcoming, if we are to generalize his results to a wider range.

A few words should be said about Dr Hoskin's edition. From the tone of his preface it would seem that the collection has been put together for students beginning history of science. If this is the case, one would have hoped to see translations of several of Koyré's other papers, especially the important and influential ones on Giambattista Benedetti, on the problem of void and infinite space in fourteenth century thought, and his highly critical analysis of A. C. Crombie's interpretation of medieval science. Still, no selection will satisfy everyone. One might have hoped for an introduction more substantial than Hoskin's two pages, perhaps something along the lines of Paola Zambelli's admirable introduction and critical analysis to her recent Italian translation of some of Koyré's essays (Turin, 1967). Finally, one is forced to admit that Hoskin's collection is a far less comprehensive selection than René Taton's *Alexandre Koyré: Études d'histoire de la pensée scientifique* (Paris, 1966), which contains all of the essays in Hoskin's volume and twelve more besides—all for only a 20 per cent higher price! One can only recommend Taton's volume over that of Hoskin to those who can read French, which is presumably not expected of students beginning a study of the history of science.

C. B. SCHMITT

SPECIAL RELATIVITY

Introduction to Special Relativity

By Robert Resnick. Pp. x+226. (New York and London: John Wiley and Sons, 1968.) 70s. cloth; 35s. paper.

Special Relativity

By A. Shadowitz. (Studies in Physics and Chemistry, No. 6.) Pp. xiii+203. (Philadelphia and London: W. B. Saunders Co., 1968.) 55s.

So many books are available on special relativity that a new one calls for some special feature to justify it. Both of these books have such a feature. That by Robert