

reviews

As a result of intensive research since the beginning of the present century, the traditional image of the Middle Ages as an epoch of sterile subservience to the authority of the Church and of Aristotle in scientific matters has been destroyed. Instead, it is now recognised as a period during which scholars became capable of wide ranging and subtle, albeit habitually inconclusive, speculation upon topics commonly supposed to be the distinctive concern of early modern science—the rotation of the Earth, for example, the atomic structure of matter, the possibility of creating a vacuum, and so on. It has emerged, moreover, that such mediaeval speculations, although cast in a very different mould, are by no means isolated from the articulation of the new philosophy in the 17th century. On the contrary, as Edward Grant clearly illustrates in *A Source Book in Medieval Science*, scholastic discussions exercised a patent or possible influence on such later innovators as Copernicus, Galileo and Otto von Guericke. At the other chronological extreme, Professor Grant begins his anthology of mediaeval science with extracts from the late-classical encyclopaedias that preserved an inkling of ancient culture in the Latin west during the Dark Ages, and proceeds thence to illustrate in considerable detail subsequent developments in logic, mathematics, physics, cosmology, chemistry, geography, biology and medicine. Although the bulk of the material is drawn from the period 1200–1500 AD to have documented approximately a millennium of, at times, intense intellectual activity

Medieval record

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A Source Book in Medieval Science. Edited by Edward Grant. Pp. xviii+864. (Harvard University Press: Cambridge, Massachusetts, August 1974.) \$32.50.

over such a wide range of subjects is obviously no mean achievement.

It is not only the sheer bulk of available material that renders the construction of an anthology of mediaeval science so problematic a task, however. In addition, there is the difficulty of selecting topics and texts that are relevant both to the subsequent evolution of early modern science and to the interests of the ordinary 'educated reader' at whom this work is partly directed, without simultaneously distorting the emphasis of the original speculations. Professor Grant is, of course, well aware of, and for the most part effectively reconciles, such conflicting demands.

Nevertheless, it is perhaps inevitable that he should tend towards the use of an essentially positivist criterion in making his selections. This tendency is most conspicuous in the devotion of relatively little space to alchemy and astrology, and the complete exclusion of the more exotic magical sciences. More subtly, however, the same criterion determines a concentration on the 'achievements' of mediaeval science

that I have already mentioned. Occasionally, this leads to a measure of distortion, most obviously, for example, in the documentation of mediaeval 'kinematics'.

On the whole, however, such misrepresentation is avoided; the broader context of individual problems, the characteristic conceptual interrelationships and the typical methods of mediaeval science are illustrated with considerable force and economy. Indeed, a particular virtue of this source book is that the (to a modern mind) metaphysical preoccupation, and the unique gothic complexity, of much scholastic scientific discussion is clearly illustrated by the reproduction of complete *quaestiones* and treatises.

It is inevitable in a work of such size and scope that one should take exception to certain features and register certain omissions. Thus, although the copious annotation of individual documents renders them perfectly comprehensible, it is regrettable that the sections on physics should be provided with neither a contemporary nor a modern outline of the principles of Aristotelian natural philosophy, which constituted, after all, the foundation of most scholastic physical speculation. Again, it seems a pity, considering the possible audience of this book, that further references for given topics are not more thoroughly recorded. Ultimately, however, it must be said that this book offers a clear and scholarly exposition of a mass of fascinating documents, and provides an unparalleled insight into the processes and pre-occupations of mediaeval science. □

Most students find mathematical physics a difficult subject. They can follow a qualitative explanation (such as, "magnetisation lines up the dipoles"), and they can follow the steps in an algebraic deduction, or in the solution of an equation and the evaluation of an integral; the physics and the mathematics are philosophically distinct activities. Difficulties arise, however, at the meeting-point between these disciplines. How does one mathematise a physical problem? Why do the same equations crop up over and over again, in apparently unrelated physical contexts?

This original undergraduate text is a largely successful attempt to answer the second of these questions. The philosophy is to apply the field equa-

tions of mathematical physics (Laplace, Poisson, wave, and diffusion) to problems of increasing complexity, illustrating the solutions obtained with examples from a very wide range of

Maths and physics

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Introductory Eigenphysics: An Approach to the Theory of Fields. By C. A. Croxton. Pp. x+275. (Wiley: London and New York, November 1974.) £6.95 board; £3.95 paper.

fields of physics. First, the field equations are introduced. Then they are solved in rectangular, cylindrical and spherical coordinates. Finally, approximate methods (perturbation, WKB and variational) are discussed. The origin-

ality lies in the examples chosen which are oriented towards physics rather than applied mathematics and which include lattice vibrations, Bloch waves, skin effect, aerofoil theory, vibration of a rotating star, earthquakes in the Mohorovicic layer, pseudopotentials in liquid metals, and quantum chemistry. There are many interesting exercises for the reader.

Unfortunately, the book is seriously marred by many minor errors and infelicities, most of which could have been avoided by careful proof-reading. Symbols are not defined, figures are imperfectly labelled and terms are introduced without explanation. This will confuse all but the best students. I do, however, warmly recommend the book to teachers. □