A SCIENTIST'S PHILOSOPHY

The Philosophy of Science

A Systematic Account. By Peter Caws. Pp. xii + 354. (Princeton, N.J.: D. Van Nostrand Company, Inc.; London: D. Van Nostrand Company, Ltd., 1965.) 52*s.* 6*d.*

THIS book, as well as being attractively produced and clearly written, is full of suggestive material for instruction within the general range indicated by the title. It is indeed 'a systematic account', but it is a good deal more than that, and it is therefore on those additional features that the present review will focus attention.

The author divides his work into four parts: 1, "The Discovery of Theory"; 2, "The Structure of Theory"; 3, "The Validation of Theory"; and 4, "The Spectrum of Theory". From this plan, the reader learns quite naturally what science is, and to what extent it is conformable with the remainder of normal living and experiencing. Then, the pattern of exact thought emerges, with the consequent background of organization. After that, anybody who asks why it is that scientific method engenders confidence will find a good answer, and lastly (and more strictly philosophically) what problems have been solved, and what remains to be done. All this is extremely readable, presented with common sense, but without being particularly noteworthy.

Different in calibre, however, are Chapters 43 and 44, which cause the reader to become air-borne, and well away to a flying start on themes that really matter, especially in the present climate of epistemology. Thus, "The Unity and Diversity of Science" (43) and "Science and the Humanities" (44) are first-class contributions to what may still be called the theory of knowledge. The questions which they raise are so important as to warrant comment in some detail.

The initial tenet is that there must be a perpetual 'in-phase' relationship between logical and experimental frontiers—a species of mutual feed-back, which is in harmony with much of general system theory, as commonly understood. The next step is to realize that the logical and rational element needs a principle of economy rather than one of simplicity, leading to a degree of austerity closely linked with aesthetic satisfaction. It is only too true, as Dr. Caws remarks, that some scientific theories give an impression of the baroque (they have, one might add, occasionally become almost rococo). But this is largely a matter of touch, itself in need of prudent discipline. Practically, however, we must 'save the appearances', as the Greeks maintained. It is impossible to avoid some growth in complexity as knowledge advances, or more exactly, as new evidence accumulates. The time arrives when expansion becomes coercive. Thus, the shift from the simple gas laws to Van der Waals's equation is mentioned. This is a classic instance, and much was gained in the process (a refined version of the critical state, for example), but it is well known that a whole host of other formulae—one of them at least being a transcendental function—were propounded at about the same time, to improve on the unhappy plight of $PV = RT$. That 'Van der Waals' survived is as much as to say that it was the best 'fit', *ceteris paribus*. Nevertheless, it implied a lowering of standards of elegance.

The quotation from Pascal's *Pensées* is apt, namely, the difference between '*esprit de géometrie*' and '*esprit de finesse*'. Adherents to the former are in safe company with the logicians and Cartesians, whereas supporters of the latter approach very closely to toying with metaphysics, when it comes to the point. But "other ways of knowing the world", tiresome as they may be to the formalist, have satisfied axiological elements all through the centuries: indeed, they watch with eternal vigilance for any vestige of arrogance in scientific claims in regions wherein other kinds of awareness illuminate the part played by value in human life and relationships.

Chapter 44 goes to the root of contemporary discomforts in regard to liberal studies. Historically, one may still marvel at the virility of Magna Graecia; localized seats of learning throwing up important advances all along the Mediterranean shores. Concerning experimental techniques, it is certain that these were frowned on by the scholars, but in a rather subtle way. Seemingly, the objection was to application, in contradistinction to the careful questioning of Nature, with the sole object of revealing her secrets.

The particular power of Aristotelianism—at its best—is well displayed as a unity of knowledge, be it metaphysics, drama, or anything in between. The evils, as well as the benefits, of specialization were yet unknown. But one development, mentioned earlier in the book, namely, the philosophical system of St. Thomas Aquinas, did much more than merely re-edit Aristotle. It largely created natural theology, thus adding its own quota to the growing body of erudition, culminating in the renaissance and the gradual acceptance of a worthy standard of 'polite learning'. Dr. Caws is doubtless aware of the revival of Thomism, in twentieth-century form, which provides such a marked, if surprising, characteristic of much modern philosophy, both in Europe and in the United States.

These pages end on exactly the right note. Skills, be they scientific, philosophical, artistic and all the rest, are priceless possessions, and there is no need to set up rivalries between them. Time was when *parti pris* generated considerable heat between the devotees of Newton and Goethe. Luckily—and on the whole—charity, like entropy, tends to increase.

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CULTURAL DEVELOPMENT OF MAN

History of Mankind

Cultural and Scientific Development. Vol. 2, Part 1, 1200 B.C. to 500 B.C.: Pp. xxxiv + 313; Part 2, From about 500 B.C. to the Christian Era: Pp. xiii + 314–664; Part 3, From the Beginnings of the Christian Era to About A.D. 500: Pp. xii + 655–1048, maps and illustrations. By Profs. L. Pareti, P. Brezzi and L. Petech. (Published for the International Commission for a History of the Scientific and Cultural Development of Mankind by George Allen and Unwin Ltd., London, 1965.) 126*s.* per set of 3 volumes.

VOLUME 2 of *History of Mankind* takes the story of man's cultural development from 1,200 B.C. down to A.D. 500, 1,700 years that witnessed the fragmentation of the widespanned cultural complexes of the second millenium B.C. into small regional cultural groups, the domination of certain political systems, and the emergence of great religious beliefs. To understand why this volume achieves a measure of both success and failure in its aims, we must examine its own story. The history of the writing of this volume is almost as complex as the historical events that it documents. Prof. Pareti was initially appointed as author-editor, with Prof. Brezzi and Prof. Petech as assistants. The draft text was finished in 1960, and after revision on recommendations from nominated specialists, the second draft was again circulated and additional material incorporated as editorial notes. Later six other authors contributed supplementary matter which appears in the text. Although considerable care seems to have been taken to preserve the continuity in content and style, it has clearly been impossible to eliminate all the interruptions where different authors are juxtaposed. This presents certain difficulties, but is at the same time the main reason for the success of the book because here, in one volume, we have the consensus of opinion about many problems of long standing, for example, the origin of the Etruscans. It is perhaps a comment on the state of our knowledge and understanding of pre- and early