Book Reviews

From Ape to Angel. An informal history of social anthropology. H. R. Hays. Knopf, New York, 1958. xxxvii + 440 pp. $7.50.

At the end of the 15th century, when the men of Europe finally broke the powerful bonds of ethnocentric ignorance in which nature and the alien cultures of hostile nations had long held them, their navigators and explorers brought back the first new knowledge about the diversity of life, the complexity of nature, and, for them, an expanding universe. The traditional patterns for identifying and placing the objects of the natural world and themselves and for explaining human experience began to undergo change. Later, when migration and travel spread Western culture across the world, further knowledge and experience resulted in the creation of whole new sciences and secular explanations, such as evolution, to categorize and explain man and his place in nature. Among these new sciences, and rather late in arriving, was social anthropology—the comparative study of men in social groups.

The present volume tells of the development of this science from its early beginnings, when the frontier ethnographers, missionaries, administrators, and others wrote their accounts of the strange cultures of the peoples of Australia, Africa, and the Western Hemisphere; it describes the classical evolutionists' attempts to substantiate simpler unilinear evolutionary theories as substitutes for the sacred account of Genesis. Although Hays, by trade a novelist, centers his account around the persons of the great figures who contributed to the new science of man, he tells his story in such a way that the lay reader is usually informed about the major contributions of each. In part 1 we read about Lewis H. Morgan and his passionate interest in the Indians of upper New York State, of the extension of this interest to the primitive peoples of the world, and of the later development of his evolutionary theories. Here the reader learns about E. B. Tylor, the Englishman who, for many, is the founder of anthropology; about the Scotsman Robertson Smith, whose scientific interest in the traditional Christian doctrine of the sacrifice got him into trouble; and about Sir James Frazier, whose interest in such problems in other cultures got him a knighthood.

In part 2, "The critical reaction," later developments are traced: Westermarck and his evolutionary theory of human marriage (from brutish promiscuity to Victorian monogamy); Van Gennep's *rites de passage*; and Freud's, and others', notions about totemism—the "worship" of species, both plant and animal.

The various theories about the diffusions of culture—among them those of Father Schmidt, Clark Wissler, Robert H. Lowie, and Franz Boas and his followers—are described. This section is followed by chapters on Emile Durkheim, A. R. Radcliffe-Brown, and others intent on developing laws about the nature of human groups. The last part of the book is devoted to contemporary anthropologists and to the use of anthropology in the study of our own people and its implications for present problems.

The book is well written, and at times the story is amusingly told. The anthropologists will find a number of small errors, but most will enjoy reading again about the great and the near great of the past. Others will acquire knowledge about the people who created the science of anthropology and will enjoy the thumbnail sketches of some of the institutions, religions, and cultures of the world. There are short bibliographies (one for each of the 38 chapters), an extensive index, and 32 pages of illustrations.

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Introduction to Fourier Analysis and Generalised Functions. M. J. Lighthill. Cambridge University Press, New York, 1958. viii + 79 pp. Illus. $3.50.

Although delta-function techniques had been widely used in physics for 25 years, a unified underlying mathematical justification for *all* of these methods was lacking until Laurent Schwartz developed his theory of distributions. However useful this theory may have been, it had little chance of filtering down to the applied mathematician or theoretical physicist, since it was phrased in the language of abstract spaces. M. J. Lighthill has, in the present book, presented an extremely lucid and well-written account of a simplified version of the theory, attributable to George Temple. By choosing a sufficiently restricted class of functions, Lighthill shows that many of the "illegal" tricks that use delta functions and Fourier transforms which do not exist in the ordinary sense have, in fact, a prosaic legality.

After discussing the basic notions of one-dimensional generalized functions, Lighthill goes on to the application of distribution theory to the asymptotic evaluation of Fourier transforms and the coefficients of Fourier series. In passing, Lighthill is able to show that Hadamard's theory of the finite part of an infinite integral is an almost trivial result of the present theory. The only defect of the book is one of omission—there is no discussion of generalized functions in higher dimensions. Apart from that, I find the book to be a stimulating and valuable addition to the literature of applied mathematics, with a good deal of the charm of 18th-century mathematics. It may well become a minor classic before very long.

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Concepts of Classical Optics. John Strong. Freeman, San Francisco, 1958. xvi + 692 pp. Illus. $9.50.

Written as a textbook for an intermediate course in optics, this volume, with its lively and original treatment of the subject, will also be useful for reference purposes. In the first 12 chapters the author covers physical optics, intentionally omitting spectra and most of crystal optics; the following four chapters are devoted to geometrical optics. The reason for reversing the usual order is not apparent, since no attempt is made to discuss the diffraction theory of aberrations. The latter part of the book—almost half—is devoted to 17 appendices consisting of essays written by outstanding authorities on topics of current research interest. Several of these are valuable summaries of material that cannot be conveniently found elsewhere. Outstanding in this respect are the articles by Jacquinot on apodization, by Greenler on optical filters, by Yates on radiation detectors and measuring devices (including the eye), and by Kapany on fiber optics.

The author, professor of physics at Johns Hopkins University, is well known for having carried on that university's

tradition of ingenious experimentation in optics—a tradition associated with the names of Henry Rowland and R. W. Wood. His flair for practical laboratory procedures shows itself throughout the book in useful descriptions of ways of testing lenses, selecting and polishing optical materials, and the like. That he is also very conscious of the "honorableness and antiquity" of his subject is evidenced by frequent historical references and direct quotations from original sources. The continuing growth of the field, on the other hand, is emphasized by several descriptions of recent developments.

One has the impression that the author continually strives to break away from the traditional presentation. In some respects this originality may not make for easy comprehension by the student. The suggested problems will challenge even the brightest. The notation, for which not only Greek but also German script symbols are used, gives a somewhat confusing impression, especially when the latter are adorned with combinations of bars and tildes.

Roger Hayward's distinctive drawings are especially helpful where three-dimensional visualization is required. The West Coast publishers are to be congratulated on the attractive appearance of their first volume in the field of physics.

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Scientific Societies in the United States. Ralph S. Bates. Technology Press, Massachusetts Institute of Technology; Columbia University Press, New York, ed. 2, 1958. xiii + 297 pp. $6.50.

This is the second edition of a book with the same title published in 1945 by John Wiley & Sons (and also Chapman and Hall, Ltd., London) for the Technology Press of Massachusetts Institute of Technology. The first five chapters have apparently been reprinted by offset, and hence remain unchanged. The new sixth chapter, "The atomic age, 1945–1955," was added to bring the story up to date.

The scope is indicated by the chapter titles: "Scientific societies in eighteenth-century America"; "National growth, 1800–1865"; "The triumph of specialization, 1866–1918"; "American scientific societies and world science, 1919–1944"; and "The increase and diffusion of knowledge."

This is not intended as a handbook of the scientific societies, such as *Scientific and Technical Societies of the United States and Canada* (National Academy of Sciences–National Research Council, Washington, ed. 6, 1955), which provides detailed information on 1712 societies. Instead, this book is a historical account of American scientific organizations from the colonial period to the present. (The author is professor of history at Massachusetts State Teachers College, Bridgewater.) Thus individuals, scientific developments, trends, societies, and governmental organizations are interwoven, and the intent has been to emphasize their interacting influences.

It is obvious that much reading and note-taking have gone into the preparation of the book. In the earlier chapters, in particular, many references have been condensed into an interesting history. The 432 footnotes and the bibliography will be useful for those interested in the beginnings of science in this country and those stimulated to delve more deeply into the subject.

Throughout the book there are repeated references, and considerable space is allotted, to the American Association for the Advancement of Science, the National Academy of Sciences–National Research Council, the American Academy of Arts and Sciences, the American Philosophical Society, and the Smithsonian Institution. This is not excessive in view of their long histories and ramified activities. On the other hand, the objectives and work of the Federation of American Societies for Experimental Biology, the American Institute of Physics, the American Geological Institute, and the American Institute of Biological Sciences all merit more attention. About five pages are devoted to UNESCO. The National Science Foundation, with no explanation of what it is or how it came into existence, is mentioned only twice and then in connection with other agencies.

A great many scientific societies are included but, inevitably, not all. Nearly all of the larger national scientific and engineering societies are present but, in many instances, coverage in the text is limited to a bare listing of names and the dates of founding. Sometimes national societies are rather uncritically grouped with less technical or local organizations. Since some degree of selection and compression were necessary, many of the points made might have had a few societies as examples instead of a dozen or more run together. The others, perhaps, could have been added in footnotes. Occasional paragraphs packed with long lists of societies, all founded about the same time or more or less in the same field, impart a checklist or compendium-like flavor and make the book less readable.

Since most of the state and city academies of science are included, probably all should have been. Among the regional societies, one finds the Western Society of Engineers but not the Western Society of Naturalists. The Southwestern Association of Naturalists is noted on both pages 197 and 198, but the older and larger Association of Southeastern Biologists has been overlooked. In surveying so many organizations over so many decades an occasional slip has occurred. To cite two: the American Association for the Advancement of Science was incorporated in 1874, not by Congress, but under the laws of Massachusetts; and it is the American Institute *of* Chemical Engineers, not *for*. But, in general, with such a plethora of names and dates, it is remarkable how relatively free from errors, typographical or otherwise, the book is.

The over-all impression is not unfavorable. The book is informative and provides, in the earlier chapters especially, a good introduction to a very complex and difficult subject.

RAYMOND L. TAYLOR

AAAS

The Reach of Science. Henryk Mehlberg. University of Toronto Press, Toronto, Canada, 1958. ix + 356 pp. $5.50.

As the title of this book indicates, the author is concerned with the range of applicability of scientific method to the problems of men. His conclusion is that "the universality of scientific method establishes that whatever is knowable is scientifically knowable" (page 343). His analysis leading to this conclusion is divided into three parts, which constitute the main divisions of the book. Part 1 deals with the concept of scientific method; part 2 considers the method of science; part 3 discusses the universality of science.

Throughout his analysis the author gives the principle of verifiability a central role, although, in the light of the recent literature on the difficulties of making this principle a criterion of meaningfulness, he attempts to connect verifiability to the truth rather than the meaning of statements. His discussion in various places of the relation between ostensive terms, conditional definitions, and the verifiable status of quantitative concepts is particularly good.

The author states in the preface that in spite of his concern with a single issue —the scope of science—he has in the course of his analysis dealt with the main problems of scientific methodology. It is in this connection that I have certain reservations about the book. On the one hand, I find myself agreeing with most of what the author has to say. His gen-