popularization of science and not another kind. It is a good kind: nondidactic, indulgent of admitted flights of fancy, highly eloquent, and at the same time, conscientiously based on current professional consensuses. Scientists are fortunate to have such an interpreter, and the book deserves wide lay notice.

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Medical Biology and Etruscan Origins. Ciba Foundation symposium. G. E. W. Wolstenholme and Cecila M. O'Connor. Little, Brown, Boston, Mass., 1959. xii + 255 pp. Illus. $9.50.

This volume is one of a series published by the Ciba Foundation to promote international cooperation in medical and chemical research. The 50th Ciba symposium departed from the narrower range of previous conferences and chose as its subject "The recent contributions of medical biology to ethnology; with special reference to the origin of the Etruscans." This book contains the papers read as well as the discussions which followed and spans the gap between science and the humanities, a bridge that archeology bitterly needs.

The choice of title was not very felicitous since it seems to promise more results achieved by medical science in the study of Etruscan origins than the book provides. Half the book deals with special phases of Etruscan archeology—for example, cities, origin of the culture, oriental characteristics of the religion, relationship of Etruscans to Villanovans and Umbrians—by outstanding scholars from Europe and America. The second half, however, is largely devoted to medical and anthropological investigations in ancient fields, written from a general point of view—for example, "The evaluation of metrical data in the comparison of ancient and modern bones" (N. A. Barnicot and D. R. Brothwell), "The use of genetical characters as indices of population distribution" (A. E. Mourant), "Blood groups and haematological data as a source of ethnic information" (R. Ceppellini)—with a minimum of data on the ancient Etruscans. The papers on the various topics are most illuminating and the discussions most interesting, but the results in terms of Etruscology are disappointing.

The difficulty of recognizing the ancient Etruscans in Italy, a difficulty enhanced by the lack of scientific digging in the early excavations, is clearly expressed. The further difficulty of identifying Etruscans in the mixed populations of ancient Cyprus, Syria, and Anatolia is scarcely touched upon. The development of the Etruscan culture in Italy and its relation to that of Central Europe is emphasized; the origins of the culture (art, techniques, language, and so forth) in the orient, except for the religion, is neglected. There emerges, however, the strong hope that great progress in the solution of the Etruscan problem may be attained if careful digging is combined with medical research and physical anthropology.

The papers are ably written, the archeology is admirably illustrated, and the book is excellently published. The price for the scholar, however, is high. The Ciba Foundation may be congratulated on taking a bold, forward step and in pointing the way to new fields of investigation.

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Group Theory. And its application to the quantum mechanics of atomic spectra. Eugene P. Wigner. Translated from the German by J. J. Griffin. Academic Press, New York, expanded and improved edition, 1959. xi + 372 pp. $8.80.

This volume is essentially a direct translation into English of the classic 1931 edition that was published in Geman. It includes, in addition to the original content, three new chapters; chapter 24, "Racah coefficients," chapter 26, "Time inversion," and chapter 27, "Physical interpretation and classical limits of representation coefficients, three- and six-*j* symbols." Much that is contained in these new chapters has not previously appeared elsewhere in print.

When the book was first published in 1931, and for a number of years after, many physicists were reluctant to accept group theory as an essential tool of theoretical physics. Just a few physicists, including Wigner, recognized that the theory of representations of symmetry groups provides a systematic method for obtaining those properties of the solutions of the Schrödinger equation which follow from the symmetry of the physical problem. Furthermore, almost every exact statement concerning solutions (exact or approximate) of the Schrödinger equation is a direct consequence of a general symmetry property. The importance of this point of view is now widely recognized among physicists not only in connection with the Schrödinger equation, but also in connection with relativisitic theories. Although group theory is not widely accepted as an essential part of the standard graduate course in quantum mechanics, it should be studied, at least by the prospective theorist, as supplementary material.

Wigner's *Group Theory* provides an excellent introduction to the subject for the physicist. It is very explicit in its handling of the theory of representations, as well as in its physical applications. A number of specific examples are treated in detail. The domain of physics encompassed by the examples is not very great; applications are limited (with one or two exceptions) to problems in atomic structure. The treatment of abstract group theory is purposely minimal. Therefore the book is probably more suitable for use as a supplementary rather than a primary source for study of the purely mathematical aspects of the subject. The basic ideas of quantum mechanics are reviewed, but, again, the book would not serve as a primary text of quantum mechanics. To reap the greatest value from this book, the student should already have a substantial knowledge of this subject. However, the sections devoted to quantum mechanics are well worth reading, for they provide an excellent and concise statement of the physical interpretation, and they give Wigner's perspective, which always has new and enlightening facets.

The rotation-inversion group in three dimensions along with some of its subgroups and the symmetric (permutation) group are treated in detail. The discussion of the representations of the symmetric group is limited to those irreducible representations which are significant in atomic structure; this does not include the complete set. Young's symmetry operators are not mentioned. This is unfortunate since, as Wigner was the first to show in his important 1937 papers on the symmetric Hamiltonian, some of the other representa-

tions are important in the study of nuclear structure. From the point of view of modern usage, it would also be desirable to have some discussion of the generators of infinitesimal rotations, their commutators, and so forth. They were not treated in the original volume, hence not in this version of the book.

The new chapters will be of interest to all theorists. In particular, the discussion of the corepresentations of a group involving antiunitary operators gives a new insight into the mathematical consequences of invariance under the operation of time inversion. This chapter would benefit from an amplification of the physical meaning of time inversion since the symmetry involved does not yield as easily to intuitive reasoning as do symmetries in configuration space.

On the whole, the chapters from the original bear up remarkably well against the passage of time, and the new chapters add further to the value of the book. The translation seems excellent; none of Wigner's personal touch appears to have been lost in translating.

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Target for Tomorrow. Space travel of the future. I. M. Levitt. Fleet Publishing Corporation, New York, 1959. 328 pp. Illus. $4.95.

Since the first artificial earth satellite was successfully launched by the U.S.S.R. nearly 2 years ago, there has been a substantial marshalling of engineering and scientific resources in this country for the exploration of space. Undertakings of this nature are costly, so much so that, to the present, only governments have been able to afford them. The support for such enterprises rests, therefore, on the public. There would be cause for considerable satisfaction if the approval of the measures taken to establish the American space program could be considered indicative of the public's understanding of the subject. Unfortunately, the emotional reactions to the early difficulties deny the possibility of any such comforting conclusion. Moreover, the scientific and engineering aspects of space exploration touch on so many of the branches of pure and applied science that it is, perhaps, unreasonable to expect very many, even among the best informed, to comprehend them all.

There is, consequently, a need for sound information at all levels concerning the aims, prospects, and problems of space exploration. Without a well-informed public, capricious reactions might well jeopardize any hope for a constructive program founded on scientific values rather than exhibitionism.

The present work represents an attempt to inform the "educated layman" about the development of rocket propulsion, the creation of artificial satellites, and some of the possibilities and problems in the future evolution of the exploration of space. The wide range of topics discussed includes the characteristics of the earth and its atmosphere, gravitation, celestial mechanics, satellites and space stations and their uses, hazards in space, the problems of supporting human life in space, interplanetary and interstellar travel, and the effects of motion at relativistic velocities. Two appendixes deal, respectively, with some statistical speculations about the hidden side of the moon and with the author's views on educating and training space engineers. Some 36 black-and-white illustrations are provided; about half of these are photographs of a selection of astronomical objects, and the remainder are artists' conceptions of various aspects of space travel.

It is doubtful whether, in its present form, the book is appropriate for the educated layman, although much of the material has been reprinted from the author's newspaper articles. I believe that most readers possessed of sufficient scientific knowledge for ready comprehension of the subject matter may find the work rather awkward and uninspired, while those not so informed may find it difficult to understand many of the technical explanations because of the lack of sufficient clarity and precision. It is unfortunate that the literary style and exposition do not reach the standards of the best popularizers of scientific subjects.

Perhaps the best feature of this book is found in the considerable amount of elementary information about astronomy, celestial mechanics, and astrophysics which it contains. Although for the most part, these subjects are correctly, though not always clearly, explained, it is surprising to find an erroneous description of the behavior of a satellite of the earth in a polar orbit (page 124).

Although a fair account is given of some of the scientific investigations which have been or will be conducted, I was disappointed to find very little discussion of the results obtained so far from satellites and space probes.

If, as the preceding remarks indicate, the book falls short of the goal set for it, the author is nevertheless to be commended for assembling a great variety of information relating to the subject.

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Die pränatalen Infektionen des Menschen unter besonderer Berücksichtigung von Pathogenese und Immunologie. Heinz Flamm. Georg Thieme, Stuttgart, Germany, 1959. xii + 136 pp. $4.70.

The dramatic announcement in 1941 by N. McA. Gregg, an Australian ophthalmologist, that he had examined 78 children with congenital cataract (44 of whom also had heart defects), born to mothers who had contracted rubella during the first three months of pregnancy, and the subsequent confirmation and extension of these findings by a special commission aroused great interest among scientists and laymen in the dangers that result from infection to which the human embryo and fetus may be exposed during pregnancy.

The author of the present book undertook the task of giving an account of the current status of clinical and experimental work in this field. Among the virus infections, to which more than half of the space is given, rubella remains the most important cause of congenital malformations, but other infections may account for larger numbers of prematurely terminated pregnancies. The pathological and developmental features of the rubella-produced defects are discussed in considerable detail, with helpful asides on the normal functions which are interfered with. This is followed by similar, but shorter, discussions of other viral infections, and for many of these the available information remains incomplete or inconclusive (for example, cytomegaly). The remaining chapters are devoted to fetal infection caused by bacteria, fungi, and protozoa. I was somewhat shocked to find that lues is