order Aptera (Diplura) with Thysanura, since these two groups of insects are fundamentally more unlike than caddisflies and butterflies and moths, or Homoptera and Hemiptera. Despite the very few reservations I have mentioned, this book will always be handy on my desk, even though I am puzzled by the choice of a male ant (*Formica* sp.) as the illustration to introduce each chapter.

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Quantum Field Theory

PCT, Spin and Statistics, and All That. R. F. Streater and A. S. Wightman. Benjamin, New York, 1964. x + 181 pp. Illus. Paper, $4.95; cloth, $9.

The subject of this book is the rigorous mathematical investigation of the quantum theory of fields. Quantum field theory was until recently the generally accepted language in which the most basic laws of physics were expressed. During the last few years a strong group of physicists has attacked the notion of a quantum field and claimed that local fields should have no place in physics. At the same time a second strong group, led by Arthur Wightman, senior author of this book, has undertaken a fundamental rejuvenation of field theory by deepening its mathematical foundations. The program of the Wightman group is to clarify by exact analysis the nature and scope of field theory, such analysis being an indispensable preliminary to any final judgment of its physical relevance.

Wightman and Streater here summarize the achievements of rigorous field theory since its beginnings, 10 years ago. Three important things have been done: (i) The establishment of field theory as a strict mathematical discipline, conforming to the standards of modern mathematics, in startling contrast to the sloppy mess of inconsistent half-theory that had existed earlier. (ii) The formulation of specific sets of axioms which define in a precise way the physical ideas of "relativity," "field-particle duality," "causality," "permutation symmetry," and so forth, which are directly derived from observations of the real world. (iii) The proof by beautiful and nontrivial mathematics of some substantial theorems, asserting logical connections between the various physical ideas. These three achievements have together created a body of theory which has an air of solidarity and permanence, a body of theory that is growing steadily year by year.

PCT and Spin-and-Statistics are the names of two of the principle theorems of field theory. PCT asserts a symmetry of the world under a simultaneous reflection in space and time and reversal of electric charge. Spin-and-Statistics asserts that precisely those particles which have half-integer spin, and no others, obey the Pauli exclusion principle. Both theorems express facts which are known to be true in the real world. The importance of a proof of such theorems lies in the insight which it provides into the deeper reasons why the world is the way it is.

The exposition in this book is consistently excellent, interspersing formal mathematical argument with informal comment in just the right proportions. The authors know well that the physical reality of quantum field theory has been questioned, and that all the theory contained in this book has not led to the calculation of a single number verifiable by experiment. They defend their subject vigorously, but with modesty and humor.

In the informal remarks that accompany the mathematical deductions, they show a many-sided understanding of the history and purposes of physics, which some of their opponents would do well to emulate.

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American Way of Life?

The Prospect of Immortality. Robert C. W. Ettinger. Doubleday, Garden City, N.Y., 1964. xxii + 190 pp. $3.95.

Science fiction is ordinarily so labeled. A writer assumes some set of physical or biological phenomena (preferably startling and usually in the indefinite future) and then proceeds to build a story around it. When the idea is ingenious and the writing is good, we enjoy the story and forgive the nonsense—besides, who knows whether it will always be nonsense? However, when an author takes his idea seriously enough to write a treatise, the situation is very different.

In his foreword, Robert Ettinger, the author of this book, states that the "argument will attempt to show: first, that immortality (in the sense of indefinitely extended life) is technically attainable, not only for our descendants but for ourselves; second, that it is practically feasible and does not raise any unsurmountable new problems; third, that it is desirable from the standpoint of both the individual and of society." He then devotes 180 pages to the attempt.

The idea is that human beings can be kept for an indefinite period of time at very low temperatures and rewarmed at will without the procedure having produced any irreversible damage. It is only necessary, then, to store people until a method has been devised for repairing the defects which have killed them (yes, indeed, if they are preserved soon enough) or which are about to kill them. The idea is, further, that everyone wants to and ought to live forever. The idea is, still further, that the human race and its individual members will benefit incalculably. Presumably the author himself will be among the first to benefit from the new cold-storage technique.

The arguments for the feasibility of the proposal rest substantially on quotations from the works of a number of people, especially biologists and physicians who have studied the freezing and thawing of cells, tissues, and whole animals. The author's sources also include a number of writings in the popular press. The arguments for the benefits to be derived from universal immortality are not easily identified. They seem to rest largely on emotional and philosophical reflections on man and society, supplemented also by suitable quotations. There are two prefaces, one by Jean Rostand and the other by Gerald Gruman.

To pass from the descriptive to the critical, one may take this kind of thing seriously, or one may not. If one does, the book can only be considered the work of an utterly confused optimist. Only a fervent and naive believer in the imminence of ultimate good would be able to underrate so completely the inertia, complexity, and inconsistency of human thought and behavior, as well as the complications of biological structure. Only such a man could quote people so uncritically and so out of context, or, having noted a few of the semantic and philosophical inconsistencies that plague us all, could imply that their