Lawrence S. Kubie, who has written frequently about man's utilization of his talents, here writes in a chapter on the ontogeny of the dropout problem: "We have always known that there is a purely accidental relationship between erudition and maturity, or between erudition and wisdom. Is it now time to consider how to produce the maturity and the wisdom which will make the erudition possible?" Kubie elaborates on several ideas which would contribute toward making such an education possible. He suggests, for example: "We may have to find ways to use living as a preparation for schooling—i.e., as a way of maturing the student to a point at which he can profit from education. . . . This is the exact reverse of what we have taken for granted in the past: namely, that school is a preparation for life."

The emphasis on what the requirements of the educational system do to the individual should not obscure another important perspective. Roy Schafer, in a paper titled "Talent as danger: Psychoanalytic observations on academic difficulty," asks: "What are the compelling subjective reasons to avoid using one's talents?" and suggests that the freedom to develop may be also put in jeopardy by the individual's need to balance between his desire to know and his desire to avoid the danger of the unknown or the unacceptable.

Many of the papers in this book pose a significant challenge to the educational establishment. There is evidence that our society has developed such a voracious appetite for trained manpower that it is willing to sacrifice the development and well-being of individuals in an effort to meet short-term goals. Such a policy, according to these authors, is misdirected, not only because it threatens individual freedom but also because it is in the long run self-defeating. The highest levels of talent, as Kubie suggests, depend on the fullest possible development of the individual as a whole.

This book can be read with profit by all who are interested in the problems of higher education. They may feel what this reviewer experiences as convention indigestion—too many ideas and too many levels of discussions too rapidly presented. Despite this drawback, the papers are provocative, and at least a selective sampling is recommended.

HAROLD A. KORN
Counseling Center and *Institute for the Study of Human Problems, Stanford University, Stanford, California*

Cosmological Enigmas

Worlds-Antiworlds. Antimatter in Cosmology. HANNES ALFVÉN. Translated from the Swedish edition (Stockholm, 1966). Freeman, San Francisco, 1966. 109 pp., illus. $3.50.

The universe contains many puzzles. It appears to be expanding in a state of approximate uniformity and isotropy. Why? We do not know. It is usually believed to contain only matter, not antimatter. But physical laws are symmetrical for matter and antimatter. According to the theoretical discussions of Hawking and Penrose, the universe develops out of a singularity. But physicists like to believe that physical laws can be continued indefinitely into the past.

Alfvén attacks with his characteristic originality two of these enigmas. He suggests that we may be mistaken, that the universe, even our own galaxy, may contain both matter and antimatter, in equal amounts. He proposes that an originally uniform and mixed ionized medium becomes separated into fragments of matter and antimatter through the combined influences of electric currents and gravitational fields. He then proposes that the matter and antimatter bodies remain thereafter substantially separated through the influence of a type of Leidenfrost phenomenon, the generation between the bodies of a relatively thin layer of high-energy electrons. The pressure of this thin high-temperature layer separates the matter from the antimatter.

Concerning the singularity, Alfvén suggests that the universe starts as a collapsing gaseous medium that ultimately fragments into galaxies. It is proposed that in this collapse there is enough nonradial motion of the galaxies to reverse the collapse and start the universe expanding before an irrevocable collapse can occur.

As might be expected in such a novel approach to the basic ills of cosmology, Alfvén does not address himself to all the possible questions and difficulties that his ideas might suggest. Thus, the origin of purely matter or antimatter interstellar clouds derived from the ejecta of a very large number of both matter and antimatter stars could present a problem. Also, a nonuniform universe capable of reexpansion without violent collapse may encounter serious observational difficulties. The large red shifts of the quasars and the microwave background radiation might be difficult to deal with in this model.

Despite the complexities of these difficult cosmological problems, Alfvén has successfully directed this book to the nonscientist. Devoid of equations, adequately illustrated, and interestingly written, with technical details discussed carefully, the book should be intelligible to the nonspecialist. But the specialist may also want to read it, for it is probably the most complete source of information on Alfvén's interesting and original ideas about these cosmological problems.

R. H. DICKE
Palmer Physical Laboratory, Princeton University, Princeton, New Jersey

Immunology

Foundations of Immunochemistry. EUGENE D. DAY. Williams and Wilkins, Baltimore, 1966. 223 pp., illus. $8.50.

In this book the author has attempted to set forth the information he believes to be fundamental to any effort employing immunochemical methods. The book is apparently not intended to, nor does it, fill the growing need for a more comprehensive book that presents the developing field of immunology from a molecular point of view. The foundations of immunochemistry, according to the author, consist of a knowledge of immunoglobulin structure and of the reactions between antigens and antibodies; among the latter, only hapten binding and the precipitin reaction are deemed relevant.

The opening chapter of the book presents a thesis which a reader with some background in physical biochemistry might regard as rank heresy, that the notorious heterogeneity of immunoglobulins is the rule, rather than the exception, in protein chemistry. The remaining chapters in this part of the book deal briefly with various aspects of immunoglobulin structure in a manner that suffers at times from oversimplification, not all of which can be ascribed to the brevity of the discussion.

A more critical approach is evident in the portion of the book dealing with antigen-antibody reactions. However, in section 5 of the chapter dealing with the precipitin reaction, the author presents what appears to be a novel treatment by means of phase diagrams. The thesis is that in the equivalence zone the antigen-antibody complexes undergo a change of phase as the antigen/