nucleotides to proteins. Some antiserums can distinguish single-, double-, or triple-stranded helical polyribonucleotides. Some differentiate between native and denatured DNA and are useful in elucidating structural changes in DNA. Antiserums to oligo- and polydeoxynucleotides have been used to examine the mechanism of bacterial transformation.

Antibodies to nucleic acids are also produced in some human diseases. Serums from patients with systemic lupus erythematosus may combine only with denatured DNA, only with native DNA, with both forms of DNA, or with nucleoprotein. Antibodies from patients with collagen diseases, labeled with fluorescein, react with various nuclear components of human white cells.

Antiserums to bacterial ribosomes are specific for the polyphosphate backbone, not for the bases. They have been used to study the number of strands in synthetic polynucleotides and to measure the proportion of the RNA that lies on the surface of each ribosomal subunit.

A session on nucleic acids as nonspecific stimulators of immune responses precedes the discussion of the role of nucleic acids in specific antibody formation. This fascinating problem, the genetic control of the means by which an animal can synthesize antibodies to an almost infinite variety of antigens, has not yet been solved, but the numerous skillful approaches described at this symposium give the impression that, as of 1967, the answer lurked just around some corner. The topics include the roles of macrophages and lymphocytes, transfer of information by isolated RNA's or RNA-peptide complexes, immunoglobulin synthesis and assembly, and theories, deduced from amino acid sequences, of the genetic control and evolution of antibody polypeptide chains.

Each group of papers is followed by a general discussion of experimental techniques and interpretation of results; these discussions are one of the most valuable parts of the book.

The final chapter is an address by Melvin Cohn entitled "The molecular biology of expectation," in which he discusses "the mechanism by which an individual can react in an adaptive way to an unexpected stimulus." Theories of somatic versus germline mutation are discussed at length for the immune system and considered briefly in regard to control of the detoxifying and learning mechanisms.

The book is highly recommended to all those who are interested in either nucleic acid structure or immunoglobulin synthesis.

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Flagellates

The Biology of Euglena. DENNIS E. BUETOW, Ed. Vol. 1, General Biology and Ultrastructure. Academic Press, New York, 1968. xii + 364 pp., illus. $19.

This volume on *Euglena* and the forthcoming second volume summarize what is known about the genus. Volume 1 ranges from taxonomy, ecology, and locomotion through morphology and cytology to growth in axenic cultures and some general aspects of biosynthesis. The chapter on cultivation and growth (J. R. Cook) is a comprehensive survey of methods for maintaining cultures (small to large volumes, conventional methods to continuous-culture techniques). Recent work on specific nutritional requirements is covered thoroughly. Following a summary of changes which *Euglena* undergoes as the culture grows older, the chapter concludes with a section on environmental influences on growth of *Euglena* in cultures, stressing effects of such factors on morphological features as well as biochemical activities. The chapter on morphology and ultrastructure (D. R. Buetow) begins with a brief description of active and flagellated stages, continues with a compact review of the pellicular complex in *Euglena*, and then proceeds to flagella, cytoplasmic inclusions, and various internal organelles. The chapter contains more than 40 excellent micrographs and several good diagrams. The nucleus is covered in a chapter which correlates revelations of electron microscopy with observations made with light and phase-contrast microscopes (G. L. Leedale). This treatment, highlighted with a beautiful series of anoptral contrast photomicrographs of living *E. gracilis* undergoing fission, yields a very informative account of mitosis. Correlated photomicrographs of stained preparations are exceptionally clear, as are a number of electron micrographs showing particularly the microtubules ("spindle elements") in dividing nuclei. Locomotion and other movements (T. L. Jahn and E. C. Bovee) are related, as far as possible, to the structure of *Euglena* (and closely related flagellates). Responses to physicochemical stimuli are critically reviewed, and phototaxis is related to structural features of the stigma and the light-sensitive paraflagellar swelling (specific function still uncertain). Swimming is discussed in detail, metaboly is considered in relation to structure of the pellicular complex, and mechanisms for gliding (still considered a mystery) are discussed. Rates of biosynthesis (carbohydrate, protein, DNA and RNA, cell number, dry weight) are compared for *E. gracilis* (supplied with different substrates) and with cultures of mammalian tissue cells (B. W. Wilson and B. H. Levedahl). For those who sometimes meet their flagellates outside labeled culture tubes, there is an excellent chapter on ecology (J. B. Lackey) and also a well-illustrated section on taxonomy of *Euglena* (L. P. Johnson). A potentially valuable feature of this volume is the consistent emphasis on major and minor gaps in the available information on *Euglena*. If these signposts awaken the curiosity of at least a few industrious investigators, *The Biology of Euglena* will be more than worthwhile on this basis alone.

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Responses to Environment

The Climatic Physiology of the Pig. L. E. MOUNT. Williams and Wilkins, Baltimore, 1968. x + 274 pp., illus. $14.50. Monographs of the Physiological Society, No. 18.

The pig is being used increasingly in biomedical research. The author here indicates that the physiological analogies between pig and man are more apparent than real. Especially is this true in regard to the skin of the animal, the subject of research carried out in the belief that it is similar to that of man. Mount points out the patent fallacies of such an approach, and does it well. There are purposes for which the pig can be the animal of choice, such as in artificial heart studies, where both anatomical and physiological similarities to man are observable. This book, however, does not treat aspects of the pig which would make it a useful work of reference for such purposes, dealing rather with the physiological responses of pigs to climatic variables with a comprehen-

sive treatment of thermal energy exchanges between the organism and its environment.

The physiological variables of heat loss, metabolism, growth, endocrine responses, behavioral responses, and temperature changes of the animal are discussed, in some instances, in considerable detail, and the book will therefore be of interest to environmental and comparative physiologists. To a lesser degree it is of interest to those who are concerned with the effects of climate on the economics of the production of pigs as a source of food. Matters not central to this theme appear to have been drawn from limited sources. This has resulted in the omission of important contributions that would have been more useful in making the author's points than some of those selected. For instance, temperature and humidity gradients over an ice-skating rink are referred to, but no mention is made of detailed work in the literature dealing with similar gradients in the Arctic and Subarctic as related to the ecology of both above- and below-ground animals. In addition, this noncomprehensive treatment of subjects not central to climatic physiology has resulted in general statements which may be criticized. The book demonstrates clearly that the author has a great deal of expertise on the measurable responses of pigs to climatic variables, but some of his treatment of comparative physiology lacks depth, an example being the cursory treatment of the calorigenic response to norepinephrine and epinephrine and its relationship to nonshivering thermogenesis.

The book is a useful compilation of existing data on the responses of the pig to climate. Although the author points out that the work is not comprehensive and exhaustive, it appears to be so for the available climatic information on the pig, though not for subjects ancillary to this main theme.

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Microbiology

Les Bactéries Anaérobies. A. R. PRÉVOT, A. TURPIN, and P. KAISER. Dunod, Paris, 1966. xxiv + 2188 pp., illus. $74.75.

At long intervals, in almost every field, a book is written that organizes and summarizes the accumulated knowledge so completely and clearly that understanding of the field attains a new level. Such, in anaerobic microbiology, was *Les Microbes Anaérobies* by Weinberg, Nativelle, and Prévot in 1937. Such, 30 years later, is *Les Bactéries Anaérobies.* Representing, as it does, 45 years of work by Prévot at the Institut Pasteur in Paris, this book brings together most of what is known about the anaerobic bacteria by a man who knows them well. *Les Bactéries Anaérobies* is concerned primarily with the individual species of anaerobes. The first 67 pages cover the general topics of anaerobiosis, anaerobic bacteria in nature, the possibility of utilizing anaerobes in industry, and the evolution of their classification. The remaining 2100 pages deal with the characteristics of the individual species—215 species of spore-forming and 307 species of nonspore-forming bacteria, divided into 51 genera in 19 families. Where sufficient information is available, each organism is discussed under the headings Synonyms, History, Habitat, Morphology, Physiology, Cultural Characteristics, Biochemical Characteristics, and Pathogenic Properties. Many of the species have been studied in Prévot's laboratory, and the information presented is based on his observations. Also, a selected bibliography is given. For references before 1937 the reader is directed to *Les Microbes Anaérobies.*

The schematic organization of the book is based on Prévot's classification of the anaerobic bacteria, the only unified systematic treatment of all the anaerobic bacteria as yet advanced, but one that is not universally accepted, particularly by British and American anaerobists. It does serve as a satisfactory framework for presenting the information that has here been compiled. Indeed, Prévot's scheme of classification, as outlined in the table of contents, is the only key to *Les Bactéries Anaérobies,* for there is no index. Most microbiologists will find it convenient to have side by side with this book Prévot's *Manual for the Classification and Determination of the Anaerobic Bacteria,* translated by Fredette (Lea and Febiger, 1966), for the latter book is indexed and provides summary descriptions of the bacteria that are covered much more thoroughly in *Les Bactéries Anaérobies.*

The large number of species listed in this book is a disadvantage. Few microbiologists working with the anaerobic bacteria would accept as clearly distinguishable the more than 500 species given here, nor would they approve the characteristics used to distinguish among some species and some genera. Admittedly, however, it would be difficult to find any two anaerobists who would agree entirely on the number of species of anaerobes that should be recognized. This disagreement is not entirely a matter of different concepts of the definition of a species; it also reflects a lack of information as to the variation allowable within a species. Fortunately, *Les Bactéries Anaérobies* provides a baseline from which we can work to resolve some of these difficulties. It makes evident what information will be needed to determine the identity or nonidentity of various species as well as shows what information is now at hand. It also indicates on what species critical work is most urgently needed. Although one may not agree with Prévot regarding all the species he lists, one cannot help considering *Les Bactéries Anaérobies* an outstanding work on the anaerobic bacteria, a reference book essential for any laboratory working extensively with these organisms.

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Solids and Liquids

Theory of Condensed Matter. Lectures presented at an international course, International Centre for Theoretical Physics, Trieste, 1967. F. Bassani, G. Caglioti, and J. Ziman, Directors. International Atomic Energy Agency, Vienna, 1968. xiii + 1020 pp., illus. $20.

There exists an understandable inverse relationship between the molecular complexity of a condensed system and the degree to which it is "understood" in a physicomathematical sense. This book stands closer to the mathematical extreme. Except for a few sections on neutron scattering methods and one on the phenomenological theory of superconductivity, it is concerned with modern mathematical methods in the theory of solids and simple liquids. Thorough coverage is afforded to Green's function techniques for electron and phonon states, to recent but more conventional techniques for electron and phonon dynamics, and to statistical methods for the theory of phase transitions, particularly those of magnetism. Discussions of the band