Book Reviews

Man in a Cold Environment. Physiological and pathological effects of exposure to low temperatures. Alan C. Burton and Otto G. Edholm. Edward Arnold, London; Williams and Wilkins, Baltimore, 1955. xiv + 273 pp. Illus. $6.75.

In bringing together the material on the influence of cold on man from government World War II reports and the open literature, the authors have done a great service to physiologists interested in human responses to low temperature. When to this practical service there is added the particular viewpoints of investigators who have contributed much to the field, there results a book of importance.

The book is centered about the discussions of three topics: the physics and physiology of maintaining the thermal steady state during exposure to low temperature, the vascular and metabolic responses of animals and man to prolonged exposure to cold (including acclimatization and adaptation), and the noxious effects of cooling tissues below the physiological range of temperatures. The first of these topics is treated in a way that can be easily understood even by the "busy executive," but for those working in the field of cold physiology it will seem that this discussion is much oversimplified. The problem of temperature regulation in the cold receives little attention, and perhaps for this reason the discussion of the primary response to cold, the sensation of cold itself, is omitted. However, the treatment of the insulation afforded by clothing and by the peripheral tissues of the body is excellent.

The chapters on the vascular and metabolic responses are also satisfying and contain a full discussion of the important experiments of Burton and Brank on the muscle action potentials of cats exposed to cold but prior to shivering. The evidence in animals with respect to the existence of "chemical regulation" of body temperature and acclimatization to cold is well reviewed. The difficulty of obtaining good data on these topics from studies on man is noted and the hope expressed that someday experiments will be carried out on the Tierra del Fuegan aborigines. The topics of hypothermia and cold injury are discussed briefly but well, with comments on the large areas in which present-day knowledge is deficient.

The book is an excellent review of the present state of knowledge on the topics that the authors have felt have not previously been covered, and for this reason physiologists will need the volume for reference. On the other hand, the book is so well written that it can be enjoyed by all who are interested in the many peculiar effects of cold on man.

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Symposium on Problems of Gerontology. Nutrition Symposium series, No. 9. Robert S. Goodhart, Ed. National Vitamin Foundation, New York, 1954. ii + 141 pp. Illus. Paper, $2.50.

In his foreword the editor points out that in the first half of the 20th century there have been remarkable advances in the reduction of mortality in infancy and childhood from infectious diseases and that we are confronted now with problems in promoting the welfare of approximately 13 million people of 65 years and over. He rightly says that knowledge and understanding of the metabolic changes, both normal and abnormal, associated with ageing are essential.

During the reading of this publication several points impressed me. The 10 participants could not have been better selected. They are N. W. Shock (Baltimore), A. I. Lansing (St. Louis), H. J. Deuel, Jr. (Los Angeles), C. S. Davidson (Boston), B. F. Chow (Baltimore), J. E. Kirk (St. Louis), F. H. Bethell (Ann Arbor), C. N. H. Long (New Haven), D. J. Ingle (Chicago), and H. A. Rafsky (New York). Each is to be congratulated on the clarity of his presentation and on the fact that it is definitely focused on ageing from the point of view of metabolism. It is a relief to find that this can be done effectively without resort to complicated formulas and advanced mathematics. All presentations are accompanied by short but well-chosen lists of references to the literature for purposes of follow-up.

In this volume the reader will find a good presentation of the essential biological background. Many significant experiments with lower animals afford clues to conditions in man and to rewarding investigations that should be carried on. Well-established data on the dietary needs and metabolic handicaps of older persons as compared with younger ones are made available. It is pointed out that the usual yardstick of adequate nutrition employed for young adults does not necessarily apply to elderly subjects. Alterations in the absorption of fat and in the roles of sex hormones are emphasized. There is little evidence to think that pituitary function fails in old age. Indeed, the secretion of gonadotropic hormones increases as gonadal function falls off. The perils of overeating are underscored. Experimental obesity in rats resulting from small lesions produced in the hypothalamus is discussed. There is much discussion about vitamin B_{12} and its distribution in the body when it is labeled with Co^{60}. The strains that older people undergo are viewed in terms of Selye's work. It is said "that Selye's concept of the role of endocrine response to nonspecific stressors in causing disease is one of the most important ever raised in medicine." Stress is defined "as a harmful state of disturbed homeostasis."

If there is anything that would add to the symposium as published, it would be inclusion of questions by the group and answers to them by the symposium participants.

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Gas Dynamics of Cosmic Clouds. A symposium of the International Union of Theoretical and Applied Mechanics and International Astronomical Union. Interscience, New York; North-Holland, Amsterdam, 1955. xii + 247 pp. Illus. + plates. $5.75.

This volume, the second in the symposium series of the International Astronomical Union, gives the proceedings of a symposium held at Cambridge, England, in July 1953. This symposium was organized jointly by the IAU and by the IUTAM (International Union of Theoretical and Applied Mechanics). It received a grant-in-aid of $6000 from UNESCO to cover traveling expenses of scientists attending this symposium, and UNESCO also assisted with the publishing of the proceedings.

The symposium was the second one on cosmical gas dynamics, the first one having been held at Paris in August 1949. Of the 63 participants from nine countries (35 from outside the U.K.), 41 were astronomers or astrophysicists and 22 were aerodynamicists or physicists. Altogether 37 papers were given in eight sections dealing with the following main topics: observational data, physical conditions of the interstellar gas, shock waves and collision problems, turbulence and magnetic fields in a compressible gas, formation of cosmic clouds and galaxies, accretion problems, and gas and dust in the interstellar medium.

From the papers it can be seen that a huge amount of work has been done between the two symposia, and some problems are beginning to look more tractable. The emphasis has shifted to a large extent to a discussion of shock waves in astrophysics. Unfortunately while most aerodynamical research is concerned with relatively small Mach numbers, in astrophysics one is dealing with large Mach numbers, and it seems unlikely that the results from aerodynamics can be applied to astrophysical problems. Another problem that is again very open is that of the origin of galactic magnetic fields, while the old problem of the distribution of angular momentum among cosmic bodies remains as far as ever from a solution.

Since this book contains the text of the discussions and papers delivered at a symposium, relatively few detailed and quantitative calculations are given, but from the discussion one can obtain an impression of the activities going on in this modern branch of astrophysics, and the volume should be very stimulating to astrophysics research workers who were not at the conference, just as the symposium itself must have stimulated those who were fortunate enough to be present.

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Einführung in die Energetik und Kinetik biologischer Vorgänge. W. Bladergroen. Wepf, Basel, 1955. ix + 368 pp. Illus. F. 28.

Discussions of the energy changes and kinetics in biological systems have formed parts of several excellent works in recent years written on the subjects of proteins, enzymes, and metabolic processes in the organism. A number of these works reviewed, in their respective chapters, the physical and physiochemical methods that concern every research worker engaged in problems of enzyme mechanism and enzyme kinetics.

Important as these reference books are for the researchers in the immediate field, too few works are available for the use of scientists in fields closely related to the afore-mentioned subjects. Workers in biology and medicine who are not directly dealing with problems of enzyme kinetics, for example, nevertheless need the general knowledge and approach of this rapidly expanding field.

This is one of the reasons that Bladergroen's concise book closes a gap. It is both an easily readable and a useful book for those who, while lacking the time to examine the problems in detail, nevertheless want to acquaint themselves with such topics as oxidation and reduction without having to equip themselves with the full mathematical knowledge of thermodynamics.

To be concise and still include all the necessary material is a problem that authors face eternally, and Bladergroen's book is no exception. To illustrate the working of physical laws in biological systems with numerous examples cannot be recommended enough in this type of treatise. The very ardor of the author to do so might lead, however, to the inclusion of too many such examples, which then cannot be explained in the necessary detail. To illustrate the role of the phosphate bond in biological systems, Bladergroen adequately employs such examples as acetylation, carboxylphosphates, and ATP and its role in muscle contraction and choline acetylation. The citric acid cycle is included too, and the half-page of text devoted to it can hardly explain it to those who do not already know more than is described there. To cover all sides of the problems in an introductory book is hardly possible, and perhaps fewer examples in greater detail would serve the purpose equally well. It should be mentioned here that the numerous and well-chosen references at the end of the individual chapters facilitate the gaining of further information for those interested in following up the presented material.

Bladergroen takes special care to use only the most necessary equations for ease of understanding without sacrificing clearness or usefulness. In this task he succeeds remarkably well. Of the 17 chapters in the book, the first five are concerned with the thermodynamic principles and relate them to practical problems in biological systems. Five other chapters deal with enzymes (in general terms) and coenzymes and catalysis with respect to kinetics and energy changes. Inhibition, activation, enzyme-substrate binding, and temperature and *p*H effects are briefly and clearly summarized in these chapters. One chapter on the principles of kinetics includes such subjects as bimolecular reactions and energy of activation. A theoretical chapter examines the possible implications of quantum physics in biology. Other chapters discuss photosynthesis and energy relationships in metabolism; one mentioned in a preceding paragraph deals with the phosphate bond; and, on the practical side, there is a chapter on energy in nutrition. The book is a useful compendium for students and research workers alike.

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Materials for Nuclear Power Reactors. Henry H. Hausner and Stanley B. Roboff. Reinhold, New York, 1955. 224 pp. Illus. $3.50.

In his historic report, *Atomic Energy for Military Purposes,* H. D. Smyth commented on the troubles encountered in sheathing or canning the uranium rods for the Hanford reactors. He said, "Strangely enough, this 'canning problem' turned out to be one of the most difficult problems encountered in such piles." Today, a decade later, it is still true that the major obstacle to successful nuclear reactor design is the choice of materials and methods of construction. It must be admitted that the character of the problem has changed. Whereas the Hanford reactors operated at low temperature and produced but little power in unit volume, the current trend is toward ever higher temperature and greater specific power. As a result, the materials problems have become more varied and more difficult to solve, and aid is badly needed.

This book by Hausner and Roboff is the first unclassified one that is devoted entirely to materials for power reactors, but unfortunately it will be of little help to hard-pressed reactor designers. The authors offer it as a guide for two very diverse kinds of readers: scientists and materials engineers in one group, and investors, insurance men, lawyers, executives, and students in the other. Clearly, it is not possible to serve both groups adequately, and the book appears to be slanted toward the latter. It is a highly readable pocket-size primer that devotes considerable space to an elementary explanation of the fission process, reactor types, and radiation hazards and the remainder (equivalent to about 50 full-sized pages) to its main subject of construction materials. The general nature of the problems is outlined, as well as possible methods of approach to their solution. Quantitative data are meager and there are notable gaps. Some of this dearth of detailed information is undoubtedly attributable to security restric-