one might well fear that it would prove totally unmanageable in a chart. But several researches of great merit, referred to by the author in warm terms of appreciation, have furnished so considerable an experimental background that empirical formulae fairly representative of water vapor radiation and absorption have been derived. This part of the author's publication occupies 12 pages with several diagrams and tables.

Carbon dioxide and ozone compared to water vapor are simple problems and are briefly treated.

In Part III, instruments and methods for measuring radiation and absorption of atmospheric constituents are discussed at considerable length and with good discretion.

A brief description is given of the important instruments used for carrying out the extensive numerical calculations for the chart. Then follows a bibliography of 123 entries, and finally the highly valuable chart.

All those interested in atmospheric radiation researches will find Dr. Elsasser's publication timely and invaluable. No doubt as research goes on he will from time to time revise and improve it.

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ANOXIA

Anoxia: Its Effect on the Body. By EDWARD J. VAN LIERE. xiii + 269 pp. Chicago: University of Chicago Press. 1942.

THE subject of oxygen deprivation, and its physiological and psychological effects, has assumed great importance in recent years in medicine and related fields. With the present war, this subject has become of increasing importance because of its role in high altitude flying in aviation. This timely review is more comprehensive than any other single work on this subject in the English language. It comprises a systematic presentation of the results of experimental studies in this field, arranged according to the physiological systems of the body.

Following a brief historical introduction, there is a short chapter dealing with the definitions of terms. The familiar classification of the various types of anoxia, according to Barcroft and to Peters and Van Slyke, is then given with a brief review of the physiology of respiration. The subject of cellular oxidation is but barely mentioned. Schmidt's classification of anoxia into the fulminating, acute and chronic varieties is then described. Here (p. 16) it should be pointed out that the term "chronic anoxia" should not be used in a sense almost equivalent to "chronic mountain sickness" as necessarily resulting in adverse symptoms. Permanent residents of high altitudes live in a condition of chronic or constant anoxia and most of them, at least up to a certain altitude, do not show signs or symptoms related to oxygen want. There follows a chapter on the experimental methods of producing anoxia. In appraising the various methods (p. 27) the author fails to bring out the fact that with the rebreather, the degree of anoxia progressively increases at such a rapid rate, and the duration of an experiment is therefore so short as to enable the subject to compensate for the effects by exerting extra effort for a short time until the final stages of deterioration. During the first World War, the rebreather tests resulted in a false impression as to the altitudes at which aviators could remain for any length of time and still maintain their physical and mental capacities. Experiments of longer duration reveal a much lower "ceiling" for the average pilot or unacclimatized subject.

The remaining chapters deal with the effects of anoxia on the various physiological systems, beginning with the morphology and chemistry of the blood, the circulatory system, with separate chapters on blood pressure and on the lymph. In the chapter on the effects of anoxia on the blood, the author points out the necessity for distinguishing clearly between "oxygen content" and "oxygen capacity" of the blood. He erroneously states, however (p. 52), that "In Keys's group the oxygen *content* of the blood increased an average of 25 per cent." It was actually the oxygen *capacity* which increased.

In several cases in which more than one factor is involved the author does not bring out the exact role played by each variable. Thus in his discussion of the changes in alveolar pCO_2, pO_2 and arterial O_2 content at high altitudes (p. 102), the author does not clearly distinguish between the effect of (a) increasing ventilation on lowering the alveolar pCO_2 and concurrently increasing the alveolar pO_2 and of (b) the Bohr effect, which leads to a greater O_2 content of the blood when the arterial pCO_2 is decreased but the arterial pO_2 is held constant. He tries to cover the whole situation merely with the Bohr effect, which *per se* has nothing to do with alveolar pressures.

The following chapters deal with mountain sickness, altitude sickness and acclimatization. In comparing the effects of acclimatization to oxygen want with acclimatization to carbon dioxide, the author states (p. 155) that certain similarities are to be expected since "in both cases there is some increase in tissue acidity." It is very questionable whether anoxia, unless it be of very serious degree, gives rise to tissue acidity; on the contrary, the increase in pulmonary ventilation results in "blowing off" of CO_2 and thus a decrease in acidity of the body fluids.

Probably the most complete and authoritative part

of the book is the chapter dealing with the effects of anoxia on the digestive tract. The author himself and his co-workers have studied this subject quite intensively over a period of years.

The remaining chapters deal with the secretion of urine, the endocrine glands, metabolism, heat regulation, nutrition, water distribution in the body and the nervous system.

In the last chapter the author discusses the physiological effects of anoxia on the nervous tissue, its circulation and function. This is followed, without adequate integration, by a discussion of the psychological effects of anoxia. This section, as the author admits, is especially lacking in detail and completeness of bibliography. The most interesting observations in this field relate to the striking and insidious changes in behavior produced by a lack of oxygen to the nervous tissue. The author fails to interpret the intimate relationship which must exist between an adequate and constant supply of oxygen to the nervous tissue and mental functions, such as memory, judgment and reasoning, which are essentially psychological in nature. This is important, not only from the point of view of research relating to the possible cause of certain mental disorders, but also in an understanding of the very foundation of mental processes or behavior in general.

The discussion of the visual effects is particularly sketchy and incomplete. Little attempt is made to interpret the role of these findings in an understanding of the nature of the visual mechanism itself. Several errors in this last chapter might be pointed out. Psychological tests, such as speed of apprehension, memory tests and repetition of auditory patterns, commonly termed mental tests, are erroneously referred to as "psycho-somatic tests" (p. 234). In reporting the various studies on sensory function, the expression "decrease in threshold" is used where "increase" is obviously meant (pp. 244, 246).

The author might have emphasized more clearly that the great variations found in the responses and adaptive processes to anoxia are not only related to the type of stimulus (acute, intermittent, chronic) but are also attributable in great part to the different *degrees* of anoxia used in experiments and found at different levels of altitude.

The chief criticism concerning the style in which this monograph was written is that frequently mere statements of experimental results are given, without mention of the methods employed by the investigators, or critical appraisal of other factors which might be of value in judging their validity. This deficiency is noted particularly when opposing experimental results are cited. More interpretation and integration of the findings of the various investigators would have improved this monograph.

For the reader who is not familiar with the literature, this monograph provides a valuable summary. It is, however, not as complete in its bibliography as might be desired. A number of important studies are omitted which would have assisted the author in interpreting several controversial topics. In the section on hematology, for example, the important paper by Talbott (1936) from the International High Altitude Expedition is not mentioned. Also, a great part of the work done in Peru has been neglected. It seems regrettable that Hoff and Fulton's more complete and excellent "Bibliography of Aviation Medicine," also published in 1942, was not available to Dr. Van Liere during his preparation of this book. Also the lack of an authors' index in a work of this kind is unfortunate.

The need for a current book reviewing the work done on this subject has been very great. In spite of the above criticisms, Dr. Van Liere's monograph serves as a useful introduction to the literature on the physiology of oxygen deficiency. It will be of value not only to research workers in physiology and psychology, but also to those concerned with the problems of high altitude in aviation. The clinician, as well, will find it of interest in view of the role of anoxia in various diseases.

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SPECIAL ARTICLES

ABOLISHMENT OF ALIMENTARY LIPEMIA FOLLOWING INJECTION OF HEPARIN

DURING the course of determining red cell circulating mass in dogs by the donor-isotope red cell procedure, an occasional animal of irregular eating habits showed a marked lipemia in the initial control blood sample. When injected with whole blood containing tagged cells, in the instances in which heparin was used as an anticoagulant, this lipemia had disappeared completely in the blood sample taken three to five minutes later. This phenomenon was so striking, even in the instances where the degree of lipemia was such that the plasma was suggestive of light cream, that it seemed advisable to determine how specific the reaction might be, ruling out any special donor-recipient peculiarities which might be responsible for the change.

In the first experiments the lipemia was due to the dilatory eating habits of the animals. Later, in order