

ence to radiometry, which perhaps deserves mention, and is mistaken in suggesting that thermocouples can be used to measure absolute zero. B. B. Longwell reviews methods for investigating some of the biochemical and physiological changes which occur during stress.

The remaining chapters are devoted to respiratory physiology.

U.P. Luft surveys the important features of various techniques used in direct spirometry and residual volume determination, but omits bronchspirometry and the measurement of maximum breathing capacity and timed vital capacity.

Clayton S. White has written a comprehensive review which describes the physical methods that have been developed for the analysis of respiratory gases. The paper covers methods based upon the measurement of thermal conductivity, paramagnetism, refractive index, velocity of sound, and absorption, mass and emission spectra. It is in the field of emission spectra that the author has made a significant contribution to this aspect of respiratory gas analysis. This section also contains an extremely useful collection of references. It suffers, however, in that it is not sufficiently critical and an investigator new to the field receives little guidance as to which is the best method to employ in given circumstances.

In a further paper written in collaboration with W. R. Lovelace II, White discusses in detail the use of the nitrogen meter. This section is full of intensely practical details with regard to the calibration, accuracy and use of this instrument. In the opinion of the reviewer it should be read by anyone who proposes to use this important tool of the respiratory physiologist.

The final paper, by N. P. V. Lundgren, presents a comparison of the Rahn-Otis sampler with a method for obtaining end-tidal air from the oropharynx. He does not consider, however, the generally accepted limitation of end-tidal air sampling as a method of determining the composition of the alveolar air during quiet breathing, when the volume of alveolar air is inadequate to wash out the respiratory dead space.

All the reviews in this book are by American authors. Most of the material is of great value to the specialist in aviation medicine. Some of the material, excellent in itself, would have more impact in a different publication.

BIOLOGICAL INFORMATION : THEORY AND PRACTICE

The Biological Replication of Macromolecules
Edited by F. K. Sanders. (Symposia of the Society for Experimental Biology, No. 12.) Pp. vi+255. (Cambridge: At the University Press, 1958. Published for the Company of Biologists on behalf of the Society for Experimental Biology.) 50s. net.

AT the present moment considerable interest is centred around the mechanisms involved in the transfer of intelligence in biological systems, particularly with respect to the relationship which is believed to exist between the structure of two types of large molecules found in all living organisms, namely the proteins, which were originally regarded as the fundamental molecules, and the nucleic acids, which

are now thought by many to be the repository of all the information required by an organism. Unfortunately, although this relationship is probably one of the most important in biology, experimental evidence for it is somewhat slight and may even be conflicting. Thus, for example, several enzyme systems are now known which will produce reasonable facsimiles both of ribonucleic acid and deoxyribonucleic acid from simple substrates, but there does not appear to be any necessity for a specific coding system for this synthesis, nor do the nucleic acids produced appear to have any particular information content built in. Indeed, such systems will willingly accept substrates which they do not normally encounter, and incorporate them into the polymers.

So far as the proteins are concerned the situation is rather different, because *in vitro* systems do not accomplish much more than incorporate radioactivity from individual labelled amino-acids into material of large molecular size, and they appear to be rather restricted in their synthetic capabilities.

However, in spite of the general paucity of experimental evidence, there is a great deal of effort now being expended in attempts to elucidate the type of code which could relate the structures of proteins to those of the nucleic acids, using methods of the kind employed in cryptographic analysis. Apart from the fact that new constituents of nucleic acids are now being discovered at regular intervals, and that work on small polypeptides has shown the existence of structures so far undetected in proteins, the problem is complicated further by lack of information about polynucleotide sequences, and by the fact that the proteins themselves are coded by a complex transposition code, which relates their catalytic surface structures to the residue sequences in their polypeptide chains. Consequently, it is necessary when engaging in this entertaining pastime to simplify the problems to such an extent as to render the conclusions doubtfully significant.

It was probably with intent to discuss the present implications of this type of work that the Society for Experimental Biology decided to organize a symposium on "The Biological Replication of Macromolecules" which has since appeared in book form. The precise meaning of the rather indefinite term macromolecule seems to have eluded the organizers, and the various contributors interpret it as meaning anything from a small polynucleotide to a nucleus, with a few proteins and polysaccharides thrown in for good measure. The general tendency of the contributors has, however, been to discuss the more complex types of structure, with the result that the emphasis is largely on genetical rather than on biochemical phenomena. Outstanding among these papers is an account of the conjugation process in *Escherichia coli* K12, while other papers discuss hereditary mechanisms of bacteria, and phenomena occurring on tumour tissue transplantation and during virus replication.

On the simpler level, there are accounts of remarkably successful attempts to isolate individual nucleic acids by ion exchange, and several papers on protein synthesis including an authoritative exposition of the rules of 'coding'. The general impression given by these papers is that a lot of experimental work is still necessary before the results can be interpreted.

It need scarcely be said that all the articles are of a high standard, and it is regrettable that a volume containing such a wealth of information should not contain an index.

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