The chapters on the evolution of oxygen transport, the shape of the red cell, the evolution of the leucocytes and of the haemostatic mechanism are of particular interest to those primarily concerned with human physiology and haematology, since they shed much light on the contributions of comparative physiology to the solution of fundamental biological problems.

It is not possible to give detailed comments on all the chapters, but a few points must be mentioned. It is disappointing to find the old-fashioned and confusing word 'tension' used instead of 'pressure' in referring to the blood gases. It is also unfortunate that many of the figures in Chapter 1 are so very small and overcrowded as to be a liability rather than a help to the reader. One hopes that these defects may be remedied in future editions.

The only section of the book which fails completely to fulfil the intentions of the editors is the one dealing with the effects of altered metabolism on the morphology of blood cells. It has all the faults of the standard review article, being a catalogue of disconnected observations presented in ungrammatical and unreadable style. Such terms as "aleukæmic leukæmia" and "sub-leukæmic leukæmia" may convey precise meaning to the haematologist, but to no one else. A halt must be called to the multiplication of this kind of jargon. All that can be said in favour of this chapter is that it is well illustrated and provides a review of the literature.

In contrast, the subject of blood coagulation, an equally difficult and controversial one, is treated with masterly clarity in the context of Chapter 7. This is also true of the chapter on complement. The authors have not attempted to minimize the difficulties, but have shown a path through the maze which even the non-expert can follow.

There are gaps in the material covered by the book and every reader will have his own ideas as to how these should be filled. I personally, for example, would have wished for more discussion of the permeability of the erythrocyte membrane and of the significance of the accumulation of potassium in the erythrocytes of some species. However, this subject has been considered in some detail in other recent publications.

The book will be of great value to experienced workers in many different disciplines and much of it could be read with pleasure and profit by undergraduate students of biology and medicine. The price is likely to deter all but the most enthusiastic student from buying his own copy.

M. E. NUTT

HORMONES IN BLOOD

Hormones in Blood

Edited by Prof. C. H. Gray and A. I. Bacharach. Pp. xviii+655. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1961.) 140s.

THIS book gives an up-to-date and critical account of the work that has been done on the estimation of hormones in blood. It is the work of about twenty of the leading authorities on this subject. They have described the best methods available to-day, omitting historical accounts of inferior methods. The articles are based on a common plan, giving first the chemical properties, so far as they are known, then the paths of biosynthesis, the methods of assay, the average results found and the changes occurring in disease.

The book deals primarily with work on human blood, but occasionally it discusses work on other mammals. Separate articles deal with insulin, thyroid hormones, the polypeptide hormones of the two lobes of the pituitary, the steroid hormones and the catecholamines. The difficulties of work in this field are fully discussed and may appear formidable, but it is impressive to see what great progress has been made in recent years.

The title of the book has to some extent limited its scope, since estimates of hormones in blood do not by themselves tell us all we want to know; we would generally like to know something about the turn-over. Estimates on the urine may sometimes give an indirect indication of the daily output of the steroid hormones, the catecholamines, and the hormones of the posterior pituitary, though their interpretation is complicated by the fact that it is generally only a small proportion of various metabolites of the hormone which are found in the urine.

The turn-over of some corticoids can be estimated by injecting isotopically labelled hormone and measuring its specific activity and rate of decay in the blood. It is pointed out in this book that this method is difficult because the concentrations are low; but this difficulty can be sometimes avoided by estimating the specific activity of a suitable metabolite in the urine; such a method would presumably be outside the scope of the book.

All these substances were originally detected and estimated by bioassay. The catecholamines, the thyroid hormones and many of the steroid hormones can now be estimated chemically, and H. H. Dale once predicted that this process would continue until bioassays became unnecessary. This stage has not yet been reached, and most of the methods described in this book are biological, though many of them do not involve the use of whole animals. Some hormones can be tested by incubating them with small pieces of their target organ. This often increases the sensitivity and the accuracy, and brings the assay within the competence of the biochemist and outside the jurisdiction of the laws governing experiments on animals.

The use of immuno-assay methods is discussed in a postscript to this book. This is a recent development of great interest and promise, which has been applied to the estimation of growth hormone, insulin, glucagon, gonadotrophins and other peptide hormones. It provides a method of estimating most of the hormones for which it seemed unlikely that *in vitro* methods would ever be devised. The hormone is obtained in a very pure state, and an antiserum is prepared. In one method, erythrocytes are coated with hormone, so that antiserum agglutinates them; they are then used as an indicator when hormone is titrated against antiserum. In another method, the unknown solution is mixed with an isotopically labelled standard preparation of the hormone, and with antiserum. The free hormone and the hormone-antiserum complex are then separated and their radioactivities determined. The amount of labelled hormone which is displaced from combination with antiserum gives a measure of the amount of unlabelled hormone present. These methods are remarkably sensitive, quick and specific; but they still require specialized knowledge and skill.

This book will be a necessary part of the equipment of anyone dealing with hormone assays. Its main disadvantages are that it is expensive, and that it will soon be out of date, since knowledge is advancing rapidly.

J. H. GADDUM