E. H. RELYVELD: **Toxine et antitoxine diphtériques. Etude immunologique.** Actualités scientifiques et industrielles: 1278, Hermann, Paris, 1959. 164 pp, 58 fig., 33 tables.

THIS monograph describes original experiments conducted to study the much discussed reactions between diphtheria toxin and antitoxin. In addition, each chapter contains a historical introduction and several useful techniques are fully described and discussed.

Crude diphtheria toxin (culture-filtrate), and therefore the anatoxin prepared from it, contains a large number of antigens besides the specific toxin. Corresponding anti-sera contains many "accessory antibodies" in addition to "antitoxin", this name being used to designate antibodies specifically reacting with the toxin, either to promote its precipitation or its neutralization.

A new semi-synthetic medium, containing casein hydrolysate, and optimal conditions for toxin production are described as well as two methods of toxin purification, one making use of the classical salting-out method, the other resorting to chromatography on calcium phosphate. A crystalline toxin titrating from 3·000 to 3·100 FU/mg N was obtained as well as a correspondingly pure anatoxin.

Tested by several methods of gel-precipitation, the purified toxin gave only one line of precipitation in response to homologous anti-serum as well as to anti-sera prepared with anatoxins of lesser purity and containing a number of accessory antibodies. Likewise, anti-serum against purified anatoxin gave a single line of precipitation when allowed to react in agar with crude toxin.

At the beginning of immunization in horses, diphtheria antibodies are associated with the γ-globulins and such anti-sera give a bell-shaped quantitative precipitation curve (type "rabbit). On the contrary, at the end of the hyperimmunization, diphtheria antibodies are associated with the β-2-globulins and the quantitative precipitation curve shows a rectilinear part and solubility of the precipitate in excess antibody (type "horse"). Under proper conditions, and with the help of ^{131}I, it was shown that antibodies, synthesized in response to the injection of pure anatoxin, can be of several kinds, some being able to flocculate without hardly neutralizing, while others neutralize without precipitating and others still act both ways. However, a study of the reactions of anti-serum with pure toxin partly degraded by a protease indicates that the toxin molecule is a single entity, provided with several determinants groups, each of which being able to induce the production of a distinct antibody, but only one of which being related to toxicity and therefore able to induce the production of neutralizing antibody.

M. WELSCH

L. REY: **Conservation de la vie par le froid.** Actualités scientifiques et industrielles: 1279, Hermann, Paris, 1959. 167 pp, 84 fig.

SEVERAL chapters of this monograph deal with the physico-chemical processes intervening during the congealing of biological material to low temperature and with the description of techniques and apparatus used to achieve that aim.

From the biological point of view, original experiments are reported showing that, under proper conditions, heart tissue from the chick as well as skin from the rat or mouse, can be stored at low temperature (dry ice: -79 °C; or liquid nitrogen: -196 °C) for an indefinite length of time without showing, upon correctly performed re-heating up to body-temperature, any loss of their physiological activities.

In order to obtain such results, the tissues must be impregnated with glycerol before being cooled. There exists an optimal concentration of glycerol, as well as an optimal length of time for impregnation, which have to be found for each particular material under study.

The range of temperature between 0 ° and $-$ 50 °C is the most noxious to the tissues and therefore re-heating must be performed as quickly as possible.

The protection afforded by glycerol is explained by the following observations. Between 0 ° and -20 °C, it slows down the rate of propagation of the crystalline front, diminishes the size of the crystals, favours surfusion and has a tendency to maintain osmotic equilibrium while water is converted to ice. Between -20 ° and -80 °C, its presence gives more regularity to the process of crystallisation and favours the formation of vitreous structures.

The temperature of storage must be below −60 °C for tissues impregnated with Eagle's solution containing less than 45% glycerol and below −130 °C whenever the concentration of glycerol is higher.

Practical applications (tissues and organ banks) and the possibility of congealing and storing whole animals without harm are discussed.

M. WELSCH

Antibiotics in Medicine. L. P. GARROD (Editor). British Medical Bulletin **16**, No. 1, 1960. The British Council, London, 1960. 20s.

THE monograph: *Antibiotics in Medicine*, prepared under the eminently competent scientific editorship of Professor L. P. Garrod, devotes an introduction and fifteen papers, written by well-known specialists to the basic and practical problems of antibiotics. It will be of the highest value to the clinician wishing to make a rational therapeutic and prophylactic use of the numerous now available anti-infectious drugs.

Four chapters are of especial interest to the biochemical pharmacologist.

In the first one, "Chemistry and classification of antibiotics", E. P. Abraham and G. G. F. Newton, show how it is now possible to group the many known antibiotics into natural families on the basis of either their chemical structure or the mechanism of their biosynthesis.

The second one, by E. F. Gale, deals with the "Selective toxicity of antibiotics". It gives a clear and up-to-date picture of what is known of the modes of action of antibiotics at the molecular and cellular levels: inhibition of cell-wall synthesis by penicillin, cycloserine and bacitracin, gross cell-permeability alterations by surface-active antibiotics such as tyrocidin and polymyxin, interference with protein synthesis by chloramphenicol and the tetracyclines.

In the third one, "Drug resistance and mechanisms for its development", M. R. Pollock, first briefly describes the biochemical peculiarities that can be held responsible for microbial drug-resistance. He next discusses the respective roles of biological mechanisms that can conceivably induce more or less stable changes in individual bacteria and therefore, thanks to natural selection, promote population changes: enzymic induction and genic alterations such as gene mutation and gene recombinations of various kinds.

The last one, by J. M. Robson and G. A. H. Buttle deals with "The pharmacology of antibiotics". Perforce, since our knowledge is yet rather limited, the biochemical aspects are less stressed than in the other papers.

M. WELSCH

Glutathione. E. M. CROOK (Editor). Biochemical Society Symposium No. 17. Cambridge University Press, 1959. 116 pp., 15s.

EVER since Hopkins isolated pure glutathione nearly 40 years ago, the elucidation of the function of this ubiquitous substance has posed considerable problems. Some of the latest views on possible roles for glutathione were discussed at a Biochemical Society Symposium held in London in February, 1958.

The first two articles deal with the chemistry and methods of determination and are by F. A. Isherwood on the "Chemistry and biochemistry of glutathione" and by C. G. Thomson and H. Martin on "Techniques for determining glutathione in animal tissues". The next two sections are concerned with possible metabolic roles for glutathione in plants and animals: "Enzyme systems associated with the oxidation and reduction of glutathione in plant tissues" by L. W. Mapson and "Glutathione metabolism in animals" by P. C. Jocelyn. In these articles particular reference is made to the oxidation/reduction of glutathione, its coupling with TPN and with vitamin C, and to the role of glutathione as a coenzyme.

The remaining three sections are concerned with more specialized aspects of glutathione metabolism: "Glutathione and neural tissues" by H. McIlwain, "Glutathione and its analogues in the lens" by S. G. Waley, and "Thiols and radiation damage" by D. B. Hope. The latter article, as its