

Phosphoric Esters in Metabolism

The Significance of Phosphoric Esters in Metabolism. By Prof. Robert Robison. (Christian A. Herter Lectureship on Pathological Chemistry, New York University.) Pp. ix+104+8 plates. (New York: New York University Press; London: Oxford University Press, 1932.) 8s. 6d. net.

THE importance of phosphorus in metabolism, both in its inorganic and organic forms, had long been recognised, but a new chapter in the understanding of vital reactions was opened by the discovery at the Lister Institute of the part played by compounds of phosphoric acid and sugar in the process of alcoholic fermentation. The painstaking researches of Harden and his assistants, begun just thirty years ago, have proved beyond doubt that the complex series of reactions which take place when sugar is fermented to carbon dioxide and alcohol involve at an early stage the formation of several phosphoric esters: it is these which break down to simpler products, setting free the phosphoric acid to take part once more in the series of reactions. From beer to bones is at first a far cry, but such has in fact been the sequence of discovery, for the knowledge of hexose phosphates, and the enzymes which serve to build and to destroy them, has enabled Robison to elucidate very largely the mechanism of bone formation. His achievement is no small one; it began with the discovery of an enzyme in the bones of young rats capable of decomposing

phosphoric esters and so precipitating phosphoric acid salts *in situ*.

Prof. Robison has put his story together in book form after delivering three Herter lectures in New York. He discusses first the natural phosphoric esters in their broader aspect, next the calcification of cartilage and bone, and finally the calcification *in vitro*, this chapter being fully illustrated by drawings of sections, which afford the histological evidence for his deductions. Very properly, the story is told mainly from the more personal point of view, the author dwelling, as he states, on the problems which seem to offer some possibility of discovering how the esterification of phosphoric acid in plant and animal assists in the various processes of their metabolism. As a consequence the book is most stimulating, and it should be widely read, both by the many interested in this field, and by students as an example of a model series of researches.

There are two other classes of phosphoric esters which are to-day in the forefront of chemical interest, namely, the phospholipins, held to play an important rôle in the transport of fatty acids and in their oxidation in the animal body, and the nucleic acids, which are composed of a pentose joined to a purine or pyrimidine base and to phosphoric acid. There is evidently some definite co-ordination between phosphoric acid and carbohydrate in the cell which plays a leading part in initiating chemical change: it appears probable that a fuller understanding of these problems will not long elude the investigators who are so zealously studying them. E. F. A.

Short Reviews

Fishes: their Journeys and Migrations. By Prof. Louis Roule. Translated from the French by Conrad Elphinstone. Pp. x+270. (London: George Routledge and Sons, Ltd., 1933.) 12s. 6d. net.

THIS book, as its main theme, discusses the vital impulses dominating the periodic movements of certain species of fish. Throughout, the narrative is illustrative of the French aptitude for relating the incidence and play of the natural and external forces of Nature, whilst in harmony, at the same time, with imaginative conceptions and discriminative fancy. The depths of the sea and the waters of rivers include fish, for example, salmon, eels, shad, which form subjects for a story of events embodying descriptive skill and insight. Certain deep-sea fishes, the habits of which maintain adjustments to their environment, are considered, among these, cod, herring, mackerel, tunny. In a

foreword Prof. Roule remarks that the migratory fish comes from the sea to the running water of the river under its own power; the migratory bird flies from one hemisphere to another, with only its wings to carry it.

A chapter, "At the Foot of the Dam", enables the author to adopt to good purpose an imaginary interchange of conversation with a chosen friend along a river-bank one spring morning in Brittany. The journey of the salmon is the topic; the dam is the rendezvous. "Beneath the blazing sun the water streamed over the dam evenly and without stopping. The great fish continued jumping, leaping . . . as though they tried to see beyond the dam what there was behind the barrier. And the object of this journey the production of young, the conservation and perpetuation of the species."

Prof. Roule is eager in support of the fascinating experiences of mackerel-fishing for the amateur