

investigation of the reality of protoplasmic connexions between the blastomeres, of the internal osmotic pressure required to inhibit gastrulation, and of the influence of nucleus and cytoplasm in determining the rate of cleavage. But, in respect to the last of these particularly, his interest in the colloid chemistry of the cytoplasm, having first led him to the important conclusion that the rate of early cleavages is dependent on cytoplasmic factors, then tempts him to overlook the fact that the nucleus is the ultimate controlling factor. Indeed, the opposite view is suggested, though never quite explicitly stated, except in the sentence (p. 30): "These facts are in harmony with the view that the nucleus can be affected by environmental change only through the gateway of the cytoplasm, and they suggest the possibility that the first step in evolutionary transformation is a cytoplasmic change in response to the impinging forces of the environment".

After his two long chapters on the blastula and gastrula, Prof. Moore moves on to another field, that of the physiological analysis of behaviour. As an example of an aganglionic central nervous system in action, he discusses the movements of starfish, and the extensive series of experiments which he and his associates have made on them. Then we go on to the function of the head ganglion in polyclads, and of the ganglion chain in earthworms and other forms. Finally, there is a discussion of "Some Intrinsic Factors in Nerve Function" (mainly drug stimulation in cephalopods) and "Habit Formation as a Basis for Mind" (training experiments on the snap reflex in axolotl larvæ).

It is, as will be seen, a mixed bag that we are offered; but why should we be the less grateful for that? We have here a general exposition of the results achieved by an experimenter of inexhaustible energy, insatiable curiosity and a complete absence of the diffidence which prevents some men from straying outside a narrow field of 'expertise'. Prof. Moore must have enjoyed himself; and, although, as might be expected, some of his conclusions will be questioned, this record of endeavour and achievement is one which many biologists will envy him.

C. H. WADDINGTON.

TAXONOMY OF ASPERGILLUS

A Manual of the Aspergilli

By Charles Thom and Kenneth B. Raper. Pp. ix + 373. (London: Baillière, Tindall and Cox, 1945.) 38s. 6d.

THE publication, in 1926, of the monograph "The Aspergilli" by Thom and Church was a landmark in the taxonomic study of this important genus of moulds. The fact that a re-working of the genus after twenty years has necessitated no fundamental change in classification is the best evidence of the sound scholarship which went to the writing of the monograph. Nevertheless, its very excellence gave other workers confidence, not only in identifying Aspergilli, but also in describing new species, with the result that a fair amount of new material has accumulated during the intervening years.

As Messrs. Thom and Raper point out, the new book is not a monograph but a manual for the use of the laboratory worker, designed to enable him to identify any known species of *Aspergillus* which he encounters, and to trace, with the minimum of difficulty, the literature relating to its activities.

The volume is divided into three sections, "General Discussion", "The Manual Proper", and "Reference Material". In the first part, history and systematic position of the genus are dealt with in two short chapters, the main emphasis being on practical considerations. General morphology and the criteria used in determination of species are discussed in considerable detail. Then come methods of cultivation, examination, and preservation of cultures, including a description, with illustrations, of the freeze-drying or lyophile process, a method by which the preservation of both morphological and biochemical characteristics can be ensured for considerable periods. Finally, there is a chapter on variation; and by this term is understood not merely the types of change which take place, sometimes by design but only too often otherwise, in cultures preserved in the laboratory, but also the natural variation in certain characters within a given species concept, often appreciated only when very large numbers of strains are examined in parallel cultures.

The second, and largest, part of the book, "The Manual Proper", is mainly taxonomic. The number of species described is rather surprisingly large, there being seventy-seven accepted species plus eight varieties and four mutants. However, a fair number of the species are known only from single isolations and, at present, cannot be considered as members of the normal mould flora. Also, the taxonomy is simplified by arranging all the species in groups around fourteen types; for, if we except the *A. glaucus* group, it is undoubtedly true that the great majority of isolates of Aspergilli belong to the typical species of these groups, and, as such, are readily identified. Quite logically, the general keys, of which there are three, including one in the form of a chart, lead to the groups rather than to individual species. As in the 1926 monograph, there is a separate chapter for each group, with a key to species where necessary; but the general lay-out of the material is much better than in the earlier work and at the end of each chapter is an account of the distribution of the species in Nature and of their economic importance.

The book is profusely illustrated. There are some line drawings to illustrate structure and a few plates from drawings, at very high magnification, of ascospores of various species in the *A. glaucus*, *A. fumigatus*, and *A. nidulans* groups. Most of the figures, however, are from photographs of colonies, portions of colonies, and typical fruiting heads. The majority of these are excellent and appreciably enhance the usefulness of the manual. In addition, seven plates reproduced from colour photographs show colonies, in Petri dishes, of all the important species. At first sight these are an attractive feature of the book, but they do not bear critical scrutiny. They are frankly disappointing and may, in fact, be misleading to the student, for in few cases are the tones even approximately correct.

On one point the authors have certainly laid themselves open to criticism. There is much to be said, from the practical point of view, for including in *Aspergillus* all species with the typical conical fructification, whether or not they have a perithecial stage in addition; but few systematists will agree with the summary rejection of *Eurotium*, in complete disregard of the Rules of Nomenclature.

Apart from these minor blemishes, the book is excellent and a very worthy successor to the monograph which first put the taxonomy of the genus on a sound basis.

GEORGE SMITH.