ULTRAFILTRATION ANALYSIS

Leçons de chimie physique appliquée à la biologie professées au Collège de France

Par Prof. J. Duclaux. 14 : Ultrafiltration, ii. Partie théorique et applications. (Traité de chimie physique, Tome 3, Chapitre 2.) (Actualités scientifiques et industrielles, 1002.) Pp. 126. (Paris : Masson et Cie., 1946.) 140 francs.

ULTRAFILTRATION can prove a most valuable method for the investigation of disperse systems, but, in his treatise on the subject, Dr. Duclaux leaves his readers in no doubt as to its inherent difficulties. In spite of these, however, considerable progress has been made in recent years, attributable largely to the more reproducible and uniform membranes—'Gradocol'—now available, covering an adequate range of graded porosities for the requirements of research workers in bacteriology, pathology, biochemistry and analytical chemistry. Thus far, their application has been restricted mainly to studies on bacteria, viruses and enzymes, for which they were specially evolved. That they have potential value in much wider fields is clear from the numerous references cited.

The first half of the book deals critically with the several methods used to calculate the pore-size of an ultrafilter membrane. Although precise knowledge of the structure of collodion membranes is lacking, many data are available that permit an assessment of their uniformity and reproducibility. In order to derive from such data a figure for the porosity it is necessary to postulate a simplified structure. Dr. Duclaux very rightly emphasizes the disparity between this ideal and the real membrane, but the assumptions underlying the basis of calibration are not wholly without justification. It is a significant fact that 'Gradocol' membranes possess the high specific water content of 0·8–0·9 over a wide range of porosities—2,000 mμ, say, down to the region of 20 mμ. This points to the gradation in porosity being due to a progressive change in the state of aggregation of the nitrocellulose. Eventually some fundamental unit is reached, and further diminution in porosity is the outcome of packing more nitrocellulose per unit volume.

Determination of the permeabilities of membranes, as distinct from their porosities, demands knowledge of the processes of ultrafiltration—the effects of applied pressure, the temperature and concentration of the disperse system, surface adsorption and blocking within the pores of the membrane—and means whereby the factors concerned may be controlled. 'Filtration curves', from which the magnitude of adsorption and blocking under varied conditions can be determined, and 'filtration end-point curves', showing how the maximum relative filtrate concentration varies with membrane porosity, must be established for *conditions found most favourable for filtration*. The latter essential is not properly emphasized. Furthermore, when deducing the character of an unknown disperse system, the complete filtration end-point curve must be considered. The actual end-point porosity enables the size of the smallest elements of a particulate phase to be derived, while the form of the curve will give information regarding degree of homodispersity. The relationship between the porosity at which the relative filtrate concentration first falls significantly below unity and that for which it first becomes zero (that is, the end-point porosity) has been found to be about 2 : 1 for homodisperse systems, whereas for heterodisperse systems and those the particles of which have decided asymmetry of shape the two porosites differ much more widely, and the curve may take a stepwise form. The ratio of particle-size to end-point porosity determined for certain known disperse systems is used to translate end-point porosities into probable particle sizes for unknown suspensions. The value of this conversion factor is found to be less than unity and to vary in different regions of porosity. This result is not wholly incomprehensible when the facts of adsorption, non-isoporosity, and of porosities being calculated on the same uniform basis without allowance for variations in membrane structure are all considered. Again, the filtration end-point for an elongated particle is decided by its width, since the longer axis will tend to be orientated in the direction of fluid flow. This has been amply confirmed experimentally, for example, with spirochætes and tobacco mosaic virus. Dr. Duclaux bases his contradiction of this relationship on the filtrability of nitrocellulose, an unfortunate choice because of its gross polydispersity in solution.

It is in every way desirable that the limitations of an experimental method should be thoroughly appreciated. Unfortunately, in Dr. Duclaux's highly critical treatment there is no apparent attempt to embody the positive value of ultrafiltration in a constructive plan for its intelligent application. The student should also read the earlier publication by P. Grabar (1943), No. 957 in the same series, an excellent contribution to the subject. W. J. ELFORD

DANISH WORK ON *ALTERNARIA* AND *STEMPHYLIUM*

Danish Species of *Alternaria* and *Stemphylium*

Taxonomy, Parasitism, Economical Significance. By Paul Neergaard. (Communication from the Phytopathological Laboratory of J. E. Ohlsens Enke, Copenhagen.) Pp. 560. (Copenhagen : Einar Munksgaard ; London : Oxford University Press, 1945.) 60*s*. net.

IN the preface to this valuable work, the author explains the circumstances which led him to the study of the genera *Alternaria* and *Stemphylium*. As plant pathologist to the seed firm of J. E. Ohlsens Enke, he appears to have enjoyed absolute freedom with regard to research and every facility for carrying it out. Working in collaboration with the seed-testing laboratory of the firm, he was thus provided with a unique opportunity of studying seed-borne fungi, among which *Alternaria* and *Stemphylium* play an important part. Every year he examined several thousand seed lots, made isolations, carried out inoculation experiments, and studied the morphology of the various species. The results of his studies are presented in this monumental work of 560 pages, copiously illustrated and well reproduced.

The author's approach to the problem of these genera was to study the living fungi. Starting with single-spore isolations, he selected from five to ten isolates one fully representative of the species as it occurred on the natural substratum, and so far as possible he isolated each species from several hosts and in many instances at several different times from the same host. He also obtained cultures from the Centraalbureau voor Schimmelcultures, Baarn. His examinations comprised morphological characters,