

tains some 680 references to papers on this subject, most of which have appeared during the past five years. Thus the fluorescent antibody technique has become the method of choice for the cytological localization and identification of viruses and bacteria in infected cells, and for recognizing structural and secreted macromolecular materials, e.g., hormones or tissue-specific antigens, in cells. It is also by far the easiest sensitive method for recognizing and tracing the detailed fate of foreign antigenic materials, unless these themselves are already labelled by means of fluorochromes or radio-active tracers. In clinical medicine and pathology, however, the most important use of fluorescent protein tracers has probably become not the purpose for which such tracers were originally introduced, namely to trace antigens, but to discover antibodies. By means of the fluorescent antiglobulin reagents it is a relatively simple matter to detect antibodies attached to elements in a tissue section or in a smear, and thus it has been possible to identify several anti-nuclear factors in sera of patients with systemic lupus erythematosus, several anti-thyroid antibodies in cases of lymphadenoid goitre, antibodies against parietal cells in pernicious anaemia, etc. Apart from the detection of auto-antibodies, the application of a similar technique to smears of *Treponema pallidum* treated with suspected syphilitic serum appears to provide a sensitive and specific test for antibodies against this microbe. The list of useful applications could be continued at great length.

The time was obviously ripe for the appearance of a book in which the practical details of the use of fluorescent protein tracers and their applications in practice would be drawn together, and this is what 'Fluorescent Protein Tracing' does. The Editor, R. C. Nairn, and his colleagues, C. S. Chadwick, J. E. Fothergill, K. B. Fraser, and M. G. McEntegart, have themselves been involved in numerous original developments in this field, and their book is obviously written by persons who have intimate practical experience of the problems involved. They include an amount of practical detail which will make the volume very useful to those who want to use the techniques themselves as well as to know about the results of other workers. The coverage of published work is good and well up to date and the aspects discussed include the chemical and optical properties of fluorochromes and their protein conjugates; fluorescence microscopy and photomicrography; the direct use of conjugated protein tracers; and various immunological applications to bacteria, protozoa, etc., to viruses and rickettsiae, and to tissue antigens and antibodies. Cytological and histological problems, on which the success of the method may stand or fall are gone into fully, on the basis of the author's own experience or reports from the literature. There are numerous illustrations, including some handsome colour reproductions, and the index is quite adequate. Although the authors write with understandable enthusiasm they temper this with caution where necessary, as is shown by the following passage (p. 159) dealing with applications of the technique for diagnostic bacteriology:—'Many of the opinions expressed about the part immunofluorescence can play in diagnostic bacteriology seem over optimistic. No one will dispute the value of the method for the rapid recogni-

tion of certain bacteria, but the use of fluorescent antibody requires no less skill, experience and judgment than any other bacteriological procedure, and any impression that it will lead to a "push button" diagnostic service in bacteriology is certainly misleading. The fluorescent method, which has certain special advantages over traditional bacteriological procedures, for example, in the recognition of non-viable organisms and in the simple detection of non-precipitating antibody, now seems likely to become a useful technique available in all well-equipped centres, though more experience is required before its place in diagnostic bacteriology can be defined.'

At a price of 42s. this book is good value, and is thoroughly recommended.

J. H. HUMPHREY

THE ANATOMY OF THE CEREBROSPINAL FLUID. By J. W. Millen and D. H. M. Woollam. (Pp. viii + 151; 92 figures. 50s.) London: Oxford University Press. 1962. Cerebrospinal fluid has been made use of in the diagnosis of disease since the beginning of the century and its potentiality in this direction is far from being exhausted. The pathologist in attempting to assess the significance of his findings, be they the result of examining this fluid or of studying histological preparations, comes up repeatedly against our present-day lack of knowledge concerning the physiology of the fluid. What part is played by the ependymal cells and what is the explanation of the seemingly decreasing importance of their cilia as life advances? What is the source of the *tau* fraction? What is the precise nature of the reabsorption mechanism in the arachnoidal villi and what is the fate of the phagocytic cells?

This monograph does not answer these questions, nor does it pose the many other problems that remain unsolved: in fact little attention is paid to physiology. But it sets out simply yet exhaustively the anatomical facts and doubts concerning the structures comprising the ventricular system. (The title, although understandable and convenient, is strictly a misnomer.) The reader will learn with interest for how long there was uncertainty about the precise siting of the foramen of Magendie and sometimes doubt as to its very existence; so far as man is concerned these questions were finally settled in the operating theatre.

Our knowledge of the detailed anatomy of the many structures concerned in the manufacture, delivery, and reabsorption of the cerebrospinal fluid has naturally been helped by the electron microscope and many recent discoveries receive mention, including some which purport to confirm the authors' well-known view concerning the nature and extent of the perivascular space.

The historical sequence is faithfully followed. Some may have believed that the aqueduct was named after Jacobus Sylvius; he along with Vesalius, Berengario da Carpi, and Arantius certainly knew of its existence, but it was Franciscus Sylvius, it seems, who first correctly described its relations, while it was Arantius (1595) who first called it 'the aqueduct'.

This book is well produced and readable.

W. H. MCMENEMEY