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Medical Research and the Practitioner.

IN the interim report[1] issued recently by the Consultative Council on Medical and Allied Services, under the chairmanship of Lord Dawson of Penn, the proportion given to research is disappointingly small. Perhaps this was inevitable. The medical organisation suggested includes effective laboratory equipment at every stage from the domiciliary work of the practitioner to the conducting of prolonged researches by the Medical Research Council; but the portions dealing with research proper are very generalised. A document like this should be a new charter for medicine, and the scientific mind naturally expects to see the scientific groundwork fully developed. For increased and accelerated research is essential to the continued expansion of scientific medicine. In the report it is hoped

"that the scheme of services which we suggest would facilitate enquiry into the causes of disease and the possible remedies. The facts which indicated the need for such enquiry might, we think, often be brought together in the first instance by the medical practitioners in a given locality."

It is difficult to justify the hesitating note of these sentences. Medical practice bristles with unsolved problems; but usually the practitioner is inadequately trained to discover them. Sir James Mackenzie shows what a general practitioner can do when he has the interest and the capacity to train himself. The war has unveiled many gaps in scientific medicine. Even the war reports of the Medical Research Council, not to refer to the many others, prove that the science of medicine will not advance merely by a re-shuffling of the medical army, but by greater intensity of research and discovery.

Medicine has to face the fact that, for practical purposes, it knows nothing about the cause of measles, scarlet fever, mumps, influenza, rheumatic fever, cancer, or other forms of malignancy; nor is the knowledge of the causes of dead and premature births more than elementary. These are only a few illustrations taken from the Medical Research Committee's fifth annual report. It is reasonable to expect that, in a scheme that brings the medical profession into a unity, the clotted masses of problems facing the general practitioner and scientific worker alike would be sketched with precision and force. The report does add that

"there are great and important opportunities for research in preventive medicine, which at present are scarcely dealt with by any organisation, and mostly are not attempted by individuals. Encouragement of research in the prevention of disease should, we think, be developed, for the materials are everywhere, and the results would undoubtedly be valuable."

From this the lay public would not readily gather that the future value of the general practitioner to the State depends on the development of research in at least the following sciences: biology, physiology, bio-chemistry, pathology, and experimental therapeutics. To the raw materials of such researches the various classes of medical practitioners can contribute; but they have little stimulus to do so unless they keep more closely in the currents of the scientific work of the schools.

The report indicates that, for the purposes of research into fundamental problems, "the profession would no doubt look to the Universities and the Medical Research Council for guidance and assistance." When we reflect that the medical profession has to deal with sanatoria for tuberculosis, recuperative centres, hospitals for curable or incurable mental disease, institutions for the feeble-minded, epileptic colonies, orthopædic centres, hospitals for infectious diseases, not to mention general hospitals and the innumerable fresh points emerging in every man's practice, there is abundant occasion to look both for "guidance and assistance."

What we miss here is a compact and well-loaded presentment of the case for research from the general practitioner's point of view. At present neither general practitioners nor consultants have an adequate conviction that more and more as time goes on the value of their work will depend on the capacity to understand and to prevent the beginnings of disease, and that, without effective training in research at some stage of their career, they can make little headway in pre-

[1] Ministry of Health Consultative Council on Medical and Allied Services. Interim Report on the Future Provision of Medical and Allied Services. Pp. 28. (London: H.M. Stationery Office, 1920.) Cmd. 693. Price 1s. net.

ventive medicine as now understood. The general practitioner's part in "field" and "team" research might well form the subject of a special reference to the Consultative Council on Medical and Allied Services. If the world of general practice does not realise that research is of vital importance to every branch of medicine, such is certainly not the case with the world of science.

Theory of Dioptric Instruments.

Ferraris' "Dioptric Instruments": Being an Elementary Exposition of Gauss' Theory and its Applications. Translated by Dr. Oscar Faber from Prof. F. Lippich's German translation of Prof. Galileo Ferraris' Italian work entitled "The Fundamental Properties of Dioptric Instruments." Pp. xxxi+214. (London: H.M.S.O., 1919.) Price 4*s*. net.

THE original of this translation was published by Prof. Galileo Ferraris, of Turin, in 1876. As a copy of this original could apparently not be procured, the English translation was made from a German one by Lippich, which appeared in 1879. At the time of its appearance the book unquestionably marked a great advance in the treatment of its subject, and well deserved the extremely favourable review with which Abbe honoured the German translation in the first volume of the *Zeitschrift für Instrumentenkunde*.

Abbe himself, however, has to be credited with far greater advances in the theory of image-formation by optical instruments with which the book before us deals, for his purely geometrical treatment of the problem leads to the same results without being limited to the infinitely constricted "threadlike space around the optical axis" which still plays so large a part in text-books, although, with light of finite wave-length, nothing of any optical interest can possibly happen within it. On the other hand, Abbe was the first to deal systematically with the actual course of light through instruments in accordance with the limitations imposed by restricted apertures and by deliberately placed diaphragms, and inasmuch as the great majority of actual instruments are used only at fixed or nearly fixed conjugate distances, the actual course of the rays so determined is of far greater importance and value, both in the designing of instruments and in the discussion of the effects produced by them, than the rays referred to the Gaussian principle and focal planes and points which form a convenient *pons asinorum* in the general theory of lens systems.

Ferraris' treatment of the Gaussian theory is, however, less open to the objections just alluded to than that adopted in most books, and in dealing with the Galilean telescope he comes remarkably close to the correct treatment of the problem of its field of view, which is so easily obtained now by Abbe's theory of the entrance- and exit-pupil of instruments. Beginners and users of optical instruments desiring to acquire a general knowledge of their elementary theory will also welcome the numerous and frequently elegant graphical solutions of the various problems which are given throughout as alternatives to numerical calculations by algebraical formulæ. The chief and decidedly regrettable omission is that the simple problem of achromatism is not dealt with at all. It is, of course, not a part of the Gaussian theory, and the omission is therefore justifiable; but it is so closely bound up with the proper explanation of the effects produced by compound object-glasses and eyepieces that the book would certainly have gained in value if the subject had been included.

The book is not so free from misprints as one would wish, and there is a really bad muddle on pp. 87–94, where the properties of thick lenses are discussed. This is not a case of a simple misprint or transposition of diagrams, but of actual errors by either the original author or one of the translators. Thus on p. 87 a thick biconvex lens is stated to be convergent if its thickness is less than one-third of the sum of the radii (both taken as positive, with $\mu = 1{\cdot}5$). This should be three times instead of one-third. Then, on p. 93 a meniscus with the shorter radius on its concave face is stated to be always convergent; and on p. 94 the meniscus with the shallower curve on the concave face is credited with being divergent, telescopic, or convergent according to thickness. The actual facts are, of course, the other way about. Immediately after this the properties of a concentric lens are correctly stated.

On p. 144 the strange conclusion is reached that of two eyepieces of the same equivalent focal length that one is to be preferred which has the *closer* eye-point. This is directly contrary to the experience of every observer.

In the calculations of the properties of the human eye, or rather of its "simplified model," the author sets a very bad example by starting with data given with three significant figures and undoubtedly uncertain even then in the third figure, and calculating all the deduced figures with six, and even seven, significant figures (pp. 71–75). The idea of beginners that the percentage-accuracy of observed data can be indefinitely increased by putting them through the mathe-