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Medical Research.

A TEACHING hospital will not be content solely with making the best possible provision for the treatment of injury and disease and for imparting knowledge; it will recognise as one of its most important functions also the increase of knowledge.

"The problems of disease presented by living patients are the most difficult and complex in the whole range of the physical and natural sciences. Much light can be shed on them by investigations conducted in physiological, chemical, pathological, pharmacological, and bacteriological laboratories, especially by experimentation on animals; but it is increasingly clear that the scientific study of many of these problems can be undertaken with the greatest advantage in well-equipped, special laboratories connected with the hospital clinics and in charge of investigators trained in chemical, physical, and biological methods, with convenient access to the material for study and in close touch with the clinicians.

"The familiar analytical and statistical study of cases of disease, based on simple clinical observations, and first extensively and fruitfully applied by the great French clinicians of the early part of the last century, has been of immense service to medicine, and will continue to be of service. A good clinical observation has precisely the same scientific value as a fact demonstrated in the laboratory, and, even if more difficult of interpretation, is often the safer guide for the action of the physician.

"It is, however, from the special clinical laboratories that we may reasonably hope for a more penetrating insight into the causes and nature of many diseases, an insight which perhaps may arm physicians with a saving power of prevention and treatment of some of the organic diseases of advancing life comparable to the inestimable gifts of bacteriological laboratories to the prevention and treatment of infectious diseases. We must welcome the establishment of such laboratories and the new directions which they are giving to medical research. When the purposes of such laboratories are made clear, their foundation and

support should make an especially strong appeal to public and private philanthropy."

I have quoted these remarks made some thirteen years ago by the distinguished leader of American medicine, Prof. William H. Welch, of the Johns Hopkins University, because they express so precisely the motive and the object of the reforms to be effected at the University College Hospital Medical School with the help of the Rockefeller gift. Dr. Welch spoke not only with deep insight and eloquence, but also with the experience he had gained as the Father of the Johns Hopkins Hospital and its famous Medical School.

The aim of the reforms of medical education that were introduced at the Johns Hopkins University in 1893 was primarily to educate the medical student rather than merely to prepare him for examinations. In other words, every encouragement was given him to learn by personal observation and experiment and to rely upon his own judgment; and he was provided with every facility in the way of properly equipped laboratories and ample material to carry out this scheme of work. Above all, he was given the time, undisturbed by multitudes of didactic classes, in which to cultivate his powers of observation and acquire knowledge by his own efforts. In other words, the ideal was to make every student and member of the staff devote himself to original research and the advancement of knowledge. How fruitful such a method can become we know from the history of our schools of physiology. The influence of the great reforms introduced at University College by Prof. Sharpey eighty years ago was carried to Cambridge by Sir Michael Foster, to Oxford by Sir J. Burdon Sanderson, and to the Johns Hopkins University by Prof. Newell Martin; and the result of these practical methods of studying physiology has been to convert almost every department of that subject into an institute of research and a perennial source of new knowledge.

The contrast presented by departments of anatomy in the English-speaking world, before 1893 in America, but even now in this country, is profound. The remarkable activity of physiology has been one of the contributory causes; and the very circumstance that Sharpey, the reformer of physiological education, was primarily a professor of anatomy was one of the factors in sterilising the spirit of adventure in his own subject. This paradoxical result was due to the fact that as a professor of anatomy and physiology Sharpey was

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at liberty to take from the former subject the more vital and interesting parts with which to render attractive his own particular hobby, practical physiology. When his disciples carried the new physiological gospel to Cambridge and Oxford (thence to English-speaking schools the world over), histology and embryology were regarded as part of the work of the department of physiology. This could not have happened if anatomy during the last half-century had had any men like Sharpey, Foster, Burdon Sanderson, or Gaskell to claim their rights and obtain the necessary laboratories and equipment for real research in anatomy. Instead of this, while most of the schools of anatomy fell into a condition of inertia, the gospel taught in the one active and dominant school was the complete repression of the scientific imagination and the crushing of all research that was not a mere record of facts. Franklin Mall was able to do what he did in America because he was not subject to this paralysing influence which was crippling British anatomy.

It is necessary clearly to appreciate these historical circumstances in order to understand the present contrast between the attitude towards research in anatomy in American and British schools. In many of our departments no attempt whatever is made to add to knowledge; in fact, in certain of them there is not merely apathy, but even active opposition to original investigation. But, for the historical reasons I have mentioned, there is no adequate provision in any anatomical department in this country of the means for carrying on research, even when the staff and students are anxious to do so. Those anatomists who, in spite of these obstacles, have been keen enough not to be altogether discouraged by them have in many cases done excellent research, but only to find, in not a few instances, that their zeal was regarded as an obstacle to their professional advancement.

Now that this unfortunate and not very creditable chapter in British anatomy is coming to a close, it is important to get a clear idea of the aims of such an Institute of Anatomy as the Rockefeller Foundation's gift will enable us to build up in London.

The chief purpose of the new building will be to provide ample room and equipment to permit the staff, graduate students, and even undergraduates, to investigate any aspect of the problems of man's structure and development. There will be dissecting-rooms and museums for the

study of macroscopic structure, and laboratories and museums for the investigation of the manifold problems of anthropology and man's evolution; but there will also be laboratories for the practical study of embryology, histology, and neurology, both human and comparative, and every necessary kind of equipment for work in any of these subjects. Proper provision is to be made for research in radiography, with special reference to the light it throws upon the structure and functions of the living body and its development. In other words, the new institute is intended to provide accommodation and equipment for research in every aspect of anatomy and anthropology; and the close association which is to be established with the departments of physiology and vertebrate anatomy and with the hospital will help to widen the outlook of investigators in anatomy and give them a clearer vision. Special importance is attached to this integrating aspect of our scheme of work, because it is proposed to create in the institute a department for the experimental study of the factors that influence growth and development and the causation of anomalies of structure and pathological monstrosities. Research in experimental embryology has been one of the most fruitful and significant fields of work in American anatomy departments within recent years. It is difficult to exaggerate the importance of the work carried on at the Carnegie Institute of Embryology by such men as Drs. Streeter and Lewis and their collaborators, by Dr. Ross Harrison at Yale, and by Dr. Stockard at Cornell Medical School, to mention only a few out of many.

In addition to these fields of investigation, many of the schools of anatomy in America carry on experiments in genetics, not so much for the purpose of studying Mendelism as for correlating the results of breeding experiments with other branches of work in anatomy and experimental embryology.

To carry out a programme of this sort it is our aim to have a staff numerous enough to give every member at least half his time free from teaching to devote to research; for a teacher who is not actually engaged in investigation is merely a retailer of second-hand goods.

At a time when this serious attempt is being made to provide proper facilities for carrying on research in anatomy, it is particularly gratifying to know that the University of Cambridge has appointed to its chair of anatomy the most learned British exponent of the technique of

anatomy and embryology. By his extensive and exact knowledge of anatomy and his technical skill, no less than by his personality and sound judgment, Prof. J. T. Wilson will exert a great influence in the encouragement of anatomical research in this country. His appointment to Cambridge inspires the confidence that the dark days of British anatomy are numbered.

G. ELLIOT SMITH.

Intellectual Stock-taking.

(1) *Science and Theology: Their Common Aims and Methods*. By F. W. Westaway. Pp. xiii+346. (London: Blackie and Son, Ltd., 1920.) Price 15s. net.

(2) *Recent Developments in European Thought*. Essays arranged and edited by F. S. Marvin. (The Unity Series.) Pp. 306. (London: Humphrey Milford; Oxford University Press, 1920.) Price 12s. 6d. net.

THERE seems to be a general disposition at the present time to take stock of the achievements of the human race in the generation which lived before the great cataclysm of the world-war. We feel, as mankind felt a hundred years ago after the great upheaval of the French Revolution and the succeeding Napoleonic struggle, that we are at the beginning of a new age. If we are to be effective in reconstructing and directing the new life of humanity, we must know the nature and extent of the forces in hand so far as they are under our control. The two books before us attempt this task in a very different manner. The first is the effort of a single worker to gather up and present, in a compact form and without bias, the definite results of recent scientific, religious, and philosophical research, and where they are conflicting or antithetical to state the case for each. The second book is the joint production of several workers, under the leadership of the author of "A Century of Hope," to express the characteristic features of the philosophy, religion, science, art, and history of the last half century, or more precisely of the period which begins with the Franco-German War of 1870 and ends with the outbreak of the great war in 1914.

(1) Mr. Westaway's work is primarily addressed to students of theology, and intended to aid them in finding a philosophic basis for their science. Before they can have this philosophic basis, however, they must, he thinks, master the main principles of mathematics, of science, and of scientific method. If, the student is told, he resorts to metaphysical arguments concerning

the infinite before he has made himself acquainted with the nature of infinity in mathematics, he is violating the first principles of common sense. The same is true of physics, biology, and psychology. The student, we are afraid, will think it a hard saying, but then here is Mr. Westaway's epitome of the bases of all knowledge offered to him in tabloid form, compact and neat as in a medicine chest. Every theory that is held by anyone of authority in the sciences and philosophies, or which can be held, is set forth in abstract terms, and each summary of results is supported by a formidable list of books of reference. The theological student is left without excuse.

(2) A very different tone pervades the book edited by Mr. Marvin, for in this the personality of each of the twelve writers is given full expression. It makes the diversity more interesting than the unity. Perhaps the most telling contrast is between the positivistic tone of the general survey with which Mr. Marvin introduces the course, and the idealistic exuberance with which Miss Melian Stawell closes it. But surely the oddest contribution to the volume is Prof. Taylor's estimate of the philosophy of the last half century. It begins with a mystifying line of asterisks, and ends with a "note." The note is appended as an "apology" for omitting Bergson, or, rather, for refusing to regard that philosopher as other than a transient and spent force. The reason given is that his earliest work in its opening chapter contains "a couple of elementary blunders," and on these the whole of his philosophy is based. The note is certainly necessary, because the other essays in the volume might easily lead the reader to imagine that the period had been dominated by the philosophy of Bergson.

The meed of honour in philosophy is awarded by Prof. Taylor to Mr. Bertrand Russell, mainly on account of his joint work with Prof. Whitehead in "Mathematica Principia." He thus agrees with Mr. Westaway in holding the mathematical theory of infinity to be the basis on which philosophy must build. There can be no doubt that if the award is to be decided in the manner of the Greeks after the battle of Salamis, Mr. Russell must be acclaimed *facile princeps*, for there is no living philosopher in regard to whom such striking unanimity prevails. No one agrees with him, but everyone is anxious to set forth his reasons for disagreeing. Prof. Taylor is no exception. He looks in vain for any recognition by Mr. Russell of what he regards as the one vital and absolute necessity of philosophy, the attainment of knowledge about the soul and God. For this he refers us to the two eminent Italian