tory. I have not so much direct knowledge of the influence exerted by Dr. Meltzer in the numerous other societies of which he was a member. In the case of the Society for Experimental Biology and Medicine we know that he was its chief founder and for many years its primum movens—it was long known familiarly among scientific men as the Meltzer Verein. I have no doubt that in every organization with which he was connected his influence was always exerted on the side of the highest scientific ideals—no other position was possible for him. He was high-minded, courageous, sincere and optimistic. Age oftentimes lays a stiffening hand upon the scientific worker, causing him to shrink from the laborious routine of research, but with Meltzer there was never any indication of weariness or sense of failure. In spite of much ill-health and physical suffering in his later years he was full of hope and energy and determination in the pursuit of his scientific ideals and problems. Death came to him, as he would have chosen, while in his study and at his work. He was a good and faithful servant in the cause of medical research. Rewards came to him in the form of academic honors and membership in the most important medical and scientific societies, but I am confident that he found his greatest recompense in the joy of the work and in the affectionate appreciation of his many scientific friends.

W. H. Howell

THE RELATIONS OF PSYCHOLOGY TO MEDICINE[1]

A sufficient excuse for this discussion of an old theme is the notable rapid progress of both psychology and medicine, and the consequent changes in their actual and prospective relations. Fresh consideration of the question what should be the relation of psychology to medicine may benefit alike the sciences and the art concerned. The discussion may not be exhaustive; instead, it must be limited to an outline of the theme and the indication of those characteristics of the two principal subjects which are preeminently important as conditions of profitable working relations.

Medicine as an art strives to maintain or restore the health of the human being. The object of the physician's concern, his patient, ordinarily is both active and conscious. It is therefore desirable that the practitioner be thoroughly grounded in the facts and principles of human action and experience. Although this may seem self-evident, it has not been accepted generally in medical education. The history of medicine indicates that it has long sought to attain a reliable and adequate scientific basis for the practise. Naturally enough, knowledge of structure was first of all sought, and in consequence, the science of gross anatomy developed. Subsequently it gave rise to histology, cytology, embryology, pathological anatomy, and bacteriology, all of which are now recognized as essential morphological bases for the art of medicine. Paralleling the growth of the knowledge of structure, although somewhat more recently and more slowly developed, are the various sciences which deal with organic functions. Among these, human physiology was first chronologically, and first in importance to medicine. For several centuries it has grown steadily, gradually extending its inquiries to most of the important types of organic process. From it have arisen a number of special sciences of function and its alteration, as, for example, in immunology, pathology, and certain aspects of pharmacology. But strangely enough, physiology has failed to take possession of those large and important groups of phenomena in human life which are designated by the terms behavior, conduct, experience, and mind.

[1] Address of retiring vice-president and chairman of Section I, American Association for the Advancement of Science, Chicago, 1920.

Viewed as functional aspects of human life, these phenomena appear to be wholly appropriate material for the science of physiology. That they have not been considered other than casually is doubtless due to the difficulty of devising methods for their exact study, and the historical relation of conduct and experience to philosophy and to the experimental psychology which emerged from it.

It seems entirely fitting to ask, in view of this limitation of the scope of physiology and the dependence of medicine upon thoroughgoing and intimate knowledge of life processes, does medicine need a science of human behavior and experience as one of its fundamental or basic disciplines? A generation ago this question would have been answered in the negative by the majority of physicians, possibly even by many of those who were most intimately responsible for the development of physiology. At present, the situation is radically different, because it has become clear that the science of psychology has developed important methods and assembled a body of facts whose theoretical and practical importance can not safely be ignored. Demonstrations of the practical applications of mental measurement, as for example in the army, in educational institutions, in industry, in penal institutions, and in hospitals, have attracted the attention of intelligent physicians, and have caused many of them to take an aggressive and constructive attitude with respect to the relation of psychology to medicine. They will unhesitatingly give an affirmative reply to the important question which has been formulated, and will earnestly support their position by pointing out the vital importance of knowledge of human action and human experience in every practical situation which confronts the practitioner. Some of them may go so far as to maintain that the average physician of to-day is quite as ignorant of the structure and functions of the human mind and of the activities through which experience gains expression, as were his predecessors of a thousand years ago of the structure and functions of the body. And they may further maintain that most physicians are entirely untrained in methods of observing and measuring human action and experience, and therefore unable to apply even the simple and well established procedures of practical mental measurement.

Assuming, then, that the medical profession recognizes its need of systematic knowledge of human behavior and experience and of the technique necessary to the acquirement and extension of such knowledge and its practical use, it is necessary to consider next whether psychology or any other existing discipline is prepared to meet this need, and if so, how it may best be done. This necessitates an examination of the status and meaning of psychology.

It is unfortunately true that many intelligent and highly educated persons, among whom are some physicians, are confused and misled by the diverse developments of psychology. This is chiefly because psychical research, spiritualism, certain kinds or fragments of philosophy, mental telepathy, isolated products of introspection, and various methods of studying behavior and conduct, each and all claim the name psychology. It is inevitable that this state of affairs should confuse the person who, unacquainted with the problems of behavior and experience and likewise unfamiliar with the methods of solving them, views the manifestations of psychology as an interested observer. It should be remarked, however, that the situation is not essentially different from that in medicine, for there the disinterested observer notes the existence of

numerous medical sects, each of which more or less insistently and ostentatiously claims for itself either a monopoly of what is useful in medical practise or the most fruitful of therapeutic methods. The layman, consequently, has grave doubts and misgivings about the trustworthiness of the art of medicine and the adequacy of its scientific basis, which are identical in principle with those entertained by the physician for psychology. It is therefore very much to the point to establish the fact that there exists a genuinely reliable, thoroughly scientific, and progressive science of behavior and experience, which rightly claims the name psychology, just as there is a reliable body of knowledge concerning human form, function, and disease, which is called medicine. The fact that the word "regular" must be used by a certain group of medical men to distinguish themselves from other medical sects should not be overlooked in this connection, for what is desirable or necessary in medicine happens to be equally so in psychology. It is also true that the broadminded, genuinely scientific psychologist is likely to be as much offended by the name telepathist, or spiritualist, as is the "regular" physician by the name eclectic, or osteopathist.

There are at least five principal phases or aspects of modern psychology which deserve mention although they have widely differing significance for medicine. They may be designated as philosophical psychology, psychical research, introspective psychology, genetic psychology, and behaviorism.

Philosophy, not many generations ago, included all of the disciplines which are now called natural sciences. Psychology has been slowest to emancipate itself, chiefly because its phenomena are most difficult to study by scientific methods. From certain points of view, philosophical psychology is quite as important as any other aspect of the subject, but for the present, at least, it need not especially concern medical education or medical practise, and least of all should it be permitted to obscure the development of psychology along lines similar to those followed by the other natural sciences.

Despite claims to the contrary, psychical research, and the spiritualistic developments of psychology, are too uncertain of their facts and either too uncritical or unreliable as to methods to be seriously considered in connection with practical problems. What may develop from or through them it would be rash to attempt to predict, but it is obviously safe to maintain that they do not constitute the science of psychology and lack immediately important significance for medicine.

The primary development of psychology and its center of reference is the psychology of the self. This is necessarily a product of introspection or self-observation. It is the aim of introspective psychology to discover the elements of experience, to formulate the laws of their combination, and to describe those complex phenomena which constitute mind. That much has been achieved in this direction must be evident to any intelligent person who reads attentively the works of leading introspective psychologists. Medicine can no more afford to neglect this important method of studying experience and its expressions than can education or any other art which works upon human material. But it is equally true that introspective psychology may not fairly or profitably be accepted as the whole of the science.

The term genetic psychology has been applied to the historical or developmental description of behavior and experience, which results from the application of the

method of comparison to the materials of observation. In this branch of psychology, the development of behavior and of mind in the individual and also in the race is studied by means of objective methods similar to those of physiology, and by the method of self-observation whenever it is applicable. Genetic psychology is even more intimately related to the medical sciences and their practical applications than is introspective psychology.

The name behaviorism has been applied to a recent development which, in effect, is a revolt against the introspective method. By the application of objective methods identical with or similar to those of physiology, it undertakes to discover and describe the various phenomena of mental life and to formulate their laws. In its extreme form, it is merely the extension of physiology to include all types and aspects of human activity and experience. It may be pointed out in this connection that the science of physiology has made few attempts to study forms of activity other than reflexes. Behaviorism would alter this situation by subjecting instinctive, habitual, and voluntary actions to scientific analysis and measurement.

It has been asserted that the general science of psychology is neither psychical research, on the one hand, nor its logical extreme behaviorism, on the other hand. Instead, like medicine, it is inclusive of what is valuable in the methods and reliable in the results of all of its branches, aspects, or special developments. For psychology in its medical relations, the term psychobiology is proposed. This term suggests the study of experience as biological phenomenon. In introspective psychology, in genetic psychology, and in behaviorism, there is much that should be valuable to medicine. Assuming that it comprehended the important scientific procedures and the established facts and principles of the several branches of psychology, psychobiology would constitute a natural bridge between physiology and psychiatry. On the one hand, it would appear as a mere extension of physiology to include human behavior and experience, and on the other hand, it would exhibit kinship to psychiatry in the utilization of the subjective or introspective method. Whether or not it be considered a distinct science, psychobiology would serve to link the basic functional science of physiology with neurology and psychiatry.

The history of medicine clearly enough indicates gradual emancipation from superstition and the slow achievement of that immense body of knowledge which renders medical treatment increasingly certain and safe. Throughout this history, mental disorders have been less intelligently, less scientifically, and less satisfactorily treated than have most others. One obvious reason for this condition of affairs is the lack in medical schools of any provision for the training of students in psychobiology. Medicine, by its passive attitude toward the development of this science, has permitted, if it has not also encouraged, the development of numerous one-sided and extreme sects whose avowed purpose is the cure of human ills by psychological means. There exist to-day several species of psychotherapy or psychological medicine, and, in addition, such religious movements as the Emmanuel Church Movement, which perhaps would not have developed and certainly would not have flourished so remarkably had medicine provided in its schools and hospitals for the development of psychobiology as it has for the development of physiology.

Granted that medicine needs psychobiology, and that the status of the science, although unsatisfactory in many respects, is

such as to justify its introduction in medical schools, what might immediately be undertaken? This question certainly should not be answered in the same way for all schools. Consequently the following possible lines of activity should be considered in their relations to local situations and special needs. Even though excellent general courses in psychology be available in colleges or other medical preparatory institutions, it may reasonably be maintained that psychobiology should be given a place, at least tentatively and experimentally, in progressive medical schools, for only in the midst of medical research, education, and practise, can psychobiological methods, knowledge, and laws, be rapidly and effectively developed to meet the needs of the physician.

The following activities are suggested as immediately practicable and desirable in the larger medical schools, provided always that a thoroughly competent biologically trained psychologist is available.

I. There could be presented, initially as a voluntary course, if it is not expedient to add a new subject to the curriculum, a lecture, demonstration, and laboratory course in psychobiology, which should acquaint medical students with the principal facts and laws of human behavior and experience and with the more important methods of observing and measuring these phenomena.

II. A groundwork in psychobiology having been prepared by the general course, opportunity should be afforded interested students for more intensive training in the use of psychobiological methods. This should provide alike for training in the methods of practical measurement and for psychobiological research. In connection with the latter, investigation might be undertaken of problems formulated in the lecture course in connection with such topics as the analysis of instinctive activities; the development, modification, and integration of habits; the nature and significance of ideational types; the discovery of peculiarities or defects of behavior and experience. Similarly in connection with practical psychobiological measurement, the medical student might be given opportunity to utilize or develop methods of measuring aspects of behavior and experience in relation to diagnosis and treatment. Important types of practical psychological tests might also be exhibited in their relations to medical aspects of hygienic, industrial, and educational problems.

III. As an extension of psychobiology toward psychiatry, special lectures and laboratory exercises dealing with atypical, abnormal, or pathological behavior and experience could be provided. These might ultimately be expected to develop into a systematic course in psychopathology, which should be carefully correlated with the established medical instruction in neurology and psychiatry. In this same connection, as a method of supplementing such practical and research activities as are referred to in the preceding paragraph, psychobiological methods might be placed at the service of the neurological and psychiatric clinics, for psychology has already developed a considerable array of methods whose diagnostic value in neuropsychiatric practise has been definitely established.

IV. Another important field of service for psychobiology is preventive medicine and hygiene. Here, research in connection with the characteristics and variations of behavior and experience which are significant of undesirable or dangerous nervous or mental tendencies is particularly in point, although didactic lectures might also be offered to advantage. Thus psychobiology might be utilized increasingly as

the partial scientific basis of mental hygiene.

It is the conviction of the writer that urgent need exists for pioneering in psychobiology as a basic medical science. It has already been suggested that this pioneering should be done in a medical environment, for by taking the matter into its own hands the medical faculty should be able to secure, more quickly and satisfactorily than otherwise, those developments and applications of psychobiology which are clearly desirable. It will not suffice to meet the general needs of medicine, if psychopathology instead of, rather than in addition to, the more inclusive discipline psychobiology, is established in leading medical schools. For it is quite as improbable that the medical student will acquire adequate training in psychobiology during his premedical years as that he will acquire similarly adequate training in physiology or in anatomy.

There are three important possibilities with respect to the administrative relations of psychobiology in medical schools. The subject may be treated as a part of physiology, it may be established independently, or it may be associated with neurology and psychiatry. For the sake of its development as a fundamental discipline, it would appear preferable to have it either associated with physiology or given an independent status during the experimental stage of its development in a medical environment. To place it with physiology would tend to lessen administrative problems and to simplify the organization of instruction and arrangements for research, but, on the other hand, it should be recognized that the clinical relations of psychobiology are likely to be much more numerous and compelling than those of physiology and to make it more and more truly the connecting link between physiology and psychiatry. For the former subject, it must always appear as a logical extension of its field of interest; for the latter, as an essential part of its scientific basis.

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SCIENTIFIC EVENTS

MEDICAL EDUCATION IN CHINA[1]

RECENT reports state that in all China there are found to be less than 2,000 physicians. What a small proportion of the population of 400,000,000 Chinese people can receive scientific treatment in case of illness or injury! In an effort to ascertain the exact number of students looking toward medicine, if not also to stimulate the youth of China to look toward the practise of medicine, a survey has recently been made of the middle schools of China. In 153 of the institutions reporting, there are 36,095 students, and of these 1,153 stated that they were planning to study medicine. Since this is only about 20 per cent. of all middle schools, the total number who may enter on the study of medicine will be considerably larger.

The Rockefeller Foundation is said to have abandoned its purpose of erecting at Shanghai a great medical school similar to the Union Medical College at Peking. This decision is said to be due to the fact that in its initial session the college had a class of only seven students, although $6,000,000 had been expended for its construction and maintenance. This small attendance is said to be due to the fact that the medical course is given in the English language and that only a small number of the universities and schools in the neighborhood of Peking emphasize their courses in English. The situation is said to be quite different at Shanghai, where English is more generally taught, which will insure larger numbers of Chinese medical students.

In order to provide a clear field when a large

[1] From the *Journal* of the American Medical Association.