

PRESIDENT'S ADDRESS

THE SCIENCE OF MEDICINE

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Mr. Chairman, Ladies, and Gentlemen:

Please allow me to preface this address by extending to the Academy my thanks for generous and active cooperation during my tenure as president of the organization. I wish, also, to express thanks to the president and faculty members of the University of Tulsa for their hospitality and active interest in this meeting.

Medicine, like other technical human activities, has had its principal development within a relatively short space of time, and that development has been due very largely to the application of facts of comparatively recent origin in the fields of the biological sciences and the physical sciences. With the acquisition of these facts, medicine entered a new era—an era where rationalism is taking the place of empiricism.

The biological sciences have given an intelligent insight into medical problems that was, not possible before the tremendously important discoveries in those sciences during the last seventy-five years.

There are many problems in medicine that cannot be understood without a knowledge of how the body develops, of the changes which take place during certain periods of its development, and of the laws which govern the development and the changes.

For the purpose of illustrating the statement which I have just made, let me cite a few examples:

There are certain cysts that sometimes develop on the side of the neck, usually some years after birth, and are characterized by an enlargement that progressively increases. They are called branchial cysts. They develop because of an embryological error in connection with the branchial arches and branchial clefts. When one understands about these structures one can understand how branchial cysts may develop when there has been embryological malformation of the branchial arches and clefts. Not only that, but such knowledge is of inestimable value in assisting the physician to make a correct diagnosis and give proper treatment.

Occasionally one sees a patient, usually about the adolescent period, or just before, with a very uniform swelling exactly in the mid-line of the front of the neck, and near the floor of the mouth. It is painless. It is tense. It gradually increases in size. It is covered by normal skin. When one sees such a swelling or enlargement, one thinks, if one is familiar with the embryology of this region, of a thyro-glossal cyst—a cyst that develops because the thyro-glossal duct has not been normally obliterated. This duct is the stem which connects the embryological thyroid gland with the ventral wall of the pharynx from whence it had its origin. The thyroid gland originating there descends in front of, behind, or through the hyoid bone, finally coming to its normal resting place at the upper part of the trachea. Normally, the tubular structure behind it becomes obliterated. When it does not, one of these cysts may form, because of the retention of the secretion by the vestigial mucosa.

Occasionally a "clumsy minded" physician incises one of these cysts, when a mucoid material escapes, but it does not heal. Thereafter, there is a discharging fistula that can be cured only by dissecting out the tract up to the base of the tongue—an operation that should be done in the first place, before incising the cyst; because after it is incised it is more difficult to outline, and there is danger of infection.

Hernia—vulgarly called “rupture”—is another and more familiar example of difficulties arising because of improper or inadequate biological development. Herniae are generally found in connection with three congenitally weak places in the abdominal wall. One of them is in the inguinal region just above the groin. Another in the femoral region where there is an opening, on the inner side of the large blood vessels of the thigh, which communicates with the abdomen. A third is at the umbilicus where there is often a weak area. A knowledge of the biological facts concerned, not only make it possible to arrive at a reasonable conclusion about the development of hernia, but the successful operation for its cure depends largely upon a proper conception of these facts.

In the body there are structures that, through evolutionary changes, are vestigial in character. They are no longer essential biological structures. The wisdom teeth belong to this class. The vermiform appendix is a vestigial structure. Having no useful function, such structures have low resisting power. Consequently, they are frequently diseased. A proper knowledge of their biological status makes it possible to understand why they become diseased, and to formulate the proper treatment when they are diseased.

Medicine is indebted to the biological sciences for invaluable information about heredity—information that is of tremendous value from both a physical and a psychological point of view. Through it, the conclusions of Mendel have been definitely established. It now appears that there is nothing more certain than the transmission from parent to offspring of physical and mental characteristics and peculiarities. Those who are fundamentally sound in body and mind have children who are sound in body and mind. Those who are fundamentally unsound in body or mind, if they have children, send the scourge of physical or mental disability on its way to cripple future generations.

In connection with my work I have an opportunity to see many children, and some adults, who come seeking relief for hare-lip and cleft palates. Many of them have horrible deformities. In almost every case there is a history of the same kind of defects in parents or grandparents. The same is true in congenital club-foot, congenital club-hand, and in other congenital deformities and distortions of the hands and feet such as supernumerary digits, webbed toes and webbed fingers. All of these congenital defects are inherited. If it were possible to prevent fatherhood or motherhood in the case of all persons who have such defects, the time would soon come when they would be unknown.

This law holds just as definitely and just as relentlessly in the transmission of criminal tendencies and certain forms of insanity. Criminals of a certain type have a certain number of children who are criminals of the same type. Men and women having certain forms of insanity, latent or active, bear a certain number of children who will have the same forms of insanity. If it were possible to apply to the human family the same scientific rules that the careful horse or cattle breeder applies, the population of our prisons and hospitals for the insane would be tremendously reduced.

Chemistry, one of the oldest of the fundamental sciences, has been associated with medicine for many centuries. While the medieval chemist tried to transmute the baser metals into gold, he at the same time tried to find a panacea for disease.

At first the application of chemistry to medicine was not uniformly scientific because the chemistry of the body was not understood. But early in the last century Claude Bernard inaugurated the study of physiological chemistry. Since then, and especially during the last forty years, physiological chemistry has become the indispensable connecting link be-

tween orthodox medicine and orthodox chemistry. Now medicine employs chemistry not only in the preparation and investigation of drugs, medicinal agents and food stuffs, and in the determination of the chemical qualities of the secretions and excretions of the body, but also in the more complex investigations of the blood, the determination of the specific activities and functions of the organs of the body, the isolation of the active principles of those organs, their relation to each other, and the causes and rate of cellular activity. There is probably no field in medicine in which there are greater possibilities than in the field of physiological chemistry.

Physics has made valuable contributions to medicine. For example, through an understanding of the phenomena controlled by the laws of physics, the physician is able to visualize what has or may have happened to the brain in connection with blows upon the head. Through a knowledge of the laws of physics, it is possible for the physician to erect a reasonable hypothesis about the effects of direct or indirect trauma of the spinal column. It is through an understanding of physics that the physician secures reliable information from such every day procedures as palpation, percussion, and auscultation, not to mention the more intricate procedures in connection with the physics of sound and light and electricity.

But all these facts—facts derived from the biological sciences, and facts derived from the physical sciences—must, in medicine, be considered in connection with clinical phenomena. They must be considered in their relation to a particular individual problem that may be modified by heredity and occupation; by environment and disease; by youth and old age; by racial characteristics and climatic conditions. Is it a problem in chemistry? In medicine the retort is the human body. Is it a problem in physics? Here force, stress, and strain must be computed in their relation with a varying and changing animate machine. It is an experiment *in vivo*, and each such experiment has individual characteristics.

The advice of the physician is usually sought because of some symptom or abnormality observed by the patient or those who are responsible for the patient. It may be that there is a complaint of shortness of breath. This is not an entity; it is a symptom. Why does the patient have shortness of breath? Is it because there is an obstruction in the trachea or some other part of the respiratory tract? Or is it due to a weak heart? Or is it because a neoplasm encroaches upon the vital organs in the thorax? Or is it due to asthma? Or is there anemia, and, if so, what is the cause of the anemia? Or, perhaps, it may be due to tuberculosis, or to toxemia resulting from imperfect kidney function. Occasionally an answer may be found quickly; sometimes the answer comes only after careful and tedious investigation, in which, consciously or unconsciously, there is an appeal to the biological and the physical sciences. But they must be considered in connection with clinical phenomena, for medicine is itself a science. After the chronology, the physician approaches a given clinical problem through the special senses—the senses of sight, of hearing, of feeling, and sometimes even the other special senses, always bearing in mind the interrelation of clinical phenomena and the allied sciences.

One may have a profound knowledge of detached fundamental and ancillary sciences, and yet know nothing useful about the practical application of medical knowledge. In order to be able to perform properly the legitimate functions of his profession, the physician must have: (1) a knowledge of the facts, clinical and otherwise, that are concerned in the development of disease and abnormal conditions; (2) a knowledge of their proximate causes and the laws which govern their development; (3) the ability to intelligently differentiate clinical phenomena; and, finally, (4) the ability to estimate the recuperative and resisting powers of the individual. For these are the things which constitute the science of medicine.