

of Archimedes, running fresh from his bath through the streets of Syracuse, shouting "*Eureka, eureka*," in his joy at having discovered the principle of specific gravity. We are told that Newton was so overcome with emotion, when he saw that his calculations on gravitation were confirming his hypothesis, that he could hardly hold the pencil to finish the equations. When Pasteur showed Biot how to make dextro-tartaric and laevo-tartaric acid, Biot exclaimed, "My dear boy, I have loved the sciences so much all my life that what you show me makes my heart thump." When Davy discovered the metal potassium he danced about his laboratory in high glee, and was too excited to continue his experiments.

The best thing I can wish for this building is that its laboratories may be the scene of many heart thumps (over science!), and of many ecstatic dances (over the discovery of truth!).

Wellesley is a college, but that is no reason why the teaching which is, perhaps, its main function, should not rest upon the solid foundation of research in progress. It is a truism that nothing is more wholesome for a college nor more stimulating to a student than an atmosphere of research penetrating laboratories and classrooms and campus. Nothing could be more unfortunate, from the standpoint of education, than to have a student, after four years of undergraduate residence, leave a college with the impression that any department of knowledge, and in particular, any science, is static—a finished product.

It was Frederick the Great who said: "The greatest and noblest pleasure which men can have in this world is to discover new truths; and the next is to shake off old prejudices." What a wonderful privilege to be able to study and teach! What a fine thing it is to provide a building and equipment devoted to the advancement of science and of education through science!

I congratulate this Department of Botany, I congratulate Wellesley College, I congratulate the botanical and educational world on this splendid opportunity and the correspondingly great responsibility.

C. STUART GAGER

BROOKLYN BOTANIC GARDEN

NEUROLOGY AND THE TEACHING OF MEDICINE¹

To be the orator of the day on an occasion as important as this is to feel at once uplifted and cast down; by the honor one is raised, and by the sense of

inferiority one is made to realize that indeed one is much lower than the angels. Graduates in the humanities, you, our new friends, are Freshmen in medicine—some of you have come because throughout your life you have been shapen in medicine, you have felt a driving urge which bade you examine the living things around you, be interested in the vagaries of the people you knew—may be, however, some have chosen this arduous trade because their fathers before them plied it and they count on his name and favor as aid and comfort for the hard launching in a not entirely appreciative world. A handicap this almost—for the spirit of practice comes only from within; an aptitude, a power to learn, may be inherited but to try to follow exactly the steps of one's father is perhaps to court the fate of Icarus. The wings with subtly-blended wax fastened on his shoulders were those which his father Daedalus had fashioned and by them he had been borne aloft. These wings lifted the ambitious Icarus, but the sun, you remember, melted the wax and he fell into the Aegean Sea—so the adventure and attrition of Practice may be the solvent of such wings; for it is the man himself, his sure selection of essentials, his ready grasp of problems, the skill of his hands, his humor, his instinct for the problems of others rather than his own, his love of the weakness of humanity as well as its strength; his pity for frail, great-brained, great-hearted, things like ourselves caught in the wheels and hammers of biological law. These are inborn and can not be transferred by will or directed in action—and they are the very stuff of happy and useful living. Those men who have a call for medicine have these qualities or most of them, but to those who doubt themselves—and who does not?—we would say that hard work will bring greater results here unaided by great brilliance of intellect than in any other profession.

Do you remember how Lydgate found that he must go doctoring—this in George Eliot's novel "Middlemarch":

One vacation, a wet day sent him to the small home-library, to hunt once more for a book which might have some freshness for him; in vain! unless indeed he took down a dusty row of volumes with grey paper backs and dingy labels—the volumes of an old Cyclopaedia which he had never disturbed. The page he opened on was under the head of anatomy and the first passage that drew his eyes was on the valves of the heart. He was not much acquainted with valves of any sort but he knew that valvae were folding doors, and through this crevice came a sudden light startling him with his first vivid notion of finely adapted mechanism in the human frame. The moment of vocation had come, and before he got down from his chair, the world was made

¹ An address at the opening of session, September, 1927, Cornell University Medical College, New York City.

new to him by a presentment of endless processes filling the vast spaces planked out of his sight by that wordy ignorance which he had supposed to be knowledge. From that hour, Lydgate felt the growth of an intellectual passion.

Again we read of him—showing that this passion touched—as it must touch—his feelings as his mind.

His scientific interest soon took the form of a professional enthusiasm. He carried to his studies in London, Edinburgh and Paris, the conviction that the medical profession as it might be was the finest in the world; presenting the most perfect interchange between science and art; offering the most direct alliance between intellectual conquest and the social good. Lydgate's nature demanded this combination; he was an emotional creature, with a flesh and blood sense of fellowship which withstood all the abstractions of special study. He cared not only for "cases" but for John and Elizabeth, especially Elizabeth.

It was my good fortune as a recent graduate in medicine to come into close contact with some of the greatest minds in English neurology—and many of them like Ferrier, Gowers and Hughlings Jackson, with the later brilliant aid of Victor Horsley, had been notable builders of our science in the latter part of the last century. It is not easy for us to realize that when they began their work, knowledge of the functions of the brain and spinal cord was very little greater than had obtained since Grecian and Roman times. Their labors were crowned with marvelous results in the course of fifty years—but their work was necessarily of the nature of adventurous engineers—they gathered the materials for the building, they collected the stones and cement; Jackson, of whom it was said that his guess was worth ten men's facts, might be described as an architect of flying buttresses; Ferrier dug foundations, fortified the true walls of Jackson's theories and dynamited weak fabrications—Gowers writing the "Bible of Clinical Neurology" in inimitable prose when still under forty-five wore down his health and added not much to his fortune by the erection of mighty arches and the giving of form and meaning to the whole. Not all the work of their hands remained standing—here a pillar and there a weak foundation has crumbled and worn down, but on the whole we have a good home over our heads, to be builded higher and stronger by succeeding generations. In the nature of things, however, these men had to be collectors—anatomical facts cemented by meager physiology—they had to catalogue and classify new diseases and give names to symptoms and habitations to observed phenomena. They had always to be collecting and listing and ordering new specimens, and their interests lay naturally with those specimens

most easily recognized as being different from normal—and such specimens were the end products of disease. We are now less interested in states of advanced deterioration and more concerned with the earliest departures from smooth working. We have come to understand how meagerly we know the normal and how necessary it is to grasp the infinite variety of natural regular processes in the organism. Problems in the natural history of disease are now more engrossing than the disease itself—we are more concerned for instance with the pathways of infection of the central nervous system than we are in neat descriptions of hopelessly paralyzed muscles resulting therefrom. This digging after roots deep in the ground is tough unproductive looking work—we have almost lost interest in the flowers and shrubs on the surface—and, for a while, less spectacular results may be available for show. This search for prime causes has also changed or rather better adjusted our value as a single specialty—added knowledge has revealed our unity with general medicine—we are discontented with labeling a disease "subacute combined sclerosis of the spinal cord"—we must find out its affiliations with pernicious anemia and with antecedent gall-bladder disorder. Epilepsy has ceased to be a diagnosis and has become a damning verdict—we must try to find the toxic factors which give rise to epileptic phenomena, which is now looked on as but congeries of symptoms produced by other agents.

This change from the static to the dynamic viewpoint makes cells on biochemistry, endocrinology, psychology and, as ever, on anatomy and physiology. These sciences, too, must in their turn be made more dynamic, more vital, more human. Twenty years ago, descriptive anatomy and amphibian physiology were the total vogue—much progress has been made since then—but there is still a divorce between the so-called pure sciences and medicine and surgery. The student of physiology should *as such* be familiar with normal heart sounds, with the normal fundus of the eye, with the appearance of the vocal cords in action—he may know the oculo-motor nerve of the eye, but what has he seen of convergence, accommodation or pupillary reactions? In short, there should be more physiology in the wards, and more humanity in the laboratory and the dissecting room. The normal must be made manifest, handled, seen, recognized, understood, before the abnormal can be appreciated—we must know truth before we know error—and we must know that there is no absolute in either. Was it not jesting Pilate, two thousand years ago, asked what is truth and did not stay for an answer? But he referred to ethics, not muscles and nerve tracts—and truth of function *can* be reached if a student study muscles in action, then dissect them,

and *about the same time* be shown them paralyzed by both a lower and upper motor neuron lesion. The X-ray department can be used to supplement physiological demonstration of digestion and heart mechanism. The instruments of clinical precision should be familiar and usable long before they are employed to detect the presence of disease.

The ophthalmoscope, the stethoscope, the laryngoscope, the otoscope, the blood-pressure apparatus, give up physiological secrets which must be mastered before those of medicine can be comprehended. Neurological cases often afford better examples of normal and abnormal function than any animal experiment in a laboratory—and coordinated education can make readily available all such material for students of the basic sciences.

The undergraduate in medicine then would have more time in the hospital to learn the very difficult art of history taking; the probing of the earliest manifestation of disease; he would grow more easy in the handling of his human charges—he would in short be more valuable in the search after first causes—more able to play his part in the open mobile warfare of the present day medicine and less of a static cataloguing agent in the trench warfare of the past. We don't yet know if man is energy or a machine. We compromise between the ideas of Plato and Aristotle and call him a transformer of power. His nervous system is three dimensional—and some of us suspect it may yet be four! Dreams though compounded of past experiences may be shot through with aspiration; the discontent of man with himself and his works forever scourging him upward can not yet be seen with stains of gold and silver, though we know some of the defects of structure which forbid the expression and perhaps existence of such torturing impulses. The study of the brain tells the tale of our painful climbing from the depths, of the building and controlling our powers of perception and adaptation—and may be from these neuronic origins spring man's nobility and lyric ecstasy as well. You will learn in this university something of the substantial workings of human powers and processes, their continuity with those of all living creatures, and, may be, you will find that control of human breedings must precede betterment in human brains.

We bid you welcome as our comrades to carry on the torch given us by our teachers—the torch that lets us see clearly—Man, half brute, half angel, most wonderfully made in mechanism, whose spirit denies the universe itself as boundary.

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THE CELEBRATION OF THE CENTENARY OF MARCELIN BERTHELOT¹

ONE of the axioms frequently expressed by Marcelin Berthelot is that "Science is essentially a collective endeavor and owes its progress to the efforts of a multitude of workers in all periods and of all nationalities, who by common agreement are associated in the search for truth and its application to the improvement of the conditions of man." A more succinct expression of this idea is that "Science reveals the persistence and the necessity of human collaboration. It impresses our heart and spirit with the vivifying notion of solidarity."

He advocated repeatedly the advantages to the progress of science of cordial relations among scientists and a mutual appreciation of the efforts of each. It was this precept which stimulated the common generous spirit exhibited at this first gathering in so many years of the chemists of all nations.

The organizers of the celebration desired that it should not be simply a passing ceremony without beneficial consequences. They wished to honor the memory of Berthelot in a manner which would perpetuate his ideals of service and the promotion of more friendly relations between all chemists. It was believed that the most fitting monument to him would be a house of chemistry which would serve as a meeting place not only for the chemists of France but for those of every country.

It was realized that an invitation to all nations to participate in its accomplishment would give to each a more personal interest in the enterprise. Furthermore, it was desired that those who might enjoy the benefits of the undertaking should regard themselves as constituent members and not as invited guests. This broad-minded point of view is more clearly appreciated when one considers the difference between an invitation to make use of the facilities provided by an organization and an offer of the privileges of membership in it.

Invitations were, therefore, addressed to all countries of the world to unite with France in celebrating the one hundredth anniversary of the birth of Marcelin Berthelot and to contribute any sum they might desire towards erecting a memorial to him in the form of an international house of chemistry. This invitation was accepted in the spirit in which it was sent by practically every nation and the ceremonies which I wish briefly to describe were held in Paris on October 24-26 last.

It is fitting, however, that attention should first be

¹ Address delivered before the meeting of the Chemical Society of Washington, January 12, 1928.