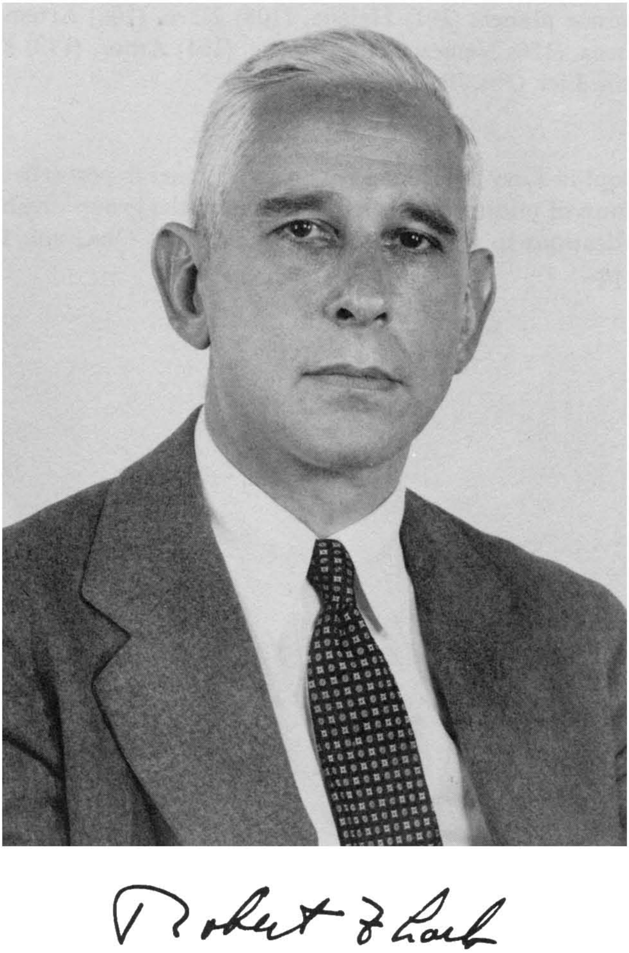
NATIONAL ACADEMY OF SCIENCES

ROBERT FREDERICK LOEB

1895—1973

A Biographical Memoir by
ALEXANDER G. BEARN

Biographical Memoir



ROBERT FREDERICK LOEB

March 14, 1895–October 21, 1973

BY ALEXANDER G. BEARN

ROBERT FREDERICK LOEB was born in Chicago on March 14, 1895, the second son of Jacques and Anne Leonard Loeb. He grew up in a family of great erudition, where traditional scholarship was highly prized and where a lively interest in history, music, art, and a wide variety of cultural pursuits was as unaffected as it was deep. His mother, Anne Leonard, was an intrepid New Englander. She was one of three daughters of Granville Hall Leonard, who, at the urging of their father's cousin, the early American psychologist G. Stanley Hall, went abroad to study in the 1880s after first attending college in the United States. Anne chose to study comparative philology at the University of Zürich, where she had the distinction not only of graduating *summa cum laude* but also of being the first woman to obtain a Ph.D. degree at that university. But Zürich brought to Anne Leonard a great deal more than a degree in comparative philology, for it was in that city, at the house of her elder sister, who had married Justus Gaule, Professor of Physiology, that she was to meet her future husband, Jacques Loeb. After a short engagement, they left for America, where they were married in Easthampton, Massachusetts, in October 1890.

Although the couple returned to Europe and spent their first winter at the Biological Station in Naples, it was not long before Jacques Loeb accepted a position at Bryn Mawr College, in

Pennsylvania. He and his wife arrived there in November 1891, accompanied by their firstborn child, Leonard. The following year Loeb accepted an invitation to join the staff of the new University of Chicago. For ten years Jacques Loeb stayed in Chicago; he became a U.S. citizen, his work flourished, and on March 14, 1895, a second son, Robert Frederick, was born.

In 1902 the family, which now included a daughter, Anne, left Chicago for California, where Jacques Loeb had accepted a position at the University of California at Berkeley and where he was to remain for the next eight years. It was thus in California that Robert Loeb began his formal education. Although his early schooling was good, the scholarly and lively conversation at home had as pervasive and enduring an influence on his intellectual development as any formal course work. Because Jacques Loeb was a physiologist, interested in the application of the rapidly developing knowledge of physics and chemistry to biological problems, it was not surprising that around the Loeb table there gathered such giants as Ernest Rutherford, Svante August Arrhenius, Hugo de Vries, Wilhelm Ostwald, and Ludwig Boltzmann. While visiting California, they would not only deliver formal lectures at the university but would also engage in vigorous discussion with Jacques Loeb on the way in which an understanding of the physical sciences could illuminate the fundamental and emerging problems of biology. It was an unusual privilege to grow up in this supremely cultivated atmosphere, and young Robert, although shy and somewhat retiring, profited immensely from it.

In 1910 Jacques Loeb, who by that time had perhaps found the University of California somewhat isolated, was approached by Simon Flexner to join the Rockefeller Institute for Medical Research, and the family, including fifteen-year-old Robert, packed up and left for New York City. In New York, Robert Loeb attended the highly regarded Horace Mann School, and, after graduating three years later, returned to the city of his

birth and enrolled at the University of Chicago. He shared lodgings there with his elder brother, Leonard, who was subsequently to become a renowned physicist and whose brotherly insistence upon hard work and high standards had an indelible influence. Robert chose to major in chemistry in the stimulating environment provided by Julius Stieglitz and other members of that remarkable department, and within two years he had completed all the formal requirements for a bachelor's degree. Although it had been suggested that Robert might like to remain in Chicago for another year or two to broaden his cultural horizon, Jacques Loeb, knowing that his son had many nonscientific interests that had been deeply instilled at home, saw no good reason for him to stay any longer. A career in medicine had attracted him from an early age, and in 1915, at the age of twenty, Bob Loeb entered Harvard Medical School.

Although it could not have been predicted, Loeb's entry into Harvard Medical School marked the beginning of an academic association that was to be characterized by lifelong devotion and service to Harvard University and the Massachusetts General Hospital. The affection was reciprocal; both the university and the medical school later called upon him on many occasions for advice and counsel.

His first year in medical school was not, however, entirely successful. Indeed, for the first and perhaps only time in his career, Bob Loeb got off to a shaky start, for when the anatomy grades were announced, he had not done as well as he had hoped. Despairing and thinking that medicine might after all not be his true bent, he wrote to his father suggesting that in view of his poor grade he should switch to his second choice, geology. It was fortunate for medicine that his father, knowing his son's invariable underestimation of his own worth, as well as his merciless self-criticism, replied, "Stay; if you don't do better, they will make the decision for you." Heeding his father's advice, Bob Loeb decided to remain, graduating first in his class,

magna cum laude, in 1919. It should be recorded that before graduation he had also obtained a prosectorship in anatomy, the very subject that had so nearly deflected him from the profession that he was destined to illuminate so brilliantly. During his second year, he was chosen by Otto Folin to assist in the teaching of biochemistry to the first-year class.

It was while Loeb was still a medical student that he wrote his first scientific paper. In collaboration with G. R. Minot, who was to receive the 1934 Nobel Prize in medicine and physiology, he outlined a number of steps that might be expected to curb the spread of influenza, which in 1918 had broken out among the students of Harvard College. Unfortunately, as was to become all too tragically clear, the influenza pandemic of 1918–1919 was both virulent and difficult to control. The paper, however, is noteworthy, for it indicates that from the very beginning of his scientific career Loeb rejected trivia for the more substantial problem, however intractable it might appear to be.

A year as an intern at the Massachusetts General Hospital was followed by an assistant residency in medicine at The Johns Hopkins Hospital. Loeb was attracted there largely by Walter W. Palmer, for whom he had already developed great admiration and who was to become one of the most important influences in his medical career. When in 1921 Walter Palmer accepted the chairmanship of the Department of Medicine at the Columbia University College of Physicians and Surgeons and at the Presbyterian Hospital, Loeb left Hopkins with Palmer to take up a position as assistant resident and instructor in medicine. Despite the many opportunities that would come his way, Loeb was to remain at Columbia for the next thirty-nine years, and to that school he brought not only an outstanding intellect but also a personal dedication which was to make its Department of Medicine one of the foremost centers for medical education in the world.

During the summer months the Loeb family would leave

the heat and humidity of New York and retreat to Woods Hole, Massachusetts. Jacques Loeb was an early member of the Marine Biological Laboratory at Woods Hole, where he and his students worked on the relevance and application of physical laws to the solution of biological problems. In 1921, in association with his father, Robert Loeb wrote a paper (published in the *Journal of General Physiology* in 1922) in which the distinctive differences between hydrophilic colloids and hydrophobic colloids were drawn and the earlier assumption that the precipitation of proteins was due to the adsorption of the ions of the precipitating salt was effectively disposed of. It was not surprising that Loeb, the young physician, should in that unique atmosphere begin to think about the application of chemistry to physiological problems in man. An interest in the physiological action of potassium not only led to a publication on this subject in the *Journal of General Physiology* in 1920, but also presaged his lifelong interest in electrolyte physiology in health and disease. In this publication, as in those to follow, Loeb's scientific contributions were rooted in painstaking, meticulous observations. He was incapable of shoddy work, and he found it both disquieting and puzzling that so many of the papers published in the medical literature failed to meet what he regarded as minimal standards.

Soon after coming to Columbia, Loeb continued experiments, begun at Johns Hopkins, that were designed to investigate the influence of pH on the conductivity of proteins. In collaboration with Dana W. Atchley, his lifelong friend and close associate, and Walter Palmer, his chief, he embarked on a series of basic experiments that helped to shed light on the complex interrelationships of electrolytes and solutes in the regulation of osmotic pressure. From the vantage point of the present day, it is hard to appreciate the primitive nature of our understanding of electrolyte balance in human blood in the early 1920s. The veil of ignorance was lifted to a very large

extent by the seminal studies of Loeb and Atchley, at first in collaboration with Palmer, but later without him. It is perhaps an important corrective to the present tendency of favoring the support of goal-oriented research to remember that the contributions to medical science made by Robert Loeb, a man whose reputation as a clinician was to become legendary in his lifetime, were rooted in fundamental studies with no obvious applicability.

The years 1923 and 1924, when Loeb was still on the resident medical staff of the Presbyterian Hospital, were enormously productive. A series of papers describing in meticulous detail the physical and chemical properties of the blood was published, usually in association with Atchley and E. M. Benedict. In 1923, also in association with Atchley and Benedict, Loeb applied for the first time the Gibbs–Donnan principle to human blood serum and investigated its relevance to the control and maintenance of the colloid osmotic pressure. The Gibbs–Donnan approach is now recognized as the cornerstone of any consideration of serum osmotic perturbations as well as variations in the acid–base equilibrium of the blood. In another paper, Loeb proved beyond doubt with a series of beautiful experiments that the kidney is the source of urinary ammonia. In the meantime, his intense interest in clinical medicine never wavered, and in 1925, the same year that he was considering applications of the emerging concepts of colloid chemistry to medicine, he wrote a paper entitled "Diagnosis of Acute Rheumatic Pericarditis."

His father, doyen of the physiology world, died in 1924; two years later the *Journal of General Physiology* brought out in his honor a special memorial volume to which Robert Loeb was invited to contribute. Loeb was becoming increasingly interested in the factors that influence the diffusion of blood calcium, and he selected as a topic the effect of pure protein solutions and of blood serum on the diffusibility of calcium. His co-author was Emily Guild Nichols, who, before obtaining

her M.D. from Johns Hopkins, was a technician in his laboratory, and who later became his wife. From then onward a companionship of the most rare and precious kind, subsequently to be shared by a son and daughter, dominated and enriched both Loeb's life and his work.

In 1927 Loeb, his career well under way, received a grant from the General Education Board of the Rockefeller Foundation that enabled him to visit the principal medical clinics in Germany and Austria, at a time when these clinics were considered the meccas of medical education. He was appalled by the schism between basic science and clinical medicine and by the doctrinaire approach to medical education abroad, and on his return to Columbia, he applied with renewed dedication both his skills in basic research and his remarkable acumen for bedside teaching. The results were far-reaching and significant, not only for his own generation but also for the ensuing fifty years of American medicine. We are still experiencing this vital heritage.

It is difficult, if not impossible, to disentangle the many qualities of heart and mind that make up a great physician. The prodigious memory which enabled Loeb to recall the names of students (and their wives) years after they had left his service also allowed him to describe the clinical details of patients seen many years before. His rigorous attention to taking a full clinical history and his meticulous attention to eliciting physical signs were of the utmost importance, but perhaps even more significant was his conviction that the making of a diagnosis took time as well as thought. Tall and courtly in bearing, he would never leave the bedside of a patient without a convincingly encouraging and friendly word. His kindness, his genuine concern for the patients' feelings and welfare, as well as their physical ills, endeared him to them and left an indelible mark on the thousands of medical students and physicians who came under his tutelage. Those who foolishly still like to believe that a rigorous

scientific attitude is incompatible with the role of a compassionate physician would do well to reflect on the life of Robert Loeb.

Above all, Loeb was a general physician. In 1932 he contributed a large number of clinical articles to the *Practitioner's Library,* a compendium of medicine published by D. Appleton and Company. These articles, which included subjects as diverse as gout, hemochromatosis, and alkaptonuria, are all characterized by a lucid unaffected style and convey a great deal of precise information without losing the interest of the reader. This facility in writing, so easily appreciated and so hardly gained, was also to characterize *A Textbook of Medicine,* which Loeb was later to edit with such distinction.

It is particularly remarkable that during these years, in which a heavy teaching load was added to his clinical responsibilities, Robert Loeb made a discovery that revolutionized contemporary thought. In 1855, Thomas Addison of Guy's Hospital, London, had described a series of patients in a paper entitled "On the Constitutional and Local Effects of Disease of the Suprarenal Capsules." The disease of the suprarenal capsules, now commonly known as Addison's disease, was invariably fatal. It was Loeb the clinician who recognized that the circulatory collapse commonly seen in patients dying from Addison's disease was similar in many respects to the syndrome caused by acute salt and water loss, and it was Loeb the investigative scientist who showed that, when the adrenal glands of a dog were removed, a profound circulatory collapse ensued, similar to that in Addison's disease. This fatal collapse of the circulation was accompanied by a massive increase in the amount of salt excreted in the urine. The simple expedient of replacing the urinary sodium lost by increasing the amount of sodium in the diet, or in severe cases by giving sodium chloride intravenously, transferred Addison's disease from the category of an invariably fatal illness to one that could be treated successfully by the administration of table salt. Loeb postulated that sodium excretion by

the kidney was regulated by a hormone elaborated by the adrenal gland (nearly twenty years later shown by others to be aldosterone), and for the next five years he systematically and carefully studied the underlying metabolic changes that accompany the clinical syndrome of Addison's disease. This scientific accomplishment, which initiated the modern era of adrenal physiology and whose therapeutic importance would be hard to exaggerate, stemmed from the application of the knowledge and techniques of chemistry to the practical problems of the medical clinic. Simple, unambiguous, and of direct clinical usefulness, it had as its origin Loeb's determination to understand the biology of man and his diseases in chemical terms.

In the next several years, in a series of classic studies, Loeb and his colleagues in Columbia's Department of Medicine began a systematic investigation of the electrolyte disturbances that occur in uncontrolled diabetes. At that time, 50 percent of uncontrolled diabetics succumbed in acidotic coma. From these experiments Loeb was able to devise, for the first time, a rational form of fluid and electrolyte therapy. Loeb's studies on abnormalities of the blood electrolytes were not confined to those found in patients with diabetes and those with Addison's disease. He was also the first to study the physiological consequences of mineralocorticoid excess, demonstrating that the administration of large doses of desoxycorticosterone acetate in the dog resulted not only in hypertension, hypernatremia, hypokalemia, and profound muscle weakness, but also in a diabetes insipidus-like syndrome that is unresponsive to the administration of pitressin. These findings anticipated by more than a decade the description of the human syndrome of excessive aldosterone secretion. Familial periodic paralysis, in which, because of an inherited defect, there are profound intracellular shifts of potassium, also came under his investigative scrutiny.

In 1936 Loeb was elected President of the American Society for Clinical Investigation, and in a powerful address which has

vital relevance today emphasized the pressing need for quality rather than quantity in clinical investigation. He stated that new knowledge was not gained by the wholesale support of large research projects that have "proven consistently barren and have resulted in the disbursement of funds which, if applied to the endowment of individual investigators or university departments may reasonably be expected to further the progress of science." Throughout his entire life he insisted that it is essential, particularly when financial support of science shrinks, to support "individual investigators possessing the spark essential for creative work."

In 1938 Loeb was appointed Professor of Medicine, and, in addition to his many other responsibilities, he became Associate Medical Director of the Neurological Institute. Although neurology was not Loeb's principal interest, his far-reaching clinical knowledge embraced this specialty, and, when he was asked to fill the position on a temporary basis, he agreed to do so. He served the institute well and for eight years was actively engaged in clinical neurology while performing his other medical duties as well.

In 1943 the only effective antimalarial drug, quinine, was becoming increasingly unavailable to the Allies, and Loeb was asked to become Chairman of the Board of Coordination of Malarial Studies. The board had the grave responsibility of developing as rapidly as possible synthetic antimalarial drugs that could serve as effective substitutes for quinine. It was under Loeb's inspiration, guidance, and effective leadership that the synthetic chemical chloroquine was developed. It was also at his suggestion shortly afterward that this drug, structurally related to the effective intestinal amebicide diiodohydroxyquin but in contrast known to attain high concentrations in peripheral tissues, was investigated as a treatment for hepatic amebiasis. Chloroquine proved effective and far less toxic than the conventional agent emetine and is still employed as an effective therapy

today. It was characteristic of Loeb that he refused co-authorship in the report of this work, insisting that reference to himself be restricted to an acknowledgment in a footnote. From then on Loeb would be increasingly asked to serve on committees and boards where important and sensitive decisions were to be made. His innate diffidence and humility could not obscure from his colleagues the erudition, compassion, and wisdom that characterized his mind. His views were increasingly solicited, often formally but even more frequently informally, by those who were placed in positions of responsibility and leadership and upon whom decisions of major consequence rested. But although Loeb's views were sought by foundations and advisory boards of all kinds, his main love was for undergraduate teaching. With Loeb at the bedside, surrounded by students, the clinical practice of medicine became alive and the art and science of medicine were welded into one. And when, in 1947, his revered teacher and friend Dr. Palmer retired as Chairman of the Department of Medicine at Columbia, it was obvious that Robert Loeb should succeed him.

Under Loeb's leadership, the Department of Medicine's reputation as a center of excellence became increasingly well known. Although it is true that after Loeb assumed the chair of medicine his responsibilities did not allow him the time to continue his own research, his personal influence on the development of young physicians and clinical investigators in his department was profound. Loeb was an insatiable reader. His love of science, his solid critique, and his masterful grasp of the medical literature, which he retained to the end of his life, were an unfailing source of guidance and inspiration. An exacting teacher who demanded the best from each of his students, he was feared as well as loved. He could forgive ignorance but was utterly disdainful of anything that smacked of intellectual dishonesty and pretense. Loeb set the highest standards for the quality of the research that was prosecuted in his department.

Wise, gentle guidance and encouragement were always available, and as one of his colleagues once remarked, sloppiness in mind, manner, or morals was no more to be tolerated in the laboratory than in the ward. His belief in the unity of medicine prevented the fragmentation which occurred in many medical departments around the country, where subspecialty groups mushroomed and other divisional systems became fashionable. Instead, each investigator was encouraged to follow his own bent, wherever it led him and without regard for an imagined need to have all the systems of the body represented in the department's activities. Perhaps the most astonishing feature of the Columbia Presbyterian Hospital under Loeb's direction was the number and variety of fields of medical science in which this department was a world leader.

The pioneering studies of André Cournand and Dickinson W. Richards, Jr., on cardiopulmonary function were pursued at the Columbia Division at Bellevue Hospital and culminated in 1956 in a Nobel Prize in medicine–physiology. Without the never-failing encouragement and support of Loeb, these studies would undoubtedly have advanced far less rapidly and with much greater difficulty. Loeb was often ahead of his time in recognizing future trends in medical research and practice. His conviction that immunology and immunochemistry would play an increasing role in our understanding of disease processes led him to continue to support Michael Heidelberger in a long and productive career within the Department of Medicine at a time when research space was short and the application of this science to human disease still distant and uncertain. In most medical schools the attention paid to chronic illness is still less than that devoted to acute disease. At the Columbia Research Division at the Goldwater Memorial Hospital, under the aegis of David Seegal, studies on long-term disease were industriously pursued, and significant contributions on hepatic cirrhosis, arteriosclerosis, hypertension, and glomerulonephritis were made. The

Francis Delafield Hospital of the City of New York came under Loeb's jurisdiction, and, in that institution, Alfred Gellhorn and his colleagues attacked the problem of cancer from a broad biological base. With considerable prescience Loeb had recognized nearly twenty years earlier that "full exploitation of the problem of aging is not possible without consideration of the enzymatic, hormonal, and other biochemical changes such as are exhibited in the chemical structure of proteins and polysaccharides and are reflected in organ dysfunction with the advance of time," a view that few would any longer contest.

It was also significant that, although many of the more talented staff members were wooed by other universities, few left, even though the physical facilities elsewhere might be better and the salaries higher. Although the department was exceptionally happy and Loeb's style was always designed to bring out the best in his students and co-workers, he could, when confronted with laziness, intellectual dishonesty, or carelessness, be roused to anger and deliver a tongue-lashing that would be long remembered by the unhappy recipient.

Bob Loeb was dedicated to hard work. An early bird, rather than a night owl, he would catch the Fifth Avenue bus each morning and be in his office well before 8:00 a.m. Precisely at eight o'clock, interns, residents, research workers, and faculty would crowd into his room for what came to be known as Bob Loeb's "Sunrise Service." There was no agenda. Inevitably much of what was discussed related to medical education and to patients and their problems. A new clinical or biochemical report of more than usual interest might be discussed and critically evaluated. Politics, music, and current affairs all came in for scrutiny and discussion. These meetings, which were entirely voluntary, were held in such high regard that even those whose natural tendencies were to be night owls rather than early birds would drag themselves from their beds to be in attendance. These sessions were particularly appreciated by the visitors from over-

seas, who came in scores to "work at the Presbyterian Hospital with Bob Loeb." For there, in that genial but critical atmosphere, they were able to try out new ideas and discuss problems of medical education, science, or whatever was on their minds. To all the discussions Loeb brought knowledge and wisdom, which he expressed in a most pungent and unforgettable manner. Many of his aphorisms are still quoted by his former students and emphasize his compassion and the need to consider the whole patient: "Remember the Golden Rule: Do unto others as you would have done to you *if you were that patient in that bed at that time*"; "There is no such thing as a dull patient, only a dull physician"; "The Bible says 'seek and ye shall find'; seek not and you won't find a damn thing." Each of Loeb's students has his favorite. Loeb was blessed more than most with an almost uncanny ability to separate the wheat from the chaff in medical research. The flashy, poorly documented ill-controlled observation that flew in the face of experience was shown for what it was, while the new observation shedding light on an old unresolved problem would bring excitement and eager discussion to the morning's session. Although he took great care to be fair-minded, he did not hesitate to criticize in the most outspoken and devastating way the psuedoscientific or the latest educational fad. When the hour was over and the day's work began in earnest, the group dispersed with a renewed sense of excitement and determination.

When the World Health Organization unwisely chose to define health as "a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity," a number of well-intentioned medical educators immediately decided that extensive curriculum reform was required if medical schools were to meet their responsibilities. It was suggested that medical schools should sharply reduce the science content of the preclinical years, introduce course work in the social sciences, and undertake to apprentice students to general practitioners

who would, so it was held, introduce the medical student to the "real problems of medical practice." This populist but ill-considered view was anathema to Loeb, who knew full well the tremendous advances that had been made in the care of the sick as the result of clinical investigation. If a student was incapable of gaining insight into the socioeconomic background of a patient unless he had walked up five flights to a cold-water apartment in a depressed part of the city, Loeb rather doubted whether the student should have gained entrance to medical school in the first place.

This attitude in no way reflected a lack of interest by Loeb in the background of his patients and the influence of social factors on disease. As he was fond of emphasizing, it was too often forgotten that Richard Cabot at Harvard in the first decade of the century had led "a crusade to introduce medical students to the significance of the socioeconomic environment of the patient." There was barely time enough in medical school to cover the scientific basis of medicine and to inculcate sound clinical practice without diluting the curriculum with flabby sociology imported to "humanize" medicine. Loeb's position on these matters was admirably expressed not only in his annual reports to the President of Columbia but also in his presidential address to the Association of American Physicians. The goal of medical education under Loeb's leadership was to "lay the groundwork for the student becoming a well-rounded internist, i.e., a family physician." His concern that the internist should be a well-rounded physician, with access to specialized services when required, lay at the very heart of the group clinic—an educational innovation that introduced the fourth-year student to the concept of group practice where, under strict on-the-spot supervision by a senior member of the staff, the student served as "family" physician with the primary responsibility for the follow-up care of a patient after discharge.

In a paper entitled "Reflections on Undergraduate Medical

Education," which he read at a symposium to celebrate the tercentenary of the Regius Chair of Physics at the University of Dublin, Loeb again emphasized his long-held belief that in "undergraduate medical education we maintain the emphasis on intellectual growth, and that we guard against the dilution of our efforts by the subtle and alluring encroachment of romanticism and the so-called practicalities."

Despite the fact that Loeb was essentially a shy man and almost never gave formal lectures, he had an immense influence on the development of medical education in the United States. It was curious that a man who had the capacity to rivet the attention of his listeners when gathered together informally in small groups could become distraught to the point that his pulse would race if called upon to address a large audience. On the rare occasions when, because of holding office, he was obliged to speak, he was miserable for months ahead. Yet when the lectures were delivered they were invariably considered a success. It was their content more than their delivery that made them so, because Loeb was incapable of using cheap histrionic techniques to make his points.

CECIL AND LOEB'S TEXTBOOK OF MEDICINE

Although the force of his intellect and broad knowledge of medicine was most evident to his students and close colleagues, Loeb wielded a global influence in medicine through his editorship of one of the classic textbooks of medicine, universally known as "Cecil and Loeb." The first edition of the textbook was edited by Russell Cecil, but in 1947 Robert Loeb became co-editor and remained its co-editor until his retirement. From the very beginning he wrote a large number of the articles himself. His article on diabetes mellitus was so well written and so comprehensive that it needed only minimal revision for many years after his retirement. The textbook is now edited by Paul B. Beeson and Walsh McDermott, but there are many through-

out the world who still refer to it as Cecil and Loeb. The book continues to flourish; 1975 saw the publication of the fourteenth edition.

As an editor, Loeb demanded an exacting standard of himself and others. Although he denied it, he wrote fluently and with a style and rhythm that expressed his ideas with great clarity. After he retired and no longer had a secretary, he still kept up a large and active correspondence in a firm and legible hand. Although his letters usually began with a disclaimer of any special understanding of the matter under discussion, what followed was always a model of logic and common sense.

WORK WITH FOUNDATIONS, UNIVERSITIES, AND NATIONAL COMMITTEES

Loeb regarded his responsibilities at Columbia as being of primary importance, and only with great reluctance was he separated from his students, house officers, and faculty. He would not have applauded the modern tendency for professors of medicine to be always on the road. Despite his reluctance, however, there were times when he felt it was his duty to take on an outside commitment. Shortly after the U.S. entry into World War II, he was asked to serve as Chairman of the Subcommittee on Blood and Blood Substitutes of the National Research Council, and in 1943 he became Chairman of the Board of Coordination of Malarial Studies, in Washington, D.C. Both of these committees contributed significantly to the war effort.

After the war, when wise counsel was needed in the field of medical education, people invariably turned to Loeb. He served on the President's Science Advisory Committee during three successive presidencies (Truman, Eisenhower, and Kennedy). It was a signal honor for a physician to be so recognized, but it was not only, one suspects, because he was the preeminent medical scientist and elder statesman that he was asked to serve but also because of his fine analytic mind and legendary common

sense. He became a member of the Board of Trustees of the Rockefeller Foundation in 1947 and remained one of its most trusted advisors until his death. In 1954 he was appointed to the Board of Trustees of the Rockefeller Institute (soon to become the Rockefeller University), and later he served for many years as Vice Chairman of the Board. This was a particularly happy appointment for Loeb, as it renewed the family association with the institute, which, as noted earlier, began in 1910 when his father joined the institute at the invitation of its first director, Simon Flexner. He applauded the administrative changes that transformed the institute into a university and followed with particular interest the physicians who were attracted to the institute to enlarge and deepen their scientific understanding of the life sciences and to obtain the additional degree of Doctor of Philosophy. Robert and Emily Loeb were always to be seen at the annual Rockefeller University graduation ceremonies, where they were invariably surrounded by their many friends, students, and former colleagues. In 1971 the Rockefeller University, recognizing Loeb's immense contribution to medical science and medical education, as well as his faithful service as a trustee, awarded him the degree of Sc.D., *honoris causa.*

Although it is clear that Loeb took great pleasure in his outside commitments, I think that he enjoyed particularly those extracurricular activities that related directly to training in the medical sciences. Nothing was more important to Loeb than to be sure that motivated and able young scientists should receive encouragement, fellowship support, and an opportunity to carry out research. For six years Loeb served as an overseer of Harvard College, and, in 1969, his alma mater awarded him an honorary degree, citing him as "a man whose career epitomizes both the compassion and the brilliance of medical science." In 1961 the Massachusetts General Hospital, where he had served as an intern some forty-one years earlier, gave him their 150th Anniversary Award.

While on the Board of Overseers, Loeb served as Chairman of the Visiting Committee to the Harvard Medical School. He had left the medical school at the end of his internship year at the Massachusetts General Hospital, and it gave him particular pleasure to be invited to renew his association with his old medical school, where he had so many friends, and where his son John had graduated *summa cum laude* in 1961. At the meetings he spoke only when he had something to say, but when he spoke the board listened. He particularly enjoyed learning of the recent advances in medicine and the biological sciences and their possible impact on clinical medicine.

After the war a steady stream of talented physicians and investigators came to work with Loeb to try out their own ideas. More than three centuries before Loeb was at the Columbia Presbyterian Hospital, William Harvey had walked from London to Padua to study with Hieronymus Fabricius, wearing out, so it has been said, three pairs of shoes in the course of the trip. Students likewise flocked to the Presbyterian Hospital in New York City to work with Bob Loeb, and many countries sent their best physicians there, where they would come under his brilliant influence.

Loeb had many friends throughout the world of medicine who eagerly looked forward to his visits and an opportunity to exchange opinions and talk over the issues of the day. His friendship with Paul Govaerts, Jules Stahl, Sir Harold Himsworth, and Sir George Pickering was particularly congenial. In 1961 Pickering, then Regius Professor of Medicine at Oxford University, suggested that Loeb come to Oxford for three months to deputize for him. As Acting Regius Professor of Medicine, Loeb was a great success. He loved Oxford and enjoyed, as he always did, the opportunity to work closely with medical students and junior faculty. It was particularly fitting that in the same year that he was Acting Regius Professor, Oxford University awarded him an honorary D.Sc.

After his retirement from Columbia, Loeb and his wife Emily traveled extensively abroad. On many occasions he traveled on behalf of the Rockefeller Foundation, which had come increasingly to lean on his unique experience and analytical mind to help evaluate medical education in the various universities and medical schools it supported throughout the world. Wherever he went, he met old friends and made new ones, for he was a sympathetic visitor, always constructive and helpful and ever mindful of the need to examine the situation in the light of local perspective. He particularly enjoyed the opportunity to make rounds and to speak with younger faculty. Although the local conditions frequently presented special difficulties to those working there, such problems were seen by Loeb simply as wonderful opportunities and challenges to be overcome, and medical schools in many parts of the world owe much to his insight and timely encouragement for their subsequent development.

NATIONAL ACADEMY OF SCIENCES

In 1946 Loeb was elected to membership in the National Academy of Sciences (Physiology and Biochemistry section) at the age of fifty-one. At that time the total membership of the Academy was only 386 and the membership of the section was about 40. As a medical man surrounded by practitioners in the more exact sciences, he rarely felt at home and attended the annual meetings infrequently. This was a pity, for he had unusually broad scientific interests and very much to offer. His great abilities were recognized by his colleagues in the Academy, however, and from 1952 to 1955 he served on the Council. In 1955, when the views and attitudes of Senator Joseph McCarthy cast a shadow over the face of the land, the Academy wisely appointed him to the all-important Committee on Loyalty. Clearheaded, of absolute integrity and of undeviating conscience, he was an admirable choice, and it was appropriate that

a longtime friend who was in a position to appreciate those qualities, Detlev Bronk, then President of the Academy, should be the one to ask him to serve.

RETIREMENT

Loeb had resolved to retire from the chair of medicine at the age of sixty-three and was dissuaded from doing so only when he was presented with a petition signed by every member of his department urgently requesting that he remain in office until he had reached the statutory age of retirement. In response to this unprecedented move, and in deference to the faculty, Loeb remained in office for another two years, when he insisted on retiring and in 1960, at the age of sixty-five, he retired from the Department of Medicine, where he had been Bard Professor for thirteen years. It was characteristic that, when the time for leaving finally came, he quietly packed his bags and left. His affection for the school was undimmed, but he was determined not to get in the way of his successor. Yet his love of medicine and the students he taught could not be brushed aside so lightly, and scores of his students continued to come to him for advice. After a period of nonexpansion, new schools of medicine were springing up throughout the country to help meet the country's need for additional physicians. Inevitably, many of Loeb's old students were approached to fill the new positions of leadership that were becoming available. Their first step was to talk over the opportunity with Loeb, who was always accessible, always encouraging, and always steadfast; his home on Park Avenue became a natural port of call for many of the leaders of the profession both in the United States and from abroad.

His many friends also seized on his retirement from Columbia as an opportunity to invite him to visit their own schools as a visiting professor. Before his retirement the chances were that he would have politely but firmly refused; afterward, he accepted, though still with reluctance and always with the single

nonnegotiable proviso that he would not have to "make a speech." As time went on he would increasingly protest that he "did not know what was going on in medicine these days." His clinical experience, however, was so great, his knowledge of the cardinal principles of investigative medicine so ingrained, and his humanity so evident that, except in the narrowest sense, the statement was wholly false. It was a revelation to see Loeb, over the age of seventy, at the bedside of a sick patient surrounded by students and house officers, a master of his craft and a continued inspiration to the young.

Eight years before his death Robert Loeb had a lobectomy for carcinoma of the lung. The operation appeared to be completely successful, and for the next seven years Loeb's life was active and enjoyed to the full. He remained fully conversant with the medical and scientific issues of the day. Although his home and family meant everything to him, his friends were legion, and he followed the careers of his former students with deep interest. He and his wife continued to travel abroad and enjoyed the countries they visited, usually on behalf of various foundations, with an appreciation that was based on an understanding of each country's history and culture. In 1971 the disease for which he had had his partial pneumonectomy recurred overtly, and on October 21, 1973, he died peacefully at his home in New York City, as he had wished.

Robert Loeb will be remembered as one of America's greatest and most influential physicians, who not only contributed significantly to new knowledge by his own research, but also showed by his teaching and personal example that the science of medicine and the art and compassion of medicine are one.

DEGREES, APPOINTMENTS, AND HONORS

DEGREES

1919	M.D., *magna cum laude,* Harvard University

HONORARY DEGREES

1951	Sc.D., University of Chicago
1951	*Docteur Honoris Causa,* University of Strasbourg
1952	*Docteur Honoris Causa,* University of Paris
1953	LL.D., University of Wales
1955	Sc.D., New York University
1957	Sc.D., Kenyon College
1961	Sc.D., Columbia University
1961	LL.D., Amherst College
1961	D.Sc., Oxford University
1962	Sc.D., Dartmouth College
1962	Sc.D., Trinity College, Dublin
1969	Sc.D., Harvard University
1971	Sc.D., Rockefeller University

HOSPITAL AND UNIVERSITY APPOINTMENTS

1919–1920	Intern, Massachusetts General Hospital
1920–1921	Assistant Resident Physician, Johns Hopkins Hospital and Assistant in Medicine, Johns Hopkins University
1921–1923	Assistant Resident Physician, Presbyterian Hospital, New York City, and Instructor in Medicine, Columbia University
1923–1924	Resident Physician, Presbyterian Hospital
1924–1927	Associate in Medicine, Columbia University
1924–1930	Assistant Attending Physician, Presbyterian Hospital
1927–1928	*Visiting German Medical Clinics,* General Education Board Grant, Rockefeller Foundation
1927–1930	Assistant Professor of Medicine, Columbia University
1930–1945	Associate Attending Physician, Presbyterian Hospital
1930–1938	Associate Professor of Medicine, Columbia University
1938–1941	Associate Medical Director, Neurological Institute
1941	Physician-in-Chief *pro tem,* Peter Bent Brigham Hospital
1938–1942	Professor of Medicine, Columbia University

1941–1946	Associate Attending Physician, Neurological Institute
1942–1947	Lambert Professor of Medicine, Columbia University
1945–1947	Attending Physician, Presbyterian Hospital
1947–1960	Bard Professor of Medicine, Columbia University and Director, Medical Service, Presbyterian Hospital
1959–1973	Consultant, Presbyterian Hospital
1960–1973	Bard Professor of Medicine Emeritus, Columbia University
1961	Delegate, U.S.–Japan Science Committee, Department of State
1961–1966	Director, Equitable Life Assurance Society of the United States
1961–1967	Overseer, Harvard College
1961	Acting Regius Professor of Medicine, Oxford University, England (Sept.–Nov.)

SOCIETIES

1920	American Medical Association (Council on Pharmacy and Chemistry 1945–1950)
1921	Harvey Society (Vice-President, 1948–1949; President, 1950–1951)
1923	Society for Experimental Biology and Medicine
1925	American Association for the Advancement of Science
1927	Interurban Clinical Club
1928	American Society for Clinical Investigation (President, 1936)
1930	New York Academy of Medicine (Vice-President, 1941–1944)
1934	New York Clinical Society
1935	Association of American Physicians (Councillor, 1948–1953; Vice-President, 1953–1954; President, 1954–1955)
1935	Century Association
	Harvard Alumni Association (Director, 1944–1947)
1938	Sigma Xi (Honorary Council, 1950–1953)
1946	National Academy of Sciences (Council, 1952–1955; Committee on Loyalty, 1955–1956)
1946–1948	American National Red Cross Advisory Board
1949	American Academy of Arts and Sciences

1951 American Philosophical Society
1951–1953 Practitioners' Society of New York
1953 American Diabetes Association
1959 Blood Transfusion Association of Greater New York
American College of Physicians (Master)

FOREIGN SOCIETIES

1945 Argentine Medical Association (Corresponding Member)
Société Médicale des Hôpitaux de Paris (Foreign Corresponding Member)
1950 Société Médicale des Hôpitaux de Paris (Honorary Member)
1954 Danish Society of Internal Medicine (Foreign Member)
Horse Shoe Club, London (Honorary Foreign Member)
Royal Australasian College of Physicians (Honorary Fellow)
1955 Norwegian Medical Society (Honorary Foreign Member)
1955–1956 Royal Belgian Academy of Medicine (Corresponding
1956 Association of Physicians of Great Britain and Ireland (Honorary Foreign Member)
1957 Royal College of Physicians of London (Honorary Fellow)
British Medical Association (Foreign Corresponding Member)
1960 Royal Society of Medicine, London (Honorary Fellow)

COMMITTEES

1941–1956, National Research Council
1960–1962 Division of Medical Sciences
Executive Committee, 1942–1943 (2d Vice-Chairman), 1943–1944 (1st Vice-Chairman), 1945–1946, 1950–1951
Member-at-Large, 1942–1951
Representative of American College of Physicians, 1953–1956
Subcommittee on Blood Substitutes, 1941–1944 (Chairman)
Committee on Shock & Transfusions, 1942–1944
Board for Coordination of Malarial Studies, 1944–1946 (Chairman)
Panel on Pharmacology of Antimalarials, 1944–1946

Panel on Clinical Testing of Antimalarials, 1944–1946
Panel on Clinical Investigation in Endocrinology, 1945–1949
Committee on Medicine, 1952–1953
Committee on Inter-American Science Cooperation 1960–1962
Medical Fellowship Board, 1941–1946, 1946–1951 (Chairman)
Division of Chemistry and Chemical Technology
Panel on the Synthesis of Antimalarial Drugs, 1944–1946
Committee on Insect Control, 1945–1946
Office of Scientific Personnel
Committee on Manpower Advisory to the Office of Scientific Personnel, 1952–1953

1945 Office of Scientific Research and Development, Mission to England

1945–1947 Veterans Administration (Consultant)

1945–1951 Life Insurance Medical Research Fund Advisory Committee

1945–1954 American Public Health Association Committee on Lasker Awards

1945–1955 Russell Sage Institute of Pathology Board of Scientific Directors

1946, 1949–1954 National Institutes of Health
Malaria Study Section, 1946
Research Fellowship Program, 1949
Advisory Health Council, 1949–1954

1947–1959 United States Atomic Energy Commission (Consultant)
Medical Board of Review, 1947 (Chairman)
Brookhaven National Laboratory, 1947–1954
Brookhaven National Laboratory Committee on Clinical Investigation, 1949–1954
Brookhaven National Laboratory Advisory Committee on Biology and Medicine, 1959
Brookhaven National Laboratory Medical Visiting Committee, 1955–1958

1947–1960 Rockefeller Foundation Board of Trustees

1948 New York Heart Association Advisory Council

1950–1954 Massachusetts General Hospital Scientific Advisory Committee

1950–1964 National Science Board of National Science Foundation

1951–1953	President's Science Advisory Committee of Office of Defense Mobilization (Consultant, 1953)
1951–1953, 1959–1962	President's Science Advisory Committee (Member under Presidents Truman, Eisenhower, and Kennedy)
1954	Massachusetts Institute of Technology Visiting Committee
1954–1971	Rockefeller Institute (University) Board of Trustees (Vice-Chairman to 1970)
1955	Atoms for Peace Awards, Inc., Advisory Committee
1955–1957	Rutgers University Scientific Advisory Committee of Institute of Microbiology
1959	World Health Organization Advisory Board
1960–1967	Committee to Visit the Medical School & the School of Dental Medicine (Chairman, 1962–1967)
1961–1967	Committee to Visit the University Health Services (Chairman, 1961–1967)

EDITORSHIPS

1947–1959	Coeditor, *A Textbook of Medicine*
1935–1962	Editor, *Martini's Principles and Practice of Physical Diagnosis*
	Board of Editors, *New York Academy of Medicine Bulletin* and *War Medicine*
1937–1946	Associate Editor, *Journal of Clinical Investigation*

AWARDS

1936	Stevens Triennial Prize, Columbia University
1939	Eastman Memorial Lecturer, Rochester University
1944	Leo Loeb Lecturer, Washington University, St. Louis
1958	James Howard Means Visiting Physician, Massachusetts General Hospital
1959	Recipient of Kober Medal, Association of American Physicians
1961	150th Anniversary Award, Massachusetts General Hospital
1962	John and Samuel Bard Award, Bard College
1965	Order of the Brilliant Star, Republic of China
1973	Distinguished Teacher Award, American College of Physicians

BIBLIOGRAPHY

KEY TO ABBREVIATIONS

Am. J. Med. Sci. = American Journal of the Medical Sciences
Am. J. Physiol. = American Journal of Physiology
Arch. Intern. Med. = Archives of Internal Medicine
Br. Med. J. = British Medical Journal
Bull. N.Y. Acad. Med. = Bulletin of the New York Academy of Medicine
Calif. West. Med. = California and Western Medicine
J. Am. Med. Assoc. = Journal of the American Medical Association
J. Biol. Chem. = Journal of Biological Chemistry
J. Clin. Invest. = Journal of Clinical Investigation
J. Gen. Physiol. = Journal of General Physiology
Med. Clin. North Am. = Medical Clinics of North America
P. R. J. Public Health Trop. Med. = Puerto Rico Journal of Public Health and Tropical Medicine
Proc. Soc. Exp. Biol. Med. = Proceedings of the Society for Experimental Biology and Medicine
Trans. Assoc. Am. Physicians = Transactions of the Association of American Physicians

1918

With George R. Minot. An attempt to prevent influenza at Harvard College. Boston Medical and Surgical Journal, 179:665–69.

1920

Radioactivity and physiological action of potassium. J. Gen. Physiol., 3:229.

1921

With Arlie V. Bock and Reginald Fitz. Acute nitrobenzol poisoning with studies on the blood in two cases. Am. J. Med. Sci., 161:539–46.

With W. W. Palmer and D. W. Atchley. Studies on the regulation of osmotic pressure. I. The effect of increasing concentrations of gelatin on the conductivity of a sodium chloride solution. J. Gen. Physiol., 3:801.

1922

With Jacques Loeb. The influence of electrolytes on the solution and precipitation of casein and gelatin. J. Gen. Physiol., 4:187–211.

With Walter W. Palmer and Dana W. Atchley. Studies on the regulation of osmotic pressure. II. The effect of increasing concentrations of albumin on the conductivity of a sodium chloride solution. J. Gen. Physiol., 4:585–89.

With Dana W. Atchley, Walter W. Palmer, and Ethel M. Benedict. On the equilibrium condition between blood serum and serous cavity fluids. J. Gen. Physiol., 4:591–95.

1923

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With Dana W. Atchley, Ethel M. Benedict, and Walter W. Palmer. Physical and chemical studies of human blood serum. II. A study of twenty-nine cases of nephritis. Arch. Intern. Med., 31:611–15.

With Dana W. Atchley, Ethel M. Benedict, and Walter W. Palmer. Physical and chemical studies of human blood serum. III. A study of miscellaneous disease conditions. Arch. Intern. Med., 31:616–21.

With D. W. Atchley and E. M. Benedict. Physicochemical studies of calcium chloride diuresis. J. Am. Med. Assoc., 80:1643–44.

With George A. Harrop. Uncompensated alkalosis in encephalitis. J. Am. Med. Assoc., 81:452–54.

1924

With Dana W. Atchley and Ethel M. Benedict. Observations on the origin of urinary ammonia. J. Biol. Chem., 60:491–95.

With S. Steinberger. On the diffusibility of the calcium of blood serum through collodion membranes. The effect of sodium chloride and changes in hydrogen ion concentration. J. Gen. Physiol., 6:453–56.

1925

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1926

With Emily G. Nichols. The effect of pure protein solutions and of blood serum on the diffusibility of calcium. Jacques Loeb Memorial Volume. J. Gen. Physiol., 8:451–61.

1927

With Emily G. Nichols. Factors influencing the diffusibility of calcium in human blood serum. J. Biol. Chem., 72:687–94.

With Emily G. Nichols. Effects of dialysis and of ether extraction on the diffusibility of calcium in human blood serum. J. Biol. Chem., 74:645–49.

With Ethel M. Benedict. Inorganic sulphates in human blood. J. Clin. Invest., 4:33–36.

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With Esther B. Reeves and H. Pelman Glasier. Responses to the injection of epinephrine in hepatic disease. J. Clin. Invest., 10:19–31.

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With Emily Guild Nichols and Beryl H. Paige. Insulin: Some effects on normal rabbits protected from hypoglycemia by ingestion of dextrose. Arch. Intern. Med., 48:70–81.

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With George A. Perera, Abbie I. Knowlton, and Alice Lowell. Effect of desoxycorticosterone acetate on the blood pressure of man. J. Am. Med. Assoc., 125:1030–35.

1946

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1947

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1962

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