these words in their technical setting. When we use a physiological or neurological manner of talking about psychological phenomena, it is well also to take note whether we really have any physiological ideas that are relevant to our problem. We may be convinced that a phenomenon is mediated by a physiological mechanism, but unless we have some physiological hypothesis concerning it, we might as well use the more direct and less pretentious psychological language.

Some rationalizations are regarded as more basic than others. We should like to have a precise physiological description of just what happens when we recall a nonsense syllable in a learning experiment. We should like it even better if the chemical equations could be written that cover the essential effects of recalling the nonsense syllable. Better still would be a detailed account, in terms of mathematical physics, of the molecular and atomic forces that characterize the recall of the nonsense syllable. In this hierarchy, we should gladly supplement a psychological explanation with one that is more basic. It would be unfortunate if the development of any psychological idea should be restricted because of a compulsion to make it look like physiology or to make it look like sociology.

Psychological theory can be rigorous. There is an erroneous impression among psychologists, as well as among our academic neighbors, that psychological ideas are necessarily loose, verbal, subjective and unfit for the quantitative analytical treatment of science. This impression is not justified. It is not necessary for us to abandon psychological concepts if we introduce analytical rigor in dealing with these concepts.

In rationalizing several psychological problems, I have been content to build with psychological concepts and postulates, even though I believe that some of them will be rephrased eventually in terms of physiology or chemistry or physics. But it is my conviction that we shall progress better by frankly building in terms of psychological concepts than by merely adopting a terminology and a manner of work which are premature for many psychological problems. It is better to formulate the laws of learning in terms of psychological ideas, and to find them experimentally verified, than to wait until the phenomena of learning can be rationalized in neurological terms. It may be a long time before that happens, even though we have faith that it will happen eventually. It is better to formulate the law of comparative judgment in terms of the discriminal error, which is a psychological concept, than to wait until we shall understand, physiologically, what happens when we say that one vase is more beautiful than another or that one synonym is better than another or even that one gray is darker than another. Even the simplest sensory comparisons are far from rationalized in physiological terms. If we isolate the primary abilities at first psychologically, perhaps we shall aid in their ultimate identification in physiological terms. I should make the plea that we develop psychological science frankly with psychological concepts, except in those cases where physical, chemical or physiological formulations are available.

In encouraging students to help us build an integrated interpretation of mental phenomena on an experimental foundation, let us remember that a psychological theory is not good simply because it is cleverly mathematical, that an experiment is not good just because it involves ingenious apparatus and that statistics are merely the means for checking theory with experiment. In the long run we shall be judged in terms of the significance, the fruitfulness and the self-consistency of the psychological principles that we discover.

OBITUARY

EDWARD CURTIS FRANKLIN

WITHIN the period of a year, American science has lost three distinguished pioneers in chemical research: Arthur Amos Noyes, on June 3, 1936, Julius Stieglitz, on January 10, and now Edward Curtis Franklin, on February 13, 1937. While they differed widely in personal traits and in the manner in which they applied their talents to the furtherance of research, each, in his own way, left an indelible impression upon American chemistry. Noyes was not a natural experimenter, but he possessed a keen, analytical mind which enabled him to concentrate his attention upon problems that seemed to hold forth promise of important results; his greatest contribution, perhaps, was the organization of two research laboratories and the selection and encouragement of able young chemists. Stieglitz was more the academician of the continental type; his genius found outlet in initiating research in numerous directions, which researches he carried out extensively through collaboration with many graduate students. Franklin was more of a lone worker; he carried on research to satisfy his innate curiosity; he worked in close association with only a few collaborators and the success of these researches was in large measure due to Franklin's consummate experimental skill.

Noyes, Stieglitz and Franklin all began their scientific careers as organic chemists, they all became interested in physical chemistry and made notable contributions to it; Noyes never returned to organic chemistry, Stieglitz always retained a primary interest in organic chemistry, while Franklin developed a special field and applied to its development his wide knowledge of physical, inorganic and organic chemistry.

Noyes and Stieglitz received much of their scientific inspiration in Germany, where they obtained their degrees—Noyes at Leipzig, in 1890, and Stieglitz at Berlin, in 1889; Franklin was essentially an American product; he was, one might say, a self-made investigator. While he spent a year abroad in 1890–91, there is nothing to indicate that his foreign experience left any great impression on his mind; he spent a year at Johns Hopkins in 1893–1894 and received his doctorate from that institution on the basis of organic research carried out under Remsen. There is some evidence of Remsen's influence in Franklin's later work, but it is not marked. While Noyes and Stieglitz entered upon active research at a very early age, Franklin, who was approximately five years their senior, did not enter upon an active research career until he had reached the age of 35. To understand this delay in Franklin's scientific development, one must be familiar with the background of his early life. In the light of that background, the surprising thing is not so much that he began his research activity so late in life but rather that he began it at all.

Edward Curtis Franklin was born on March 1, 1862, in the little town of Geary City, in Doniphan County, which is located in the northeastern corner of Kansas. He entered the University of Kansas, which had been founded twenty years earlier, at the rather late age of 22; his brother, Will, a year younger, had entered the university a year earlier, and it was largely through his brother's influence that Edward Franklin followed him to the university. Will Franklin became interested in physics and had a notable career as teacher and writer; Edward Franklin took up chemistry, led to this, probably, by his earlier contact with pharmacy. One trait of Franklin's, and one that he never lost, was evident in his student days at Kansas—his capacity for forming friendships. These friendships were lifelong; included among his early intimates were a number of men who later achieved distinction, such as William Allen White, the journalist, and Frederick Funston, one of America's greatest adventurers.

In those early days, of which we are now speaking, the youthful University of Kansas had already achieved a position of some distinction for its researches in biological fields; botany, entomology and, particularly, paleontology. Samuel W. Williston, who had come to Manhattan, Kansas, in early life, from New England, was one of the leaders in research at Kansas; his special field was paleontology. There is little doubt but that the research atmosphere at the University of Kansas in the 80's and 90's was largely due to Williston's influence. In the physical sciences, no active research was carried out at the University of Kansas in those days; this is not surprising when one considers how few were the productive investigators in America at that time. It is not remarkable, therefore, that Franklin, who entered college at an age when students are usually graduating, should have been long delayed in training himself to become an accomplished investigator.

Any one who was not at one of the mid-western universities during the last quarter of the nineteenth century can have no comprehension of the meagerness of the physical facilities. The writer well recalls how Franklin cut up the jackets of Liebig condensers for the purpose of constructing Dewar tubes. Glass, suitable for glass-blowing purposes, was unobtainable in this country; chemicals had to be ordered from Germany and, frequently, had to be made because of the length of time required in obtaining them from abroad. Of the equipment employed in the early work on liquid ammonia, a resistance box and a simple Kohlrausch bridge were the only things that were not homemade.

Franklin hit his stride as an investigator when he began the study of liquid ammonia solutions. The work on liquid ammonia was initiated at Kansas by H. P. Cady with Franklin's encouragement. Later, Franklin and the writer undertook a series of investigations dealing with the problem. The success of the work was due, primarily, to Franklin's superb manipulative skill, which made it possible to successfully carry out measurements with the limited facilities then available. It is interesting to note that many of the results of these early investigations of Franklin's with several collaborators remain to this day almost the only reliable data available. Nothing shows more clearly Franklin's remarkable ability as an investigator than the fact that he was able to plan and carry out physical measurements in a field that had scarcely been cultivated in America at that time and that the results of these measurements have stood the test of forty years.

Franklin was quick to grasp the significance of the results of the experiments with liquid ammonia. He soon saw that a striking parallelism existed between solutions in water and solutions in liquid ammonia. He pressed the analogy further, always devising experiments calculated to establish relations upon a basis of sound fact. He extended and applied his ideas to organic as well as inorganic substances, and with remarkable success. The whole he finally gathered together and published a few years ago in a monograph entitled "The Nitrogen System of Compounds."

As an experimenter, Franklin was unsurpassed. He constructed Dewar tubes as early as 1895, probably the first constructed in America, and he prepared argon at about the same time and sealed it into Plücker tubes and examined its spectrum. In 1896, he constructed platinum target x-ray tubes to be used by Lucian Ira Blake in his lectures on x-rays; he was ever ready to help a colleague. Franklin enjoyed giving lectures, particularly, when they required difficult demonstrations. He never failed, for example, to prepare nitroglycerine in his lectures on organic chemistry and he delighted in showing what it would do. His lectures on liquid ammonia were something in the way of a work of art; he carried out most difficult reactions in sealed tubes which he carried about with him on his trips. He had the rare ability to present a subject interestingly as well as logically.

If there was one quality of Franklin's that stood out above all others, it was his power of making friends; where others made acquaintances, he made friends. He valued these friendships, and nothing gave him more pleasure than to take a trip through the country to meet again his friends of old or to make new ones.

Franklin was anything but a recluse; he loved social intercourse and gloried in the activities of life. His love of nature was second only to his love of science. Mountain climbing was his favorite recreation and there are few of the higher peaks of the Rockies and the Sierras that Franklin did not climb. In his later years, when climbing mountains was out of the question, his automobile became his out-of-doors friend and companion.

In Franklin were combined many rare qualities that endeared him to his friends; he could be frank without giving offense and he could criticize without provoking rancor, his fair-mindedness was as obvious as his lack of guile and he was generous to a fault. His friends will miss his ready smile and treasure the memories of their happy associations with him.

Vale!

CHARLES A. KRAUS

RECENT DEATHS AND MEMORIALS

DR. EDWARD S. ROBINSON, professor of psychology at Yale University, died on February 24 as the result of injuries received when struck by a bicycle. He was forty-four years old.

DR. RICHARD HOOPE CUNNINGHAM, neurologist and chief of clinic in the neurological department of the Vanderbilt Clinic of Columbia University, died on February 24 at the age of sixty-one years.

PROFESSOR E. S. ERB, for twenty-eight years a member of the department of agricultural chemistry at the Pennsylvania State College, died from a heart attack on February 19 at the age of fifty-nine years.

FREDERIC HEDGE KENNARD, associate in ornithology at the Museum of Comparative Zoology of Harvard University, died on February 24. He was in his seventy-second year.

RICHARD C. RADDATZ, since 1924 general assistant in the department of preparation of the American Museum of Natural History, an expert in mounting animals in habitat groups, died on February 21 in Nairobi, British East Africa. He was about fifty years old. Mr. Raddatz sailed from New York early in January with Mr. and Mrs. Philip M. Plant to collect specimens of wart hogs and ostriches for the Carl Akeley animal groups in the museum.

CRANDALL Z. ROSECRANS, assistant director and chief of the metallurgical division of the Leeds and Northrup Company, Philadelphia, died suddenly on January 7 at the age of forty years.

Nature reports the death of Professor Michael Lenhossék, emeritus professor of anatomy in the University of Budapest and president of the Hungarian Academy of Sciences, an authority on the histology of the nervous system, on January 26, aged seventy-three years, and of Dr. F. Sowerby Macaulay, known for his mathematical work, on February 9, aged seventy-four years.

THE following minute was drawn up by the Wistar Institute of Anatomy and Biology, Philadelphia, on the death of Effingham Buckley Morris: "From a long and active life in law, in finance and in the promotion of science Effingham B. Morris on January 22, 1937, passed forever from scores of devoted friends and admirers in all walks of life. To his associates in financial circles he was known for his integrity and vision in the management of affairs of magnitude; to those who knew him as a promoter of scientific knowledge he was admired for his resourceful efforts in building the institutions he administered; to those whose privilege it was to know him intimately he engendered a love and respect without limit. Members of the staff and employees of The Wistar Institute mourn the loss of a real friend; a member of the board of managers since 1915 and president of The Wistar Institute since 1922."

SCIENTIFIC EVENTS

THE COLUMBIA UNIVERSITY SCHOOL OF MEDICINE

GIFTS received by the Columbia University School of Medicine will enable it to advance its program of graduate medical education by enlarging its laboratory facilities at a cost of $500,000. Eight floors will be added to the west wing of the building of the School of Medicine at the Medical Center. The new construc-