After the German "chlorine wave" at Ypres, he was called back to Paris and appointed by Clemenceau chief of the scientific department of the Allied Chemical Services then being hastily improvised in an atmosphere of gloom. One illustrious chemist expostulated that "no nation could fight a chemical war with Germany." Mayer and his British associate, Joseph Barcroft, rallied their colleagues, fashioned in a few days the first Allied gas masks, and organized the first Allied reprisals. The discovery of the hyperthermic effects of dinitrophenol and of the cellular effects of mustard gas are interesting scientific by-products of his wartime activity. In 1917, Mayer's group was enlarged by the arrival of United States personnel; many of his American collaborators, Walter Cannon, L. J. Henderson, A. M. Pappenheimer, and others, remained his lifelong friends.

In 1919, André Mayer became the first professor appointed by the French Government at the University of Strasbourg. There he planned and initiated the rebuilding of the Medical School and its research institutes. In 1923, he was elected to the Collège de France, in the chair of Cuvier and Marey. Between the two wars he directed there an extremely active laboratory, devoted, among other topics, to the characteristics of the regulation of food intake and of water intake, the relationship between temperature maintenance and oxygen consumption, the relationship of lipogenesis to hydration in plants, and so on.

During the period between the two world wars, André Mayer was also active in strengthening French scientific organizations, a task made all the more urgent by the decimation of educated young men during World War I. He served as president of many of the French scientific societies, varying in object from physical chemistry to psychology, as chairman of the board of the Biological Institute and of the Cancer Institute (Hoover Foundation) at Lille, as secretary general of the French National Research Council, as vice president of the Collège de France, and as head of the Scientific Military High Committee. He was a member of the Académie de Médecine and the Académie des Sciences. Yet he did not seek or enjoy the administrative duties which took him away from his laboratory. He repeatedly declined cabinet appointments as well as the rectorship of the University of Paris. On the other hand, he never refused to undertake any task which could lead to greater international understanding and peace. He served as delegate to the Disarmament Conference, as chairman of the Expert Committee of the International Red Cross, as adviser to the International Labor Office and to the Health Section of the League of Nations. With all this, he found time to write some of the best contemporary French prose. His introduction to volume IV (*Life*) of the French Encyclopedia, which he directed, is considered a literary classic.

World War II found him back in service, with the equivalent rank of lieutenant general, at the head of the Chemical Warfare Services of the Allied command, and later as head of the Fighting French military and medical missions to the United States. In Washington in 1943–44 he worked on the landing plans, was chairman of the Social Council of UNRRA, was one of the chief architects of the Food and Agriculture Organization of the United Nations, serving as chairman of its first executive committee (he later declined to succeed Lord Orr as director general, preferring to remain in a more independent position as chairman of the coordinating committee). He also found time to give the Lowell lectures in Boston.

Back in France at the end of 1944 he took a leading part in the creation of other international organizations, including the International Scientific Unions, on the council of which he later represented physiology. His last years were as busy as his life had always been; at 80 he was still working 12 hours a day as head of public health, agricultural, and military institutions, and as plenipotentiary ambassador to the technical agencies of the United Nations. One month before his death—and 1 month after the death of his cherished wife—he was in Central Africa, inspecting nutrition and technical assistance work.

André Mayer received the highest distinctions from his colleagues, from universities on both sides of the Atlantic, from his own and many allied governments, and from international organizations. But the real measure of his greatness is that all who have had the privilege to know him retain the example of his appetite for knowledge, his disciplined imagination, his care in the execution of any task worth undertaking, his courage and fierce love for freedom, and his utter selflessness—the traits held throughout the ages to be the attributes of the scholar and the humanist.

JEAN MAYER
Department of Nutrition, School of Public Health, Harvard University, Boston, Massachusetts

Seymour Korkes, Biochemist

With the accidental death of Seymour Korkes at the age of 33, on 10 December 1955, American biochemistry lost one of its most promising young men.

Korkes, a native of New York City, received most of his undergraduate training at Brooklyn College from which he was graduated in 1942. Harry Albaum invited Korkes to become his research assistant when Korkes was under 20. While studying the metabolism of oat seedlings—the subject of the first of Korkes' published scientific papers—with Albaum, Korkes initiated his acquaintance with the biochemical methods used in the study of cell respiration and metabolism. During his senior year in college, Korkes worked with I. N. Korr in the department of physiology, New York University College of Medicine, on the difference in the responses of resting and stimulated tissues to inhibitors of the cytochrome oxidase system.

On graduating from the New York University College of Medicine, Korkes received an Army Medical Corps commission. After serving an internship at Queens General Hospital, he was selected for a position on the teaching and research staff of the division of biochemistry of the School of Aviation Medicine at Randolph Field, Texas. A year and a half later, he joined the staff of New York University College of Medicine as instructor in pharmacology. He was awarded a Markle scholarship in the medical sciences and became assistant professor of pharmacology in 1951.

At Randolph Field, Korkes attacked certain biochemical aspects of the problem of anoxia at high altitudes through studies of the respiration of tissue homogenates at low oxygen tensions and the effect of various metabolites and cytochromes on this respiration.

At New York University, Korkes discovered a new inducible bacterial enzyme, which catalyzed the oxidative decarboxylation of malic acid to lactic acid and carbon dioxide, and elucidated the mechanism of the reaction. His most striking contribution, however, was the demonstration that soluble enzyme preparations from bacteria could catalyze the oxidation of pyruvic acid on addition of diphosphopyridine nucleotide (DPN) and coenzyme A, with the formation of reduced DPN, acetyl coenzyme A, and carbon dioxide. This discovery was rapidly followed by the isolation of similar enzymes from animal tissues. Although the participation of coenzyme A in pyruvate oxidation had been made to appear likely by the work of Lipmann and his collaborators, and the role of acetyl coenzyme A in the enzymatic synthesis of citric acid was essentially established at that time (1950) through work at New York University, the exact nature of the initial steps in the biological oxidation of pyruvate had remained obscure until the time of Korkes' work.

A study by Harold Strecker and Korkes of the glucose dehydrogenase of mammalian liver led to the discovery that the immediate oxidation product of glucose by DPN is the δ-gluconolactone and that the reaction is readily reversible. Oxidation to the lactone had been made to appear likely in the case of glucose-6-phosphate dehydrogenase that is triphosphopyridine nucleotide-dependent by the work of O. Cori and Lipmann and had previously been established by Bentley and Neuberger for the oxidation of glucose by notatin, the glucose oxidase of *Penicillium notatum*. Unlike the liver enzyme, however, notatin is a flavoprotein, and the oxidation of glucose by this enzyme is irreversible.

During 1952 and 1953, Korkes worked as a research guest in the laboratories of Earl R. Stadtman, at the National Institutes of Health, Bethesda, Maryland, and Horace A. Barker at the University of California in Berkeley. In September, 1953, Seymour Korkes joined the staff of the Duke University School of Medicine as associate professor of biochemistry in Philip Handler's department. At Duke University Korkes continued work that he had started in Bethesda on the mechanism of the biological reduction of certain metabolites by molecular hydrogen catalyzed by the enzyme hydrogenase.

Delving deeper into nature's secrets, he was investigating the idea that biological reduction by hydrogen might operate through the same basic patterns as the reduction occurring in photosynthesis through the photochemical cleavage of water and that a common step, possibly the reduction of pyridine nucleotides, might be involved. This idea was partly based on experimental results of Korkes himself and of Wolf Vishniac with chloroplast and bacterial preparations at New York University.

The initial results of this work provided a clear-cut demonstration that the hydrogenase system present in soluble enzyme preparations of the microorganism *Clostridium kluyveri* very actively catalyzed the reduction of diphospho- and triphosphopyridine nucleotides by molecular hydrogen; furthermore, as yet unidentified heat-stable cofactors were required for this reaction.

During most of 1955 Korkes had been working hard on the preparation of the review on carbohydrate metabolism for volume 25 (1956) of the *Annual Review of Biochemistry*. He had given considerable thought to this review and had prepared a number of notes on the various topics with highly original and stimulating ideas on some of them. It is very fortunate that, through the efforts of Philip Handler, George W. Schwert, Efraim Racker, Sidney P. Colowick, B. L. Horecker, Seymour Kaufman, Nathan O. Kaplan, and other friends, this last contribution of Seymour Korkes will be available to biochemists and physiologists as a posthumous paper.

Because of his lucid intelligence, his keen imagination, his rapidity in grasping concepts and ideas, and his uncommonly broad background in mathematics, physics, chemistry, and the biological sciences, Korkes was exceptionally well endowed as an investigator. These qualities, together with his clarity of expression, his unselfishness, and his desire to help other people, made him a teacher of unusually high caliber. His kind, modest, and inspiring personality and his warm friendliness gained the sympathy and confidence of students as well as that of his colleagues. His conversation, full of youthful, overflowing enthusiasm or of searching criticism, was highly stimulating, and one was captured by the warmth and intellectual integrity with which he defended or criticized ideas and experiments.

Korkes had wide interests, and he was equally at home whether he was performing a biological experiment or was engaged in the construction of electronic equipment, in glassblowing, or in various other activities. These qualities made him very resourceful in the laboratory. He was a man of more than average culture and had the fortune of sharing his wide interests in literature, painting, music, and art in general with his gifted wife, Frieda. Seymour Korkes will always be remembered by his friends and colleagues with admiration and deep affection.

SEVERO OCHOA

Department of Biochemistry, New York University College of Medicine, New York, N.Y.