ciated and known. By forming such a reserve, the intellectual status and the fruitfulness of government science would inevitably be raised and the universities would be brought into closer touch with realities.

There is no need to go into details; they can be settled later. The broad principle is that in every way we need to break down barriers between universities, independent research institutions, industrial laboratories and the scientific establishments and service of the government. This can be done by regular interchange of personnel, by a common pension system, by providing in the government laboratories all those facilities for discussion, for meetings, for criticism, for initiative, for collaboration—even perhaps for teaching—which are found elsewhere. We must not be deterred in this project by bureaucratic objections, by false economy, by the red-herring of secrecy or by alleged administrative difficulties. In science also we must deliberately follow the line of our national genius and ensure the fullest cooperation and interchange between independent science and science controlled by the state.

This plan for a reserve of officers and for frequent and regular interchange between different kinds of institutions need not be limited to science; it should be open to the government service as a whole. Drastic changes are needed in the Civil Service. Personal ability and personal integrity, essential as they are, are not sufficient; the outlook, the methods, the organization, the traditions of the Civil Service must be altered, and contact must be maintained with the real world and its methods outside. The war has shown, what many suspected already, that for all its devotion and its high traditions, the Civil Service has largely failed; the same might well be said of Parliament, but that is another matter. Nothing could be better for the Civil Service, for industry, for the universities, than to institute a regular interchange of personnel; to treat the universities as staff colleges to which workers from the Civil Service or from industry return at intervals for refreshment; to treat industry and the Civil Service as the workshops in which for a period university dons can obtain practical experience; to give to government offices a touch with reality, and to industry a touch with national needs, by the mutual temporary interchange of some of the ablest men on either side. We are concerned here to-day primarily with science in government. Science, however, will never be given full scope until a revolution has occurred in the methods and outlook of government itself.

May I finish on a note, not of criticism but of hope? Under the old régime of *laissez-faire,* which we intend that the proper use of science in government shall replace, our public health services were organized mainly on the principle of trying to cure people when they were sick, our architecture on mending the pipes when they burst after a frost, our industry on paying people a dole when they were unemployed, our national defense on getting ready when a war had begun. It is obvious, however, that scientific planning and the planning of our national resources can make many of our troubles unnecessary. By designing our houses properly the pipes need never get frozen up; by proper attention to nutrition, to public health and physical education, sickness can be largely avoided; by deliberate planning of public works, unemployment can be greatly reduced and the standard of living raised; by adopting a period of national service, universal for men and women alike, as the highest form of democracy, we can avoid blundering unprepared again into war, and can add a new dignity to our citizenship. Scientific planning and planning with the aid of science are what we look forward to; planning, however, in which any new order we arrive at is fitted to our traditional freedom.

OBITUARY

WILLIAM ALBERT NOYES, 1857–1941

WILLIAM ALBERT NOYES departed this life on October 24, 1941, at his home in Urbana, Illinois, aged 83 years, 11 months.

How familiar the form of such an announcement! It marks the beginning and ending of life, the two covers of the book, but of the contents—particularly rich in this case—not a word.

Dr. Noyes was born in the country near Independence, Iowa, November 6, 1857. His family, of New England Congregational stock, lived under pioneer conditions not favorable to the study of chemistry and physics; nevertheless, as a boy he managed to get hold of some scientific books and became interested in these subjects at an early age. In the midst of farm work he prepared himself for college, almost without a teacher. In the Iowa college of that day little chemistry was taught, but this was supplemented by a large amount of self-instruction. At the end of four years the young man was W. A. Noyes, A.B. and B.S., in spite of the fact that he had taught school every winter to pay expenses. He conducted much of his graduate work himself while carrying a full load of teaching, so that he was able to take his doctor's degree in chemistry at Johns Hopkins under Remsen in a year and a half, before reaching the age of twenty-five.

Such unremitting labor was characteristic of Dr. Noyes throughout his long life. During a year as

instructor at the University of Minnesota he performed much analytical work for the State Geological Survey (just as he later did in Indiana) and began original research of his own. The research was continued at the University of Tennessee, where he was professor from 1883 to 1886. A seventeen-year period followed at Rose Polytechnic Institute, a small school of high grade. This was just the sort of place where many a man, condemned to a heavy teaching load, with improvised equipment and with little or no graduate assistance, would have sunk out of sight; Dr. Noyes attracted the attention of the chemical world by his researches and his books.

From Rose he stepped in 1903 to the position of chief chemist of the Bureau of Standards (the first to hold that title), and from there to head of the department of chemistry of the University of Illinois, where he served with distinction from 1907 to 1926, becoming then professor emeritus. In recognition of his success in building during this period a great department, the university in 1939 dedicated the scene of his labors as the William Albert Noyes Laboratory of Chemistry. Dr. Noyes himself took part in the dedication, surrounded by many staff members whom he had selected. His pathway had been strewn with well-deserved honors: presidency of the Indiana Academy of Science (1894), vice-presidency of the American Association for the Advancement of Science (1896), presidency of the American Chemical Society (1920); degrees from Clark in 1909, Pittsburgh in 1920, and Grinnell(his alma mater) in 1929; memberships in the American Academy of Arts and Sciences, the National Academy of Sciences, the American Philosophical Society; the Nichols medal (1908), the Willard Gibbs medal (1920), the Priestley medal (1935).

Dr. Noyes was married three times. By the first union he leaves W. Albert Noyes, Junior, head of the chemistry department of the University of Rochester; by the second, Charles Edmund, engaged in newspaper and information work in Washington, D. C.; by the third, his widow Katharine Macy Noyes and their sons, Richard Macy, graduate student in chemistry at California Institute of Technology, and Henry Pierre, Harvard undergraduate.

It is difficult in so short a biography to give a true idea of Dr. Noyes' many-sided life work. Perhaps we should first characterize his research, the principal part of which was performed with his own hands. From the oxidation of benzene derivatives with potassium ferricyanide, which links him with his teacher Remsen, he turned to the exact determination of the hydrogen-oxygen ratio, which is at the basis of our system of atomic weights. So excellent was this piece of work that it stands to-day as one of the nearest approaches to the probable truth for this value. His later determination of the atomic weight of chlorine was also outstanding. Methods for the determination of phosphorus, sulfur and manganese in iron constituted a fruitful excursion into the analytical field. During the course of a long series of important researches on camphor Dr. Noyes was the first to furnish definite proof of its present accepted structure (the Bredt formula). Other organic researches dealt with the hydrolysis of maltose and dextrin, molecular rearrangements, optically active diazo compounds and amine oxides. He was active as an investigator almost to the end of his life.

In 1901 a study of the formation of nitrogen trichloride from ammonia and chlorine led Dr. Noyes to the hypothesis that the molecules of elements may ionize into positive and negative parts and to the thought that two kinds of nitrogen trichloride might be capable of existence, one in which the nitrogen is positive and the chlorine negative, and one in which the opposite relations hold. He was thus one of the earliest investigators to recognize that the older conceptions of valence were inadequate to explain experimental facts. From that time on he took an active part in the development of the theory of valence and reactions.

At the turn of the century powerful influences began to operate under which the American Chemical Society, originally a local organization in New York, was destined to become the great national organization that it is to-day. Dr. Noyes was one of the leaders in this development. He saw that the greatest source of strength in such a society lay in disseminating the results of research. His friend Edward Hart had put the *Journal of the American Chemical Society* on its feet; Dr. Noyes took over the editorship in 1902 and held it for fifteen years. Together these men made the *Journal* respected the world over and drew to it the best contributions of American chemists. Besides original articles there had been since 1897 an abstracts section limited to American chemical research. This was not broad enough to satisfy Dr. Noyes. In 1907 he founded *Chemical Abstracts,* summoning to his aid a brilliant corps of nearly thirty assistant editors, and remained its editor for three years at considerable personal sacrifice. Thus he created a "key to the world's chemical literature," as the greatly expanded periodical now justly calls itself. Through the joint efforts of Noyes, Parsons and many others the society grew by leaps and bounds. Dr. Noyes found time to serve as secretary from 1903 to 1907 and as president in 1920. In the latter year he became editor of the series of American Chemical Society Scientific Monographs, a position which he held to his death; he was also the first editor of *Chemical Reviews,* from 1924 to 1926.

As if this varied editorial output were not enough,

several successful text-books bear the name of Noyes: "Elements of Qualitative Analysis," "Organic Chemistry for the Laboratory," "Organic Chemistry" (with a German translation), "Textbook of Chemistry," "Laboratory Exercises in Chemistry," "College Textbook of Chemistry." "Modern Alchemy," a book for lay readers, in collaboration with W. Albert Noyes, Jr., was published in 1932. One need not wonder that Dr. Noyes was often seen at meetings, on the train or at home, with a sheaf of printer's proofs in his hand.

The personal character of William Albert Noyes has been left to the last, but it is the key to all that has preceded. One would judge from his life that genius is fine intellect with capacity for a tremendous amount of hard work. He was first of all a scientific thinker, less affected by emotion or selfish bias than any man the writer has ever known, and utterly unassuming. He was a hard, persistent fighter for whatever he thought was right, and he was right most of the time. Unusual patience, earnestness and the force of example contributed to his success as a teacher. The fabric of Dr. Noyes's achievements was shot through with loyal friendships and strong humanitarian sympathies. Perhaps his deepest interest was religion—a liberal faith which he felt to be in harmony with scientific truth and at the same time a vital faith, something to be lived.

Dr. Noyes was a strong believer in promoting better international understandings as a means of preserving peace and curbing aggression. He felt that scientists, on account of their international community of interest, have a special duty in this field. During the troubled years which have followed the first World War, he made vigorous efforts to draw scientists of different nations closer together. He attended meetings in Europe on different occasions, and published two pamphlets entitled "Building for Peace," besides other articles. His belief never wavered that such efforts, by himself and others of like mind, will finally prevail. Certainly the life and work of William Albert Noyes, distinguished scientist who loved his fellow men, will be no small influence toward the better world of which he dreamed.

AUSTIN M. PATTERSON
U. S. OFFICE OF EDUCATION

MATARO NAGAYO

ON August 16, 1941, Baron Professor Mataro Nagayo, president of the Japanese Foundation for Cancer Research, died of cancer.

He was born on April 6, 1878, in Tokyo, as the third son of Sensai Nagayo, who exerted a great influence on the propagation of Western system of medicine and hygiene in Japan. In 1904 he graduated from Tokyo Imperial University Medical College, and the next year was appointed assistant in pathology in the university. In 1907 he was sent by the government to Europe, where he studied pathology mostly under Professor Aschoff at Freiburg. Returning to Japan in 1909, he was made assistant professor, and in 1911 was promoted to a full professorship in pathology, which he held until 1933. During 1919–1934 he was director of the Government Institute for Infectious Diseases and was most successful in organizing it into a powerful research center. In 1933 he was made dean of the Medical Faculty of Tokyo Imperial University, and in 1934 was elected president of the university. He retired from his duty at Tokyo Imperial University in 1938 with the title of professor emeritus.

Professor Nagayo early became closely connected with the Japanese Foundation for Cancer Research, then called Japanse Society of Cancer Research. In 1915 he became chairman of the executive committee, and in 1929 was unanimously elected president of the foundation. It must be freely acknowledged that the development of the work of the foundation has been almost entirely due to the earnest effort of President Nagayo, and that he is the founder of the Laboratories and Koraku Hospital of the Foundation. With the establishment of the laboratories in 1933 he assumed the directorship.

Professor Nagayo's personal contributions to science include some 200 published papers. His early studies on the pathology of liver cirrhosis and of beri-beri are widely quoted. During his directorship at the Government Institute for Infectious Diseases he attacked that baffling tsutsugamushi disease and finally established its etiology by discovering *Rickettsia orientalis*. His "Statistical Study of Cancer in Japan," published as a special number of *Gann,* is of permanent value. Studies he started on the brains of superior men in Japan produced morphological evidence that the brain of the Japanese is in no way inferior to that of the European.

The international aspect of Professor Nagayo's activity was wide and varied. In 1921 he went to Batavia, Java, as the Japanese representative to the Far Eastern Association of Tropical Medicine, of which association he was vice-president at the Tokyo Congress in 1925. In 1923 he was a member of the Japanese Medical Mission to the United States at the invitation of the Rockefeller Foundation. In 1928 he represented Japan at the Health Congress of the League of Nations (Geneva), the Congress for the Standardization of Serum (Copenhagen), the Leprosy Congress (Paris) and also the Cancer Congress (London). By request, he had served since 1933 as an advisory trustee to the International Cancer Research Foundation, Philadelphia, U. S. A. Professor Nagayo