as important as legislation in the abatement of stream pollution. Research and education must point the way, and finance furnish the wherewithal. Without them, attempts to apply mandatory corrective measures are apt to be abortive. Once the many answers as to proper methods of treatment are known and appropriate standards are set to govern the condition of streams in various localities, it may make little difference from whence the authority of administration flows, provided the administration is practicable and equitable.

THE FUTURE OF POLLUTION ABATEMENT

There is no gainsaying the fact that the discharge of waste waters into streams imposes a burden upon them which, under certain circumstances, may be undesirable. To hope, however, for the restoration of all streams to a state of pristine purity in thickly settled and highly industrialized sections of the country is probably beyond the realm of practical attainment. In some districts there are sources of contamination, resulting in part from past activities, which have been long established and may not be susceptible to engineering and chemical treatment. They will be factors even though wastes currently produced are rendered harmless.

It has been proposed by some students of the subject that streams be divided into several classes according to superior overall function. Into the first group would fall those streams which have been preserved in nearly their natural condition and to serve as sources of public water supply or for recreation. The purity of such streams is already so jealously guarded by various associations and by state health departments that they are unlikely ever to become contaminated. The second group would include those streams which serve for the disposal of sewage and industrial waste after treatment and for public water supply after purification. This class would comprise most of the streams in industrial areas except those carrying a heavy burden of acid mine water. Long reaches of such streams would provide recreational areas and wildlife refuges because waste treatment would be adequate to preserve a natural stream balance. Many watercourses in this group will have the benefit of additional waste treatment facilities, which are being installed as acceptable treatment processes are developed and money to finance them becomes available. A third group would consist of those streams now heavily polluted and unsuited for public water supply into which wastes might be discharged after treatment adequate to prevent nuisances. Actual stream mileage in this class is relatively small.

The network of streams with which industrial districts are endowed played an important role in our national development and can not be considered apart from their collective function in the overall economy. Over a period of years, contamination increased. Over a period of years, with the finding of feasible methods for the treatment of wastes, contamination should decrease. Chemistry and engineering, through research, have evolved many valuable by-products from former wastes. They have marked a course for industry to follow. With the continuation of research work supported by many branches of industry, there is the hope that reasonably economical processes may be developed whereby industrial wastes may be handled satisfactorily.

OBITUARY

THOMAS FRANKLIN HOLGATE

DEAN THOMAS F. HOLGATE, who had long held a distinguished place in American science and education, died on April 10 at the age of eighty-six years. He had been associated with Northwestern University for fifty-two years—as professor of mathematics, as dean of the college, as acting president of the university and as professor and dean emeritus. After retirement from teaching at the age of seventy-five, he continued to live in his home near the campus, maintaining his scholarly interests and participating in religious and civic affairs to the end of his long and fruitful life.

Born in Hastings County, Ontario, on April 8, 1859, he received a bachelor's degree from the University of Toronto in 1884, and a master's degree in 1889. He entered Clark University for advanced study in mathematics in 1890, receiving his doctorate three years later. He accepted a position as instructor in mathematics at Northwestern University in the summer of 1893, and was promoted to a professorship in applied mathematics the following year.

When he came to the Midwest in 1893, the Chicago World's Fair was in progress, and the new University of Chicago had recently been opened. Working with an enthusiastic and brilliant group of young mathematicians—including such men as White, Moore, Bolza, Maschke, Miller and Van Vleck—he took part in major scientific developments. He attended the first International Congress of Mathematicians (held in Chicago in connection with the Fair) and a famous series of Colloquium Lectures by Felix Klein (held in Evanston following the Congress). He was active in the formation of the Chicago Section of the Ameri-

can Mathematical Society in 1897, and he served as its secretary from 1897 to 1905.

Dean Holgate published a number of mathematical papers between 1892 and 1908, his most important ones dealing with certain ruled surfaces of the fourth order. His translation of "Reye's Geometrie der Lage," published in 1898, was an important contribution to our mathematical literature. Three years later he brought out a text-book, "Elementary Geometry, Plane and Solid," which was widely used in high schools and colleges. In 1911 he contributed an encyclopedic monograph on "Modern Pure Geometry" to J. W. A. Young's well-known volume entitled "Monographs on Modern Mathematics." Because of heavy administrative duties he made no further mathematical contributions for many years, but in 1930, at the age of seventy-one, he published his "Projective Pure Geometry," an excellently written book designed for college seniors and graduate students.

In recognition of his scientific standing, Dean Holgate's name was starred in the first edition of "American Men of Science," in which he was ranked among the forty leading American mathematicians in 1903. He served as a secretary of the International Congress of Mathematicians at Rome in 1908.

Starting in 1902, he served for seventeen years as dean of the College of Liberal Arts. To this office he gave unsparingly of energy and thought. He had a flair for such work, and demonstrated a remarkable ability for mastery of the details of the activities of the college and the university. Faculty and students alike found in the dean's office a genial clearing-house. No problem was too trivial to receive careful consideration; none too large to be faced courageously. Twice he was called upon to serve as acting president of the university, from 1904 to 1906 and again from 1916 to 1919. It was thus his responsibility to lead the university during the strenuous days of World War I, and he carried out the assignment with energy, patience and sound judgment. During these decades of administrative service he was a valuable member of many educational and civic committees, commissions and organizations. To mention only one, he was a leader in the formation of the North Central Association of Colleges and Secondary Schools, and was its president in 1917–1918. He won a high place for himself in the annals of his university by his success as an administrator.

In 1919, at the age of sixty, he retired from major administrative duties with the title of dean emeritus, but he continued his teaching for fifteen years. He spent one year, 1921–1922, as visiting professor of mathematics at the University of Nanking. This experience served to intensify his interest in foreign students, by whom he was regarded as an illustrious friend and an ever available adviser. During his long teaching career he inspired a host of students by his quiet enthusiasm, his clarity of expression and his scientific integrity.

To refer to Dean Holgate's university activities alone would give an inadequate account of his life, for he was long prominent in civic and religious affairs, particularly in administrative problems of the Methodist Episcopal Church. Serving five times as a member of the General Conference of the church, while momentous changes were being considered, he became a respected and influential participant in their sessions. He also served the church as a member of its Board of Education for Negroes, giving advice and guidance to several Negro colleges in their formative stages, in recognition of which they have named buildings in his honor. From 1924 until his death he was a member of the Board of Education of the church, being treasurer of the organization for four years. From 1923 to 1925 he was president of the Chicago Church Federation. This incomplete account of the official positions which he held is indicative of the wide influence which he exerted in fields outside the sphere of the university.

Dean Holgate was thrice honored with the LL.D. degree—by the University of Illinois in 1905, by Queen's University in 1919, and by Northwestern University in 1937.

We have mentioned the high points of Dean Holgate's scientific and public career, but those who knew him well will longest remember him as a generous and considerate friend, a man to whom his friends naturally turned for assistance or sane advice. To thousands of students of Northwestern University he will forever be "the Dean," a friend who always remembered their names and continued to have a personal interest in them. All who knew him will remember him for his staunch dependability, for his unfailing poise and dignity and for his granite integrity.

Dean Holgate is survived by four children—Eleanor (Mrs. Owen Lattimore), Robert Burdette, Barbara and Frances Burdette.

E. J. MOULTON

RECENT DEATHS

THE death by suicide is reported of Dr. George Vaillant, director of the University of Pennsylvania Museum, previously of the American Museum of Natural History. He was forty-four years old.

DR. HAROLD ORVILLE WHITNALL, head of the department of geology of Colgate University, died on May 18 at the age of sixty-seven years.

DR. ELLEN B. FOOT, assistant professor of anesthesiology at the Cornell University College of Medicine