tion of a type of complete quadratic equation. The more detailed explanation to appear in a later issue of the *Quellen* is awaited with great interest. With this material is also found new material on arithmetical series and on linear and quadratic equations in two unknowns.

When the Rhind papyrus was issued in 1877 by Eisenlohr the announcement was made that an ancient leather roll of mathematical content was also in the possession of the British Museum. Recently, in the *Journal of Egyptian Archaeology*,[9] S. R. K. Glanville has been able to publish the contents, as improved chemical methods made it possible to unroll the document. The material adds definitely to our knowledge of the Egyptian treatment of fractions. A long series of articles on the Egyptian fractions and other phases of the Egyptian mathematics, notably the beginnings of algebra, has appeared within recent times by Wieleitner, Abel Rey, Kurt Vogel, Loria, Neugebauer and others, as well as more detailed discussion in the books by Peet, by Gillain,[10] and in the work of D'Ooge, Robbins and Karpinski.[11] Doubtless in the new edition of the Rhind papyrus by Chancellor Chace, Dr. Archibald will give a somewhat comprehensive summary of the literature to date.

Any summary, however brief, of recent activities in the field of ancient mathematics and science must include a large group of serious comprehensive treatises which contribute largely to the modern view of the ancient learning. First and most important is George Sarton's "Introduction to the History of Science," a veritable mine of information. Then there are the histories by Gino Loria, Aldo Mieli, Sir Thomas L. Heath and J. L. Heiberg which from varying points of view give a survey of the present state of our knowledge and a background for appreciation of the most recent discoveries.

The writer may be pardoned if in closing reference is made to an article "Algebraical Developments among the Egyptians and Babylonians" which appeared in the *American Mathematical Monthly*[12] more than twelve years ago. In this the writer stated that the material then available indicated a high state of development of mathematical thought in Egypt and Babylon before the golden age of Greece. To-day even more than then, when the assertion represented a somewhat new point of view, it is certain that the indebtedness to Babylon and Egypt often explicitly affirmed by Greek writers is no figure of speech, no rhetorical gesture, but rather an assured fact.

[9] 13, 1927: 232–239.

[10] "La Science Egyptienne," "L'arithmétique au moyen empire," Brussels, 1927. xvi and 326.

[11] "Nicomachus of Gerasa, Introduction to Arithmetic," Michigan Humanistic Series, Vol. XVI, Chapter I. New York, 1926.

[12] L. C. Karpinski, *American Mathematical Monthly*, 24: 257–265.

OBITUARY

VICTOR CLARENCE VAUGHAN

THE death of Victor Clarence Vaughan on November 21, 1929, has deprived American medicine and public health of a great leader. He was born on October 27, 1851, at Mount Airy, Missouri. From 1874 until his retirement in 1921 he was connected with the University of Michigan, first as student, then as teacher and dean, during which long period he achieved for himself a rare reputation as a teacher, scientist and epidemiologist.

Dr. Vaughan went to the University of Michigan in 1874, after having taught Latin for two years at Mount Pleasant College, Missouri, where he graduated in 1872. At Michigan he received four degrees: M.S. in 1875; Ph.D. in 1876; M.D. in 1878, and the honorary degree of LL.D. in 1900. Later, other institutions honored themselves by conferring upon him the honorary degrees of LL.D., Sc.D. and M.D.

Dr. Vaughan was president of the Association of American Physicians in 1908 and of the American Medical Association in 1914. He was a member of the National Academy of Sciences, the American Philosophical Society, the French and Hungarian Societies of Hygiene. He also served as member of the House of Delegates of the American Medical Association in 1902, 1903, 1904 and 1906, and of the Council on Medical Education from 1904 to 1913. He was chairman of the section on pathology and physiology in 1902, of the reference committee on medical education in 1904 and of the Council on Health and Public Instruction from 1919 to 1923.

Dr. Vaughan began his teaching connection with the University of Michigan in 1875, as assistant in the chemical laboratory. In 1879 he became lecturer and in 1880 assistant professor of medical chemistry, and in 1883 he was advanced to the professorship. In 1887 he became professor of hygiene and physiological chemistry and director of the newly established hygienic laboratory. To these duties he added, in 1891, that of dean of the medical school. He held this chair and the deanship until 1921 when he retired as emeritus professor.

Retirement from the university did not close his activities. For several years, as chairman of the Medical Division of the National Research Council, he resided in Washington. It was there he wrote his splendid work, in two volumes, on "Epidemiology and Public Health," and in 1926 he produced his living

autobiography "A Doctor's Memories." In the fall of that year, with Mrs. Vaughan, he went as delegate to the Medical Congress in the Orient, visiting China, Japan and the Philippines. On his return in the spring of 1927 he suffered an attack from which he never fully recovered.

For twenty years following his graduation in medicine Dr. Vaughan was engaged in active medical practice. Nevertheless his interest always centered in laboratory work. From the beginning he was attracted to chemistry, and the chemical view-point appeared prominently throughout his subsequent work. His first modest contribution on the separation of arsenic from other metals appeared in 1875. The action of poisons and their detection fascinated him to such an extent that before long his services were in demand as a medical expert and he became a recognized authority on toxicology.

It was but a step further to become interested in sanitary matters. The question of the pollution of wells and of larger water supplies arose, and a chemical examination at that early period was the only means of arriving at a decision. At this time Dr. Vaughan was called upon to investigate the not infrequent poisonings from cheese and other milk products. Though bacteriology was then in its infancy he soon realized that the poisonous products were in some way the result of bacterial action. He was among the first to teach that similar products could be the cause of cholera infantum and that this disease was therefore due to the contamination of milk. Without his fully realizing it at the time, the sanitary chemical work was leading him into the new and broader field of modern bacteriology.

It was soon apparent that the old chemical laboratory was inadequate for pursuing problems pertaining to health and disease. His broad vision indicated the need of a separate institution. Accordingly, he appeared before the Michigan Legislature of 1887 and secured an appropriation establishing the hygienic laboratory at the university. At this time some attempts were made in the old laboratory to apply the new science of bacteriology to the solution of problems arising in connection with the examination of waters, but it was seen that a thorough training in the new discipline was necessary. At that early period this could be obtained only in Germany. Accordingly, Dr. Vaughan spent the summer of 1888 in Koch's laboratory in Berlin, where under the direction of Carl Fraenkel a first-hand knowledge of the new methods was acquired.

The hygienic laboratory at the university was completed in the fall of that year and opened for work in January, 1889. It was the first laboratory in this country which offered systematic teaching of bacteriology to physicians and students. Before long the laboratory outgrew its quarters and in 1903 it was moved to the new, the present west medical building; since 1926 it has occupied a wing in the east medical building. For twenty years after the opening of the laboratory Dr. Vaughan was active as its director, and it was during this period that a further and important step in extending its service to the state took place. In 1903, on the occasion of the first serious outbreak of rabies in the state, Dr. Vaughan obtained from the Board of Regents authorization to establish a Pasteur Institute as a part of the hygienic laboratory. At that time the antirabic treatment was not given except in two or three places in this country.

Dr. Vaughan's investigations in the new laboratory covered many fields. At first, the examination of water supplies claimed much attention, and in this connection he devised what he termed "the Michigan method" of analysis which made use of the experimental animal as a means of detecting harmful bacteria. His studies on food poisonings were likewise extensive and thorough. He sought the explanation of the germicidal action of normal serum and found it in the complex chemical constituent nuclein. Even more important were his studies upon the nature of the bacterial poisons or toxins. He devised an ingenious "tank" method for growing pathogenic organisms in mass quantities in order to obtain a sufficient amount of the cells for the purpose of studying the bacterial proteins which he was able to break up into two portions, one toxic and the other nontoxic. He utilized these results in formulating a valuable theory bearing upon the nature of hypersensitiveness and of fevers. As an earnest and enthusiastic investigator Dr. Vaughan had few equals. His extraordinary capacity for writing found expression in more than two hundred publications, not including his more pretentious works, on physiological chemistry, on ptomaines and leucomaines, on cellular toxins, on protein split products, on infection and immunity and on epidemiology. As an editor he founded the *Physician and Surgeon,* the *Journal of Laboratory and Clinical Medicine,* and served as the first editor of *Hygeia.* During his thirty years of service on the Michigan State Board of Health he did much to spread the growing knowledge of sanitation and public health.

No mention of Dr. Vaughan's activities would be complete without reference to his services in the army. Intensely patriotic, at the outbreak of the Spanish War he volunteered his services and saw active service at Santiago where he contracted yellow fever. The most deplorable fact in connection with that war was the outbreak of serious disease among the troops in the different concentration camps.

Laboratory methods were non-existent in the camps, and the prevailing disease was called indigestion, malaria or typho-malaria, rarely by its true name—typhoid fever. At the close of the war a commission, consisting of Majors Walter Reed, V. C. Vaughan and E. O. Shakespeare, was appointed to investigate the outbreak. The final report of that commission was prepared by Dr. Vaughan, the only surviving member. It was a classical contribution to the epidemiology of typhoid fever. This report forcibly attracted attention to the necessity of conducting future military campaigns under strict hygienic conditions. In the interval between this and the recent war improved diagnosis and immunization made it possible to avoid this terrible scourge.

Upon our entry into the late war, Dr. Vaughan was again called upon to give his services. As one of the board in charge of the communicable diseases in our camps, he served with ability and distinction, receiving the rank of colonel, the Distinguished Service medal and the decoration of the French Legion of Honor. More recently he was the recipient of the Kober medal. His work during the two wars brought him full recognition as a leading epidemiologist.

As a member of the National Research Council which came into being at the request of President Wilson, Dr. Vaughan participated in the work of that body by his wise counsel and his vast experience.

It is as an instructive and inspiring teacher that Dr. Vaughan will be remembered by the thousands of students who had the opportunity and privilege of listening to him. He freely drew upon his experiences in life and by his masterly presentation made the lectures interesting and forcible.

Unquestionably the greatest service which he rendered to the cause of medical education came during his tenure of the deanship. At the time that he entered this office the new laboratory methods of instruction were just coming into their own. With his clear foresight he recognized the importance of having productive scientific men upon the faculty, and it was this fact which enabled him to get together men of outstanding ability, thus placing the medical school of the university in the front rank of the schools in the country.

Dr. Vaughan's interest in the investigations of his colleagues was not less than that in his own researches. He lived, so to speak, in the laboratory and was never so happy as when a new fact or result rewarded his work. He loved his fellow men and freely gave of his time and energy. As a scientist and educator he was among the first. He has left an enduring impress in both fields. A great leader, a constructive thinker and a broad idealist is gone.

FREDERICK G. NOVY
UNIVERSITY OF MICHIGAN

MEMORIALS

The British Medical Journal reports that a memorial tablet has recently been placed on the house of Dr. Aloys Pollender (1800–79) at Wipperfürth, Westphalia, who described the anthrax bacillus in 1849, a year before C. J. Davaine, who is generally credited with its discovery.

WE learn from the London *Times* that in the City Church of the Ethelburga, Bishopsgate, where Henry Hudson, the navigator, took his last communion, a second window in his memory was unveiled on November 28. The ceremony was performed by Mr. Albert Halstead, the American consul-general in London. The new window, designed and executed by Mr. Leonard Walker, shows Henry Hudson exploring the Hudson in his ship, *The Half-Moon,* and finding some Indians who welcomed his approach. At the base of the window are represented various animals, including the beaver and the skunk, indigenous to North America.

RECENT DEATHS

MATURIN LIVINGSTON DELAFIELD, originally of New York, who for the last twenty-five years has resided in Lausanne, known for his work in botany, died on December 18, at the age of sixty-one years.

DR. SAMUEL RIDEAL, known as a chemist and an expert on sanitary science, died suddenly in Southern Rhodesia, on November 13, at the age of sixty-six years.

DR. AUGUST TOBLER, director of the geological section of the Natural History Museum in Basel, Switzerland, one of the leading European workers on the geology of the East Indies and also of northern South America, died on November 23.

THE death is announced of Professor Angelo Ruffini, professor of histology and general physiology at the University of Bologna.

SCIENTIFIC EVENTS

GOLD, SILVER, COPPER, LEAD AND ZINC IN THE EASTERN STATES

THE total value of the mine production of gold, silver, copper and zinc (value of lead is excluded) in the Eastern States in 1928 was $23,867,816, according to final figures for the year compiled by J. P. Dunlop, of the U. S. Bureau of Mines. There was an increase in both quantity and value of the above metals, al-