growing, since in many cases herbarium material is entirely inadequate for the purpose.

Without attempting further enumeration or suggestion, it may be said in brief that for the study of tropical and semitropical plants, both native and introduced, the investigation of habit and structure as adaptations to both climatic and edaphic factors, and the demonstration of various existing facts of plant distribution as a phase of geological history now in progress, the Tropical Laboratory at Miami offers advantages that can hardly fail to attract and reward earnest students for years to come.

V. M. Spalding.

Miami, Fla.,
February 27, 1902.

HENRY MORTON.

The death, in New York city, May 9, of Dr. Henry Morton, President of the Stevens Institute of Technology, removes from the stage one who cannot be replaced either in the field of his work or in the hearts of his friends. Nor can his work be fully appreciated by any one man or by any one class of men, so varied has it been in character, in its fields of action and in its specialization.

Physicist and engineer; chemist and educator; investigator and legal expert; linguist, editor and writer; man of business and philanthropist; pioneer in the reduction of the art of the mechanic and inventor to a professional and scientific form; mechanic, inventor and organizer and administrator: his many-sidedness necessarily precludes alike appreciation, correct judgment and exact quantitative measurement of his life's work. Whoever studies the life of the man and endeavors to weigh his work and its productive value to the world will at least conclude the investigation impressed with the conviction that this was the rarest of rare cases, that of the man of genius, at once brilliant and versatile, and fruitful of good works in many departments ordinarily supposed to be far separated, as vocations, by the constitution of the human mind. But heredity, environment and an irrepressible ambition conspired with extraordinary powers to make this life fruitful, both in opportunity and in accomplishment.

Henry Morton was born in New York city, December 11, 1836, the son of the late Rev. Henry J. Morton, Rector of St. James' Church, Philadelphia, and the grandson of Col. James Morton, a patriot of the Revolution, inheriting strength and talent from earlier generations of well-known families. He was educated at the University of Pennsylvania.

While still an undergraduate he undertook with classmates the translation of the parallel texts of the famous Rosetta Stone. Mr. C. R. Hale translated the Greek and the Demotic texts and Morton the hieroglyphics. Young Morton also made the smooth manuscript and illuminated it with a skill and taste which proved his inheritance from his father of remarkable artistic ability. This work was published at the suggestion of Henry D. Gilpin, later U. S. Attorney-General, and was edited by Morton, who actually reproduced the manuscript on the lithographic stone and all its illustrations. The extraordinary task was completed and the book issued from the press in the latter part of the year 1858, a volume of 172 pages with 100 illustrations. The book remains one of the famous and rare works in its department. It was commended in enthusiastic terms by Baron Humboldt.

On leaving college, Morton delivered the valedictory address and in admirable verse. His talent as poet continually came to the surface, even in later years and in the midst of the most engrossing occupations.

He entered upon the study of law, which he soon deserted, compelled by his inclination toward the physical sciences, the study and the practical investigation of which, together with mechanical occupations, had been his habitual amusements from childhood. He began his life as educator by accepting a lectureship at the Episcopal Academy of Philadelphia, his own preparatory school. He instantly became distinguished as a lecturer, and his clearness of demonstration and the brilliancy and ingenuity of his experiments, at the time unprecedented, continued to contribute to his fame throughout his life and were never excelled, if ever equaled, by later and noted scientific lecturers.

In 1863 he became Professor of Chemistry at the Philadelphia Dental College, in 1864 Secretary of the Franklin Institute and in 1867 the Editor of the *Journal of the Franklin Institute.* Meantime, his public lectures attracted enormous audiences and his ingenious, original and tremendously impressive experimental illustrations gave him a standing beside Tyndall as a popularizer of science and perhaps placed him fairly above that great genius in this feature of his lectures.

As editor of the *Journal of the Franklin Institute,* Morton accomplished an admirable work. He secured the contributions of men of science and of technical and industrial writers foremost in their respective departments, and his journal soon commanded the respect of the great authorities on both sides of the Atlantic. This periodical, founded in 1826, is quite as well known abroad as at home, and files may be found throughout Europe. It had long been accepted as a leading organ of technically applied science; but, under the direction of the young and active and talented man now coming to the editorial chair, it became still more widely known and exchanged with the important scientific and technical periodicals of all countries. The Abbé Moigno, editor of *Les Mondes,* the well-known French journal of science, Dr. Schellen and many other famous men of the time were among the friends made by the young editor through his work on the *Journal.*

In 1868, Professor Morton was made *ad interim* Professor of Chemistry and Physics at the University of Pennsylvania, in the temporary absence of Professor Fraser, and, in 1869, he was given an independent chair of chemistry. In the latter year he took part in the work of the U. S. Solar Eclipse Expedition and obtained exceptionally fine photographs of the eclipse. He discovered and explained the cause of the bright line on the disk of the sun beside the edge of the moon. This he showed to be purely a photographic phenomenon. His work attracted the attention and commendation of Airy, De la Rue and other astronomers. His pen was prolific of original and useful papers at this time, and their almost invariable reproduction abroad testified to their admitted value among men of science throughout the world.

In 1870 came Morton's great opportunity. By bequest, Mr. Edwin A. Stevens, of Hoboken, had provided for the foundation of 'an institution of learning' which was to be organized for the benefit, particularly, of 'the youth of the State of New Jersey.' The testator and his executors were alike without any definite idea of the form most desirable for such an institution. Professor Morton was consulted and, at his suggestion, the trustees concluded to make the new 'institution of learning' a school of mechanical engineering. At the time, as Morton pointed out, there were schools of civil engineering practically competent to supply all the instruction then demanded by aspirants for admission to that branch of the profession of engineering; but there were no

schools of the mechanic arts and of mechanical engineering, while the requirements of the rapidly growing industrial system were certain to make an early and imperative demand for professionally trained mechanicians and engineers. This prophecy was soon shown to be correct.

President Morton took his place as the head of the new school in 1870, promptly selected his faculty and organized the institution, in accordance with the accepted plan, in 1871. Its success was instant and the thirty-two years which have elapsed since the foundation of the Stevens Institute of Technology have seen steady progress in numbers and in quality of its alumni, in the character and extent of its curriculum and in the amount of fruitful research and valuable engineering data experimentally obtained through the able and unintermitted work of its faculty. It promptly assumed and permanently retained a place among leading professional schools.

The president set an admirable example of enterprise and industry and his life, from this time on, was one of great productiveness. The administration of the college, the prosecution of experimental investigations and the studies compelled by calls upon him for testimony in the courts as an expert in the departments of applied science, in which work he soon became, as everywhere, distinguished, completely put an end to his public lectures and reduced his authorship to a minimum. The new institution, however, was always a first consideration and he was always ready to make any personal sacrifice to insure its successful development.

In the early days of this period, Morton carried on his scientific researches as best he could in the midst of the constant calls of duty and the distractions of a busy life. He studied the fluorescence and the absorption spectra of over eighty uranium salts, publishing results on both sides the Atlantic. In 1873 he similarly studied the petroleum products, anthracene, pyrene, chrysene, and published valuable papers regarding them in the years 1872 to 1874. He discovered 'thallene,' and its modification 'petrolucene'; which substances have extraordinary fluorescent properties. His inventiveness was illustrated in everything undertaken by him; but one of his most useful devices was his new form of projection lantern, permitting the exhibition on the screen of a great variety of experiments which, previously, could not be satisfactorily displayed. This apparatus greatly interested Professor Hoffman, who visited the country a short time after its production. He independently discovered 'flavopurpurin,' though himself crediting Auerbach with its first production. It proved, later, that Auerbach made 'isopurpurin,' a mixture of anthrapurpurin and flavopurpurin. The demands of expert work led the young chemist and physicist into many interesting and often important researches, and his coolness, courage and entire confidence in his plans and processes were often strikingly exemplified, as by his work in distillation of nitroglycerine and in conducting investigations involving the employment of steam at above twenty atmospheres' pressure.

His expert work proved a lucrative as well as an attractive and interesting field for the display of his talents and, vastly more important from his own point of view, it gave him means for promoting the success of his college of engineering. He turned back into its treasury probably the full equivalent of the salary of the president, and never allowed an important opportunity to advance the work of the Institute to pass for want of funds when he could supply them. Besides many smaller and often unnoticed contributions, he provided, in 1880, a new workshop; in 1883 he

organized at his own expense a Department of Applied Electricity; in 1888 he organized the Department of Engineering Practice, in both cases contributing liberally toward the equipment and endowment of the new chairs. In 1892 he placed an additional $20,000 in the hands of the trustees for this last-named department. Later, at the celebration of the twenty-fifth anniversary of the organization of the institution, he gave it about $25,000, in 1900 $15,000 and again in 1901, $50,000. His total contributions to the funds of the college probably amounted to $150,000, including numerous small and unrecorded gifts of apparatus.

President Morton in 1878 was elected a member of the U. S. Lighthouse Board, filling the vacancy produced by the death of Professor Henry. He was a member of the National Academy of Sciences from 1873. He was Ph.D. (Dickinson, 1869, Princeton, 1870) and in 1897 was made D.Sc. (Pennsylvania) and LL.D. (Princeton). He was a member of many learned and technical associations, at home and abroad.

The personal character of President Morton compelled respect and admiration. Cultured, scholarly, acute and brilliant, he exhibited in every way intellectual superiority. Broad-minded, of good judgment and possessing unusual force, his moral side was admirable and impressive. He was generous to a fault, liberal in sentiment, and devout. At home in all social relations and adapting himself to any society, he influenced strongly every person with whom he came in contact and his welcome was warmest in the most intellectual gatherings. His fine personality and his earnestness in the pursuit of his lofty aim compelled the sympathy and induced the active cooperation of Mr. Carnegie, and the most important and most valuable and productive of accessions to the equipment of his college was the recently erected 'Carnegie Engineering Laboratory.' He was himself generous to a fault in other directions than the promotion of technical education, and his friends and neighbors, both at his home in Hoboken and in his summer home at Pine Hills, testify to his constant and liberal contributions to all good works; so quietly and unobtrusively were these private philanthropies conducted, that it is probable that very few of his friends were aware of their extent.

The death of President Morton is an event of serious importance as a loss to science, to the cause of education and to a large social circle; it is a catastrophe for the institution over which he presided for so many years and which he brought to such a prominent position among professional schools, and to his family and friends. He will always have a memorial in his valuable contributions to science, and the already famous school organized by him will permanently stand a monument of larger real value and importance than that construction which commemorates its architect with the inscription '*Si monumentum requiris, circumspice.*'

R. H. THURSTON.

SCIENTIFIC BOOKS.

Hygiene for Students. By EDWARD F. WILLOUGHBY, M.D. London, Macmillan & Co. 1901. Pp. 563.

This excellent volume appears under a new title, but is in reality a fourth enlarged and improved edition of his 'Principles of Hygiene' first published in 1884. Dr. Willoughby needs no introduction to the American reader, since he has been for a number of years the European editor in charge of the Department of Hygiene and Public Health in the *American Journal of the Medical Sciences,* and we may expect therefore that he speaks authoritatively on all matters pertaining to his specialty. The volume is divided into six parts and twenty chapters. Part I. deals