FACULTY AND INSTRUCTORS.

Senior Professors.

*AMOS EATON, A. M.....1824—42
GEORGE HAMILL COOK, C. E., B. N. S., Ph. D., LL. D.....1842—46
CHARLES DROWNE, C. E., B. N. S., A. M.....1859—60

Directors.

B. FRANKLIN GREENE, C. E., A. M.....1847—59
*REV. NATHAN S. S. BEMAN, D. D., LL. D.....1859—60
CHARLES DROWNE, C. E., B. N. S., A. M.....1860—76
WILLIAM LAWSON ADAMS, C. E.....1876—78
DAVID MAXSON GREENE, C. E.....1878

Junior Professors.

*LEWIS C. BECK, M. D.....1824—29
*HEZEKIAH H. EATON, A. B. (r. s.).....1829—30
*PAUL EUGENE STEVENSON, A. B. (r. s.).....1830—35
*EBENEZER EMMONS, A. M., M. D., (N, Y. State Geologist).....1835—39

Professors of Geology.

*AMOS EATON, A. M.....1824—35
*EBENEZER EMMONS, A. M., M. D.....1835—39
GEORGE H. COOK, C. E., A. M., Ph. D., LL. D.....1842—46
EDWARD A. H. ALLEN, C. E.....1851—54
JAMES HALL, A. B. (r. s), A. M., LL. D. (Emeritus 1876).....1854—76
ROBERT PARR WHITFIELD, A. M.....1876—78

Professors of Chemistry.

*AMOS EATON, A. M.....1824—35
JAMES HALL, A. M., LL. D.....1835—41
GEORGE H. COOK, C. E, Ph. D., LL. D.....1841—46
EDWARD A. H. ALLEN, C. E.....1851—55
*WILLIAM ELDERHORST, M. D.....1855—61
CHARLES A. GOESSMANN, Ph. D.....1861—64
HENRY B. NASON, Ph. D., M. D., LL. D.....1864

Professors of Botany.

*Amos Eaton, A. M. ..... 1824—38
R. Halsted Ward, A. M., M. D. 1869

Professors of Botany and Zoology.

*John Wright, M. D., (State Botanist of Michigan.) ..... 1838—45
*Frederick B. Leonard, M. D. ..... 1845—48

Professors of Natural History.

*Lewis C. Beck, M. D. ..... 1824—29
Edward A. H. Allen, C. E. ..... 1854—55
Henry B. Nason, A. M., Ph. D., M. D., LL. D. ..... 1858—64

Professors of Mechanics.

B. Franklin Greene, C. E., A. M. ..... 1847—59
Charles Downe, C. E., A. M., (Emeritus 1876) ..... 1859—76
William Hubert Burr, C. E. ..... 1876—84
Palmer Chamberlain Ricketts, C. E. 1884

Professors of Mathematics and Astronomy.

Charles Downe, C. E., A. M. ..... 1851—55
Dascom Greene, C. E. 1857

Professors of Descriptive Geometry and Drawing.

G. Gustavus Berger ..... 1851—53
S. Edward Warren, C. E. ..... 1853—72
Dwinel French Thompson, B. S. 1872

Professors of Geodesy, Road Engineering and Topographical Drawing.

Charles Downe, C. E., A. M. ..... 1851—55
David Maxson Greene, C. E. ..... 1856—61
William H. Searles, C. E. ..... 1862—64
Charles McMillan, C. E. ..... 1865—71
William Lawson Adams, C. E. ..... 1872—78
David Maxson Greene, C. E. 1878

Professor of Mental Philosophy.

*Rev. Nathan S. S. Beman, D. D., LL. D. ..... 1854—65

Professors of Physics.

Edward A. H. Allen, C. E. ..... 1851—55
Henry A. Rowland, C. E., Ph. D. ..... 1874—75
Arthur W. Bower, C. E. ..... 1875—80
Frank Perkins Whitman, A. M. 1880

Professors of Modern Languages.

*GEORGE F. STRUVE.....1854—56
LOUIS COUSIN, B. L. and S., de la Faculte de Paris.....1856—59
PHILIP H. BAERMANN.....1861—66
J. H. C. LAJOIE DE MARCELEAU, A. B.....1869—73

Professors of English Composition.

JAMES T. ALLEN, B. S.....1855—58
T. NEWTON WILLSON, A. M.....1859—60

Professor of Metallurgy and Practical Mining.

GEORGE W. MAYNARD, A. M.....1867—71

Professor of Analytical Chemistry.

WILLIAM PITT MASON, C. E., B. S., M. D., (Ass't Prof. 1882—85).....1885

Assistant Professors of Mathematics.

CHARLES DROWNE, C. E., B. N. S., A. M.....1849—51
DASCOM GREENE, C. E.....1853—57
*T. ORLANDO HOPKINS, C. E.....1857—59
WILLIAM FENTON, C. E.....1864—70

Assistant Professors of Physics.

HENRY A. ROWLAND, C. E., Ph. D.....1874—75
ARTHUR WELLINGTON BOWER, C. E.....1875—80

Assistant Professors of Mathematics and Astronomy.

ARTHUR WELLINGTON BOWER, C. E.....1874—75
PALMER CHAMBERLAIN RICKETS, C. E.....1882—84
CHARLES WINTHROP CROCKETT, A. M , C. E.....1884

Assistant Professor of Mechanics.

ELEUTERIO E. BESOSA, C. E.....1882—83

Instructors in Mathematics.

CHARLES DROWNE, C. E., A. M.....1847—49
GEORGE W. PLYMPTON, C. E., A. M.....1850—51
DASCOM GREENE, C. E.....1852—53
DE VOLSON WOOD, C. E., A. M.....1856—57
JOSEPH G. FOX, C. E.....1861—62
HORACE LOOMIS, C. E.....1862—63
WILLIAM FENTON, C. E.....1863—64
GEORGE M. HUNT, C. E.....1864—67

Instructors in Descriptive Geometry and Drawing.

DAVID HATHAWAY.....1847—50
S. EDWARD WARREN, C. E.....1852—53
ALBERT H. EMERY, C. E.....1855—58

Instructors in Physics or Mechanics.

ALBERT H. GALLATIN, A. M., M. D.....1866—67
ARTHUR W. BOWER, C. E.....1871—72
HENRY A. ROWLAND, C. E., Ph. D.....1872—74

Instructors in Geodesy.

GEORGE B. ROBERTS, C. E., B. N. S.....1850—51
*JOSEPH A. MOAK, C. E.....1854—55
DAVID MAXSON GREENE, C. E.....1855—56
CHARLES C. MARTIN, C. E.....1856—57
WILLIAM LAWSON ADAMS, C. E., (Acting Professor.).....1864—65
CHARLES E. SMITH, C. E., (Acting Professor.).....1871—72

Instructors in Botany.

*JOSE TELL FERRAO, B. S.....1850—51
LEWIS G. LOWE, C. E., M. D.....1854—55
R. HALSTED WARD, A. M., M. D.....1867—69

Instructors in French or German.

PAUL EDWARD VON THUN.....1852—54
*JOHN B. LUCE, A. M.....1860—61
J. H. C. LAJOIE DE MARCELEAU, A. B.....1866—69
JULES GODEBY, A. B.....1873

Instructors in English Composition.

*JAMES R. PERCY, B. S.....1858—59
CHARLES E. ILLSLEY, A. M., C. E.....1866—67
*ALEXANDER G. JOHNSON, A.M.....1868—75
JOHN HEALY KELLOM, A. M.....1875—77
WILLIAM WEEKS MORRILL, A. M.....1877—82
FRANK LEWIS NASON, A. B.....1882

Assistants in Chemistry and Natural Science.

*EDWARD SUFFERN, C. E.....1835—36
DAN S. SMALLEY, B. N. S., C. E.....1835—36
JONATHAN R. POWELL, C. E., B. N. S.....1847—48
LEWIS G. LOWE, C. E., B. N. S., A. M., M. D.....1849—50
*JOSE TELL FERRAO, B. S.....1850—51

JAMES T. ALLEN, B. S. ..... 1854—55
MATTHIEU DARMSTADT, Ph. D. ..... 1866—68
IRVING A. STEARNS, M. E. ..... 1868—69
EDWARD NICHOLS, B. S. ..... 1871—73
ALFRED S. BERTOLET, M. E. ..... 1873—75
WILLIAM PITT MASON, C. E., B. S., M. D. ..... 1875—82
JOHN FRANCIS WILLIAMS, C. E., B. S. ..... 1883—84

Assistants in Mechanics.

C. WHITMAN BOYNTON, C. E. ..... 1856—57
WILLIAM HUBERT BURR, C. E. ..... 1875—76
WILLIAM HENRY POWLESS, C. E. ..... 1876—78
JOHN ALEXANDER LOW WADDELL, C. E. ..... 1878—80
ADOLFO ELEUTERIO BESOSA, C. E. ..... 1880—82
GUY HARTWELL ELMORE, C. E. ..... 1883—84
WILLIAM WARREN CUMMINGS, C. E. 1884

Assistants in Physics and Mechanics.

JAMES W. BRADSHAW, C. E. ..... 1850—51
WILLIAM TWEEDDALE, C. E. ..... 1852—54
GEORGE L. MOODY ..... 1854—55

Assistants in Mathematics.

GEORGE B. ROBERTS, C. E. ..... 1850—51
DASCOM GREENE, C. E. ..... 1852—53

Assistants in Descriptive Geometry, Geodesy and Drawing.

WILLIAM HENRY POWLESS, C. E. ..... 1875—76
*HERMAN VOORHEES, C. E. ..... 1876—78
ROBERT REMSEN CHADWICK, C. E. ..... 1878—82
GEORGE RICHMOND BAUCUS, C. E. ..... 1882—84
EDGAR BOYD KAY, C. E. ..... 1883—85
JOHN H. EMIGH, C. E. 1883
HARRY LEE VAN ZILE, C. E. ..... 1884—85
CHARLES WELLMAN PARKS, C. E. 1885
ROBERT ANDREW CAIRNS, C. E. 1885

Assistants in Mathematics and Astronomy.

PALMER CHAMBERLAIN RICKETS, C. E. ..... 1875—82
JAMES MAXWELL WILSON, (Special Assistant) 1884

Adjuncts and Assistants to the Senior Professor.

(Appointed for a Single Term or Year.)

*Fay Edgerton, A. B. (r. s.) ..... 1828.
Thomas C. Ripley, A. B. (r. s.) ..... 1828.
Daniel O. Comstock, A. B. (r. s.) ..... 1829.
John M. Barrows, A. B. (r. s.) A. M ..... 1829.
James Curtis Booth, Ph. D., LL. D ..... 1831.
*Samuel W. Williams, A. B. (r. s,) LL. D ..... 1832.
*Alexander Van Rensselaer. A. B. (r. s.) M. D ..... 1833.
David Cady Smith, A. B. (r. s.) ..... 1833.

Adjuncts and Assistants to the Junior Professors.

(Appointed for a Single Term or Year.)

*Timothy Dwight Eaton, A. B. (r s.) ..... 1827.
*Orlin Oatman, A. B. (r. s.) ..... 1827.
*Douglass Houghton, A. B. (r. s.) M. D ..... 1830.
*James B. Dungan, M. D ..... 1830.
*Abram Sager, A. B. (r. s.) A. M., M. D ..... 1831.
Abel Storrs, A. B. (r. s.) ..... 1832.
James Hall, A. B. (r. s.) A. M., LL. D ..... 1833.

FACULTY AND INSTRUCTORS.

(IN ORDER OF APPOINTMENT.)

SENIOR PROFESSORS AND DIRECTORS.

AMOS EATON, A. M., son of Abel and Azuba (Hurd) Eaton, was a native of Chatham, Columbia county, N. Y., and was born May 17th, 1776. His father was a farmer in comfortable circumstances, a highly respectable citizen, and a deacon of the church. Young Eaton early manifested superior abilities, and his aspirations were for a wide field of action. He was selected to deliver an oration on the 4th of July, 1790, when but fourteen years of age, which was a creditable performance. About this time, having acted as chain-bearer in surveying some land, he resolved on learning the surveyor's art; but how shall he obtain the requisite instruments? He soon interested a skilful blacksmith in his behalf, who agreed to work for him at night, if he would "blow and strike" by day. An accurately constructed needle (magnetized from kitchen tongs) and a good working chain, were the result of several weeks' work. This circumstance in his life doubtless gave rise to the remark, found in *Silliman's Journal*, that "in 1791 he was an apprenticed blacksmith." The bottom of an old pewter plate, well smoothed, polished and graduated, made a pretty good compass case, so that Eaton, when sixteen years old, was in the field with his home-made instruments, doing little jobs of surveying in the neighborhood. But he aspired to higher attainments, a wider sphere of action. Encouraged by his parents, he fitted for college with the late Rev. Dr. David Potter, of Catskill, then of Spencertown, N. Y., and was graduated at Williams College in 1799, with high reputation for his scientific attainments. He commenced the study of law in Spencertown, with Hon. Elisha Williams, September 13, 1799, and subsequently continued his studies in New York with Hon. Josiah Ogden Hoffman. It was at this period, and under the instruction of Dr. David Hosack and Dr. Samuel L. Mitchell, that Mr. Eaton first became espe-

Amos Eaton

cially interested in the study of botany and other natural sciences. While in New York, in 1802, he borrowed Kirwan's Mineralogy, then a scarce book, and made a manuscript copy of the entire work. He was admitted as an attorney of the Supreme Court of the State of New York, at Albany, October 30, 1802, and soon after established himself as a lawyer and land agent in Catskill, N. Y. Here he remained several years, his position affording him good opportunities for cultivating his growing taste for the natural sciences. In May, 1810, he made in Catskill, it is believed, the first attempt in this country at a popular course of lectures on botany (compiling for the use of his class a small elementary treatise,) for which he was highly complimented by his former teacher, Dr. Hosack, as "first in the field," saying "you have adopted the true system of education, and very properly address yourself to the senses and the memory." Here we find Mr. Eaton, at this early day, adopting that mode of instruction which rendered him so pre-eminently successful in inspiring young men with that enthusiasm which assured success.

Owing to a concurrence of circumstances which our limits will not allow us to explain, Mr. Eaton now found his love for the details of his profession diminishing, and his interest in the natural sciences fast growing upon him; and he therefore resolved to abandon the practice of the law, and prepare himself to become an efficient laborer in the congenial pursuits of science. With this end in view, he went to New Haven in 1815, to avail himself of the advantages of Yale College. Here he placed himself under the instruction of Professor Silliman, who threw open to him his lectures on chemistry, geology and mineralogy, as also his own library and the cabinet of minerals of that institution. Here, also, he found a good botanist in Dr. Eli Ives, professor of botany and materia medica in the medical department of the college, who had accumulated a good library, to which he gave Mr. Eaton free access. With these advantages, and Mr. Eaton's already advanced acquirements, he made such rapid progress that he was soon well qualified to take the field as an explorer, and the desk as a teacher. He now turned towards his alma mater, with whose honorable endorsement, as a competent teacher, he desired to go forth into the world; he therefore went to Williamstown in March, 1817,

and was most cordially received by the faculty of the college, especially by Professor Dewey, and gave courses of lectures on botany, mineralogy and geology to volunteer classes of the students. His influence in the college was remarkable. He awakened a lively interest in the natural sciences, which has never died out. With few books adapted to his department, he accomplished wonders. The graduates of that day who were among his pupils, always speak of him in terms of the most affectionate interest and gratitude. They published, in 1817, the first edition of his Manual of Botany, a 12mo, of 164 pages, which gave, as the late Dr. Lewis C. Beck wrote in 1852, "an impulse to the study of botany in New England and New York as the only descriptive work which was then current was that of Pursh, an expensive one, with Latin descriptions." The work, improved by repeated revisions and additions, became, in the eighth edition, published in 1840, a large octavo volume of 625 pages, entitled "North American Botany," and contained a description of 5,267 species of plants. In this edition, Mr. Eaton was assisted by the late Dr. John Wright, professor of botany in the Institute.

Mr. Eaton always aimed to render scientific principles and facts useful; still he loved science, though it brought no pecuniary gain. To him, knowledge was in itself a good, which idea he carried through all the editions of his Manual, from the fifth, by introducing as a motto the following sentence of Linnæus: "That existence is surely contemptible which regards only the gratification of instructive wants, and the preservation of a body made to perish."

The patronage and encouragement which Mr. Eaton received at this time from the faculty and students of Williams College determined him to give courses of popular lectures, accompanied with practical instructions, to such classes as he might be able to organize in several of the larger towns of New England and New York. The aid he thus received he gratefully acknowledged in 1818, by inscribing the second edition of his Botany to the president and professors, saying to them: "The science of botany is indebted to you for its first introduction into the interior of the Northern States; and I am indebted to you for a passport into the scientific world." To Professor Dewey he was warmly attached, and through life regarded him as a successful

fellow-laborer, and his friendship and co-operation were warmly reciprocated. From Williamstown he went first to Northampton, where Governor Strong, the Hon. E. H. Mills, and others, patronized and encouraged him. He gave popular scientific lectures, and practical instructions in many places, with great success. In the course of two or three years he diffused a great amount of knowledge on these interesting subjects; and so far excited the curiosity and enthusiasm of many young students, that there sprung up, as a result of his labors, an army of botanists and geologists.

The following communication from the late Professor Albert Hopkins of Williams College will be read, in this connection, with interest: "Professor Eaton was one of the first to popularize science in the Northern States. For this task he had some special qualifications. He had an easy flow of language, a popular address, and a generous enthusiasm in matters of science, which easily communicated itself to his pupils. I well remember attending a lecture of his in my native town, the first scientific lecture I ever attended, and, if I may judge by the sharp outline of it still in my mind, one of the most interesting and impressive. Perhaps the 'leafy month of June,' the subject of the lecture, 'Flowers,' and the presence of a large number of interesting young persons, may have added something to the charm; but, making all due allowance, I am sure that the lecture itself must have had a good deal of intrinsic merit. Professor Eaton was at this time (1817, I think,) nearly in his prime. His person was quite striking—a large form, somewhat portly and dignified, though entirely free from what is is commonly called *starch*. His face was highly intellectual, the forehead high and somewhat retreating, locality strongly marked, and the organs of observation and compassion well developed. His hair at that time was black, and being combed back, rendered his fine physiognomy still more striking. I well recollect the flowers, which I believe his young pupil, Emmons, had been employed to collect for the occasion. There were, in the first place, the common lilac, which I had probably seen before; however this may be, the small floret, with its salver form corolla and long tubular throat, into which the professor dexterously inserted his penknife, with no murderous intent, but to give us a view of the organs which the great Linnæus had selected as the basis of his

classification,—this small floret, I say, is the first I now recollect to have seen; and seen it was, and still is, with great distinctness. Then followed the Pedicularis and some plants more difficult in their analysis. In the analysis of these plants Professor Eaton made use of his manual, descriptive of plants in the vicinity of Williams College, a book which, with some imperfections, was highly valuable as a pioneer work. Professor Eaton was among the first in this country to study nature, in the field, with his classes. In pursuance of this idea he used to make an annual excursion with Rensselaer School, sometimes leading these expeditions in person, at others deputing some competent teacher to take the lead. The cause of natural history in Williams College owes, undoubtedly, a good deal to Professor Eaton. I think his zeal in the department of Botany led Professor Dewey to direct his discriminating mind to the study of plants. a study which he pursued farther than Professor Eaton had done, in certain lines, particularly in caricography, which was then a kind of *terra incognito*, and still is, except to the initiated. At this time, also, as has been hinted, Dr. Emmons took the field. In fact, natural history came in on a spring tide, and has never lost the impulse since."

In 1818, in compliance with a special invitation from Gov. De Witt Clinton, he went to Albany, and there gave a course of lectures before the members of the Legislature. Here he became acquainted with many of the leading men of the State, interesting them especially in geology, and its application, by means of surveys, to agriculture. There and then were set in operation a train of causes which resulted in giving to the world that great work, "The Natural History of New York," so creditable to the State and to those scientific gentlemen who executed it, several of whom had been Professor Eaton's pupils. In this year he published the first edition of his "Index to the Geology of the Northern States," which "was the first attempt at a general arrangement of the geological strata in North America." Although this and his subsequent works on Geology have been found to contain some errors, still it is universally conceded that great credit is due him for his early and successful labors in developing the Geology of America.

"In the spring of 1819, while I was a member of Lenox Academy, Mr. Eaton came there, at the request of Hon. H. W.

Bishop, and delivered a short course of lectures on Botany. And I retain a vivid recollection of his manly appearance, his constantly flowing conversation, and his instructive lectures. He afterward delivered several courses of lectures in the Medical College at Castleton, Vt., in which he was appointed Professor of Natural History in 1820. Professor Eaton's lectures and practical instructions in Troy produced a most happy impression, where, through his efforts, seconded by many of the most distinguished gentlemen of that city, such as Drs. Burrit, Robbins and Hale, there was established a Lyceum of Natural History, which for many years did much service to the cause of natural science. In the fall of 1818 Troy could boast of a more extensive collection of American geological specimens than could be found at any literary institution in this country. In 1820 and 1821 Mr. Eaton, with the assistance of Drs. T. Romeyn and Lewis C. Beck, made, at the expense and under the patronage of the Hon. Stephen Van Rensselaer of Albany, N. Y., geological and agricultural surveys of Albany and Rensselaer counties, reports of which were published. This, it is believed, was the beginning of such surveys in this country, of which Professor Silliman, in his journal, remarked: 'The attempt is novel in this country;' adding. 'We are not aware of any attempt on so extensive and systematic a scale, to make them [such surveys] subservient to the important interests of agriculture.' The Hon. Stephen Van Rensselaer, for many years one of the trustees of Williams College, and the generous patron of merit, employed Prof. Eaton to make a geological survey of the district adjoining the Erie canal, and the result was published, in 1824, in a report of 160 octavo pages, addressed to his patron, with a profile section of rock formations, from the Atlantic ocean, across the States of Massachusetts and New York, to Lake Erie. Of the work of Professor Eaton, Gov. Seward, in his introduction to 'The Natural History of the State of New York,' said: 'This publication marked an era in the progress of geology in this country. It is, in some respects inaccurate, but it must be remembered that its talented and indefatigable author was without a guide in exploring the older formations, and that he described rocks which no geologist had, at that time, attempted to classify. Rocks were then classified chiefly by their mineralogical characters, and the aid which the science has since

learned to derive from fossils in determining the chronology and classification of rocks was scarcely known here, and had only just begun to be appreciated in Europe. We are indebted, nevertheless, to Professor Eaton for the commencement of that independence of European classification, which has been found indispensible in describing the New York system.' 'For,' he adds, 'after examining our rocks with as much care and accuracy as I am capable of doing, I venture to say that we have at least five distinct and continuous strata, neither of which can with propriety take any name hitherto given and defined in any European treatise which has reached this country. Professor Eaton enumerated nearly all the rocks in western New York, in their order of succession, and his enumeration has, with one or two exceptions, proved correct. It is a matter of surprise that he recognized, at so early a period, the old red sandstone on the Catskill Mountains, a discovery the reality of which has since been proved by fossil tests."

In 1824 the Hon. Stephen Van Rensselaer established, at Troy, N. Y., a school of science, called the Rensselaer School, placing Mr. Eaton at its head as "Senior Professor." Here he continued his labors through the remainder of his life, publishing, at different times, several scientific works required for his own pupils, as well as for the general advancement of science. In this school Professor Eaton was enabled to perfect and carry out, to a high degree of success, his favorite plan of teaching classes by making his pupils experimenters and workers, in every department of science where it was practicable; substituting also lectures by the pupils to each other, in place of the usual system of recitations. This method of giving instruction, and of preparing young men to become successful teachers, has here succeeded most admirably, and has been, in some of its features, introduced into other schools of science. The Rensselaer School still exists, with only a slight change of name; its course of study, though modified and extended, still retains the characteristic features impressed upon it by its first Senior Professor. As a school of practical science, it occupies the very highest place, and its graduates are to be found in every State of the Union.

It will thus be perceived that in developing the botany and geology of the Northern States, Professor Eaton rightfully

ranks among the pioneers of the new era of the natural sciences in this country. His efforts in various departments of natural history were a rich gift to New England, New York, and even to the whole country, for which the country owes him a debt of gratitude. Many of his pupils have been for years among the most justly distinguished scientific men of the country. As an educator and an active laborer in the general cause of natural history in America, his memory will long be cherished. The history of natural science on this continent can never be faithfully written without giving the name of Amos Eaton an honorable place. It was he, more than any other individual in the United States, who, finding the natural sciences in the hands of the learned few, by means of popular lectures, simplified textbooks and practical instructions, threw them broadcast to the many. He aimed at a general diffusion of the natural sciences, and nobly and successfully did he accomplish his mission.

Professor Eaton was a kind-hearted and courteous gentleman. His vast acquirements and simple habits induced a distinguished woman, Mrs. Emma Willard, the founder of the Troy Female Seminary, who knew him well, to speak of him as "Amos Eaton, the Republican Philosopher." He died in Troy, N. Y., May 6, 1842, in the sixty-sixth year of his age, saying, "I submit to my Heavenly Father's will. His remains are interred in Oakwood' cemetery, at Troy, N. Y., where, with appropriate ceremonies, a suitable monument was placed by the alumni, at the time of the semi-centennial celebration, 1874. The monument is a cubical block of light gray granite, measuring four feet six inches by five feet, and bears the simple inscription: "Prof. Amos Eaton, born May 17th, 1776, died May 10th, 1842." The stone was brought from Clark's Island, on the coast of Maine, and weighs eleven tons.

Three of Professor Eaton's sons, who were educated by their father to follow him in the walks of science, died young. Hezekiah Hulbert Eaton, Assistant Professor of Chemistry in Transylvania University, a scholar of great promise, died at the age of twenty-three. Major General Amos B. Eaton was graduated at West Point In 1826; was an officer in the United States army and a man of scientific tastes. He died at New Haven, Conn., Feb. 21, 1877. A daughter of Professor Eaton, Miss Sara C. Eaton, was a distinguished teacher of the natural

sciences and the modern languages in the flourishing Female Seminary at Monticello, Ill. Professor Daniel Cady Eaton, son of General Eaton, was graduated at Yale College, in 1857, and has been Professor of Botany in that institution since 1864.

Professor Eaton published an Elementary Treatise on Botany, 1810; Manual of Botany, 1817; Botanical Dictionary, 1817; Botanical Exercises, 1820; Botanical Grammar and Dictionary, 1828; Chemical Note Book, 1821; Chemical Instructor, 1822; Zoölogical Syllabus and Note-Book, 1822; Cuviers' Grand Division, 1822; Art without Science, 1800; Philosophical Instructor, 1824; Directions for Surveying and Engineering, 1838; Index to the Geology of the Northern States, 1818; Geological and Agricultural Survey of the County of Albany, N. Y., 1820; Geological Nomenclature of North America, 1822; Geological and Agricultural Survey of the District adjoining the Erie Canal, 1824; Geological Text-Books, prepared for popular lectures on North American Geology, 1830; Geological Text-Book, for Troy Class, 1841. Of most of these works, a number of different editions were printed, amounting in all to about forty publications. (*Durfee's History of Williams College.*)

GEORGE HAMILL COOK, C. E., Ph. D., LL. D. son of John and Sally (Munn) Cook, was born in Hanover, N. J., January 5th, 1818. He was prepared for the Institute in the public schools and with private teachers. Was engaged as civil engineer on Morris & Essex railroad, New Jersey, and Catskill & Canajoharie railroad from April, 1836, to December, 1838. He entered the Institute December, 1838, and taught district school in Chatham, N. J., parts of 1839 and 1840. Was student and tutor in the Rensselaer Polytechnic Institute May, 1840; adjunct professor October, 1840; senior professor May, 1842. He was a manufacturer of glass in Albany October, 1846; professor of mathematics in the Albany Academy, July, 1848; principal of Albany Academy, July 15, 1851; and professor in Rutger's College, New Brunswick, N. J., from November, 1853, to the present time. He was assistant in the geological survey of New Jersey in 1854–6; state geologist of New Jersey from 1864; director of the New Jersey agricultural experiment station, 1880; in the board of water commissioners of New Brunswick from 1873, and president of the board from 1882. He received the honorary

degree of LL. D. from Union College, and Ph. D. from the University of New York city. He was elected a member of the American Association for the Advancement of Science in 1842, and was a member of the American Philosophical Society, the Royal Agricultural Society of Sweden, the Academy of Natural Sciences, Philadelphia, and the American Institute of Mining Engineers. He published "Geology of New Jersey," 1868; "Geological Reports on Fire-clays," 1878; "Annual Reports on Geological Survey, 1854–6, and 1864–84;" "Annual Reports of the New Jersey Agricultural Experimental Station, 1881–84."

Prof. Cook was married March 26th, 1846, to Mary H. Thomas, daughter of William Thomas. Five children.

BENJAMIN FRANKLIN GREENE, A. M., C. E., was born in Lebanon, N. H., October 25th, 1817. He entered the Rensselaer Polytechnic Institute November 5th, 1841, and graduated in 1842. Was professor of mathematics and natural philosophy, Washington College, Maryland, November, 1843, to December, 1846; director of Rensselaer Polytechnic Institute and professor of mechanics, machines and constructions, January, 1847, to July 1859; private school of engineers, at Glenmore, Troy, N. Y., October, 1859, to July, 1862; chief clerk of Bureau of Navigation, February, 1863, to March, 1873. Was professor of mathematics in United States Navy (commissioned March 28th, 1873), and detailed as superintendent of companies same date. He was editor of "Magnetism of Ships and Direction of the Compass," two volumes, 1867; "Projectile Tables," one volume, 1868; "International Signal Code," one volume, 1873. He was also author of a report on the reorganization of the Rensselaer Polytechnic Institute, 1855; several books of computation forms in nautical astronomy, chronosemic signals, 1863, and a paper on the marine compass, 1874, read before the United States Naval Institution.

Hs was married April 11th, 1848, in Maryland; his wife died June 10th, 1850; four children, none living.

NATHAN SIDNEY SMITH BEMAN, D. D., LL. D., was director of the Institute from 1859 to 1860. *See Presidents, page 30.*

CHARLES DROWNE, A. M., C. E., was born July 5th, 1824. He entered the Institute and was graduated in 1847. The same

year he was appointed repeater of mathematics and physics; in 1849, adjunct professor of theoretical and practical mathematics; in 1851, received the appointment of professor of mathematics, astronomy and geodesy, which position he held until 1855. In 1859, he was appointed Senior Professor, and professor of civil engineering, and in 1860 was made Director and professor of thereotical, and practical mechanics. In 1875, on account of impaired health, he resigned his position, and was made Emeritus professor by the unanimous vote of the trustees, his name still appearing in the Annual Register.

During Professor Drowne's long period of service, of sixteen years, there were many and important changes in the institution. The old buildings were destroyed by fire, and the present ones were erected. The courses of study were broadened, and the examinations made more careful and rigid. By his own example of fidelity, painstaking and devotion, a manly and earnest spirit of study was infused, and the high standard of scholarship was maintained. During this period, over two hundred names were added to the list of graduates.

After leaving the Institute, two or more years were spent in foreign travel and study; making his headquarters at Hanover, Germany. His health during this time was greatly improved, and he returned to his home in Canaan, N. Y., where he still resides. Was married, July 18th, 1872, to Frances Emily Bortells, of Palmyra, N. Y.

WILLIAM LAWSON ADAMS, JR., C. E., son of William Lawson and Araminta D. (Platt) Adams, was born at Morrisville, Madison county, N. Y., July 13th, 1842. He prepared at the Troy Academy, and entered the Rensselaer Polytechnic Institute in September, 1859, graduating in 1863. From June 15th to October 1st, 1863, he was assistant engineer on the Brooklyn Water Works; and from October 1st, 1863, to May 1st, 1864, engaged in the United States civil service in charge of government surveys in the Sea Islands. September, 1864, to February, 1865, he was acting professor of geodesy, road engineering and topographical drawing in the Rensselaer Polytechnic Institute. From July, 1866, to August, 1869, was assistant engineer on a railroad in Iowa; August, 1869, to August, 1872, engineer of the land department, Union Pacific railroad; August, 1875, to

David M. Greene

COMLEY BROS. LONDON & NEW YORK.

September, 1872, principal assistant engineer Texas Pacific railroad. From September, 1872, to February, 1876, was professor of geodesy, road engineering and topographical drawing, and from February, 1876, to September, 1878, Director of the Rensselaer Polytechnic Institute, and professor of road engineering and topographical drawing. From September, 1878, to June, 1880, was assistant engineer on the Union Pacific railroad, and from June, 1880, to January, 1883, principal assistant engineer on the Missouri Pacific railroad, Omaha extension. Since January, 1883, has been a civil engineer and architect at Omaha, Neb., and chief engineer of the Omaha Belt Line and Lincoln branch of the Missouri Pacific railroad, uow being constructed. Married, September 7th, 1875, Clara E. Kellom, daughter of John H. Kellom, of Omaha, Neb.; three children.

DAVID MAXSON GREENE, C. E., son of Joseph Langford and Susannah (Maxson) Greene, was born July 8th, 1832, in Brunswick, Rensselaer county, N. Y. His family is descended from John Greene, who emigrated from England in 1635, and settled in Rhode Island, where he was associated with Roger Williams. His mother descended from Rev. John Maxson, the first white child born on Rhode Island, R. I. At the age of three years he was taken to Adams, N. Y., where his family continued to reside, and where he was brought up on a farm. His schooling was in the district school until he was fifteen years of age, when he attended the Adams Seminary. In October, 1850, at eighteen years of age, he entered the Rensselaer Polytechnic Institute, and was admitted to the graduating class, consisting of twenty-four members ; he was one of the four, out of this number, who passed the examinations and were graduated, August 29th, 1851, as civil engineers.

Immediately upon graduation, he was appointed assistant to the professor of mechanics and physics in the Institute, remaining until the spring of 1852, when having been appointed assistant engineer on the enlargement of the Erie canal, he relinquished his position. He rose through the grades of chainman, rod-man, assistant leveler, and leveler. In September, 1853, he went west, and was employed as assistant and division engineer on railroads in Ohio and Indiana. After a year's service, he was prostrated with sickness and returned east. In

September, 1855, he was appointed professor of geodosy and topographical drawing in the Institute. In order to prepare himself for his work, he spent part of his first year at West Point, as a pupil of the late General Thomas H. Neill, United States Army, taking a course in topographical drawing. His success in his department was immediate and rapid, the work of his classes being quite equal to that at West Point. He held this professorship until the spring of 1861, when he was appointed third assistant engineer in the United States Navy. He was, at the same time, offered a position as chief topographical engineer for the Government of Peru, for five years, at a large salary, which he declined.

He was ordered to the frigate Susquehanna, upon which he served sixteen months, participating in the engagements at Hatteras, Port Royal, Fortress Monroe, and the capture of Norfolk, and doing blockade duty along the coast from Hatteras to Mobile. In September, 1862, he was detached, and ordered to the United States Naval Academy, as senior assistant in the department of natural and experimental philosophy, and as instructor in steam engineering. After remaining three years in this position, he was detached and ordered to duty as assistant to the chief of the bureau of steam engineering in the Navy Department at Washington, where he remained for three years, during which time he was detailed as a member of a commission appointed by the U. S. Treasury Department to devise means to secure the collection of the revenue on distilled spirits. Subsequently he was ordered to the United States steamer Narragansett, as chief engineer, in the West India squadron. Yellow fever broke out on board, and Engineer Greene was attacked. The vessel was ordered north and went out of commission. Next Engineer Greene was detailed as chief engineer of the Port Admiral's vessel in New York harbor, but in 1869 he resigned from the navy, having served about eight and a half years.

After resigning, he settled in Troy, and began the practice of his profession as civil, mechanical and hydraulic engineer, and as consulting engineer and expert. In 1872 he was appointed chief engineer of the proposed Walloomsac railroad ; also consulting engineer of the Ottawa City Water Works, Canada.

In 1873 he was appointed chief engineer of the Dansville Water Works, Livingston county, N. Y., and in 1874 Village Surveyor of West Troy, N. Y. He served as engineer to the State Commission appointed to examine plans for introducing steam on the canals, from 1871 to 1874. In 1874 he was appointed division engineer on the New York state canals. In July of the same year he was appointed Deputy State Engineer, and served until January 1, 1878. From 1872 to January 7th, 1885, he was engineer of the Troy City Water Board. He is also a general consulting engineer.

In September, 1878, he accepted the appointment of Director of the Rensselaer Polytechnic Institute, which position he still holds. He is a director of the Troy City National Bank, and also of the Troy Citizens' Steamboat Co.

He married Maria N. Skinner, second daughter of the late Hon. Calvin Skinner, of Adams, N. Y., January 31st, 1855.

JUNIOR PROFESSORS.

LEWIS C. BECK, A. M., M. D., was born at Schenectady, N. Y., October 4th, 1798; died at Albany, N. Y., April 21, 1853. Was a brother of John B. and Theodoric Romeyn Beck. He graduated at Union College in 1817. Was admitted to the practice of medicine at Schenectady in 1818; he resided in St. Louis in 1820–21, and afterwards settled in Albany. He was appointed Junior Professor of the Rensselaer School before it opened, November 5th, 1824, to give full courses of demonstrative lectures on chemistry, botany, mineralogy and zoology, and resigned September 1st, 1828. He was professor of botany and chemistry in the Vermont Academy of Medicine, 1826–32; gave a course of chemical lectures at Middlebury College in April, 1827; was mineralogist of the survey of New York in 1837. In 1830, he was professor of chemistry and natural history in Rutger's College, N. J., and at the time of his death was professor of chemistry in the Albany Medical College. He published "Account of the Salt Springs at Salina," 1826; "On Adulterations," 12mo, New York, 1846; "Botany of the United States," and of the "United States North of Virginia," 12mo, 1848; "Mineralogy of New York," quarto, 1842; "Illinois and

Missouri Gazetteer," octavo, 1823; "Chemistry," 1831. For a complete list of Dr. Beck's writings, see Memoir by Dr. Alden March, in "Gross's Medical Biography."

HEZEKIAH HULBERT EATON, A. B. (r. s.), son of Amos and Sally (Cady) Eaton, was born at Catskill, Greene county, N. Y., July 21st, 1809. He was educated by his father, Professor Amos Eaton, having been his assistant at lectures and in work at Middlebury, Vt., and elsewhere, and entered the Rensselaer Polytechnic Institute at its opening. He gave lectures on chemistry at Black Rock and Rochester, N. Y., in the summer of 1825, and at the Female Academy in Canandaigua in the winter of 1826–27. In the winter of 1828 he lectured on chemistry before the Mechanics' Institute in Boston. In 1829 he was elected to a Junior Professorship in the Rensselaer Polytechnic Institute. In the autumn of 1829 he removed to Lexington, Ky., and in 1831 was chosen assistant professor of chemistry in the medical department of Transylvania University, and lectured on chemistry and electricity. This position he held until his death. He, with Dr. Wm. Akin, "selected, arranged, compared and transcribed" the greater part of the fifth edition of his father's Manual of Botany (1828–1829). At the time of his death he was preparing a work on "The Birds of Kentucky." He was a member of the Philadelphia Academy of Natural Sciences; was the author of "Notices of Western Botany and Conchology," published in the fourth volume of the "Transylvania Journal of Medicine."

Married, December 1st, 1831, Mary R. Harper, of Lexington, Ky. He died of consumption, August 16th, 1832.

REV. PAUL EUGENE STEVENSON, A. B., (r. s.) A. M., son of James Stevenson, was born in New Brunswick, N. J., October 14, 1809. Having passed through the usual academical studies preparatory to a collegiate course, under the tuition of his father (who was celebrated in his day as an instructor of youth) he entered the Institute, from which he was graduated in 1839. He was then appointed junior professor, and delivered several courses of lectures. From here he went to Union College, in April, 1832, and entered the junior class. During his senior year he delivered a course of chemical lectures in Albany, in the new Medical College; but he returned again to Schenecta-

dy and graduated with his class in 1833. In December of that year he entered the Theological Seminary at Princeton, N. J. His course here was interrupted by ill-health, which compelled him to suspend his studies for one whole year; he graduated from the Theological Seminary in 1837, and was licensed to preach by the Presbytery of New York. Soon afterwards, through the influence of Dr. Archibald Alexander, he was called to the pastorship of the church at Staunton, Va. He was ordained to the gospel ministry and installed pastor by the Presbytery of Lexington, Va., June 9, 1838, where he remained for seven years.

In 1844 he accepted a call to the South Third Street church, Williamsburgh, N. Y., remaining here five years. In 1849 he accepted a call to the church at Wyoming, Pa. While laboring here as a pastor, he took charge of an academy, to which he afterwards devoted his whole time, having given up his pastorate. Under his direction the institution came to a state of high prosperity and usefulness. From this period of his life, he devoted himself to the work of a teacher, being fully convinced that he was especially fitted for this department of christian labor. He was always accustomed to call his school his parish. After spending six years in Wyoming, the health of his family compelled a removal. He went first to Bridgeton, N. J., where he remained only one year, and then removed to Madison, N. J., connecting himself, April, 1857, with the Passaic Presbytery. In 1866 he was induced to go to Paterson, N. J., where he founded the Passaic Falls Classical Institute, a school for young ladies that reflected great credit upon its teachers, and was regarded with unqualified favor by its patrons. Beside his labors in the school, he often preached, and devoted much time to the work of the church.

His physical strength was overtaxed by his fatiguing and varied labors, which caused nervous prostration, from which he never recovered. He languished a few weeks without much pain, but constantly grew weaker until he died, March 17, 1870. His last words were characteristic of his devoted and earnest piety: "I long to be with Jesus; glory be to God, the Father, the Son and the Holy Spirit." It was remarked by many that he possessed all the qualities of a perfect gentleman, as well as of a most earnest, devoted and consistent christian.

EBENEZER EMMONS, A. M., M. D., was born at Middlefield, Mass., May 17, 1796. He fitted for college under the Rev. Mr. Hallock, of Plainfield, N. J., entered college in 1814, and was graduated in 1818. During his college course he became greatly interested in the study of the natural sciences, under the tuition of Amos Eaton and Prof. Dewey, and subsequently had a large share in introducing those studies into the country. After graduation he studied medicine, and settled as a physician in Chester, Mass. He still continued his favorite studies. He graduated at Rensselaer School with the class of 1826. The same year he published his "Manual of Mineralogy and Geology," for the use of the students of the school. Soon after he removed to Williamstown, where he was appointed lecturer on chemistry in Williams College, and gave attention to the formation of a cabinet of mineralogical and geological specimens. He also continued the practice of medicine. He was appointed junior professor in the Rensselaer School in 1830, and held this position until 1840. In 1836 a geological survey of the State of New York was undertaken, and Dr. Emmons was appointed by Gov. Marcy one of the four surveyors. The second, or northern district, was assigned to him, much of which was unexplored territory. He made the public acquainted with the Adirondack region, and gave the names to the principal mountains. While engaged in these labors, Dr. Emmons discovered, as he supposed, a group of rocks intervening between the Potsdam sandstone—the lowest of the sedimentary formations of New York—and the primitive rocks of central Vermont, and constituting a distinct system, underlying the silurian, and not recognized in the ordinary classification. He proposed to call it the Taconic system. His views, however, met with general opposition, and, when persisted in, even with ridicule, still, such was the firm conviction of their truth, based upon personal observation, as to lead him, single-handed, to maintain a warfare in their behalf, though it subjected him to much odium, and to a species of ostracism, at the hands of his professional brethren. Subsequent discoveries in the Canada survey, and by Barrandi, in Bohemia, and the latest investigations by eminent geologists, did very much to sustain his position.

In 1838 Dr. Emmons was appointed to the professorship of chemistry in the Albany Medical College, and took up his resi-

dence there. He still retained his connection with Williams college, going there annually to deliver a course of lectures upon geology and mineralogy. His "Report on the Second Geological District of New York" was published in 1842. In 1843 he was directed by Gov. Bouck to take charge of the agricultural part of the survey, which heretofore had had no distinct organization.

In 1846 the first volume of the "Agriculture of New York" was published, containing an account of the classification, composition, and distribution of the soils and rocks, and of the natural waters of the different geological formations, etc. The second volume, devoted mainly to the analysis of grains, and other vegetable products, with many illustrations, was published in 1849. The third volume, devoted to the cultivated fruits of the State, was published in 1851. This part consists of a volume of text, with a volume of more than ninety colored plates, illustrating fruits. In 1854 the fourth volume, under the title of the "Agriculture of the State," was published, containing descriptions and figures of insects injurious to vegetation, and is illustrated by about fifty colored plates.

Previous to the publication of the last volume, Dr. Emmons had been appointed by the governor of North Carolina to the charge of the geological survey of that State. His Report upon the Geology of the Midland Counties of North Carolina" appearad in 1856. The report on the "Agriculture of the Eastern Counties" was published in 1858, and a report on "The Swamp Lands of North Carolina" in 1860.

In 1860, also, he published a brief text-book of geology. It was preceded, in 1854, by the first part of a treatise upon American geology. The breaking out of the war interrupted his labors, and the anxieties consequent upon it, and upon his separation from his friends, probably hastened his death, which took place at Brunswick, N. C., October, 1863.

Dr. Emmons was a plain, unpretending man, of solid attainments and worth. His perception was quick and his knowledge accurate. He was an indefatigable worker. He sustained a Christian character, and held the office of deacon in the Congregational church at Williamstown.

PROFESSORS.

JOHN WRIGHT, M. D., son of John and Hannah (Dawson) Wright, was born in Troy, N. Y., February 2d, 1811. He prepared for the Institute at Allen Fisk's school in Troy, and entered in 1828. He practiced medicine in Troy, and was a professor of natural history in the Institute from 1838 to 1845. He was appointed to the State survey in Michigan in 1837, and remained there about two years. He was admitted to the practice of medicine in New York city. Was associated with Professor Eaton in publishing the "North American Botany," and issued a "Flora of the Plants within ten miles of Troy." The dates of these publications are unknown. He married Mary Cottrell, April 11th, 1838, who died April 10th, 1841; had one son, who died September 18, 1841; was again married to Catherine Wyant, December 5, 1844. He died of consumption in Aiken, S. C., April 11th, 1846. In 1874, a handsome memorial window was placed in the east end of Institute Hall, by Mrs. James Gardner, of Lansingburgh, N. Y., in memory of her brother, Dr. John Wright.

GEORGE HAMILL COOK, A. M., Ph. D., LL. D., was appointed professor of geology and civil engineering, 1842. *See page 129.*

FREDERICK BALDWIN LEONARD, M. D., of Lansingburgh, N. Y., was appointed professor of botany and zoology in 1846, and resigned in 1848. *See Trustees, page 99.*

CHARLES DROWNE, A. M., C. E., was appointed professor of mathematics, astronomy and geodesy in 1851, and resigned in 1855. *See Directors, page 130.*

EDWARD AUGUSTUS HOLYOKE ALLEN, C. E., son of Joseph and Lucy C. (Ware) Allen, was born in Northborough, Worcester county, Mass., August 15th, 1828. He attended the State Normal School, Bridgewater, Mass. Entered the Institute in 1847, and graduated in 1850. He spent one year in the Lawrence Scientific School, Cambridge, Mass. Then accepted, in 1851, the appointment as professor of geology, etc., at the Institute. He resigned in the spring of 1855, and became principal of the Friends' Academy, New Bedford, 1855 to 1869. He then had a private school in New Bedford until 1872. Taught in English

and Classical School in West Newton two years, until 1874. Was principal of Sawin Academy, Sherborn, Mass., until 1882, and of Allen Howe School, Northborough, Mass., since that time. Was teacher of country schools in Northfield, Mass,, 1844–45 ; Dana, 1845–46 ; North Bridgewater, 1846–47 ; German school, Baltimore, Md., 1847–48. Was on school committee in Sherborn, Mass., also in Northborough, Mass. He is a member of the Natural History Society of Montreal. Published " Reformed Spelling " and " Oral Teaching." Married September 5th, 1855, Eugenia S. Tenlon, daughter of Dr. William F. Tenlon ; eight children.

G. GUSTAVUS BERGER occupied the position of professor of descriptive geometry, structural and topographical drawing from 1850 to 1851.

SAMUEL EDWARD WARREN, C. E., only child of Dr. Samuel and Anna Catherine (Reed) Warren, was born in the village of West Newton, in the town of Newton, Mass., October 29, 1831. His father was born in Weston, Mass., and his mother in Charlestown, Mass. He remained at home till September, 1846, attending a private school from about his fifth year. In 1844 he entered the " Model," that is, the experimental part of the State Normal School, at West Newton, where, under superior instruction, a decided taste was formed for mathematics, etc. In September, 1846, he entered Phillips Academy, Andover, Mass., the English department then being in charge of William H. Wells, and in April, 1848, entered the Putnam free school, Newburyport, Mass., where he remained for two years. In May, 1850, he entered the Rensselaer Polytechnic Institute, and graduated in September, 1851, the Commencement of that year being held in Apollo Hall, Congress street, then the principal hall in the city. In November, 1851, he returned to the Institute, as a resident graduate and " repeater," or assistant, in charge of descriptive geometry, geodesy, mechanics and drawing. In September, 1854, he was appointed professor of graphics, the department embracing descriptive geometry and geometrical drawing. This position was held by Professor Warren until 1872, when he was appointed professor in the Massachusetts Institute of Technology, Boston, Mass. During the period of his professorship at Troy, he prepared a number of text-books, which

appeared in the following order: 1860, "Descriptive Geometry;" 1861, "Projections," first entitled "Students', Draftsmen's and Artisans' Manual," which was revised in 1867 and also in 1872; 1863, "Elementary Perspective; 1865, "Drafting Instruments and Operations;" 1867, "Elementary Plane Problems;" 1867, "Shades and Shadows;" 1868, "Higher Perspective;" 1870, "Machine Construction and Drawing." Called to the Massachusetts Institute of Technology, at Boston, in 1872, he remained there three years, living in a suburban residence, which, by change of municipal boundaries, was first in Brighton, then in Boston, and finally, and ever since, in Newton. After those years of diligent service, embarrassed, however, by great contrasts between the new and former conditions under which his duties were performed, the great reduction of attendance following the panic of 1873, led to the successive vacating of his and of other professors' chairs. Leaving his work in Boston in a very promising condition in 1875, he has been engaged in completing and perfecting his series of text-books: "Free-Hand Drawing," 1873, (revised and enlarged in 1878); "Stone Cutting," 1875; "Elements of Descriptive Geometry, Shadows and Perspective," 1877; "Drafting Instruments," (revised and enlarged,) 1879; and "Projective Drawing," (revised and entarged,) 1881.* He has, besides, given private instruction to a considerable number of pupils of various ages, in numerous subjects; together with parlor lectures on history and art. He has also been an occasional contributor to educational and other periodicals.

Professor Warren has been a member of the Newton Natural History Society since its formation in 1878, has read several papers at its meetings, and has been successively its vice-president, treasurer and secretary. He is also a member of the New England Historic-Genealogical Society, from whose library he learns that he is the eighth in descent from John Warren of Watertown, Mass., an original and large land-owner in 1630, and who, as an illustration of his time, had his house searched for Quakers, and was sometimes fined for absence from church. Prof. Warren was married on November 18th, 1884, to Miss Margaret Miller, daughter of Mr. James Miller, of Paisley, Scotland.

*His individual exhibit of his works at the Paris Exposition of 1878, accompanied by a large album of plates by former pupils in Troy and Boston, gained a diploma of "honorable mention," in a department (Education) in which it is believed only larger school or municipal exhibits gained larger notice.

REV. N. S. S. BEMAN, D. D., LL. D., was appointed professor of mental and moral philosophy in 1854, which position he held, being also president of the Institute, until 1865. *See Presidents. page 30.*

JAMES HALL, B. N. S., A. M., LL. D., was born of English parents at Hingham, Mass., September 12th, 1811. Intended at first for the medical profession, he soon turned his attention to natural history, and from 1831 to 1836 he pursued his studies under Professor Amos Eaton, in the Rensselaer School, now the Rensselaer Polytechnic Institute, where for many years he has been professor of geology.*

On the organization of the Geological Survey of the State of New York, in 1836, he was appointed assistant geologist in the Second district, as the survey was then divided ; and in 1837 he was appointed State Geologist for the Fourth geological district. He published annual reports, from 1838 to 1841, and in 1843 made his final report, a large quarto volume, forming one of the series of works on the natural history of New York, published by the State. In this volume is described, in a very complete manner, the order and succession of the strata, their mineralogical and lithological character, and their organic remains.

In 1843, on the resignation of Mr. Conrad, Mr. Hall was appointed to take charge of the palæontological department of the survey, and in this work he has been engaged down to the present time, 1886. He has embodied the results of his investigations in the "Palæontology of New York," one of the most remarkable monuments of scientific labor, zeal and industry which this country has produced, and alike creditable to the learning of the author and the liberality of the State. The volumes have been published as follows :

The first volume, beginning with the lowest member of the New York system of palæozoic rocks, contains descriptions of all the organic remains up to the summit of the so-called Champlain division, which terminates with the Hudson river group, corresponding to the Cambrian of Sedgwick, or the

* This sketch is founded mainly upon the biographical notice by Dr. T. Sterry Hunt, published in Appleton's Cyclopædia in 1874, with later data from the "Civil Service of the State of New York," and other sources.

Cambrian and Lower Silurian of Murchison. (388 pages quarto, with 100 plates, 1847.)

The second volume continues the series up to the base of the Onondaga or Salina formation. (362 pages, with 124 plates, 1852.)

The third volume includes all the fossil remains of the water-lime, the Lower Helderberg and Oriskany sandstone, except the corals and bryozoans. (522 pp. with 141 plates, including 21 intercalated plates, 1859.)

The fourth volume includes the Brachiopoda of the Upper Helderberg, Hamilton, Portage, and Chemung groups, making together the Erian or Devonian system. (Pp. xi, 428, and 69 plates, including 6 intercalated plates, 1867.)

The fifth volume, as originally planned, was intended to embrace the Lamellibranchiata, Gasteropoda, Pteropoda, and Cephalopoda. Later investigations and more extensive collections, rendered it necessary to divide these classes; and the Lamellibranchiata were presented to the public in 1884 and 1885, as Vol. V, part 1, in two volumes (pp. xviii, lxii and 562, with 96 plates.) Therein are described and illustrated over 500 species of this class of fossils, which are mostly from the Upper Helderberg, Hamilton, Portage and Chemung groups of New York, and including about thirty species from the Waverly group of Pennsylvania and Ohio. The volume V, part 2, embracing the Gasteropoda, Pteropoda and Cephalopoda of the same groups, was published in 1879, and also in two volumes. (Pp. xv,, 492, with 113 plates, including 7 intercalated plates, making 120 plates.)

The sixth volume of the series will embrace the Corals and Bryozoans of the Lower Helderberg group, and the Bryozoans of the Upper Helderberg and Hamilton groups, and will contain about 300 pages and 65 plates.

The seventh volume will contain descriptions and illustrations of the Crustacea; also a supplementary addition to the subjects treated of in the fifth volume.

The eighth volume will contain a complete revision of the Palæozoic Brachiopoda of North America; intended to be illustrated in about sixty plates. Twenty-seven plates of these Brachiopoda, prepared for volume VIII, together with more than thirty plates of the Corals and Bryozoans of volume

VI, have been re-produced in photolithography, and with the explanations, appear in the annual report of the State Geologist for 1883.

Beyond the work enumerated, it has been Mr. Hall's wish to prepare a volume upon the palæozoic Corals of the State of New York, and some of the illustrations of the same have already appeared in a volume entitled "Illustrations of Devonian Fossils," printed by the Albertype process.

In 1855, Mr. Hall was offered, by Sir William E. Logan the Government geologist of Canada, the charge of the palæontology of the survey, with the promise of succeeding as director on the retirement of Sir William. The work in New York had been for some time suspended in default of appropriations, and Mr. Hall had already accepted the appointment, and was making preparations to remove to Montreal, when the Hon. E. W. Leavenworth, Secretary of State, appealed to the patriotism of Mr. Hall not to abandon the work in New York. Inviting to Albany Professor Agassiz, Sir William Logan, Professors Chester Dewey, James D. Dana and others, Mr. Leavenworth urged their influence to induce Mr. Hall to remain, while it was represented to a committee of the legislature that a work of such great scientific value should be sustained by a powerful and wealthy State. Confiding in the promises then made, which seemed well founded, and in the expectation of being sustained in his work, Mr. Hall decided to remain. But these conditions were never realized, and he has always regarded this decision, on his part, as the great mistake of his life.

Although not connecting himself with the Canada survey, he undertook the study and description of the graptolites of the Quebec group, which appeared as a "Decade of the Survey in 1865," an exhaustive monograph, illustrated by twenty-two plates, and forming, at that time, the most complete work known on this class of fossils. A review of this work, with additional material and illustrations, was subsequently published under the title of "An Introduction to the Study of the Graptolitidæ," appearing in the Twentieth Report on the New York State Cabinet of Natural History.

To these publications must be added the illustrations of organic remains, given in the government reports of various surveys, of Fremont, Stansbury, the United States and Mexican

Boundary survey, and others. Also numerous papers published in scientific journals and transactions of scientific societies, both here and abroad

"Professor Hall has also devoted much time to the study of crystalline stratified rocks, and was the first to point out the persistence and significance of mineralogical character as a guide to their classification, in the manner which has since been developed and extended by Hunt.* While devoting himself to the study of the minute details of organic structure, and discriminating between and classifying these with the utmost precision, Professor. Hall has also successfully traced out and arranged in their true order, over vast areas of North America, the formations to which they belong, thus doing for the stratigraphical geology of our country a work second in importance only to that which he has done for its palæontology. Carrying his investigations still further, he has attempted the solution of some of the most difficult questions of dynamical geology, and has laid the grounds for a rational theory of mountains, which must be regarded as one of the most important contributions to geological science." †

The following comprise, according to dates, the order of noticable events in Mr. Hall's life: In 1831 and 1832 he received the degree of A. B. and A. M. from the Rensselaer School, and at a later date the degree of A. M. from Union College. In 1837 he was elected member ef the Imperial Mineralogical Society of St. Petersburg, Russia. In 1840 he was one of the founders and original members of the American Association of Geologists. This organization, with enlarged scope and changed title, is the present American Association for the Advancement of Science.

In 1843 he was elected correspondent of the Academy of Natural Sciences of Philadelphia. In 1845 he was elected member of the Geological Society of France. In 1848 he was elected foreign member of the Geological Society of London, the number of foreign members being limited to fifty. In 1848 he was elected Fellow of the American Academy of Arts and Sciences. In 1850 he was appointed judge in the Provincial Industrial Exhibition of Montreal. In 1854 he was elected member of the

* See GEOLOGY, Appleton's Cyclopædia.
† See MOUNTAIN, Appleton's Cyclopædia.

American Philosophical Society of Philadelphia. In 1856 he was elected president of the American Association for the Advancement of Science. In the same year he was elected honorary member of the Natural History Society of Montreal. In 1858 he published a report on the geology of Iowa ; subsequently, a report on the geology of Wisconsin.

In 1858 the Council of the Geological Society of London, of which he was a foreign member, awarded him the honor of the Wollaston medal. In 1859 he was made member of the Societas Cæsareæ Naturæ Curiosorum Mosquenses. In 1859 he was elected corresponding member of the Chicago Academy of Sciences. In 1860 he was elected corresponding member of the Naturhistorischen Gesellschaft in Nurnberg. In 1860 he was elected member of the Naturforchende Gesellschaft in Basel. In 1862 he was made honorary member of the Portland Society of Natural History ; and in 1863 honorary member of the Buffalo Society of Natural Sciences. In the same year he received the degree of LL. D. from the faculty and trustees of Hamilton College. In 1863 he was named, by an act of Congress, to be one of the fifty original members of the National Academy of Science.

In 1866, on the reorganization of the New York State Museum, he was appointed director. In connection with this office, which has required much thought and labor in systematizing the arrangement of the specimens, he has each year, in his annual reports, made valuable contributions to science. In 1867 he was elected a correspondent by the conchological section of the Academy of Natural Sciences of Philadelphia. In 1872 he was elected a member of the British Association for the Advancement of Science. In 1873 he was made corresponding member of the Société Royale des Sciences de Liège. In 1873 he was elected honorary member of the Minnesota Academy of Natural Sciences.

In 1876 he was one of the founders of the International Congress of Geologists, and president of the committee on its organization. He was one of the vice-presidents of this congress at the session in Paris in 1878 ; also at the session in Bologna in 1881, and at the session in Berlin in 1885.

In 1878 he was elected president of the Albany Institute, and re-elected to the same office in 1879. In 1879 he was made mem-

ber of the Academiæ Cæsareæ Leopoldina-Carolinæ Germanicæ Naturæ Curiosorum. In 1882 the King of Italy conferred on him the title and decoration of Commander of the Order dei Santi Maurizio é Lazzaro. In 1883 he was made corresponding member of the Academia Valdarnese del Poggio, Italy. In 1884 he was elected correspondent of the Academie des Sciences de l' Institute de France, and took his seat as member of the Institute in October, 1885. In 1884 he received the Walker quinquennial grand prize of one thousand dollars, awarded by the Boston Natural History Society. In the same year the degree of LL. D. was conferred upon him by McGill University of Montreal. In 1885 he was made correspondent of the Königliche Gesllschaft der Wissenschaften zu Göttingen.

WILLIAM ELDERHORST, M. D., was born September 30th, 1828, in the town of Celle, kingdom of Hanover, Germany. His father was lieutenant colonel in the Hanoverian army, and was appointed postmaster in the city of Hameln, on the Weser, about the year 1840. From the name William, instead of Wilhelm, being given to the son, it would appear that the King of Hanover and England, William IV, had consented to be his godfather, as is frequently the case with sons of meritorious officers.

In 1840 he entered the Gymnasium at Hameln, where he remained for two and a half years, until the fall of 1843. He then entered the Hanoverian artillery as cadet, and was discharged in February, 1845, by request of his father, on account of weakness of his eyes, from which he suffered during his whole life. In 1845 and 1846 he studied mathematics at the Höhere Gewerbe Schule in Hanover. He then went to the Georgia Augusta University, Göttingen, where he devoted his attention to chemistry, mineralogy and botany, until March, 1848. He was then occupied for a few months with analytical researches in the laboratory of the Probir-assistant.

He then returned to Göttingen, and continued his former studies until 1850, when he went to England and spent four months in the laboratory of the Horsley Fields Chemical Works, at Wolverhampton. In the winter of 1852–53 he was assistant professor of chemistry in the Polytechnic school at Stuttgart, but was obliged to leave on account of ill-health.

He came to this country in the late summer or early autumn of 1853. He first served for some months in a drug store in Charleston, S. C., and afterward in New York, at the same time giving private instruction in chemistry.

He was appointed professor of theoretical and practical chemistry, in the year 1855, in the Institute, and remained in this position until the time of his death in 1861. During this time he gave courses of lectures and instruction in the Medical College at Castleton, Vt., and New Harmony, Indiana. The degree of M. D. was conferred upon him by the former institution.

A manual of Blowpipe analysis was compiled by Prof. Elderhorst, and published in 1856, for use in his classes, there being at that time no text-book in English which seemed well adapted to the course of instruction then given. The second edition, revised and greatly enlarged, was published in 1860. Early in the month of May, 1861, Prof. Elderhorst went to Maracaibo, Venezuela, S. A., making a visit to the interior of the province, and returning early in July. On July 17th he was taken sick with yellow fever, and died on the 28th of July, 1861.

A memorial window was presented at the semi-centennial celebration, by the alumni and friends of Prof. Elderhorst, which is placed in the east end of Institute Hall.

JAMES THEODORE ALLEN, B. S., (Medfield, Mass.,) son of Ellis and Lucy (Lane) Allen, was born in Medfield, Norfolk county, Mass., August 29th, 1831. He attended Bridgewater State Normal School, Mass., in 1850, taught school in Easton during the winter, and in South Natick in 1851 ; during 1852–53 he was in Provincetown, Mass., teaching. He entered the Institute in April, 1854, and graduated in 1855. He was then appointed professor of English at the Institute and rector of the training school in connection therewith, 1855. After three years he resigned to study the languages. His health failing, he went to Germany ; traveled two years, and then connected himself, in 1860, with the English Classical School at Newton, Mass., where as associate principal he still remains. He is a member of the Webster Historical Society, Boston, Mass.

Married, August, 1860, Paulina A. Kittredge, daughter of Dr. E. A. Kittredge, of Lynn, Mass. ; four children. He tudied in Germany, Latin, Greek and German, 1872–74 ; and is now a

classical teacher, fitting pupils for Harvard, etc.; also teaches mathematics and higher classics. Traveled through Sweden, Norway, Denmark, and all Europe save Russia, Spain and Portugal ; also through Greece, Turkey and Egypt in 1859–60.

DAVID MAXSON GREEN, C. E., was appointed professor of geodesy and topographical drawing in 1856, and resigned in 1861. He was re-appointed to the same professorship, including road engineering, in 1858. *See Directors, page 131.*

LOUIS COUSIN, B. L. and S. de la Faculte de Paris, was appointed professor of the French language and literature at the Institute in 1856 and resigned in 1859.

DASCOM GREENE, C. E., son of Benoni and Oracy (Clark) Greene, was born at Richmond, Ontario connty, N. Y., June 15th, 1825. For several years he attended the Genesee Seminary at Lima, N. Y., although not with a view to preparing for the Institute. He entered, Oct., 1851, intending to spend a year here, taking a special course ; at the end of the year he decided to complete the regular course, and was examined and admitted to Division A, graduating July 28th, 1853. Was immediately appointed assistant professor of mathematics and practical astronomy at the Institute. After two years' service in that position, he was placed in charge of the department, at the beginning of the scholastic year 1855–56. Was elected a member of the American Association for the Advancement of Science in 1868. Published, in 1873, an "Elementary Treatise on Spherical Astronomy." Married, February 10, 1859, Sara I., daughter of Samuel Parsons, of Utica, N. Y. She died March 3d, 1861, leaving one son, who died September 20th, 1864. Married, July 19th, 1866, Elvira, daughter of Jairus Dickerman, of Troy, N. Y. November 7th, 1864, was elected professor of mathematics and astronomy at Lehigh University, Bethlehem, Pa., but declined the appointment.

HENRY BRADFORD NASON, Ph. D., M. D., LL. D., son of Elias and Susanna (Keith) Nason, was born at Foxborough, Norfolk county, Mass., June 22d, 1831. In November, 1841, moved to North Bridgewater, Mass., the native place of his mother, who had died the year previous. In 1843 he attended a school for

H. B. Nason

boys kept by a Mr. Savory, at Newburyport, Mass. From 1844 to 1847 he attended the Adelphian Academy at North Bridgewater, (now Brockton,) Mass. In December, 1847, he entered Williston Seminary, Easthampton, Mass., graduating in 1851. Entered Amherst College, and graduated in 1855. On September 1st, 1855, sailed from New York to London, Eng., on the ship "Amazon," having a long passage of thirty-five days. He traveled through Holland, Belgium, up the Rhine to Frankfort, and then to Göttingen, where he was matriculated as a student of philosophy, October 24th, 1855. While connected with the University, he devoted his time to chemistry, mineralogy and geology, and also attended lectures on physics and botany, graduating in the summer of 1857. He then spent a short time at Heidelberg and Freiberg, and then visited Berlin, Paris and London, before returning to the United States.

He spent the winter of 1857–58 in teaching at the Raymond Collegiate Institute, Carmel, Putnam county, N. Y. In April, 1858, he was appointed professor of natural history in the Institute. In the summer, declined an appointment as professor of chemistry and natural science in Oahu College, Hawaian Islands. He accepted an appointment to the same chair in Beloit College, Wisconsin, in September, 1858, and spent a part of each year there, the remainder of the time at Troy, until 1866, when he resigned the position at Beloit to accept the professorship of chemistry and natural science at the Institute, which position he still holds.

From 1855 to 1857, while connected with the University, during vacations, he made the tour of Europe. In the spring of 1860 he traveled through the southern portion of the United States; sailed for Europe, July, 1861, and traveled through Great Britain; spent a term at Göttingen; thence to Italy, Sicily and Southern France, spending considerable time in the study of volcanic phenomena. Spent the summer of 1872 in California, Nevada and Idaho. In the autumn, made a second visit to California, visiting the mining regions of Colorado and Utah. In 1875, made a third trip to California, visiting the Yosemite, Northern California and Nevada. He spent the summer of 1877 in visiting Northern Europe, Finland and Russia. In 1877, he was appointed, by President Hayes, juror for the United States Government at the Paris Exposition, and was assigned the de-

partment of mineralogy and metallurgy. In 1884, visited Northern Europe, the fiords and glaciers of Norway, extending his travels to the North Cape.

He has published, "Inaugural Dissertation on the Formation of Ether," 1857; "Table of Reactions for Qualitative Analysis," 1865; translated and revised "Wöhler's Handbook of Mineral Analysis," 1868; "Table for Qualitative Analysis in Colors," 1870; edited Elderhorst's "Manual of Blowpipe Analysis," 1873; fourth and fifth editions of the same, 1875–76; edited "Manual of Blowpipe Analysis and Determinative Mineralogy," 1880; compiled "Semi-centennial Catalogue of the Rensselaer Polytechnic Institute," 1874; and edited "Proceedings of the Semi-Centennial Celebration of the same institution, 1874; edited "Biographical Record of the Officers and Graduates of the Rensselaer Polytechnic Institute," 1886.

In 1857, he received the degree of A. M. and Ph. D. from the Georgia Augusta University, Göttingen; in 1864, the honorary degree of A. M. from Amherst College; in 1880, the honorary degree of M. D. from the Union University of New York, and the same year the honorary degree of LL. D., from Beloit College, Wisconsin. He has been elected Fellow of the American Association for the Advancement of Science; Fellow of the London Chemical Society; Fellow of the Society of Chemical Industry, England; member of the American Chemical Society; corresponding member of the New York Academy of Sciences; member of the American Institute of Mining Engineers; member of the Troy Scientific Association; honorary member of the Albany Institute; member of the Norske Turistforenings, Christiania, Norway; elected member of the University Club, 1883, and of the Union League Club, New York city, 1886.

He united with the Congregational church, North Bridgewater, Mass., in 1848, and by letter with the First Presbyterian church, Troy, N. Y., in 1866, where he served as trustee for several years, and was elected ruling elder in 1874.

He married, September 7th, 1864, Frances Kellogg Townsend, daughter of the Hon. Martin Ingham Townsend, LL. D., Troy, N. Y. Two children, Henry Townsend Nason and Louisa Kellogg Nason, the latter deceased.

THOMAS NEWTON WILLSON, A. M., son of James S. and Tirzah (Humphreys) Willson, was born at South River, Rockbridge county, Virginia. In September, 1839, he was principal of common schools in Virginia, at intervals for six years; in 1847–48, was tutor in mathemetics in Washington College, Va.; in 1849–50, was principal of Mountain Academy, Tennesee; in 1850–53, was professor of mathematics in Oakland College, Miss.; in 1858–59, was professor of English composition, and rector of Institute Training School, Rensselaer Polytechnic Institute; since 1859 has been principal of Troy Academy. He received the honorary degree of A. M. from Washington College, Virginia. He was married January 30th, 1850, to Mary Caroline Evarts, daughter of Frederick Evarts. One son, Prof. F. N. Willson, of Princeton College, N. J.

CHARLES ANTHONY GOESSMANN, Ph. D., son of Dr. Henry and Helena (Bödiger) Goessman, was born at Naumberg, Hesse Cassel, Prussia, June 13th, 1827. He studied at the Latin School at Fritzlar, and for a time was a pharmaceutist. He entered the Georgia Augusta University, Göttingen, in the spring semester, 1850, and was graduated in the winter semester of 1853, receiving the degree of doctor of philosophy. He was then appointed privat docent in 1854, and remained until 1857. He then came to this country, and occupied the position of superintendent and chemist in the large sugar refinery of Messrs. Eastwick, in Philadelphia, Penn., remaining until the winter of 1860, when he went to Cuba, W. I., in December, visiting plantations and investigating methods until March, 1861. In April, 1861, he was appointed chemist to the Onondaga Salt Company, N. Y., and there remained as chemist and superintendent until January, 1869. He was chosen professor of chemistry in the Rensselaer Polytechnic Institute in 1861, and held the position until 1864, spending the winter months in Troy. In 1868 he was appointed professor of chemistry in the Massachusetts Agricultural College, at Amherst, Mass., which position he still retains.

He was appointed chemist of the State (Mass.) Board of Agriculture and state inspector of commercial fertilizers in 1873. In 1884 he was appointed analyst to the State Board of Health,

(Boston,) and director of the Massachusetts Agricultural Experimental Station, at Amherst, in 1883.

He was elected associate member of the Medical Society of the University of Erlangen, Bavaria, 1856; honorary member of the New York State Agricultural Society, 1861; Fellow of the American Association for the Advancement of Science, 1875, and is a member of the Buffalo, N. Y., Scientific Association, New York City Society of Natural History, and American Meteorological Society.

Dr. Goessman has published many articles in American and foreign journals, and many pamphlets and reports, relating to the manufacture of salt, of sugar, of beet sugar, and concerning fertilizers, and on other subjects.

He married, October 22, 1862, Anna Mary Kinney, daughter of Edward Kinney, of Syracuse, N. Y. Five children.

PHILIP H. BAERMANN, son of Hiram B. and Jette Baermann, was born in Bayersdorf, District of Erlangen, Bavaria, Germany, January 9th, 1816. He was appeinted professor of modern languages in the Rensselaer Polytechnic Institute in 1864, and remained so engaged till 1867. He had been engaged in teaching French and German, before coming to the Rensselaer Polytechnic Institute, at Mrs. Willard's Seminary, Troy, Albany Academy, Albany, Williams College, Mass., Troy University, Troy, and Alger Institute, Conn. In 1852 he was admitted as attorney and counselor of the Supreme Court of New York State. He was married in 1845 to Rose Ann Palmer of Troy, who died in March, 1875; one child. He was married again, to Matilda Lebeschulz, of South Carolina, who died in March, 1881.

WILLIAM HENRY SEARLES, C. E., son of Asbury M. and Rachel (Mitchell) Searles, was born in Cincinnati, Hamilton county, Ohio, June 4th, 1837. He prepared at Wesleyan University, Middletown, Conn., and the Scientific School of Yale College, entering the Rensselaer Polytechnic Institute in February, 1857, and graduating in 1860. In 1860–61, he was assistant engineer of the Marietta and Cincinnati railroad; in 1861–62, assistant engineer military defenses, department of the Ohio; in 1862-64, professor of geodesy and topographical drawing, Rensselaer Polytechnic Institute; in 1864, chief engineer Middle Range rail-

road, Michigan; in 1865–66, assistant engineer Pittsburgh, Fort Wayne and Chicago railroad; in 1866–67, principal assistant engineer Allegheny Valley railroad; in 1870–71, chief engineer Indiana North and South railroad; in 1872–73, chief engineer corps No. 7, New York, West Shore and Chicago railroad; in 1874–75, consulting engineer, New York; in 1876–78, division engineer New York State canals; in 1879–80, consulting engineer American Pier and Column company, New York; in 1881–82, division engineer New York, West Shore and Buffalo railroad; in 1883, chief engineer Williamsport and Clearfield railroad, Penn.; in 1884, assistant chief engineer B. C. Clearfield and S. W. railroad. He is at present civil and consulting engineer, Cleveland, Ohio. He built the Indiana North and South railroad, the West Point tunnel at West Point, N. Y., and the railroad lift bridge for the B. C. C. and S. W. railroad over the west branch of the canal, Jersey shore, Penn. He is a member of the American Society of Civil Engineers. He published "Field Engineering," "Railroad Spiral" and several papers in "Transactions of the American Society of Civil Engineers," etc.

He was married June 8th, 1870, to Mary J. Doolittle, daughter of Hon. Charles H. Doolittle, of Elyria, Ohio.

CHARLES MCMILLAN, C. E., son of Alexander and Elizabeth (Platt) McMillan, was born in Moscow, Russia, March 24, 1841. His special preparation for the Institute was with a private teacher, having been previously educated at the Protestant Chapel, Moscow, the School of the Lutheran church, Moscow, and the public schools of Hamilton, Canada. He entered the Institute in September, 1856, and was graduated in 1860. In 1860 he was draughtsman, Brooklyn water works, Brooklyn, N. Y.; in 1861–63, draughtsman, Croton water works, New York; in 1863, assistant engineer in charge of pipe distribution and rates of engines; in 1864, assistant engineer in the construction of the new reservoir in Central Park, New York; in 1865, civil engineer, (McMillan & Gould,) Titusville, Penn.; in 1865, professor of geodesy and topographical drawing, Rensselaer Polytechnic Institute, Troy, N. Y.; in 1866–71, professor of geodesy, road engineering and topographical drawing, Rensselaer Polytechnic Institute, Troy, N. Y.; in 1871–75, professor of civil and mechanical engineering, Lehigh University, Bethlehem, Penn.; in 1875 to date, professor

of civil engineering and applied mathematics, College of New Jersey, Princeton, N. J., and was also consulting engineer in Troy, N. Y., Bethlehem, Penn., and Princeton, N. J.

He designed and built the arched bridge, and the upper lake, in Oakwood Cemetery, Troy, N. Y.; the sewerage of Theological Seminary, Princeton, N. J., and the sewerage of Princeton, N. J. He was school commissioner from the third ward, Troy, N. Y., in 1870–71. He is a member of the American Society of Civil Engineers, also of the Rensselaer Society of Engineers. He edited "Smith's Topographical Drawing," and also published a pamphlet entitled "Disposal of Town Sewage," in the report of the New York State Board of Health for 1882.

He was married July 17th, 1866, to Henrietta J. Dodge, daughter of R. J. Dodge, of Brooklyn, N. Y., and October 31st, 1878, Annis T. Field, daughter of the late R. S. Field, of Princeton, N. J.

GEORGE WILLIAM MAYNARD, A. M., son of George Washington and Caroline Augusta (Eaton) Maynard, was born in Brooklyn, Kings county, N. Y., June 12th, 1839. He was educated at Columbia College, the University of Göttingen, and the Mining School at Clausthal, Germany. In January, 1863, he was metallurgical manager of mines in Ireland. From 1864 to 1867 he was engaged in mining engineering, for the most part in Colorado, and was manager of chemical works for a year following. From 1868 to 1872 he was professor of mining and metallurgy at the Rensselaer Polytechnic Institute, and at the same time consulting engineer for iron and steel works in Troy and elsewhere. From 1873 to 1879 he was consulting engineer for iron, steel and copper works in England, Germany and Russia. From 1879 to date he has been engaged in the general practice of his profession in the United States, and is now president of the Bower Iron company. He has built works in Ireland and Colorado, mills, dressing works, and Russian metallurgical plant for treating coper ores. At present he is constructing a furnace for metallurgical purposes.

He received the honorary degree of A. M. from Columbia College, New York, and is a member of the American Institute of Mining Engineers, New York Academy of Sciences, American Geographical Society, American Society of Mechan-

ical Engineers, Long Island Historical Society, and the Iron and Steel Institute of Great Britain.

He has written sundry mining and technical reports, contributions to the Iron and Steel Institute, and the American Institute of Mining Engineers, also articles in various technical journals at home and abroad.

He was married June 12th, 1865, to Fannie Atkin, daughter of John H. Atkin. Three children living.

R. HALSTED WARD, A. M., M. D., F. R. M. S., was born in Bloomfield, Essex county, N. J., June 17th, 1837. He was the eldest son of Israel C. and Almeda H. Ward. After a preparatory course in the local schools, he entered Williams College at the age of seventeen, and was graduated at twenty-one. (A. B. in 1855; A. M. in 1861.) While in college he was president of the Philotechnian Literary Society, editor of the *Williams Quarterly*, and a most active member of the "Florida Expedition" (1857), one of the first and most successful of the parties that have been sent out from various colleges for the purpose of scientific study and collection.

After a thorough course of study in the medical schools and hospitals of New York and Philadelphia (M. D. from College of Physics and Surgery, New York, 1862), a short service in the United States military hospital at Nashville, Tenn., and a short residence, as a sanitary measure, in Minnesota, he established in Troy, in 1863, the system of family medical practice which has been maintained uninterruptedly ever since. He is a member of the Rensselaer County Medical Society (president in 1877, and re-elected in 1878); of the American Medical Association, and was a delegate to the International Congress, held in London in 1881. Several of his papers on medical subjects have been published in the transactions of the State Medical Society. He is also a member of the Medical Board (since 1868), and of the Board of Governors (since 1868, and secretary since 1883), of the Marshall Infirmary.

His scientific work, outside the medical profession, originated from a fondness while in college for botany, biology and microscopy, and has maintained the same direction ever since. He was appointed instructor of botany at the Rensselaer Polytechnic Institute in 1867, and was made professor of botany the

following year. He has also delivered courses of lectures on microscopy at the Institute on several occasions, and is lecturer on microscopy in the scientific course lately established. Outside the Institute his scientific lectures have been numerous, and have seldom failed to touch in some way his favorite subject of the practical applications of science.

His original work in the advancement of science has been mostly in the direction of microscopy, in which he was among the first to apply the microscope to the discrimination of different kinds of blood in connection with criminal trials, and to the detection of forgery, erasures, and other falsifications in handwriting. Besides introducing the microscope as a critical element in many important criminal trials, he has made it prominent and important in many legal, medical, sanitary and economical cases pertaining to water supply, adulterations of food and medicine, special causes of disease, etc. Finding the existing standards of measurement quite unsatisfactory for work of such precision, he took a leading part in organizing the "National Committee on Micrometry," and in securing the standard micrometer, which is now acknowledged as authority for such purposes. Among his inventions and contrivances for the improvement of the microscope are an illuminating arrangement for binoculars, a safety mailing box for slides (used by the Postal Club), an eye shade, the iris illuminator, and a lens holder for dissecting purposes.

Professor Ward is author of the elaborate article on microscopy in *Appleton's Annual Cyclopedia* for 1884; and editor, conjointly with Rev. A. B. Hervey, of the American revision of Behrens on the *Microscope in Botany*, (Boston, 1885,) to which work he made extensive critical contributions respecting the microscope and its accessories. His numerous scientific papers, published during the last twenty years, have pertained mostly to such practical subjects as the practical uses of the microscope; medical microscopy; the study of blood and handwriting; micrometry; illumination; the powers, aperture and nomenclature of objectives and oculars; student's, dissecting and binocular microscopes, etc. His papers have been mostly published in the *Proceedings of the American Association for the Advancement of Science*, and of the *American Society of Microscopists;* in the *American Naturalist*, (Philadelphia,) *American Monthly Microscopical*

Journal, (Washington,) the *Microscope*, (Ann Arbor,) the *Monthly Microscopical Journal*, (London,) the *Journal of the Royal Microscopical Society*, (London,) the *Journal de Micrographie*, (Paris,) the *Microscopical Bulletin*, (Philadelphia,) etc. Many of them have been republished in pamphlet form and extensively circulated. For twelve years he was associated with the editorial corps of the *American Naturalist*, having established (1871) the department of microscopy of that journal—the first microscopical department established by any scientific journal in this country; and during that time he contributed a monthly budget of critical notes in regard to that branch of science, which were prepared with such care and judgment as to be constantly quoted as authority.

His connection with numerous scientific societies has brought him into intimate relations with the most advanced scientific work and progress of the times. He was first president of the Troy Scientific Association (1870–77), and of the American Society of Microscopists (1879); is manager of the American Postal Microscopical Society (since its formation in 1875); member of the American Metrological Society; Fellow of the American Association for the Advancement of Science (chairman of the sub-committee of microscopy in 1876, re-elected in 1877); Fellow of the Royal Microscopical Society (London); and associate member of the British Association (1881–84); honorary member of the Belgium Microscopical Society; Minnesota Academy of Science; Louisville Microscopical Society; Microscopical Society of Central Illinois; Phi Beta Kappa Society; etc.: and correspondent of the Albany Institute; Boston Society of Natural History; San Francisco Microscopical Society; American Microscopical Society of New York; Indianapolis Academy of Science; State Microscopical Society of Illinois; Memphis Microscopical Society; Tyndall Association of Columbus, etc.

He was married in 1862 to Charlotte A. Baldwin, daughter of Caleb D. Baldwin, of Bloomfield, N. J., and has four children.

J. H. C. LAJOIE DE MARCELEAU, A. B., was instructor in the French language from 1866 to 1869, and was appointed professor of the French language and literature in 1869. He resigned in 1873. He published, while at the Institute, in 1869, "Dictées Corrigées of Orthographical Exercises," for his classes, and it

was adopted in other institutions. After his resignation, he went to Canada, and there engaged in mercantile pursuits.

DWINEL FRENCH THOMPSON, B. S., son of Joel Dwinel and Harriett Newell (French) Thompson, was born in Bangor, Penobscot county, Maine, January 1st, 1846. He prepared for college, and entered Bowdoin College, where he remained for two years, and then went to Dartmouth College, Hanover, N. H., where he was graduated in the scientific department in 1869. He then received the appointment of tutor in the same institution, and remained three years. In 1872 he was appointed professor of descriptive geometry, stereotomy and drawing in the Institute, which position he still holds. He married, January 1st, 1880, Mary Lena Saxton, daughter of S. Burt Saxton, of Troy, N. Y. ; three children.

WILLIAM LAWSON ADAMS, C. E., was appointed professor of geodesy, road engineering and topographical drawing in 1872, and resigned in 1878. *See Directors, page 130.*

ROBERT PARR WHITFIELD, A. M., son of William and Margaret (Parr) Whitfield, was born May 27th, 1828, in New Hartford, Oneida county, New York. He received his early education mostly at home. He began his work at Albany, N. Y., on the palæontology of the State of New York in 1856, and continued until 1876, the records being found in the "State Natural History." He was assistant curator of the State Museum, Albany, from March, 1870, to February 28th, 1876. Professor Whitfield was appointed professor of geology in the Institute in 1875, and held the position until 1878. He was appointed curator of the geological department of the American Museum of Natural History, New York city, June 1st, 1877, which position he still holds.

He is a member of the Albany Institute, Albany, N. Y.; Fellow of the American Association for the Advancement of Science, and corresponding member of the New York Microscopical Society.

He was married July 28th, 1847, to Mary Henry, daughter of William Henry. Five children.

The following is a list of works written by Professor Whitfield:

Observations on the Rocks of the Mississippi Valley and Descriptions of new species of Fossils. By C. A. White and R. Whitfield, Proceedings Boston Society of Natural History, 1862.

Description of new species of Eocene Fossils. By R. P. Whitfield, (American Journal Conchology, July 1st, 1865, vol. 1).

Observations on the internal appendages of the genus Atrypa. By R. P. Whitfield, (twentieth report State Cabinet, New York, 1867).

Description of new species of Fossils from the Devonian rocks of Iowa. By James Hall and R. P. Whitfield, (twenty-third report State Cabinet, New York, 1869, page 223).

Notice of new species of fossils from the vicinity of Louisville, Ky., and the falls of the Ohio. By James Hall and R. P. Whitfield, (twenty-fourth report State Cabinet, 1872).

Remarks on some peculiar impressions in sandstone of the Chemung group of New York. By James Hall and R. P. Whitfield, (twenty-fourth report State Cabinet, New York, 1872).

Notice of two new species of fossil shells from the Potsdam sandstones of New York. By James Hall and R. P. Whitfield, (twenty-third report State Cabinet, 1869, page 241.

Notice of three new species of fossil shells from the Devonian of Ohio. By James Hall and R. P. Whitfield, (twenty-third report State Cabinet, 1869, page 240.

Description of new species of fossils from Ohio. By James Hall and R. P. Whitfield, (Palæontology of Ohio, vol. 2, 1875.)

United States Geological Explorations of the fortieth parallel, invertebrate fossils. By James Hall and R. P. Whitfield, 1877.

Preliminary report on the palæontology of the Black Hills of Dakota. By R. P. Whitfield, (Washington, D. C., 1877).

Palæontology of the Black Hills of Dakota. By R. P. Whitfield, (United States Geological Survey of the Rocky Mountain Region, Washington, D. C., 1880).

Preliminary description of new species of fossils from Wisconsin. By R. P. Whitfield, (Annual Report of the Geological Survey of Wisconsin, 1878).

Description of fossils from the Palæozoic formations of Wisconsin. By R. P. Whitfield, (Geological Report of the Survey of Wisconsin, vol. 4, 1872–79).

Description of new species of Palæozoic fossils from Wisconsin. By R. P. Whitfield, (Annual Report of the Geological Survey of Wisconsin, 1880).

Determination of the age of the black slates of Indiana and report of examination of fossils. By R. P. Whitfield, (Annual Report of the Geological Survey of Indiana, 1874, page 179).

Notice of the occurrence of rocks representing the Marcellus shales of New York, in central Ohio. By R. P. Whitfield, (Proceedings A. A. A. Sciences, vol. 28, 1870).

Notice of new fossil crustaceans from Ohio, with new genera and species. By R. P. Whitfield, (American Journal of Science, 1880).

On the occurrence of true Lingula in the Trenton limestones. By R. P. Whitfield, (American Journal of Science, 1880).

On the nature of Dictyophyton. By R. P. Whitfield, (American Journal of Science, 1881; two articles).

Notice of a new genus and species of air-breathing molluscs, from the coal measures. By R. P. Whitfield, (American Journal of Science, 1881).

Description of a new species of Carboniferous Crinoid. By R. P. Whitfield, (Bulletin No. 1 of American Museum of Natural History, 1881).

Remarks on Dictyophyton and description of new species. By R. P. Whitfield, (Bulletin No. 1 of American Museum of Natural History, 1881.)

Description of new species of fossils from Ohio, etc. By R. P. Whitfield, (Annals of the New York Academy of Sciences, 1882—preliminary to vol. 3, Palæontology of Ohio, plates and manuscript in geologist's hands for six years).

Description of Lymnæa (Bulimæa) Megasoma, (Say,) with an acccount of changes produced in the offspring by unfavorable conditions of life. By R. P. Whitfield, (Bulletin No. 3 of the American Museum of Natural History, 1882).

Notice of some new species of primordial fossils in the collection of the museum, and correction of previously described species. By R. P. Whitfield, (Bulletin No. 5 of the American Museum of Natural History, 1884).

On a fossil scorpion from the Silurian rocks of America. By R. P. Whitfield, (Bulletin No. 6 of the American Museum of Natural History, 1885).

Notice of a new cephalopod from the Niagara rocks of Indiana. By R. P. Whitfield, (Bulletin No. 6 of the American Museum of Natural History, 1885).

Notice of a very large species of Homalonotus from the Oriskany sandstone formation. By R. P. Whitfield, (Bulletin No. 6 of the American Museum of Natural History).

WILLIAM HUBERT BURR, C. E., son of George William and Marion F. (Scovill) Burr, was born in Watertown, Litchfield county, Conn., July 14th, 1851; prepared by private tutor, entered the Institute October, 1868, and was graduated in 1872. From August, 1872, to March, 1873, he was assistant engineer with the Phillipsburgh Bridge Company, Phillipsburgh, N. J., and New York city. March, 1873, to December, 1873, was assistant engineer on the Newark, N. J., water works. January 1874, to May, 1875, was assistant engineer with the Phillipsburgh Bridge Company. September, 1875, to December, 1876, he was acting professor of theoretical and practical mechanics at the Rensselaer Polytechnic Institute, and from December, 1876, to June, 1883, was professor of rational and technical mechanics; from June, 1883, to September, 1884, was the "William Howard Hart" professor of technical and rational mechanics. In April, 1884, he accepted the position of assistant to the vice-president, and chief engineer of the Phœnix Bridge Company, Phœnixville, Pa. He is a member of the American Society of Civil Engineers, the American Association for the Advancement of Science, and the Rensselaer Society of Engineers. Published a "Course on the Stresses in Bridge and Roof Trusses, Arched Ribs, and Suspension Bridges," New York, 1880; "The Elasticity and Resistance of the Materials of Engineering," New York, 1883; "The Theory of the Masonry Arch," Troy, N. Y., 1881. Married, September 7th, 1876, Caroline Kent Seelye, of Ballston Spa, N. Y.; two children.

ARTHUR WELLINGTON BOWER, C. E., was born September 25th, 1846, at Pleasant Valley, N. Y. He had spent some time in teaching before entering the Institute in the fall of 1867. He was graduated in 1871, and was instructor in mathematics and mechanics in the Institute from 1871 to 1874. In 1874 he was appointed assistant professor of mathematics and instructor in mechanics. In 1875 he was appointed assistant professor of

physics, and in 1878, professor of physics, which position he held until his resignation in 1880. Prof. Bower was married about 1877. Since leaving the Institute, he has been engaged at various places in the west in stock raising. He now resides at Stanford, Meagher Co., Montana.

FRANK PERKINS WHITMAN, A. M., son of William W. and Caroline K. (Perkins) Whitman, was born in Troy, Rensselaer county, N. Y., July 29th, 1853. Graduated at Brown University, Providence, R. I., in 1874. Was teacher of natural science and mathematics in an English and Classical School at Providence, R. I., 1874–78. Was a student in physics at Brown University and the Massachusetts Institute of Technology, Boston, 1878–79, and at the Johns Hopkins University, Baltimore, Md., 1879–80. Was appointed professor of physics at the Institute in 1880, which position he still holds. He received the degree of A. M. from Brown University, 1877. Married, May 26th, 1881, Charlotte W. Wheeler, daughter of Rev. Charles H. Wheeler, of Providence, R. I.

PALMER CHAMBERLAIN RICKETTS, C. E., son of Palmer P. and Eliza (Getty) Ricketts, was born in Elkton, Cecil county, Md., January 17th, 1856 ; moved to Princeton, N. J., and was prepared for college by Mr. Obrien, tutor of Princeton College. He entered the Institute in September, 1871, and was graduated in 1875. In September, 1875, was appointed assistant in mathematics and astronomy at the Institute. During the summers of 1876 and 1877 engaged as assistant engineer on the Troy & Boston railroad. From 1882 to 1884 was assistant professor of mathematics and astronomy, and in 1884 was appointed to the William Howard Hart professorship of rational and technical mechanics at the Institute, which position he now holds.

WILLIAM PITT MASON, C. E., B. S., M. D., son of James and Emma (Wheatly) Mason, was born in New York city, October 12th, 1853. Prepared at Bernard French Institute, New York city. Entered the Rensselaer Polytechnic Institute in September, 1870, and was graduated in 1874. The following year was spent in Europe and in the chemical laboratory of Harvard University. He was appointed assistant in chemistry and natural science in the Institute in September, 1875 ; assistant

professor of chemistry and natural science in 1882, and professor of analytical chemistry in 1885, which position he now holds. He studied medicine, and received the degree of M. D. from Albany Medical College, March, 1881. Edited "Notes on Qualitative Analysis," September, 1882. Was married April 29th, 1886, to Emilie Eliza Harding, daughter of George Harding, of Philadelphia, Pa.

ASSISTANT PROFESSORS.

TIMOTHY ORLANDO HOPKINS, C. E., son of Hon. Timothy A. and Hannah (Williams) Hopkins, was born at Amherst, Erie county, N. Y., May 14th, 1832. Graduated at the Albany State Normal School in 1851 ; taught on Long Island and in Buffalo two or three years ; entered the Institute in 1854, and graduated in 1857. After graduation, was appointed assistant professor of mathematics and repeater of mechanics, and remained two years, until 1859. In 1859–60 he taught in the Normal School at Joliet, Ill., and in the spring of 1861 went to California. In 1862, he was elected surveyor of Alameda county, Cal., which position he held at the time of his death, January 23d, 1865.

WILLIAM FENTON, C. E., was born in Essex county, England. July 12th, 1832. Emigrated to America in 1846. Previous to entering the Rensselaer Polytechnic Institute, he attended the Polytechnic College, Philadelphia, Pa., one year, and for the year 1858 held the office of city engineer of West St. Paul, Minn. In the fall of 1859 he entered the Rensselaer Polytechnic Institute (Division B), and graduated in 1861. The summer of 1862 was spent drawing plans for, and assisting in the superintendence of the erection of a block of buildings in St. Paul, Minn. In the fall of 1862 he went to Brooklyn, N. Y., and during that winter and part of the following summer he taught an evening school for mathematics and drawing, being employed during the day in the construction of the "Iron Clads," at the Continental Works, Greenpoint, L, I. The latter part of the summer of 1863 he was employed as assistant in the city engineer's office at Jersey City. He was appointed instructor in mathematics and geodesy in the Institute from 1863 to 1865, and assistant professor of the same from 1865 to 1870. Under an

impression of a call to preach the gospel, this position was resigned. In the fall of 1870, he entered upon a course of theological studies in the Baptist Theological Seminary, Chicago, Ill. In the year 1872 he was ordained to the gospel ministry at the Baptist Church of Lamartine, Wis. Soon after he discovered the nature and character of Freemasonry, and its power over the churches. For the past few years he has been engaged in various occupations, principally lecturing against Freemasonry and preaching the gospel in the streets, and in churches when permitted. In 1868 he was elected a member of the American Association for the Advancement of Science, and previous to that time was elected a member of the American Association of Civil Engineers.

HENRY AUGUSTUS ROWLAND, C. E., Ph. D., son of Rev. Henry A. and Harriet (Heyer) Rowland, D. D., was born in Honesdale, Pa., November 27th, 1848. He prepared for the Institute at the Academy in Newark, N. J., entered in the fall of 1866, and graduated in 1870. He surveyed a railroad in western New York; taught in Wooster University, Wooster, Ohio, for six months; was instructor in physics in the Institute from 1872 to 1874, and assistant professor of physics from 1874 to 1875. Passed one year in Europe, examining physical laboratories, and studying in Helmholtz' laboratory. Was appointed professor of physics in Johns Hopkins University in 1876. Received the honorary degree of Ph. D. from Johns Hopkins University, 1880; Chevalier of the Legion of Honor, Paris, 1881; received the Rumford medal in 1884, for researches in light and heat. He is associate member of the American Academy of Science, Boston; member of the Physical Society of London; corresponding member of the British Association; member of the National Academy of Sciences; member of the Electrical Congress at Paris, 1881, and of the jury of the Exposition, and permanent member of the International Commission for establishing electrical units; was vice-president of the American Association for the Advancement of Scienec in 1883. Has edited various papers in the scientific journals.

ADOLFO ELEUTERIO BESOSA, C. E., was born in Ponce, Porto Rico, April 18th, 1856. He was graduated at the Institute in

1875, and then went abroad and spent some time as a student of engineering in Paris, France. In 1880 was appointed assistant in rational and technical mechanics in the Institute, to which descriptive geometry and drawing were added the following year. In 1882 he was appointed assistant professor in the same department, and resigned in 1883.

CHARLES WINTHROP CROCKETT, A. B., C. E., son of Earlsworth and Elizabeth (Holden) Crockett, was born at Macon, Bibb county, Ga., October 6th, 1862. Graduated from Mercer University, class of 1879, receiving the degree of A. B. Entered the Institute October 2d, 1880, and graduated in 1884. He was then appointed assistant professor of mathematics and astronomy in the Institute, and entered upon his duties in the fall of 1884.

INSTRUCTORS.

GEORGE WASHINGTON PLYMPTON, C. E., A. M., son of Thomas Ruggles and Elizabeth (Holden) Plympton, was born in Waltham, Middlesex county, Mass., November 18th, 1827. Learned the machinist trade, 1844 to 1847. Prepared for the Rensselaer Polytechnic Institute in the Waltham High School, and with Rev. Thomas Hill. He was graduated in 1847, and was for a time instructor in mathematics at the Institute. Engaged in farm, road and plank road surveying in Essex, Rensselaer, Greene and Dutchess counties, N. Y., in 1850; 1851–52, at Cleveland, Ohio, in city street work; from 1852 to 1855 was professor of mathematics at Albany State Normal School; 1856–57, he built bridges with J. W. Murphy; 1859–63, taught physics and engineering at the Trenton State Normal School. Has been professor of physical sciences in the Brooklyn Polytechnic Institute from September, 1863, to the present time; professor of chemistry and toxicology in Long Island College Hospital from March, 1865; professor of physics and engineering at Cooper Institute from November, 1869; director of the Cooper Union night schools since September, 1881; has edited Van Nostrand's Engineering Magazine since January 1st, 1870. He built an iron railway bridge at Allentown, Penn.; an iron bridge, two span, double track, at Beaver Meadow, Penn., in partnership

with J. W. Murphy, of the class of 1848. Designed the drainage of the city of Bergen, (now part of Jersey City), as engineer for the Water Board, in 1867–68. Received the honorary degree of A. M. from Hamilton College, and the degree of M. D. from Long Island College Hospital. Aside from work for Van Nostrand's Magazine, he has made several translations from the French, as "Guide to Determination of Rocks," "The Aneroid and how to use it," "Theory of Ice Machines." Married, December 17th, 1855, Delia M. Bussey, daughter of Col. Thomas Bussey, of Troy, N. Y., who died April, 1859, leaving one son; married, July 2d, 1861, Helen M. Bussey; four children. Has been a member of the American Society of Civil Engineers since 1868.

DAVID HATHAWAY was instructor in linear and perspective drawing in the Institute from 1847 to 1850.

PAUL EDWARD VON THUN was instructor in the French and German languages in the Institute from 1852 to 1854.

JOSEPH A. MOAK, C. E., son of Robert and Mary (McMillen) Moak, was born at New Scotland, Albany county, N. Y., August 15th, 1830. He prepared for the Institute at the district school in New Scotland, and Schoharie Academy, Schoharie county, and entered in 1852. He was graduated in 1854, and was instructor in field geodesy from 1854 to 1855. He commenced surveying, and then went South as civil engineer, deepening and widening Appomattox River in Virginia, and afterward opened an office in Richmond, Va. He married in June, 1859, Sarah West. One child. He died during the war.

LEWIS GOULD LOWE, C. E., B. N. S., A. M., M. D., son of Abraham and Emma (Burr) Lowe, was born in Boston, Suffolk county, Mass., August 17th, 1828. He attended Phillips Academy, at Andover, Mass., the Bridgewater State Normal School, at Bridgewater, Mass., and entering the Institute in 1847, was graduated in 1848. He was instructor in natural sciences in the Rensselaer Polytechnic Institute during the summer term of 1850, and for a part of one summer afterwards (1855); assisted the principal of the State Normal School, Bridgewater, Mass., and studied medicine from 1860 to 1864, and practiced that pro-

fession in Bridgewater from 1864 to 1869, giving up the practice on account of poor health. He then engaged in the insurance business, together with the superintendence of a farm in Bridgewater. In the winter of 1876–77 he was sent as Representative to the Massachusetts State Legislature from Bridgewater, and served several years as school committee in Bridgewater. He received the degrees of C. E., B. N. S., and A. M. from the Rensselaer Polytechnic Institute, also of M. D. from the New Hampshire Medical College, 1863, and from the Medical College of Harvard University, 1864. He married, April 29th, 1850, Joanna, daughter of Mr. Jacob Jackson. Ten children; nine living. In 1862 he served in the Union army for three months as acting medical cadet, stationed at Judiciary Square hospital, Washington, D. C., but resigned to attend the winter course of lectures at the Harvard Medical School.

De Volson Wood, C. E., M. S., A. M., son of Julius and Amanda (Billings) Wood, was born in Smyrna, Chenango county, N. Y., June 1st, 1832. After graduating from the Normal School at Albany, he entered the Institute October, 1855, and was graduated in 1857. He was instructor in mathematics in the Institute from 1856 to 1857. Began teaching at 17 years of age, and still continues; was assistant professor of civil engineering in the University of Michigan, 1857; professor of civil engineering in the same university from 1859 to 1872; was appointed professor of mathematics and mechanics in the Stevens Institute, Hoboken, N. J., 1872. Designed ore dock at Marquette, Mich., 1866. Was President of the Board of Education, Boonton, N. J., in 1881. Received the honorary degree of M. S. from the University of Michigan, and A. M. from Hamilton College. Is a member of the American Society of Civil Engineers, the American Society for the Advancement of Science, corresponding member of the American Society of Architects. He wrote "Resistance of Materials," 1871; a "Treatise on Bridges and Roofs," 1872; "Analytical Mechanics," 1876; "Elementary Mechanics," 1878; "Co-ordinate Geometry," 1879; "Mechanics of Fluids," 1884. Married, September, 1859, Cordera E. Crane, who died June, 1866; one child. Married, August, 1868, Fannie M. Hartson; six children.

JAMES R. PERCY, B. S., of Fowler's Mills, Ohio, was born at Pike River, Canada East, September 18th, 1829. He entered the Institute in 1856, and graduated in 1859. He had taught in public schools before coming to Troy, and was instructor while pursuing his engineering course. He was also engaged in teaching in Ohio, after graduation. He entered the United States service November 16th, 1861, remaining in the army until he was killed at Atlanta, Ga., August 18th, 1864. In 1874 a stained glass memorial window was placed in the Institute library room, by his classmates, bearing the inscription of the engagements in which he took part: Pittsburg Landing, Vicksburg, Mission Ridge, Resaca, Kenesaw Mountain, Atlanta.

JOHN B. LUCE, A. M., was instructor in the French language and literature from 1860 to 1861. He was born in France, February 3d, 1785, and died in Troy, N. Y., January 12th, 1865. He was buried in Oakwood cemetery, and a suitable monument was placed for him by a friend and pupil.

JOSEPH G. FOX, C. E., son of Buell and Prudence (Ely) Fox, was born in Adams, Jefferson county, N. Y., September 7th, 1833. Until 1848 he remained at home on a farm; from 1848 to 1853, was an apprentice in a cabinet and chair factory at Adams, attending the Adams Academy a portion of the time. From 1853 to 1855 was proprietor of a cabinet and chair factory at East Saginaw, Mich. 1855–56 was a student at the Union Academy, Belleville, N. Y. 1856–57 was a student at the State Normal School, Albany, N. Y., graduating July, 1857. 1857–58 was principal of the West Troy Academy, West Troy, N. Y. 1858–59, associate principal of the Paulding Institute, Tarrytown, N. Y. He entered the Rensselaer Polytechnic Institute in September, 1859. While pursuing his course at the Institute he acted as instructor in mathematics, and on graduating, in 1861, he was appointed instructor in geodesy and topographical drawing. In 1862 he accepted a position in the city of New York, where for the next ten years (1862–72,) he was a resident, and engaged in teaching, chiefly as principal of the Collegiate and Engineering Institute, and also holding the position of professor of mathematics in Cooper Institute in 1863–64, and for seven years following was director and professor of mechan-

ics in the same institution. In 1872 he was elected to the chair of civil and topographical engineering in Lafayette College, Easton, Pa. He received the honorary degree of A. M. from Columbia College, 1864. Is a member of the American Association for the Advancement of Science. Married, September 1st, 1864, Lina Sutherland, daughter of Allen M. Sutherland; three children.

HORACE LOOMIS, C. E., son of Benjamin N. and Sarah A. (Gardiner) Loomis, was born in Binghamton, Broome county, N. Y., July 14th, 1840. He prepared for the Institute at the Binghamton Academy and State Normal School, Albany. He entered in September, 1862, and was graduated in 1865. During these three years he was also instructor in mathematics and English composition. From August, 1865, on the Lehigh Valley railroad, Wilkesbarre, Penn., one year; Western and Connecticut and Dutchess and Columbia railroad, Dutchess county, N. Y., one year; Erie railroad, Hoboken, N. J., three years; Midland railroad, Jersey City, seven years; private work, three years. He designed and built the railroad stock yards, docks, etc., for the Erie railroad at Hoboken and Weehawken, N. J.; old White Plains post road improvement, Westchester county, N. Y.; Jersey City and Albany railroad, in Rockland county, N. Y.; Gravity railroad, Cumberland county, Maryland; additional water supply for New York city from the Housatonic river, Conn. He has been trustee and president of the village of Mount Vernon, is a member of the American Society of Civil Engineers, and published "Reports to the Department of Public Works on Additional Water Supply." He married, May 10th, 1871, Kate A. Chabert, daughter of Dr. R. F. Chabert, of Hoboken, N. J. Six children.

GEORGE MARSHALL HUNT, C. E., son of Marshall and Lydia (Gibbs) Hunt, was born in St. Armand, Missisquoi county, Province of Quebec, September 2d, 1826. He attended Morrisville Academy, Morrisville, Vt., Lawrence Academy, Groton, Mass., and Charlotteville Seminary, Charlotteville, N. Y. He entered the Rensselaer Polytechnic Institute in September, 1859, remaining one year. He re-entered in September, 1864, and was graduated in 1866. In 1852 he commenced teaching, and has taught

more or less every year since. In 1855 he was granted a State teacher's certificate, by the State department of public schools of the State of New York. He learned the tanner's and currier's trade before he was twenty-one years of age, and also learned the carpenter's and joiner's trade. In 1851 he was assistant section engineer on the Fitchburg railroad; March, 1884, in Argyle, N. Y., was elected to the office of commissioner of roads and bridges. He married, December, 1856, Jane Eliza Lester, daughter of John Lester. Since 1876 he was engaged in experimenting upon the steam engine. A successful rotary steam engine was the object sought. He was instructor in mathematics in the Institute from 1864 to 1866; instructor in mathematics and and analytical mechanics, 1866–67; principal of Hartford Academy, N. Y., 1867–68, and of Hebron Academy, N. Y., 1868–69, and afterward taught at Argyle. He died at North Argyle, N. Y., April 6th, 1886.

CHARLES EDWARD ILLSLEY, A. M., C. E., son of Edward and Nancy (Selleck) Illsley, was born in New York city, May 29th, 1842. His parents removing to St. Louis, he attended the St. Louis High school, and then took a collegiate course at Washington University in the same city. He entered the Institute in October, 1865, and was graduated in 1867. Was instructor in English composition at the Institute from 1866 to 1867 ; instructor in mathematics, drawing and civil engineering at Washington University, St. Louis, one year after graduation at Troy. He had three years' practical engineering work in street construction department at St. Louis, and then began practice as an architect. Received the degree of A. M. from Washington University. Was president of the Western Association of Architects, Chicago, Ill., in 1884. He married, September 3d, 1877, Sarah E. Godlove, daughter of Emanuel Godlove, of St. Louis, Mo. Four children; three now living.

ALBERT HORATIO GALLATIN, A. M., M. D., son of Albert Rolar and Mary Lucille (Stevens) Gallatin, was born in New York city March 7th, 1839. He was instructor in physics from 1866 to 1867 in the Institute, and has held the positions of professor of chemistry, geology and minerology in Norwich University, Vermont; professor of analytical chemistry and director of the

laboratory, Cooper Union, New York; professor of analytical chemistry, University of the city of New York, which position he still holds. He is a member of the New York Academy of Medicine. He was married September 7th, 1877, to Louisa Belford Ewing, daughter of Lieutenant Maskell Ewing, U. S. A. Three children.

ALEXANDER GEORGE JOHNSON, A. M., son of David and Lucy (Towne) Johnson, was born at Newbury, Vt., February 7th, 1813. He practiced law in Troy, N. Y., and was editor of the Troy *Whig* for about ten years before his death. He was deputy secretary of state about 1851; also deputy superintendent of public instruction at two other different times. He was a graduate of Dartmouth College, and received the honorary degree of A. M. from the same college. He married Charlotte Ward, daughter of Hon. Andrew Ward, of Windsor, Vt., in 1846. Eight children; five now living. He died February 7th, 1879.

CHARLES EDWARD SMITH, C. E., was born in Mobile, Ala., July 24th, 1841. He came north and entered Mr. Roe's preparatory engineering school, May, 1856, at Cornwall-on-the-Hudson. He entered the Rensselaer Polytechnic Institute in the fall of 1857, and graduated in June, 1860. He obtained work first on the Bergen tunnel, near Jersey City, merely a temporary job, given because the assistant engineer was disabled for a few days by an accident. He obtained a position as assistant engineer on the Raritan and Delaware Bay railroad sometime during the summer of 1860, but left when the work was temporarily suspended a few months afterward. After a short interval was recalled and remained until the beginning of the war of secession, when he went South and enlisted as a private in the Third Alabama infantry regiment, which he joined at Norfolk in October, 1861. He was attacked with what subsequently proved to be chronic diarrhœa just before the evacuation of Norfolk, but accompanied the regiment as far as Richmond, where he was taken to the hospital, while the Third went into the series of battles beginning with Seven Pines. In a few weeks he was detailed as hospital clerk, and after holding that place about a year his detail was transferred to the engineer department, as draughtsman, within one month from which time he received a

commission as second lieutenant of engineers, and was retained on duty in the engineer bureau of the war department. In May, 1864, he was, at his own request, ordered to field service, and joined Gen. Polk at Demopolis, Ala., just on the eve of his departure for J. E. Johnstone's army in Georgia. There followed an active campaign on Johnstone's retreat from New Hope Church to Atlanta, where he was detached—more correctly was detached some time after the retreat from Atlanta, at "Rough and Ready." And then came service, chiefly detached, in making and mending roads and bridges, establishing ferries, etc., until the changes of fortune and special orders brought him to be surrendered by Gen. Dick Taylor, at Meriden, Miss., May 4th, 1865. He returned to New York June 3d, 1865; began the study of law; was graduated at Columbia College Law School, in May, 1867, and admitted to the bar. February 1st, 1869, he went into the partnership of Cronin & Smith, attorneys and counsellors at law, No. 176 Broadway, New York city. He was instructor in geodesy and acting professor in the Institute from 1871 to 1872.

PIERRE-JULES GODEBY, A. B., son of Pierre and Marie Therese (Duvwier) Godeby, was born at Manoir, department of Seine-Inférieure, France, April 24th, 1829. He was appointed professor of the French language and literature in the Institute in September, 1873, in which position he still continues. He received the honorary degree of Bachelierès lettres from the Université de France October 30th, 1847. Honorary member of the Rensselaer Society of Engineers. He married, May 4th, 1881, Mary Patrick, daughter of the late Jesse Patrick, of Troy, N. Y.

JOHN HEALEY KELLOM, A. M., was born in Washington county, N. Y., in 1818. He was graduated at Williams College in 1842. Taught one year at Whitingham, Vt.; three years near Milledgeville, Ga.; studied law one year in Auburn, N. Y.; taught the Troy Academy in Bradford county, Penn.; was two years principal of the Elbridge Academy, N. Y.; and four years of the East Bloomfield Academy. He removed to Omaha, Neb., in 1856, and was there principal of the high school for several years. He was instructor in English composition and rhetoric in the Institute from 1875 to 1877. He married Miss Henriette

Newell, of Syracuse, N. Y. One daughter, who married W. L. Adams, C. E., formerly director of the Institute.

WILLIAM WEEKS MORRILL, A. M., son of Josiah Robinson and Filinda (Weeks) Morrill, was born in Gilmanton, Belknap county, N. H., August 31st, 1851. He prepared for college at the New Hampton, (N. H.) Literary Institution, entering Dartmouth College in September, 1870, where he was graduated in 1874. He was principal of Norwich (Vt.) Academy from February, 1875, to June, 1876, and was head master of "Bede Hall," Cooperstown, N. Y., for the school year 1876–77. He was appointed instructor in the English language and literature in the Institute in September, 1877, and resigned in 1882. Meanwhile he had pursued the study of law, and was admitted to the bar of the state of New York in September, 1880, and since then has been engaged in the practice of law in Troy, N. Y.

He received the degree of A. M. from Dartmouth in 1877, and is a member of the Rensselaer Society of Engineers. He married, September 14th, 1876, Mira Marie Louise Lewis, daughter of William E. Lewis.

FRANK LEWIS NASON, A. B., son of Lewis Clark and Maria Julia (Stickles) Nason, was born at New London, Waupaca county, Wis., May 12, 1856. He prepared for college at Middlebury High School, Middlebury, Vt., and was graduated from Amherst College, Amherst, Mass., in June, 1882. He was appointed instructor in the English language, and assistant in mathematics, in the Institute in September, 1882. He spent a part of the winter of 1885 and 1886 at the Johns Hopkins University. He married, July 29, 1885, Thalia A. Painter, daughter of Dr. Henry W. Painter, of West Haven, Conn.

ASSISTANTS.

JAMES B. DUNGAN, M. D., was born in Canandaigua, N. Y., in 1812. He attended lectures at the Institute, and was appointed adjunct to the junior professor November 2d, 1830. He afterward studied medicine, and practiced in his native town for about three years, and then left, on June 15th, 1837, for the South. He located at Bayou Grossetete, about ten miles from

Bayou Plaquimine, on the Mississippi river, in the state of Louisiana, and practiced there his profession until he died, about 1870.

F. M. Howell, of Canandaigua, who furnished the above facts, writes that he has a letter, three pages of foolscap, sent him by Dr. Dungan from the South, dated September 27th, 1837, on which he paid one dollar postage.

GEORGE L. MOODY, of Boston, Mass., was a member of Division B. of the Institute, in 1850 and 1851, and of Division A, 1851 and 1852. He was also repeater or assistant in physics and mechanics in 1853 and 1854.

MATTHIEU DARMSTADT, Ph. D., of Darmstadt, Germany, studied in the Gymnasium, a private laboratory in his native town, and the laboratory of Fresenius, at Wiesbaden. After coming to this country he spent a short time in a drug store, and was afterward employed in the laboratory of Rutger's College. He was appointed assistant in chemistry at the Institute in the summer of 1866, and remained until 1868. He then returned to Germany, and entered the University at Göttingen, where he received the degree of Doctor of Philosophy. He afterward went into business, but has devoted considerable time to scientific investigation. He has written an article occasionally for some of the journals. Is married, and has a family.

N. B.—The records of other assistants and adjuncts, some of whom served for a year or more, and some for only a single term, all being graduates of the Institute, may be found with their respective classes.