Chapter Three

Rutgers College
Theodore Strong (1827-1859)

Formation of Rutgers College

While the teaching in the "collegiate" part of Queen's College ceased in 1816, the Theological Seminary and the Grammar School continued to function. Shortly after the suspension of instruction in the College, a controversy arose between the Queen's Trustees and the General Synod of the Dutch Reformed Church. In 1817 the General Synod, in response to concerns of the wealthy churches in New York City, proposed that the Theological Seminary be relocated to New York. The Queen's College Trustees resisted these efforts, arguing that they could not release to the Synod the theology funds that they held, if the Theological Seminary were no longer connected with Queen's College. Although the Trustees prevailed in resisting the efforts to relocate the Theological Seminary, they still faced serious financial problems. In order to address these financial problems, the College agreed to sell to the Synod the college building (Old Queen's) and property for a total price of $6,212. This was a nominal amount, which enabled the Trustees to pay off their debt to the bank and to repay the money that had been borrowed from the theology fund. It was understood, however, that the uses of the building would not change, and that the Trustees would begin to take steps towards reopening the College.[1]

In 1823, after some negotiation, the State extended its authorization for the College to conduct a lottery, originally made in 1812. This authorization included the stipulation that the funds that were raised would be used to provide for the salary of a professor of mathematics. In the end, the College realized approximately $20,000 from the lottery. These funds went into the "Mathematical Fund" at the College.[2]

---

[1]Demarest, *A History of Rutgers College*, 239-283; McCormick, *Rutgers: A Bicentennial History*, 34, 35.
[2]Lukac, *Aloud to Alma Mater*, 27-31.

Theodore Strong (1827-1859)

By 1825 the College had settled its debts and raised funds for the support of the major portion of a professor's salary. At that point, the Trustees and the Synod agreed on a plan to reopen the College. That plan became known as the Covenant of 1825. It provided that the Trustees would be responsible for naming and paying the salaries of a professor of mathematics and a professor of languages, that the three theological professors, then in the Theological Seminary, would have teaching duties in the College, and that one of the theology professors would be President of the College. Under this Covenant, the authority of the Trustees was limited by the Synod. The course of studies in the College, and the regulations relating to its government, were to be determined jointly by the faculty of the College, and by a Board of Superintendents consisting of three Trustees and three appointments made by the Synod.[3]

Before the College could reopen, President Livingston died in January 1825. Philip Milledoler, who had been a member of the Board of Trustees since 1815, was named to replace Livingston as Professor of Theology in July 1825, and as President of the College in September 1825. At the same time, with the approval of the State Legislature, the College was renamed Rutgers College, in honor of Colonel Henry Rutgers. Henry Rutgers was a graduate of King's College and a prominent layman in the Dutch Church. He served in the Revolutionary War and held various positions of importance in New York City. Henry Rutgers was a bachelor with valuable land holdings in New York City. It was undoubtedly hoped that he would help to support the College financially, but these hopes were not realized. In 1826 Henry Rutgers gave $200 for the purchase of a bell for the new cupola on Old Queen's, and he gave the Synod a bond for $5,000, with a stipulation that the interest was to be paid to the College. He died in 1830, leaving a third of his estate to charity, but nothing to Rutgers College.[4]

With a new structure (Old Queen's), new name (Rutgers College), and new president (Philip Milledoler), the College reopened on November 14, 1825, with 5 faculty members and 30 students. The faculty members

---

[3]*History of Rutgers College or An Account of the Union of Rutgers College and the Theological Seminary*, 12.

[4]Demarest, *A History of Rutgers College*, 266-275; McCormick, *Rutgers: A Bicentennial History*, 40, 41; *Rutgers Magazine*, Fall 1991, 26.

included the President and the two other theology professors, a professor of languages, and Robert Adrain, who returned as Professor of Mathematics, after teaching at Columbia for twelve years.[5]

Rutgers College (1825-1859)

Philip Milledoler served as President of the College from the date of its reopening in 1825 until he resigned in 1840. Disputes between two groups in the Dutch Church spilled over to the faculty and contributed to his decision to resign the presidency. A. Bruyn Hasbrouck followed Milledoler as President of Rutgers College, and served from 1840 until he resigned in 1850. Hasbrouck was a lawyer and served briefly in Congress. He became a member of the Board of Trustees in 1837. An elder in the Dutch Reformed Church, he was the first layman to serve as President of the College. When Hasbrouck became President, there were 10 faculty members and 50 undergraduate students in the College. The faculty members included the President and the three theology professors, three language professors, a professor of mathematics and natural philosophy, and a professor of chemistry and natural history.[6]

Following President Hasbrouck, Theodore Frelinghuysen served as President of the College from 1850 until his death in 1862. He was the son of General Frederick Frelinghuysen, the first tutor at the College, grandson of John Frelinghuysen, and great grandson of Theodorus Jacobus Frelinghuysen, the Dutch minister who came to the Raritan Valley in 1720 and planted the seeds for the new College. He too was an elder in the Dutch Reformed Church, and a layman. He was a lawyer, a member of the New Jersey Legislature, Attorney General for the State, United States Senator from 1829 to 1835, and candidate for Vice-President of the United States with Henry Clay in 1844. At the time of his selection as President of the College, Frelinghuysen was Chancellor of New York University.

When Frelinghuysen became President in 1850, there were 8 faculty members and 72 students in the College. The faculty members included the President, the three theology professors, a professor of mathematics and natural philosophy, a professor of chemistry and natural history, a professor of Greek and Latin, and a professor of modern

[5]Demarest, *A History of Rutgers College*, 278-298.
[6]Demarest, *A History of Rutgers College*, 336; *Rutgers College Catalogue*, 1841.

languages. In his inaugural address at the annual commencement in 1850, Frelinghuysen made a plea to continue the study of Greek and Latin, and he indicated his support for teaching mathematics, astronomy, and chemistry. However, he made it clear that, in his mind, "the whole circle of the natural sciences, tends to confirm the revelations of the Scriptures, and demonstrates that the Author of nature is the Author of the Bible."[7]

This period marked a significant evolution in the role of the Dutch Reformed Church in the operation of Rutgers College. In 1839 and 1840 the Covenant with the General Synod of the Dutch Reformed Church was again revised. The Trustees of the College increased their authority to run the College. They were guaranteed rights to use the Old Queen's Building, and it was agreed that the Synod would not sell or lease the building without the consent of the Trustees. It was further agreed that the President of the College would no longer be one of the theology professors, and that the theology professors would no longer be in the College Faculty, although they would continue to help with the teaching.[8]

Evolution of Science and Mathematics in the Rutgers College Curriculum

When the College reopened in 1825, Old Queen's was unfinished. The College library consisted of a few old books in Dutch, and the "philosophical apparatus" consisted of a large spyglass, which could hardly be called a telescope. The Trustees realized the importance of providing "philosophical apparatus" for the College, and in 1826 they appointed a committee to obtain two globes and other necessary apparatus. In 1827 Dr. David Hosak gave $1,000 for this apparatus, and from the funds raised by the lottery, the Trustees allocated $750 for the purchase of a telescope. At the time, this telescope was "said to be the largest in the United States." It was later replaced by a larger instrument.[9]

When the College reopened, there were three terms of instruction, concentrated on the classics, mathematics, and the several branches of

---

[7]Demarest, *A History of Rutgers College*, 360-363, 391; Vittum, Henry Earl. *The Development of the Curriculum of Rutgers College, 36*; *Rutgers College Catalogue, 1850-51*.

[8]Demarest, *A History of Rutgers College*, 331, 404, 405; McCormick, *Rutgers: A Bicentennial History*, 56.

[9]Lukac, *Aloud to Alma Mater*, 31, 41; Demarest, *A History of Rutgers College*, 293.

philosophy. All students took the same classes. Latin and Greek were studied in all four years. In addition to the classical subjects, the freshmen studied Hassler's *Arithmetic*, Bonnycastle's *Algebra*, and Woodbridge's *Geography*. The sophomores used Day's *Mathematics* for instruction in trigonometry and navigation, and the juniors studied Young's *Analytical Geometry* and *Differential Calculus*. The students learned physics from Cavallo's *Natural Philosophy*, during three terms of the junior and senior years. In 1834-35 mathematics instruction included differential and integral calculus, and in 1840-41 one term of spherical trigonometry & spherical astronomy was taught in the junior year. In 1858-59 astronomy was taught from Lardner's *Philosophy*.[10]

The physics textbook was *The Elements of Natural or Experimental Philosophy* by Tiberius Cavallo. In four volumes, the book was originally printed in London in 1803. Volume One included a treatment of Newton's laws of motion that was quite similar to what would be found in a present-day textbook. Volume Two included topics on hydrostatics, fluids in motion, waves, sound, music, and chemistry. Volume Three presented the "caloric" theory of heat, with the First Law of Thermodynamics, nature of light, lenses and optical instruments, electrostatics, and magnetism. Volume Four covered various topics in astronomy, including Kepler's Laws, universal gravitational attraction, phases of the moon, comets, fixed stars, and astronomical instruments.[11]

In 1827 Robert Adrain left the College for the second time to become Professor of Mathematics at the University of Pennsylvania. In 1828 he became Vice-Provost of the University. Although one of the finest mathematicians in the United States, Adrain was asked to resign in 1834, when he had serious problems of discipline in his classes at Pennslvania. It seems that he was often irritable in the classroom. He returned to New Brunswick to private tutoring, then to New York where he taught in the Grammar School attached to Columbia College. In 1840 he retired, returned again to New Brunswick, where he died in 1843.[12]

---

[10]McCormick, *Rutgers: A Bicentennial History*, 42; *Rutgers Catalogues* 1829-59.
[11]Cavallo, *The Elements of Natural or Experimental Philosophy*.
[12]"Robert Adrain", Web page of School of Mathematics and Statistics, Univ. of St Andrews, Scotland.

Theodore Strong (1827-1859)

When Adrain left Rutgers College in 1827, Theodore Strong was appointed Professor of Mathematics and Natural Philosophy. He remained at the College until he retired in 1861.

Figure 7 Theodore Strong

Strong was born in South Hadley, Massachusetts, July 26, 1790. He graduated from Yale College in 1812, taking the prize in mathematics. After graduation he went to Hamilton College, and was Tutor there for four years He then served for eleven years as Hamilton College's first Professor of Mathematics and Natural Philosophy. While at Hamilton he continued his interest in mathematics. Among other things, he studied the famous *General Theorems* of geometry (1746), written by Matthew Stewart of the University of Edinburgh. He succeeded in demonstrating one of the theorems relating to a circle. This work was praised by Jeremiah Day, Strong's mathematics professor at Yale, and was published in the *Memoirs of the Connecticut Academy*. He published other work, including a geometrical demonstration of the values of the sines and cosines of the sum and difference of two arcs. This work was published in the first volume of Silliman's *American Journal of Science* in 1818. Strong studied the works of Newton, Lagrange, Laplace, Poisson, and the other great European mathematicians. He became acquainted with the most eminent American men in pure science of the time, including

Nathaniel Bowditch, who translated Laplace's *Celestial Mechanics*, and Robert Adrain, who preceeded him at Rutgers. He was active in mathematical research and an especially able teacher. In 1825 he turned down offers of the Chair of Mathematics at Queen's College, Columbia College, and the University of Pennsylvania. Then in December 1827 he accepted a second invitation to go to Rutgers College after Adrain went to the University of Pennsylvania.[13]

Between 1818 and 1845 Strong published twenty-two papers in Silliman's *American Journal of Science*. He published a number of other papers in the *Scientific Journal of New York* and elsewhere. One of his papers was a systematic discussion of the laws regulating the action of a central force on a system of bodies. His papers on celestial mechanics were characterized by their originality, and threw light on points that were left obscure by other authors. In pure mathematical science, he was a giant, and he had a strong influence on at least two outstanding students. Strong's students included George W. Coakley, class of 1836, and George William Hill, class of 1859.[14]

George Coakley studied law, medicine, and theology after graduating from Rutgers. While engaged in post-graduate work he wrote for Dr. Gill's mathematical journal. As a result of his publications in the journal he was appointed Professor of Mathematics and Astronomy at St. James College, Indiana. After seventeen years in Indiana, he became Professor of Mathematics and Astronomy at New York University in 1860, filling the chair left vacant when Loomis went to Yale. Coakley held the position at NYU until his death in 1893. His research for some years focused on the motion of comets, the origin of meteoric bodies, and the nature of Saturn's rings.[15]

George William Hill may well have been the most famous graduate of Rutgers in science. He came to Rutgers in 1855, where Theodore Strong took a liking to him. Hill was interested in celestial mechanics, the motions of planets. At that time it was rare to have a student interested in mathematical astronomy, and he was far ahead of the other students in his class. Hill had access to Strong's extensive library, where he saw a copy of

---

[13]Bradley, *Memoir of Theodore Strong*, 3-14.
[14]Ibid., 3-14.
[15]*The Rutgers Targum*, November 22, 1893.

Laplace's *Mechanique Celeste*. Under Strong's guidance, Hill read books by the leading mathematicians and astronomers, such as Lacroix, Poisson, Pontecoulant, Laplace, Legendre, and many others. Hill later observed that Strong frequently referred to Euler as "our great master," but that Strong scarcely had a book in his library published after 1840.[16]

Before graduation, Hill began independent astronomical research, and shortly after graduation he won first prize for his essay, "On the Conformation of the Earth", which was published in *Runkles Monthly* in 1861.[17] This was his third publication, the first of which was published while he was a senior. In his prize essay he attempted to extend Laplace's investigation of the form of the earth. After graduation from Rutgers in 1859, he took a position in the Nautical Almanac Office in Cambridge, Massachusetts. In 1867 the Office moved to Washington, D.C., where it came under the more immediate jurisdiction of the Navy Department. In Washington, Hill wrote his very famous paper, "Theory and Tables of Jupiter and Saturn", which took 14 years to write. His ability and fame were first shown in his "Researches in the Lunar Theory", which appeared in 1878 in the *American Journal of Mathematics*. In that paper he calculated, by a new method, the motion of the moon under the attraction of the earth and the sun. In 1895 he gave the Presidential Address on celestial mechanics before the American Mathematical Society. In 1898 he took a position at Columbia University.[18]

Hill came to be considered the greatest celestial mathematician in the world at that time. He was called a genius by many of the best scholars in American and abroad. For his many achievements in mathematical astronomy he was the recipient of three gold medals, two monetary prizes, and a bronze tablet in Rome. On the 50th anniversary of his graduation from Rutgers, the Royal Society of England awarded Hill its Copley Medal, the highest scientific honor of the British Empire. Previous winners of the medal were Benjamin Franklin, Joseph Priestley, Sir Humphrey Davey, Charles Darwin, Louis Pasteur, and Herman von Helmholtz. A complete collection of Hill's works was published in four

[16]Olsen, "George William Hill".
[17]Hill, "On the Conformation of the Earth", *Runkle's Mathematical Monthly*, III, 166-182, 1861.
[18]Olsen, "George William Hill".

volumes by the Carnegie Institute of Washington.[19] Towards the end of his life, Hill honored Professor Strong by saying that Strong had given him great stimulus for his mathematical work. In more recent times, Rutgers honored Hill by naming its Mathematics Building after him.[20]

The College gave attention to other areas of science, beginning with chemistry. The appointment of a professor of chemistry was proposed as early as 1813, but funds were not available for such an appointment. In 1816 a series of extension lectures in chemistry was given to the public by Henry B. Poole, a graduate of the class of 1813, and by John J. Barker. This was the beginning of "extension education" at Rutgers. It would later become an important part of the University's mission. In 1826 the Trustees authorized a Mr. Finch to give a course of lectures in chemistry in one of the rooms of the college, a course that was open to both students and townspeople. In 1829 a proposal was made to the Trustees for a regular course of lectures in geology, mineralogy, and chemistry, to be added to the regular curriculum. The Trustees then appointed, in October 1830, Lewis Caleb Beck as Professor of Chemistry and Natural History (biology). Beck wrote extensively on scientific subjects, especially mineralogy and chemistry, and was viewed as a pioneer and pathfinder in the modern teaching of natural science. He kept pace with the new investigations of his time, and he studied electricity. He had several miles of brass wire run around his lecture room for the transmission of electrical signals before the electric telegraph was announced. He developed a valuable collection of minerals, which was left to the College at his death. Chemistry gradually assumed an increasingly more important part of the curriculum. By 1841 chemistry, geology, and mineralogy were listed in the *College Catalogue* as separate subjects. Dr. Beck taught chemistry at the College, with some slight intermission in the 1830s, until his death in 1853.[21]

With the expansion of the College, especially in the sciences, there was no longer space in Old Queen's for all the work of the College. The Grammar School moved into a new building in 1830, and the President

---

[19]Hill, *The Collected Mathematical Works of George William Hill*, 1905.
[20]*The Sunday Times, New Brunswick, NJ*, January 29, 1939; Demarest, *A History of Rutgers College*, 286, 375, 376, 384.
[21]*Rutgers Catalogue* 1840-41; Demarest, *A History of Rutgers College*, 226, 292, 303, 304.

moved into a house built for him adjacent to Old Queen's in 1843. In 1848 Van Nest Hall was completed, the third college building on the Queen's Campus.. Two rooms on the first floor were made available to the literary societies, and the remainder of the two-story building was used for the museum and the chemical laboratory of Professor Beck.[22]

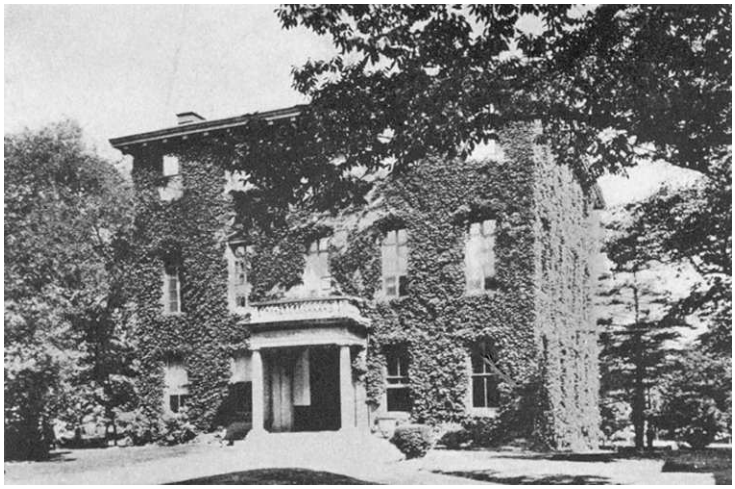

Figure 8 Van Nest Hall

In 1854, the Trustees came to express dissatisfaction with the teaching of Theodore Strong, who had served as Professor of Mathematics and Natural Philosophy since 1827. It was said that he had long neglected instruction in geography and he was ordered to resume instruction in that area. In 1859 the Trustees informed Strong that, although the Board recognized his high scholarly accomplishments, "yet circumstances have compelled us painfully to feel that a change that shall bring more youthful energies to the service of the Institution has become imperatively necessary." Strong appealed the decision of the Trustees, arguing that it was unjustified, but their decision prevailed. He was permitted to remain for two more years at reduced salary. During that period he held the title of Senior Professor of Mathematics and taught only the seniors. He became Professor Emeritus in 1861, and in 1863 severed his connection with the College entirely. Although being criticized for his teaching in 1859,

[22]McCormick, *Rutgers: A Bicentennial History*, 67.

Strong published a treatise on elementary and higher algebra that year, a work remarkable for its originality. In 1867 he wrote a textbook on differential and integral calculus, which was not published until after his death in 1869.[23]

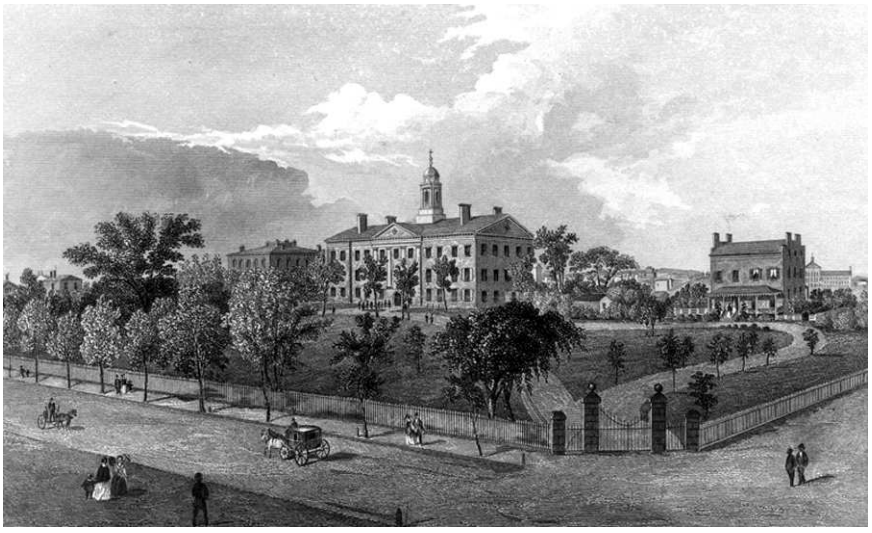

Figure 9 College Campus, 1849

[23]Demarest, *A History of Rutgers College*, 384; McCormick, *Rutgers: A Bicentennial History*, 72; Bradley, *Memoir of Theodore Strong*, 14; *Rutgers College Catalogue*, 1860-61.