

Notes from the Oesper Collections

Elijah Slack

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Chemistry Enters the American College

Although most academic chemical education prior to the 1830's was connected in some fashion with the teaching of medicine and pharmacy, a second academic route had also gradually evolved within the traditional arts and sciences curriculum. This involved a progressive expansion of the Professorship of Mathematics, which had been an integral part of the university structure since the Middle Ages. By the 16th century, the responsibilities of this professor frequently included the teaching of astronomy and mechanics and, by the end of the 17th century, virtually all of the other branches of natural philosophy (i.e., physics) as well, including optics, hydrostatics, electrical phenomena and, in some cases, the rudimentary facts of chemistry. Thus, I. Bernard Cohen has uncovered a tradition of teaching chemistry as a branch of natural philosophy at Harvard that extends back to 1687 and which predates by almost a century the appointment of Aaron Dexter as the first Professor of Chemistry and *Materia Medica* within the Harvard Medical School in 1783 (1).

By the end of the 18th and the first decades of the 19th century, the inclusion of chemistry was often made explicit by specifying the position as a Professorship in Mathematics, Natural Philosophy and Chemistry – the first known example in the United States being the appointment of Scottish-born John Maclean (figure 1) to such a chair at Princeton in 1795 (2). Trained in the medical-chemical tradition under Joseph Black at Glasgow and Edinburgh, Maclean was an early advocate of Lavoisier's new antiphlogistic chemistry and engaged in an important debate on the new chemistry with the aged Joseph Priestley shortly after the latter's immigration to Pennsylvania in 1794 (3, 4).

Multiple appointments of this type continued to be common within American colleges, academies and high schools until the 1870's, when the increasing demand for science courses and the availability of professionally trained chemists gradually led to the separation of the chemistry component. This route into academic chemistry is also illustrated by the life and career of Elijah Slack, who was not only Maclean's successor at Princeton but, as far as we know, the first Professor of Chemistry in Cincinnati.

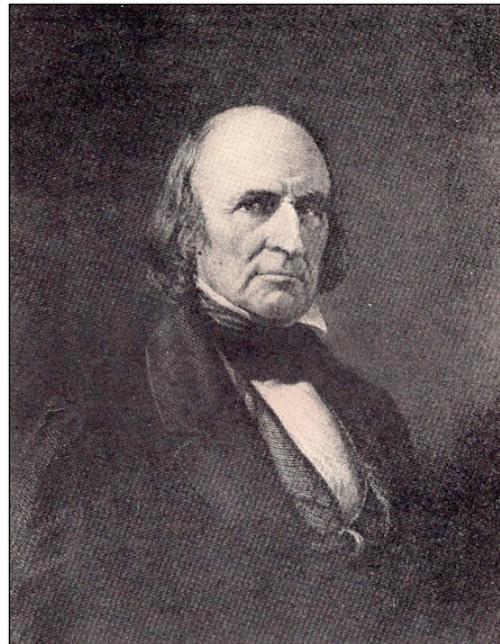


Figure 1. John Maclean (1771-1814). Slack's instructor in chemistry and his predecessor as Professor of Mathematics, Natural Philosophy and Chemistry at Princeton.

Birth and Early Education

Slack (figure 2) was born on 24 November 1784 in lower Wakefield Township, Bucks County, Pennsylvania, about 30 miles north of Philadelphia. He was descended, on his father's side, from a Dutchman by the name of Cornatisen Sleight, who had emigrated from Leiden to New York sometime around 1662, and, on his mother's side, from an Irish family from Belfast by the name of Torbert (5).

In later years Slack reported that, though he had always been "fond of study," he had received only a rudimentary "country education" as a boy. However, his conversion to Presbyterianism in 1801, at the age of 17, awakened in him a desire to become a minister and launched him on a program of adult education. After first studying Latin for a year under his local pastor, Slack proceeded to correct the deficiencies of his elementary education by attending the Trenton, New Jersey, Grammar School, from which he graduated three



Figure 2. A pencil sketch of Elijah Slack (1784-1866) at age 35 done by James Audubon for Western Museum of Cincinnati on 11 July of 1820. The significance of the tassels on Slack's coat are unknown.

years later (1805) at what was, for the time, the rather advanced age of 21! The same year he entered Princeton College (then the College of New Jersey), where he not only received recognition for his outstanding scholarship in mathematics and science, but the dubious distinction of having been, in the words of one of Princeton's official historians, "probably the oldest member of his class" – hardly an overstatement for a time when the Princeton undergraduate was somewhere between the ages of 14 and 15 (6, 7).

Vice-President of Princeton College

After receiving his BA in 1808, Slack served as Principal of the Trenton Male and Female Classical Academy for the next three years, while simultaneously continuing his theological studies at Princeton. In the Fall of 1811 he received an MA degree, as well as his long-coveted ministerial license and, in the following year was suddenly appointed, at age 28, as Maclean's successor as Professor of Mathematics, Natural Philosophy and Chemistry at Princeton College and as the school's first Vice-President. This change in status brought with it an annual salary of \$1000 and the use of a house, and allowed Slack to marry Sophia Leake (figure 3), the daughter of a local Trenton Jurist (8). However, in order to fully understand both the nature

of and the reasons for Slack's appointment at Princeton, as well as the reasons for his subsequent departure for Cincinnati, it is necessary to first say something about the general state of university education in the United States at this time.

By the end of the colonial period there were nine colleges in the United States and, with the exception of the University of Pennsylvania, all of them had been founded by various religious denominations, usually for the explicit purpose of training their own clergy. As President Clap of Yale put it in 1754, "Colleges are Societies of ministers, for training up Persons for the Work of the Ministry" and exist in order that churches might "educate Ministers in our own Way" (9). However, by the first decade of the 19th century an increasing percentage of the student body was entering with the intent of pursuing careers in the fields of law and business instead and was becoming increasingly discontent with the rigid discipline and pervasive religiosity thought proper for the training of clergy. This was further exacerbated by a general climate of questioning traditional authority which followed in the wake of the American War of Independence. The result was several decades of student unrest and riots, which were particularly severe at Princeton, where the religious prerogatives of the school were still closely guarded by the Presbyterian clergy who dominated its Board of Trustees.



Figure 3. A pencil sketch of Sophia Slack (né Leake) done by John Audubon for the Western Museum of Cincinnati in 1820 as a companion to the sketch of Elijah Slack shown in figure 2.

Beginning with minor infractions, such as showing disrespect in chapel, burning stink bombs in Nassau Hall and rolling cannon balls down the hallways at night, the student unrest finally erupted during Slack's undergraduate years in the "Great Rebellion of 1807" (7). This started with the dismissal of three students accused of frequenting taverns, bringing strong liquor into the college and showing insolence towards the tutors and professors. The next day the student body presented a petition to President Samuel Smith, declaring that their dismissals were unjust and demanding that the faculty apologize for their denunciations. Appalled, the faculty convened the student body in the Prayer Hall and demanded, in turn, that the students remove their names from the petition or face suspension. In response, 125 of the 160 or so students rushed from the hall and barricaded themselves in Nassau Hall, which they then proceeded to dismantle. When armed men from the village failed to dislodge the students, Smith finally closed the school.

By 1812 the Board of Trustees had had enough of the ungodliness at Princeton. President Smith was forced into retirement and Maclean was dismissed for being too lenient towards the students. In their place the Trustees appointed Ashbel Green, one of Smith's most outspoken critics, as president and Slack as Maclean's successor and Vice-President. In explaining the selection of Slack to Green, the board described Slack as being "pious, prudent and highly respectable, and as one of the best mathematicians and natural philosophers in the country," though a later history of Princeton came closer, although euphemistically so, to the truth when it explained his appointment as a bit of good luck, since "it was not an easy matter to find a preacher qualified for such a chair [i.e. to teach science]" (6). For in truth, Slack's scientific reputation was in no way even remotely equal to that of Maclean and it was Slack's clerical, rather than his scientific credentials, that were of greatest concern to the Trustees. The real reason for the creation of the new posi-

tion of Vice-President was to provide for a college officer who was to explicitly take charge of student discipline and "purge the school of the irreligious in order to again fill it with pious youths and make it a scene of religious revivals," and not surprisingly, the first and primary justification of the new position was that the occupant had to a qualified Minister of the Presbyterian Church.

Though in later years Slack would claim that Princeton had "prospered" during his tenure and that "a revival of religion was experienced" during which "45 young men of the college class were converted to God," the actual truth appears to be otherwise. The student unrest continued unabated and, though a revival did sweep through the College in the Winter of 1814-1815, it had dissipated by Fall. Indeed, the situation eventually became so bad that Princeton historian, Thomas Jefferson Wertenbaker, would retrospectively characterize the reign of Green and Slack as "Princeton's Nadir" (7).

During the 1813-1814 academic year, exploding fire crackers became the favorite expression of student discontent, culminating in the "big cracker" of 9 January 1814 (7). This consisted of a hollow log packed with two pounds of gunpowder which was set off behind the central door of Nassau Hall. The resulting explosion cracked the adjacent walls from top to bottom, blew out most of the windows and hurled a fragment of the log through the door of the Prayer Hall. In January of 1817, the students, after deciding that their reading assignments were too long, proceeded to nail shut all of the entrances and windows to Nassau Hall, along with the doors to the rooms of the tutors and the religious students. They then rushed to the top floor, yelling "Rebellion and Fire," broke out the upper windows, and proceeded to ring the bell incessantly. Slack, noticing that they had failed to secure a basement window, broke out several panes, crawled through and ran upstairs, where one of the rioters threw a flint glass decanter at his head. Nonselective punishment of the students followed which, in turn, induced yet a second riot a few days later, during which Slack was caught by the students "stalking up and down on the first floor of Nassau Hall with a club in his hands" and was ignominiously driven from the building (7).

The Move to Cincinnati

It was unofficial criticism of his "undignified antics" during the riots of 1817 by certain of the College Trustees which finally induced Slack to tender his resignation and move to Cincinnati at the end of the Summer term in order to take charge of the city's newly organized Lancasterian Seminary (10). This was a combina-

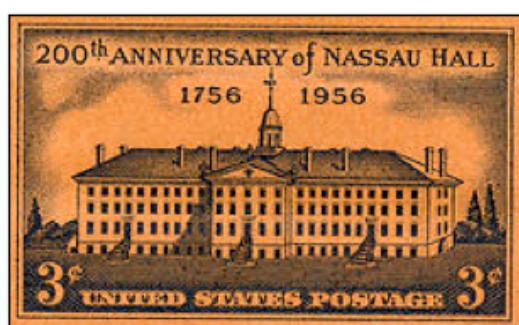


Figure 4. Nassau Hall where Slack taught chemistry from 1812-1817.

tion elementary-secondary school, with segregated male and female departments, based on the principles of the English educational reformer, Joseph Lancaster. The central feature of Lancaster's proposals was the use of a monitorial system of instruction in which the older and more mature students were used as monitors or assistants to teach specific lessons to the less advanced students. The advantage of the system, which was in vogue in the United States from about 1810 to 1830, was that it allowed two or three faculty to manage a school containing several hundred students (9).

In the Fall of 1817 Slack also offered the first set of public lectures on natural philosophy and chemistry to be given in Cincinnati, using his own set of apparatus, which he had brought with him from the East for use in his new school. Naturally, the appearance in Cincinnati of a former Vice President of Princeton did not go unnoticed in certain circles and, within a year of his arrival, Slack would find himself deeply immersed in the cultural and education schemes of the ever ubiquitous Daniel Drake (figure 4).

The first of these involved a radical expansion of the original scope of the Lancasterian Seminary, whereby it would, in effect, become the preparatory department for an advanced school, sharing the same building (figure 5), and known as Cincinnati College (11-12). Organized in 1818, with Slack as President and Professor of Mathematics, Natural Philosophy, Chemistry and Mineralogy, Thomas Osborn as Profes-

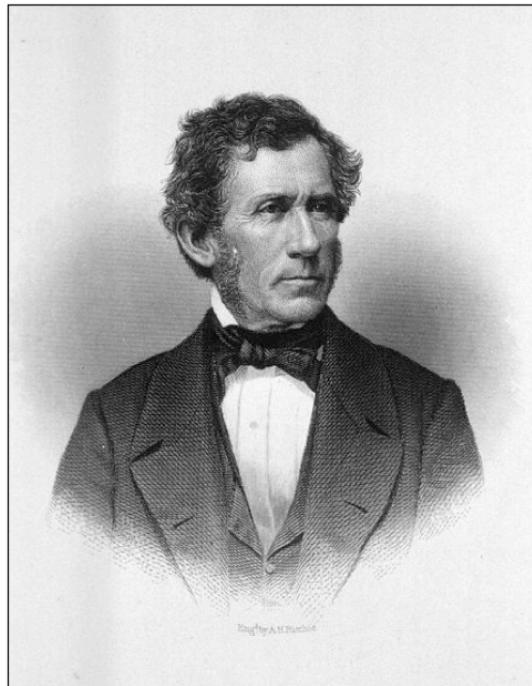


Figure 4. Daniel Drake (1785-1852).

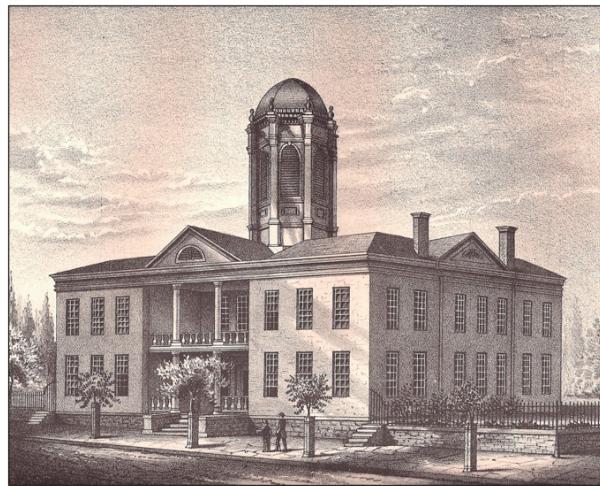


Figure 5. Cincinnati College. Located at the corner of Walnut and Fourth Streets, the building was built for the Lancasterian Seminary in 1815 and further enlarged for the College in 1819. It consisted of two wings, one for male and one for female instruction, connected by a central set of hallways and stairwells and a central dome which was originally intended to house an astronomical observatory but was never outfitted. The building was destroyed by fire in 1845. Slack taught chemistry in this building from 1817-1825.

sor of Languages, and David Taylor as the Tutor, it was chartered by the State on 22 January 1819 and officially opened its doors in November of the same year. An announcement in the local paper, *The Liberty Hall*, indicated that the college would house a chapel, a library, a museum, and a laboratory, as well as the usual classrooms for recitations, the library in question being the recently organized city library, and the laboratory consisting of Slack's personal "philosophical and chemical apparatus," which the paper described in glowing terms as "so extensive and perfect as to leave scarcely a desideratum" (13).

The museum in question represented yet a second of Drake's schemes and was officially known as the Western Museum Society (14-17). Also organized in 1818, with Drake, Slack, James Findlay, Jesse Embree, and William Steele as its officers, it began to officially meet in July of 1819. That year Drake hired Robert Best and John Audubon to prepare the collections and displays, which were finally opened in the College building in June of the following year and included samples of metals, minerals, fossils, indigenous and extinct animals, and local Indian artifacts. Indeed, we owe our only known portrait of Slack to Audubon's brief connection with the museum (recall figure 2). In addition to its displays, the museum also sponsored popular public lectures on science by both Drake and Slack.

Unfortunately, Drake overestimated the cultural appetite of what was essentially still a frontier river town and also failed to provide his ventures with a properly endowed financial base, in large part because the financial depressions of 1819 and 1822 resulted in many of the subscribers to the college and museum reneging on their obligations (18). Despite growing debts, both institutions continued to struggle on for a number of years. Slack resigned as President of the College in 1822, but his successor, Philander Chase, was so overwhelmed by his duties that Slack had to step in again after a year and, as Vice President, he managed to keep the school afloat until 1825. That year a contractual error involving the "College Aid Fund" robbed the school of its remaining financial base and Slack and the faculty "resigned and sent their students [amounting to about 380] to other institutions." Most of these pupils were in the Lancasterian preparatory department, which had averaged about 400 pupils a year, whereas the College had averaged around 60. For the next decade or so the College building was rented to various societies. In 1832 it served as a cholera hospital and at one point was even used as a combination stable and hog shed (12).

A similar fate overtook the museum, which by 1823 could boast of owning 100 mammoth and arctic elephant bones, 50 megalonyx bones, 33 quadrupeds, 500 birds, 200 fishes, 5,000 invertebrates, 1,000 fossils, 3,500 minerals, 325 botanical specimens, 3,125 medals, coins and tokens, 150 Egyptian and 215 Indian artifacts, 112 microscopic designs, several views of American scenery and buildings, about 500 specimens of fine art, an elephant "organ" [i.e. penis] and the head of a South Sea Island Chieftain "preserved and beautifully tattooed by the Cannibals of New Zealand." Upon the collapse of the College in 1825, the museum was given to Joseph Dorfeuille, "a wandering French naturalist and showman of uncertain antecedents," who moved it into a building on the northwest corner of Second and Main Streets by the Public Landing. By the time Mrs. Trollope saw it in 1829, it had taken on a definite P. T. Barnum aura, its scientific displays being overshadowed by its waxwork "Chamber of Horrors" and by a carnival-like display of mechanical monsters designed by Hiram Powers and known as "Dorfeuille's Hell or the Infernal Regions." The star attraction of the Chamber of Horrors, in addition to its collection of famous murder weapons and waxwork reenactments of various crimes, was the actual head of a murderer named Hoover "swollen and distorted in a huge glass of alcohol"(14-17).

Unlike the college and museum, the third of Drake's ventures involving Slack would survive, though its history would be one of continuous political

upheaval. This was the Medical College of Ohio (19). Initiated, like the other schemes, in 1818 with a series of public lectures by Drake and Slack, it was chartered in January of the following year with Slack as Registrar, Treasurer and Professor of Chemistry, and opened its doors to its first class in November of 1820. However, two years later Slack and Jesse Smith, the Professor of Anatomy and Surgery, voted to eject Drake from the school for "intrigues against certain professors," an action which would have grave consequences for Slack when Drake finally launched his infamous "War of Extermination" against the College in 1830. This began when Drake arranged to set up a rival medical school in connection with Miami University in Oxford, Ohio, and proceeded to import an appropriate faculty from Philadelphia. To prevent this, the Trustees of the Medical College agreed to remove Drake's enemies from the faculty and to replace them with Drake and his imported colleagues. Thus, at the end of the 1830-1831 session, after 12 years of service, Slack was "retired" from his Professorship in the Medical College of Ohio and replaced by Drake's candidate, Thomas Duche Mitchell.

Within two years, however, Drake resigned his chair in the Medical College and attempted to launch yet a second rival school, this time in connection with the revived Cincinnati College. In 1834 a new law school was started under the provisions of the College's original charter, an event which inspired Drake to organize a medical department the next year. This was followed, in turn, by a revival of the Academic Department in 1836 under the leadership of William McGuffey. However, the old problem of an inadequate endowment again returned to haunt the school, forcing the Medical Department to close in 1839 and the Academic Department in 1846, after the original College building was finally destroyed by fire in January of the previous year. Only the law school would survive (12).

Slack was totally excluded from these events and the Professorship of Chemistry in the Academic Department was given instead to James B. Rogers, who was also Drake's choice for the Professorship of Chemistry in the Medical Department. Apparently, the insult of being snubbed by the institution for which he had made so many sacrifices proved too much for Slack, as he left Cincinnati in 1837 to start a private high school for girls in Brownsville, Tennessee, and later taught at various secondary schools in Alabama (20). In 1844 he returned to Cincinnati, where he supported himself by teaching private classes in chemistry and the other sciences. He also gave lectures on chemistry at the Ohio College of Dental Surgery during the 1846-1847 session and at the Cincinnati College of Medicine and Surgery during the 1852-1853 session,

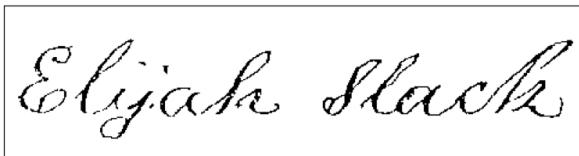


Figure 6. Slack's signature in old age.

though by this time he was a “venerable septuagenarian with a wealth of flowing white hair” (3). Since he was also a licensed Presbyterian Minister and was active in various congregations throughout the Cincinnati area, he may also have derived supplementary income from his religious activities.

In later years Slack received an honorary MD degree from the Medical College of Ohio and an honorary LLD degree from Princeton (1863). One of the streets in Liberty Hill (Slack Street) is also named in his honor. He died in Cincinnati on 29 May 1866 at the age of 81.

Activities as a Lecturer and Educator

Slack’s scientific education must have largely been the result of self-study, since, at the time, Princeton offered only a year of chemistry, mechanics, and natural philosophy, and the study of all three topics was reserved for the senior term (6). Even then the instruction was, at best, intermittent – at least if we are to judge from the correspondence between Slack’s teacher and predecessor, John Maclean, and Benjamin Silliman, the first Professor of Chemistry at Yale (21). In 1802 Maclean’s laboratory equipment (newly purchased in London by President Smith) was destroyed in a fire that gutted Nassau Hall and, as late as 1804, he reported to Silliman that he was “unable to make any experiments of consequence” since his new laboratory was still not completed. In 1810 he confessed that his chemistry was getting rusty since, “owing to certain circumstances in our College, I have paid no attention to it for 18 months.” However, for the curious, some idea of the kind of chemistry course which Slack must have taken from Maclean can be had from the set of notes for Maclean’s lectures taken by John Howard Jr. in 1806. These are summarized in an article by William Foster and are still preserved in the Princeton archives (22).

In all probability, Slack continued to maintain the same curriculum after succeeding Maclean in 1812, though the large degree of student unrest during Slack’s tenure must have increased its sporadic nature. Indeed, the only hint we have of Slack’s scientific activities during this period comes from President Green’s report on the dysentery epidemic which swept through the college in 1813 and his acknowledgement

that Slack had prepared a “chemical fumigant” for Nassau Hall from a recipe in a foreign scientific journal “which had a most wonderful, speedy and happy effect in purifying the atmosphere” (7). Too bad Slack hadn’t applied his chemical skills to fumigate and purify Nassau Hall of rioters during the student unrest. If so, his career at Princeton might have had a happier ending. As it was, the Board, after receiving his resignation, voted him \$300 and thanked him for “arranging and preserving the articles in Philosophical Hall and in the Cabinet of Natural History” (6).

As previously noted, upon leaving Princeton for his new position as President of the Lancasterian Seminary in Cincinnati, Slack brought with him a complete set of apparatus for the teaching of chemistry and natural philosophy. Probably purchased in Philadelphia, this equipment was installed in the “philosophical hall” of Cincinnati College, a room, 25 square feet in size and illuminated by a skylight, which was located in the center of the second floor of the College Building on Walnut Street (11). Unfortunately, as reported by the local paper of 27 April 1819, this apparatus soon met an ignoble fate when (23):

..... *some diabolical Enemy of the human race, actuated by a spirit of malignity scarcely paralleled in the annals of civilized society, forcibly entered the Cincinnati College on Sunday night and, after soiling the leaves of the books of the students with ink, proceeded to demolish the philosophical apparatus of President Slack. The perpetrator of this diabolical deed of vandalism has not yet been discovered.*

Given our knowledge of how much Slack must have endeared himself to countless students during the riots at Princeton, we can only surmise that Slack wasn’t the only disgruntled Princetonian to seek greener pastures in the western frontier of Cincinnati in 1817.

From its organization in 1818 until 1826, the Medical College of Ohio met in various rented rooms throughout the city and, doubtlessly, in order to avoid the inconvenience of having to transport laboratory equipment, had its chemistry lectures in Slack’s lecture hall at Cincinnati College. In 1826 the Medical College finally built a permanent building on 5th Street, between Race and Vine (figure 7). This building did sport a permanent chemical lecture hall which could accommodate between 300 and 400 students (24), the seats of which were “arranged in the form of a semi-decagon” and rose “in such a manner as to afford a distinct view from the most distant parts of the room” (25). The front of the room was also connected, via folding shutters, with a laboratory in which the Professor of Chemistry could prepare his lecture demonstra-

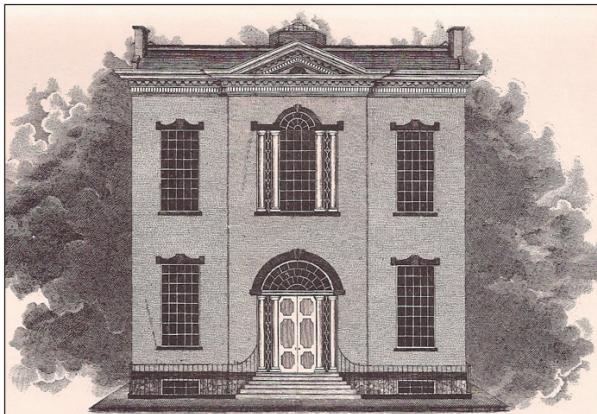


Figure 7. The Medical College of Ohio. Located on 5th Street between Race and Vine, Slack taught chemistry in this building from 1826-1831.

tions. Probably designed by Slack, this lecture hall was used by him for the next five years, until his forced retirement from the Medical College at the end of the 1830-1831 session.

Slack's philosophy of teaching was heavily influenced by his calling as a Presbyterian minister and, not untypical for the time, contained a heavily moralistic undertone. Like the school master in Dicken's *Bleak House*, he felt that the study of unadorned scientific fact, coupled with the moralistic interpretations of Paley's natural theology, was the best route to happiness – sentiments which he expressed in his lecture on "The Application of Principles to Practice in the Various Departments of Physical Science," given at the 4th Annual Meeting of the Western Literary Institute and College of Professional Teachers, held in Cincinnati in October of 1834 (26):

..... physical science, in her onward march of improvement, from her store-house, has been furnishing thousands of the most important items of practice, which not only adorn, but bless the human family. To this cause, above all others, is to be ascribed the rapid progress of civilized countries, in improvement and real wealth. Nothing, in connection with the above is required, but moral culture and genuine religious principles, to make mankind what the majority never have been – happy here – and prepared at death, for a happy eternity.

Hence, one can understand Slack's combination of the ministry with a career in science teaching.

Ever attuned to possible corrupting influences which might excite and inflame the imaginations of his students, he was quick to point out in his first public lecture on chemistry in 1818 that (27):

In a course of lectures on natural science you are not to expect those flowers of speech and embellishments of language which are essential to other departments of literature. The subject is not calculated to inflame the passions, but merely to interest and engage the understanding. In the investigation of nature we are concerned with the facts, which tho' every way important, yet are of such a character as to admit only of description in simple and perspicuous words. Our chief aims are, therefore, to make ourselves understood, leaving the importance of our matter to weigh against any deficiency in the figures of rhetoric.

Indeed, Slack's observations on the "noninflammability" of scientific prose were more than a disingenuous way of apologizing for his lecture style, as he was also violently opposed to the reading of popular novels and other forms of fiction (26):

My experiences ... lead me to say [that] the whole herd of novels exerts an injurious influence. Time is wasted, the imagination disturbed by pictures of visionary life, and the mind, of course, polluted and unfitted for the severe discipline of real science. Hence, disgust at study, and dissipation in practice, like the finger-board, points too frequently to the ruined novel-reader.

This question, like the watching of television and the playing of computer games today, seems to have pressed heavily upon the minds of educators in the 1830's and 1840's and, at the 6th Annual Meeting of the College of Professional Teachers, held in Cincinnati in October of 1836, they actually debated the question "Can the reading of fictitious compositions be rendered beneficial to students?" The majority report, headed by Alexander Kinmont, concluded that the answer was no, but made an exception for the classical mythology of Rome and Greece (28). The minority report, chaired by Slack, dissented from even this exception, maintaining that the reading of fiction in any form rendered the student "unfitted for the studies necessary to a substantial education" and recommended that local churches exercise some form of control over libraries and book stores (29).

Added to these puritanical tendencies was the fact that Slack also appears to have had a number of unattractive personality quirks. Thus Juettner, though admitting that Slack was "an honest, painstaking man, whose character was above reproach," had to further confess that "he was meddlesome, which is said to be a trait not infrequently found in gentlemen who wear the cloth" (5). Likewise, John Maclean Jr., in his history of Princeton, also admitted that, though Slack "was a good scholar and teacher, and a most faithful and up-

right man, fearless in discharging his duties," these traits did not always secure for him "the respect and esteem of the students" and that "his manners were not as attractive as they might have been"(6). In short, though Slack was able to command the respect of those who responded to his social position as a minister and educator, he was apparently unable to command respect on the basis of his personality alone.

Described as "short and dumpy" in appearance, Slack also carried his idiosyncrasies into the lecture hall. Thus Juettner reported that (5):

In his lectures and demonstrations he was scrupulously conscientious, but owing to his pedantic, deliberate and tiresome way of proceeding, did not appear to advantage in either the lecture room or laboratory. He was too diffuse in his lectures and his attempts to clarify often obscured the subject. He was lacking in dexterity, and for this reason, his experiments often failed.

This scenario is verified by others. Thus, Horine reported that one of the first squabbles in the newly founded Medical College centered around the firing of Slack's lecture assistant, Robert Best (1790-1830), since Slack, "jealous of the superior talents and dexterity of Best ... flatly refused to use him again" (17). Likewise, William S. Merrell (1798-1880), the future founder of Merrell Pharmaceuticals, who was at the time trying to manufacture lead pigments in downtown Cincinnati, reported in his diary of 18 November 1823 that (30):

This evening [I] commenced attending a course of chemical lectures delivered by President Slack of Cincinnati College. I do not expect to find him superior in this branch, but as I am about making chemistry my business, I think it best to improve every opportunity of increasing my knowledge of it.

Merrell further added that:

From the chemical lecture I went with Mr. Slack to the meeting of the Sabbath School Society of the First Presbyterian Church which was held in their vestry room. Joined the society and paid my subscription for a year ...

It should be noted that Merrell was really not entitled to be overly critical of Slack's laboratory skills, since he was also somewhat lacking in that department, as revealed several months later by his diary entry of 20-23 January 1824 (30):

Set up a little cast iron retort and made an experiment

on the manufacture of ammonia. Unacquainted with the abundance and quality of the peculiar fumes which [are the] same as disengaged in the combustion of animal substances and got my clothes so contaminated that I scarcely dared to appear in public for one or two days. And at the end of my preparation, in subliming my product, I raised the heat too high and chased all my ammonia out of my vessel and scattered it to the wind. Thus ended that experiment.

Without a doubt, however, the most amusing picture of Slack's behavior in the lecture hall is a story recounted by Jeuttner. After first noting that Slack "had absolutely no sense of humor" and that, consequently, "his awkwardness was constantly causing hilarity which, of course, he could not account for," Juettner related the incident of the hydrogen bladder, which

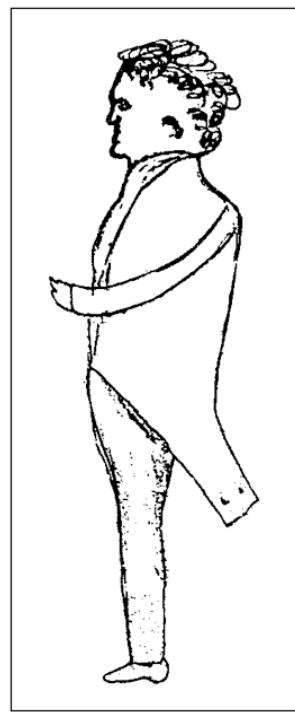


Figure 8. What is thought to be a caricature of Slack found inside a copy of the American edition of C. L. Berthollet's book, *Researches into the Laws of Chemical Affinity*, in which Berthollet first proposed the law of mass action. The book belonged to one D. Davenport of Cincinnati who purchased it in 1819. What Davenport was doing in the frontier town of Cincinnati with a copy of the latest advanced European treatise on theoretical chemistry is not known. About the only chemical activity in Cincinnati at the time was Slack's public lectures on chemistry and the drawing is not inconsistent with Slack's features. Davenport also left a succinct critique of Berthollet's book inside the front cover, where he scribbled, "This is an abstruse book."

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occurred during a public lecture before a mixed audience of both ladies and gentlemen. Attempting to show that the combustion of hydrogen in air produced water, Slack proceeded to fill a large pig's bladder with the gas, a device frequently used by chemists of the period to store gases, since rubber balloons were still impractical. However, before proceeding, he announced his intentions to the audience with the words, "Ladies and Gentlemen, I shall now fill my bladder and proceed to make water." This remark quite naturally "threw the assembly into hysterics," though poor humorless Slack "could not account for the commotion" (5).

Indeed, the local paper, lamenting the lack of proper theaters and entertainment in Cincinnati, went so far as to single out Slack's public lectures on chemistry for comment when complaining that the drab social life of the city currently provided (35):

... no other source of amusement and instruction than about twenty sermons a week – private assemblies – State cotillion parties – Saturday Night Clubs, and chemical lectures – which, like theague, return every third day with distressing regularity.

However, in spite of his personal foibles, Slack did have some progressive ideas about education. At a time when most students had no laboratory experience in their science courses, Slack argued for a direct hands-on approach (26):

How are experiments to be performed, so as to illustrate the principles and suggest the practice? Is the pupil to coldly witness them at a distance? Or is he to have the instruments placed directly in his hands, and the experiments repeated, say by himself, after the professor's manner? The latter course is unquestionably the best to ensure success. In mechanical philosophy, every instrument ought to be familiar in the hands of the pupil; and in chemical science, unless he witness the operation of every experiment, unless the laboratory be his constant resort, an entire defect will be seen in most of the fundamentals of a general education.

Likewise, in spite of his opposition to overly imaginative writing, Slack could write purple prose with the best of them if he wished, as seen in his later characterization of the progress of modern chemistry (26):

The foundations of this noble science are laid deep, and are daily growing more imposing under the hands of its practical and successful experimenters. A century ago, it was but a speck on the horizon of science. It now commands universal admiration. It is like a pure

fountain sending down to the valley its hundred rills, to fertilize and render desirable, the extended plain. No part of it can be touched without interest excited, and pleasure imparted. The very course of procedure, resolving bodies into simple elements and reconstructing them, in obedience to the great principles of affinity, strike the beholder with imposing effect.

But perhaps the most memorable of Slack's pronouncements was his evaluation of the chemistry textbooks of his day, a critique which will strike a familiar chord with every teacher who has ever been harassed by hordes of book salesmen peddling their textbook clones (26):

The majority of those who make books are mere copyists. In their rage to become authors, they seize on a well digested work, alter some of its essential features, too frequently for the worse, and send it forth with the favorable review of the interested, or book-sellers, to the no small annoyance of the scholar. In this way, both in the east and the west, books on science, have crept into colleges, which have no pretensions to originality, except in a defective arrangement. If authors write books, we expect something new, or where is the advantage to be gained? – None at all. The public mind is distracted, pupils are taxed most inordinately by inconsiderate professors, for those follies which belong to the book authors and professors, who, without a special knowledge of their contents, give such trash the credit of their names. I am persuaded that so much impropriety arises on this point, that it is high time a practical body of instructors should constitute a board of review, to expel from circulation a herd, which rather cripples than promotes education. I have known some works for a considerable time, the "laus deo" of theoretic and interested scholars, which were little suited to any situation, except the grocery counter, or the manure yard.

Activities as an Author

The evidence clearly indicates that Slack considered himself to be primarily an educator, rather than a practicing scientist and, in keeping with this characterization, he does not appear to have ever published in the scientific literature, though he did publish several lectures and reports in the educational literature (26, 29, 31). In addition, in 1828, he published a 25-page booklet for the students at the Medical College entitled, *A Key to the Technical Language and a Few Other Difficulties of Chemistry or Chemical Nomenclature, Together with A Concise View of the Doctrine of Definite Proportions and Equivalent Weights* (32). This was

followed in 1831 by *A Discourse on Agricultural Chemistry*, which was a reprint of a lecture given before the Hamilton County Agricultural Society in June of that year (33). In the *Chemical Nomenclature* (figure 9), Slack also mentioned his intention to publish a small *Treatise on Electricity* and a booklet on *Incompatibles and Poisons*, though no evidence can be found that he ever followed through with either plan.

Of these works, the *Chemical Nomenclature* is by far the most important and represents the first known work on chemistry to be written and published in Cincinnati. Though not a full length textbook, like Thomas Duche Mitchell's 1832 volume, it is, nevertheless, one of the last of a line of booklet-length chemical nomenclatures published in the United States (34). Designed to summarize Lavoisier's new chemistry and its accompanying nomenclature reforms for the beginning student, the first of these booklets was published by Samuel Latham Mitchill in 1794. This was followed by a work by Lyman Spaulding (1799), a second work by Mitchill (1801), and works by William Macneven (1821), James Cutbush (1821), Parker Cleveland (1826)

and, of course, by Slack (1828). The booklet shows that Slack kept up with the British textbook literature, as it incorporates the latest views of Gay Lussac, Davy, and Thomson on the nature of combustion and acids and quotes values of atomic weights from the textbooks of Ure, Brandt, Thomson, Paris and Henry.

A rare example of Slack's abilities as a chemist can be found in a lecture which he delivered before the Western Literary Institute in 1834, in which he offered some chemical speculations on the cause of the steam boat boiler explosions that were plaguing the Cincinnati waterfront at the time (26). These he attributed to the decomposition of the steam by the hot iron of the walls to produce an explosive mixture of hydrogen and oxygen in the boiler. Though he knew that hot iron would decompose steam into hydrogen and iron oxide, he was a bit vague about where the free oxygen came from. No demonstrations were used for the lecture – perhaps the incident of the hydrogen bladder was still on his mind.

In summarizing Slack, Juettner reflected that "in spite of his peculiarities, [he] was a very useful man" (5). Slack, himself, in a letter written to his nephew in 1846, chose to stress his work as a teacher, noting that "I have assisted in educating as many as anyone this side of the Allegheny Mountains – between eight and ten thousand young men and women." (8). But, ever true to the rhetoric of his religious beliefs, he couldn't resist qualifying his statement with the observation that, when all was said and done in this life, he had nonetheless been "an unprofitable servant."

References and Notes

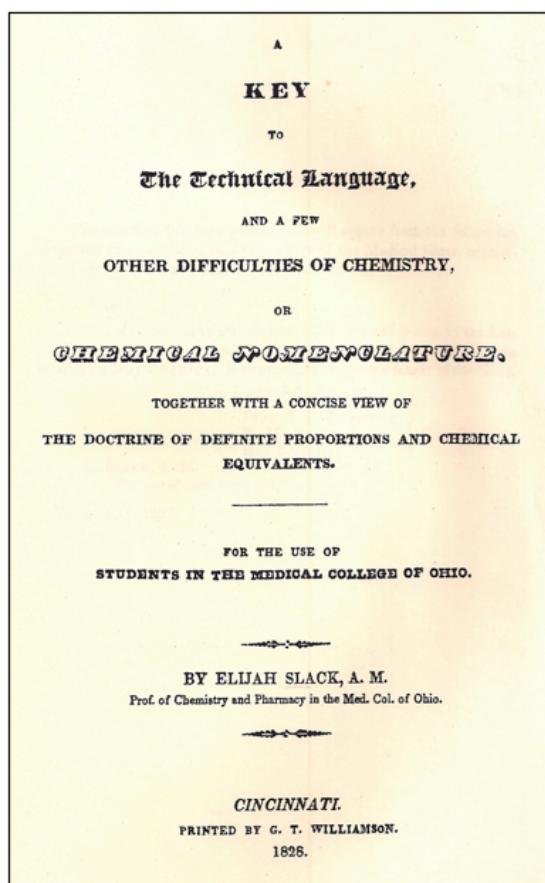


Figure 9. The title page of Slack's 1828 booklet on chemical nomenclature.

1. L. B. Cohen, "The Beginning of Chemical Instruction in America – A Brief Account of the Teaching of Chemistry at Harvard Prior to 1800," *Chymia*, **1950**, 3, 17.

2. J. Maclean Jr., *A Memoir of John Maclean, MD.*, Princeton, 1876. See also Maclean (6), Wertenbaker (7) and Foster (21-22).

3. S. Edelstein, "The Chemical Revolution in America from the Pages of the Medical Repository," *Chymia*, **1959**, 5, 155.

4. J. Maclean, *Two Lectures on Combustion*, Dobson: Philadelphia, PA, 1797, reprinted by Princeton University in 1924.

5. The following have proven useful in establishing the outlines of Slack's career: a) O. Jeuttner, *Daniel Drake and His Followers*, Harvey: Cincinnati, 1909, pp. 47-49; b) J. H. Brown, Ed., *The Twentieth Century Biographical Dictionary of Notable Americans*, Vol. 9, Biographical Society: Boston, 1904; c) "Elijah Slack" in Register of the Presbytery of Cincinnati, 1860, p. 22. Copy in the Cincinnati Historical Society.

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6. J. Maclean Jr., *History of the College of New Jersey*, Vol. 2, Lippincott: Philadelphia, 1877, pp. 9-13 (Maclean Sr.); pp. 148, 172-173 (Slack); and pp. 200-201 (curriculum).
7. T. J. Wertenbaker, *Princeton: 1746-1896*, Princeton University Press: Princeton, NJ, 1946, Chapters 4-5.
8. Sophia was the youngest daughter of Samuel Leake, Esq. and eventually bore Slack at least eight children. See letter of 6 February 1846 from E. Slack to his nephew, J. W. Slack. Copy in the Cincinnati Historical Society.
9. E. P. Cubberley, *The History of Education*, Houghton Mifflin: Boston, 1920, pp. 653, 702-703 (religious dominations); pp. 624-630 and 662-664 (Lancasterian system).
10. The details of the history of the Cincinnati Lancasterian Seminary vary from source to source. Compare, in particular, those in Ford (11) and McGrane (12).
11. H. A. Ford, K. B. Ford, *History of Cincinnati, Ohio*, Williams: Cincinnati, OH, 1881, p. 173 (Lancasterian Seminary); and pp. 179-180 (Cincinnati College).
12. R. C. McGrane, *The University of Cincinnati, A Success Story in Urban Higher Education*, Harper & Row: NY, 1963, Chapter 2 (Cincinnati College); Chapter 3 (Medical College of Ohio); and Chapter 4 (later history of Cincinnati College).
13. *Liberty Hall*, 1 May 1819, p.1, c.6.
14. W. B. Hendrickson, "The Western Museum Society of Cincinnati," *Sci. Mon.*, **1946**, 63, 66.
15. E. R. Kellogg, "Joseph Dorfeuille and the Western Museum," *J. Cincinnati Soc. Nat. Hist.*, **1945**, 22(4), 3.
16. W. H. Venable, *Beginnings of Literary Culture in the Ohio Valley*, Clarke: Cincinnati, OH, 1891, p. 310-315.
17. E. F. Horine, *Daniel Drake (1785-1852): Pioneer Physician of the Midwest*, University of Pennsylvania: Philadelphia, PA, 1961, pp. 154-155 (origin of Medical College); pp. 167; and 172 (Slack and Best).
18. There are many discrepancies (of the order of two-three years) in the accounts of the demise of Cincinnati College given by Slack (5c) and McGrane (12). For consistency we have generally followed McGrane.
19. For the history of the Medical College of Ohio see Jeuttner (5a), McGrane (12) and Horine (17). We have largely followed McGrane's account.
20. Several of Slack's descendants were still living in Alabama in the 1940's. See letter of 18 March 1949 from Tobert Slack, Elijah's great grandson, on file at the Cincinnati Historical Society.
21. W. Foster, "Some Letters by Doctor John Maclean," *J. Chem. Educ.*, **1929**, 6, 2104.
22. W. Foster, "A Century Old Chemistry Notebook," *J. Chem. Educ.*, **1925**, 2, 164.
23. *Liberty Hall*, 27 April 1819, p. 3., c. 1.
24. W. B. Jensen, "Thomas Duche Mitchell, Part II," *CINTACS Newsletter*, **1988**, 26(1), 10.
25. B. Drake, E. D. Mansfield, *Cincinnati in 1826*, Morgan, Lodge & Fisher: Cincinnati, OH, 1827, p. 29.
26. E. Slack, "Lecture on the Application of Principles to Practice in the Various Departments of Physical Science," *Transactions of the 4th Annual Meeting of the Western Literary Institute and College of Professional Teachers*, Drake: Cincinnati, OH, 1835, pp. 181-205.
27. "Chemical Lectures," *Liberty Hall*, 15 December 1818, p. 2, c. 1-2.
28. A. Kinmont, "Fictitious Compositions," *Transactions of the 6th Annual Meeting of the Western Literary Institute and College of Professional Teachers*, Talbott: Cincinnati, OH, 1837, pp. 213- 217.
29. E. Slack, "Fictitious Compositions," *Transactions of the 6th Annual Meeting of the Western Literary Institute and College of Professional Teachers*, Talbott: Cincinnati, OH, 1837, pp. 219-224.
30. W. S. Merrell, *Personal Diaries*. Manuscript on file at the Cincinnati Historical Society.
31. E. Slack, "Report on the Introduction of Agriculture as a Branch of Common School Education," *Transactions of the 6th Annual Meeting of the Western Literary Institute and College of Professional Teachers*, Talbott: Cincinnati, OH, 1837, pp. 202-207.
32. E. Slack, *A Key to the Technical Language and a Few Other Difficulties of Chemistry or Chemical Nomenclature, Together with a Concise View of the Doctrine of Definite Proportions and Chemical Equivalents*, Williamson: Cincinnati, 1828.
33. E. Slack, *A Discourse on Agricultural Chemistry*, Ferris: Cincinnati, 1831.
34. D. I Duveen and H. S. Klickstein, "The Introduction of Lavoisier's Chemical Nomenclature into America," *Isis*, **1954**, 45, 278 and 368.
35. *Liberty Hall* as quoted in R. C. Vitz, *The Queen City and the Arts: Cultural Life in Nineteenth-Century Cincinnati*, Kent State University Press: Kent, OH, 1989, p. 8.

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