

HISTORY OF GEOLOGY AT UNION COLLEGE

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The Early Years

Geology began at Union in 1809 when Thomas Brownell was hired to teach a course in mineralogy. At that time mineralogy was closely allied to chemistry, which was also under his purview. Much of the search for new chemical elements at that time was focused on exotic minerals of unusual composition. Brownell was dispatched to Europe to study and to purchase specimens, instructional aids, and apparatus for teaching the new courses. During the following ten years he added to the mineral collection through his own efforts in the field and donations from alumni and others. When he left to become Bishop of Connecticut the collection, for which he had maintained a partial catalogue, numbered about 2000 specimens.

Joel Nott, one of Eliphalet's sons, was added to the faculty about 1820. He took over teaching mineralogy and chemistry upon Brownell's departure. His close association with geology is evidenced by his inclusion in an expedition to the Michigan Territory in 1821.

The records concerning geological instruction are sparse during the late 1820's and early '30's. Joel Nott seems to have left the college during that time. His brother, John Nott, may have been involved in teaching geological subjects as one of the faculty in Natural Philosophy, but this cannot readily be determined. Geology during the nineteenth century was typically included in the broader field of natural history and at Union College the professor of natural history normally would teach botany, zoology, and geological subjects. Mineralogy, however, was taught by a chemist, at least until the latter part of the century.

In 1834 Benjamin F. Joslin is listed as a professor of natural philosophy, a position he held until at least 1838, but he appears to have been mostly, if not exclusively, concerned with biological instruction. Mineralogy was almost certainly taught in 1833-36 by Chester Averill, an adjunct professor of chemistry and languages, and he was apparently replaced in 1836 by Edward Savage, an assistant professor of languages and chemistry.

Chester Averill died of tuberculosis in 1836, leaving a wife and infant son, Chester Jr.. The younger Averill completed a degree at Union in 1857. He subsequently became a member of the first Geological Survey of California, headed by Josiah Whitney (after whom Mt. Whitney was named). Whitney clearly had an association with Union College, as curator of the college mineral collection, and as an advisor to Eliphalet Nott concerning Nott's investment in the Bristol Mines in Connecticut. That venture was a financial disaster, but apparently not to the detriment of Whitney's relationship with Nott, for Eliphalet wrote an enthusiastic letter supporting Whitney's candidacy for the directorship of the California Geological Survey.

Edward Savage, of whom little record remains, left the college in 1839, to be replaced by Jonathan Pearson, as assistant professor of natural philosophy and chemistry. Pearson is well known for the diary he kept through most of his considerable time at the college, but he was also of great importance as the curator of the college museum, including the mineral collection.

Starting around 1840 geology became a part of the curricular offering, along with mineralogy, and separate textbooks were used for geology and mineralogy. The advent of a curriculum in engineering in 1845 added a strong practical element, to which geology no doubt contributed through study of ore minerals, mining and metallurgy. In the college catalogue of 1852 a Botany and Mineralogy Department is mentioned for the first time, likely a reflection of Pearson's main interests. The curriculum and structure of the college was apparently quite fluid throughout most of the latter half of the century, with course

In Garver, J.I., and Smith, J.A. (editors), Field Trips for the 67th annual meeting of the New York State Geological Association, Union College, Schenectady NY, 1995, p. 1-9.

Figure 1. Harrison Webster. Prof. of Natural Philosophy at Union (1868-1883). Prof. of Geology and Natural History at the University of Rochester (1883-1888). President of Union College (1888-1894).



offerings and departmental designations appearing and disappearing from year to year. However, mineralogy remained an important part of the Science Course, as reflected in descriptions of Analytical Chemistry from the college bulletin:

When [the student] has in this manner acquired sufficient confidence in his skill, he can proceed to the actual Analysis of Minerals, Soils, Manures, (etc.)" and "Mineralogists will have access to the College [mineral] Cabinet, and can also take a full course with the blowpipe, and in Qualitative and Quantitative Analysis.

In 1858, the Wheatley Collection was purchased by Edward Delavan and donated to the college. This important collection has been the core of the departmental collections ever since. The close connection between chemistry and mineralogy continued with the addition of the Wheatley collection, and Charles Chandler (appointed to the faculty in 1857 as an assistant prof. of analytical chemistry) became curator of the museum. In 1865 Maurice Perkins took over from Chandler, including duties as museum curator.

Harrison Webster (1868 - see Figure 1) joined the faculty as a tutor in Natural History in 1868, and soon advanced to a regular faculty position. His responsibility for geology is evidenced by his later assumption of a professorship of geology and natural history at the University of Rochester. Webster was a major actor in the faculty movement opposing President Potter during this time and he left the college for Rochester in 1883. His replacement was another alumnus, James Stoller ('84), first as a tutor then as a professor. Stoller's duties increased with the retirement of Jonathon Pearson in 1885. Webster returned to the College as its president in 1888 (the first non-clergy to hold that position) and he again taught in the department of biology and geology.

Charles S. Prosser

The first full-fledged geologist at Union College was added to the faculty in 1894 in the person of Charles S. Prosser (Figure 2), who as acting Professor of Geology was responsible for the department of Geology and Paleontology.



Figure 2. Charles Prosser. Prof. of Geology at Union College (1894-1899). Prof. and Chair of Geology at Ohio State University (1899-1916). Published early work on Permian and Late Paleozoic stratigraphy of Kansas, Ohio, etc.

While he is probably unknown to even the oldest Union alumnus, Charles S. Prosser was probably the most eminent geologist ever to teach at the college. He was the first professor at the college specifically trained in geology, and was brought to the college in 1894 to start a full-fledged geology program. He was born on March 24, 1860 and raised in the Unadilla Valley of south-central New York. He attended Cornell University where he earned a B.S. in 1883 and a Master's degree in 1886, studying geology as his principle field. He was the first holder of the Cornell Fellowship in Natural History as a beginning graduate student, and was in the first class of initiates to the Society of Sigma Xi, which was founded at Cornell. In 1906 he was awarded a Ph.D. from Cornell.

An avid and careful field observer, he began his career at the United States Geological Survey in the Division of Paleobotany. In 1892 he took a position as Professor of Geology at Washburn College in Topeka, Kansas, where he began a study of Permian rocks. The study of Paleozoic strata occupied him throughout his professional life. Depending upon the rocks available in the immediate vicinity he shifted his focus to different parts of the geologic record, from Devonian at Cornell, to the Permian of Kansas, to the Ordovician of New York and Ohio. In 1894 he answered the call to Union to establish geology. Although his stay was comparatively brief, by the time of his departure in 1899 he had not only provided Union with a strong geology department with a full range of courses, but he had profoundly influenced a small group of young men, at least two of whom (Cumings '97, and Hartnagel '98) would themselves become prominent geologists. His method of teaching was one almost of apprenticeship; in modern terms we would describe it as undergraduate research participation. Field trips and detailed examination of specimens in the laboratory, as well as familiarity with the literature were fundamental to his approach to teaching geology.

Prosser's contributions to geology included many observations and constructions of Paleozoic stratigraphy which were major departures from previous work. He was at various times on the staffs of the State Geological Surveys of New York, Maryland, Kansas, and Ohio, where most of his work was carried out. He was a founding Fellow of the Geological Society of America, and an inspirational mentor to many successful geologists. His view of higher education, and more particularly his approach to teaching geological science would be well heeded by more institutions in the present day. His statements concerning the practice of science are filled with references to the selflessness and hard work necessary to the pursuit of scientific research.

The Turn of the Century

Prosser left Union in 1899 at the behest of Prof. Edward Orton, Sr., who was seeking a successor to the chairmanship of the Geology Department at Ohio State University. The opportunity so presented, especially in contrast to the support for geology forthcoming at Union, made this move inevitable. Within two years he was confirmed as Professor and Head of the Department of Geology, the position he held until his untimely death by his own hand in 1916.

At this point in the history of the department there was a fairly complete curriculum in geology: Geology, Historical Geology, Paleontology, Economic Geology, Areal Geology, Field Geology, and Mineralogy and Lithology. The Wheatley Collection had become part of the Geology Department in 1890, and during his brief stay at the college (until 1899), Prosser put considerable effort into rehabilitating and adding to the collection, especially with paleontologic specimens. Prosser's ambitions for a strong geology department appear to have initially received some support from the trustees and administration of the college, but apparently not to his satisfaction. He left for Ohio State where he soon became chair of the Geology Department.

Stoller resumed responsibility for geology and curation of the collections when Prosser left. Stoller, although primarily trained as a biologist (his Ph.D. Dissertation concerned sowbugs), carried out some very significant early work on the surficial and glacial geology of the Mohawk-Hudson region.

James Stoller

James Stoller (Figure 3) was born on December 11, 1857 and was raised in Johnstown, NY. He attended public schools and the Cazenovia Seminary before entering Syracuse University. He left Syracuse for Union in 1881, and graduated with an A.B. in 1884. The following year he joined the faculty as an Instructor in Natural History. He taught courses in Biology and Geology, and was appointed Assistant Professor of Biology and Geology in 1889. In 1894 he was appointed Professor of Biology following graduate study at Johns Hopkins, Munich, and Leipzig Universities. In 1898 he was awarded the Ph.D. from Leipzig, having completed a dissertation on "The Organs of Respiration of the Oniscidae". This study of the terrestrial isopods commonly known as "sowbugs" or "wood lice" shows his interest in biological matters as well as careful observation and attention to detail. He was appointed chair of Biology and Geology in 1898, and with the arrival a new biology professor in 1919, he became Professor of Geology.

Stoller's investigations on the glacial history of the area from Saratoga to Albany and west up the Mohawk Valley clearly established a sequence of events during the latter part of the glacial epoch. His results, stemming from many years of field observation and careful deduction, were published as Bulletins of the New York State Museum. They include: "Glacial Geology of the Schenectady Quadrangle", "Glacial Geology of the Saratoga Quadrangle", "Glacial Geology of the Cohoes Quadrangle", and "Topographic Features of the Hudson Valley and the Question of Post-Glacial Marine Waters in the Hudson-Champlain Valley." These unassuming titles conceal some of the most fundamental observations concerning the recent geologic past in this area, and remain scientifically useful to the present day.

In 1924, after forty years of service teaching at Union, he was awarded an honorary Sc.D. by his alma mater. He retired the following year, but his presence was felt at the college for many years, as he was a focus for returning members of his class of 1884, who established a fund in his honor. The proceeds from that endowment continue to provide for the purchase of books in geology, and even kept a spark lit during the nearly twenty years when geology was in eclipse. Stoller's divided responsibilities led to a reduction in



Figure 3. James Stoller. Prof. of Biology and Geology at Union College (1884-1925).
Published some of the earliest studies of glacial geology in the Captiol District.

course offerings in geology for the next 20 years, but geology continued as part of the department of biology and geology.

The importance of fieldwork to a geological education had been recognized at least as early as 1889, and during Stoller's years reached a point where an honors course in glacial geology required at least 60 hours of fieldwork, and in 1916-17 an honors course in field geology required at least 120 hours of fieldwork and a detailed report on an assigned area.

The mineral collections continued to be an important educational asset, and were curated by a volunteer, Dr. D.S. Martin from 1908-1917. The developments of X-ray crystallographic methods, beginning with the Bragg's in 1912, reached Union College in 1919, when a series of special lectures in crystallography and x-rays was taught by Albert W. Hull and Wheeler P. Davy.

As Stoller neared retirement, the need for a successor led to the hiring of Edward Staples Cousins Smith (known to the students by various nicknames, e.g. alphabet Smith). Smith was the Geology Department for thirty-five years, from the retirement of Stoller in 1925 until 1960.

Edward Staples Cousins Smith

Certainly the best known geologist in Union's history, "Prof." Smith was mentor to a long string of geology students, a remarkable number of whom went on to eminence in the field. Smith was geology at the college for nearly thirty five years, from his accession to chair of the department in 1925 to the addition of a second regular faculty member in 1957.



Figure 4. Edward S. C. Smith. Prof. and Chair of Geology at Union College (1923-1960).

Edward Staples Cousins Smith was born in Biddeford, Maine on August 23, 1894. He studied chemistry at Bowdoin College, and after his graduation in 1918 he continued with graduate study in geology at the Massachusetts Institute of Technology and Harvard University. After receiving his M.A. degree from Harvard in 1920 he taught for two years at Radcliffe College, which he left to become the new instructor of geology at Union.

Upon Prof. Stoller's retirement in 1925, Smith was promoted to Assistant Professor and chair of the Geology Department. Smith was a geologist both by inclination and education, and he set about creating a comprehensive program in the science.

Smith was promoted to Associate Professor in 1929, and to Full Professor in 1932. Although diminutive in stature he was a "presence" on campus, and many are the stories told by former students and colleagues. While many of these touch on a certain imperiousness, they also reflect the affection which the students held for him, no doubt a re-reflection of his concern and fondness for them.

Smith's contributions to geology, while not extensive in terms of publications, touched upon some very significant areas of geology, especially with regard to the geology of his home state, Maine. It is fair to say that he was first and foremost a dedicated teacher, and not just within the gates of Union College. He had a great concern for the education of the general public, especially regarding the importance of geology to the public at large. His concern for conservation and the environment preceded by many years the fashion which became general a decade or so after his retirement. He was responsible for one of the earliest television series devoted to geology, and was heard over WGY in a series of lectures for the General Electric Science Forum. With co-authors he published one of the earliest books on nuclear energy: "Applied Atomic Power", not only a useful technical compilation, but a helpful work for the general public.

Smith's role in geology was recognized by many of his colleagues. He was a close associate of Christopher Hartnagel, the New York State Geologist, and Rudolf Ruedemann, a noted paleontologist and stratigrapher who worked not only in New York, but studied (with help from Smith) important Cambrian sections in Maine. Ruedemann named a fossil, *Oldhamia smithi*, in his honor. Smith was a fellow of the Geological Society of America and the Mineralogical Society. He was an early organizer and president of the New York State Geological Association.

One of Professor Smith's most interesting contributions was in the field of mineral fluorescence. He and one of his students, William Parsons, did experimental work on fluorescence spectra of minerals. This phenomenon is familiar to many who have visited one of the darkened chamber in a mineralogical museum where "black lights" produce striking colors on a variety of specimens. Smith's collection of fluorescent specimens is still a fascinating part of the mineral collection at Union.

When he retired in 1960 he was honored by his former students, who established a prize fund in his name. The Edward S. C. Smith Geology Prize is awarded to a geology major at the college who shows high professional potential. Although the award was suspended in the early 1970's, as a result of the termination of the geology major, the fund continued to grow. With the re-establishment of geology the prize is once again being awarded to outstanding students in geology. Although he died on Nov. 11, 1971, after the demise of geology at the college, the renewal of the department, and the Smith Geology Prize, somehow brings him to life once again, as a presence among those of us dedicated to geology at Union.

During the 'late 20's and 30's Smith was able to teach a sound curriculum in geology, often with the help of a young instructor, who would be working on a master's degree in geology at the college. This was the only period during which M.S. degrees were awarded in geology at Union, and the contributions made by those few who assisted Smith with instruction are remembered by many of the older alumni in geology. The department can be characterized as a successful, smoothly functioning entity which produced many fine geologists, who left the college with considerable pride in their department. The department structure had finally become formalized about 1920, with courses regularly listed by department from that time to the present. The geology department, however, did not participate in the growth of many of the other departments during that interval, being comprised of Smith and a young visiting lecturer for much of that time. During the thirties the department offered a master's degree, and the lecturer was often a graduate student working on his degree, or a recent graduate of the department.

After World War II

As Smith in his turn neared retirement, a new assistant professor was hired in 1957. Philip Hewitt took over the department in 1960, and Leo Hall was hired as a second full time geologist in 1961, expanding the department to two regular faculty for the first time. Through much of the 1960's these two gradually increased the offerings in geology. The increased interest in geology (partly from increased employment opportunities) coupled with generally increasing enrollments in higher education at that time, encouraged Hewitt and Hall to ask for a further increase in the faculty in the department. This was bolstered by the report of an external examining committee chaired by John Moss, a member of the geology

department at Franklin and Marshall College. The need for an additional faculty member was apparent to the visiting committee, as was a restructuring of the course offerings in geology. On the basis of the small number of geology majors (averaging five for the decade from '55-'65), and declining enrollments in introductory geology due to changes in curricular requirements, the administration refused to increase the size of the department. While this decision is thought by some to have been made by the Board of Trustees, there is little or no evidence that they seriously considered the issue, rather it seems to have been an administration decision. Faced with continuation of what they perceived as inadequate support for Geology, Hewitt and Hall resigned in 1967. Courses were taught to remaining geology majors through an arrangement with RPI until 1971. The geology department was allowed to "run down" as the majors departed and no new majors were added to the program.

With the demise of the geology major, there remained an interest in having geology courses taught as part of the general education program of Union students and for introductory geology for civil engineers, but no investment in a full-fledged department was considered. In 1971 Herman Zimmerman, a marine geologist, was hired to teach introductory level courses in geology and oceanography. For the next 13 years his success was measured, in part, by the number of students who left Union to seek a major in geology at other institutions. Zimmerman was officially a part of the department of civil engineering, the closest entity available to accommodate a geologist. The "geology department" was moved into the second floor of Butterfield Hall when the Civil Engineering department was moved into the first and third floors, following the construction of the Science and Engineering complex.

The return of geology after dormancy

During the late 1970's and early 1980's an effort was made to reestablish a geology department and major at the college. This effort was led by Frank Grigg's, the chairman of the Civil Engineering Department. A group of geology alumni also discussed the possibility of a restart of geology. This movement finally bore fruit through the singular contribution of John S. Wold, a geology major of the class of 1938. In 1983-84, Wold conferred a substantial endowment upon the college with the understanding that it be used for a chair in Geology and for re-establishment of a Geology Department at the college. Interestingly, the report of this gift in "Concordiensis" is rather ambiguous about the purpose of the gift, seemingly a reflection of the ambiguity felt by the administration toward a restart of geology.

Although one might assume that this backing would result in a rapid renewal of geology, such was not to be the case. The college, during deliberations concerning the possibility of restarting geology, requested advice from an external committee. The committee recommendations, perhaps on the basis of their understanding of what the college considered possible for geology, made what can be best described as "minimal" recommendations. In particular little consideration was given to the needs of a new, modern geology department in terms of equipment and space. Even the recommendation of a minimum of three full-time faculty was just that, a bare minimum rather than an estimate of the optimal size. It is clear that the college began the renewal of geology with a substantial underestimate of the costs involved for a quality program. Since the administration was concerned (and so stated) that the new department should be a quality addition to Union, the new department was placed in a resource squeeze, especially regarding space. Much of this was simply a lack of appreciation of what a geology department really needs for facilities. Indeed, this is a problem extending well back into the Department's history. In the late 1890's Charles Prosser clearly had some difficulty in making his needs known to the administration, and certainly Hewitt and Hall likewise.

The Geology Department was officially re-established in 1985, in conjunction with hiring a new assistant professor, Kurt Hollocher. The new department was allocated three full time faculty lines and Hollocher was the second, joining Zimmerman, who chaired the new department. The department began the process of hiring a third faculty member, but the process was interrupted by Zimmerman's announcement of his intention to resign to take a position with the National Science Foundation. A decision was made to hire a visiting assistant professor to temporarily fill the third position while a search was begun for a new department chair. Paul Ryberg joined the department in the fall of 1986 as a visiting professor and the search for a new chair proceeded. The search took two years and ended with the appointment of George Shaw as the John and Jane Wold Professor of Geology and chair of the Geology Department in the fall of 1988. During the 1988-89 academic year the Department hired John Garver as the permanent third faculty member, completing the complement of faculty envisioned for the rebirth of geology at Union.

In 1992, after a four year effort to convince the college of the need for a fourth faculty line, the Department was granted a fourth permanent position. This was filled with the arrival of Donald Rodbell in the summer of 1994. During the 1992-93 academic year the department had the pleasure of hosting Nikolai Sobolev from the Siberian Academy of Sciences. During his visit he taught a course on the Geology of Russia, and gave a number of public lectures. As a result of his visit, Prof. Garver was able to establish important research contacts in Russia, resulting in two field excursions to the Kamchatka Peninsula which has only been recently opened to foreigners. These contacts also resulted in the department hosting another visitor from Russia in 1993-94, Galina Ledneva, a graduate student from Moscow. Overlapping with these two visitors from Russia, we also had a visitor from Romania, Marian Lupulescu. Marian's interest in economic mineralogy was especially appreciated. His curation of the mineral collection, including entering data into a computerised format, will make the collections significantly more useful. He also taught a course in economic geology and led a three week field trip in Romania, attended by two faculty and six students.

In the fall of 1994 George Shaw was asked to chair both the Department of Geology and the Department of Civil Engineering. To compensate the Geology Department for the diversion of faculty time to additional administrative responsibilities, a two year visiting position was granted to the Department. Sharon Locke was hired into this position in the spring of 1994.

During its ten years of new life the Geology Department has grown apace. We are now (at least temporarily) five faculty. The number of geology majors has increased from zero to about twenty. In 1995 eight students graduated in geology, and one in environmental studies with a geology concentration. In the last seven years the Department has obtained grants and contracts totalling more than \$1,000,000.

No history of an academic department would be complete without some discussion of the students. Union's Geology Department has always been small, and the total number of geology alumni, including those of the last few years, is less than 150. However, the quality of the program and students has been high, and the devotion of the graduates to their old department has been admirable. The successes of the alumni have been gratifying, especially as an indication of the quality of geological education provided by the Geology Department and by Union College. Among the graduates are three who became State Geologists (of New York, Pennsylvania, and Wisconsin). About 1/3 of the alumni (~40) went on to earn Ph.D. degrees. About a dozen have been, or currently are, chairs of geology departments at colleges and universities. About 1/3 have enjoyed careers in industry. One currently serves as the Director of the Geological Survey of Canada. The nearly equal division of careers between industry, government and academe demonstrates not only the breadth of interest of our former students, but the breadth of the educational preparation they received, and of which the college can be justly proud.