PENNSTATE

A HISTORY OF THE GEOSCIENCES AT PENN STATE

On the Occasion of the 75th Anniversary
of the
Department of Geosciences

1988

College of Earth and Mineral Sciences
The Pennsylvania State University

PREFACE

This volume contains three brief contributions dealing with the history of the geosciences at Penn State: a summary history that is based largely on a paper by B. F. Howell that will be published in its entirety in an upcoming issue of Earth and Mineral Sciences, and two anecdotal accounts of some aspects of that history, one by T. F. Bates ('Geology Department Recollections') dealing with the 1940's and the other by E. F. Osborn on 'The Deike Building -- Home of the Geological Sciences'.

Charles P. Thornton

GEOSCIENCES AT PENN STATE

Geosciences has been an integral part of Penn State's educational and research program from the beginning. The Pennsylvania State University, known at its inception as the Farmers' High School, opened for its first class in 1859. Evan Pugh, the first president, also had the title of Professor of Chemistry, Scientific and Practical Agriculture and Mineralogy. Although Dr. Pugh was committed to the emphasis of agriculture in the new institution's curriculum, he also believed that the school should provide sufficient breadth in its course offerings to meet the needs of Pennsylvania industry in general. President Pugh gave high priority to the study of geology and mineralogy. His microscope and other research and instructional equipment are on display in the College Museum. There were only five other faculty. A single curriculum for all students is listed in the catalog for 1861, the year in which his first class graduated. It included programs of study in geology and paleontology and in physical geography and meteorology. All students were required to write a thesis to graduate. The theses were prepared jointly by pairs of students. There were 17 students in the class, but six did not graduate: four because of illness and two because they left school two months before the close to join General Sherman's Body Guard. The eleven students who graduated produced six dissertations to meet graduation requirements. Five of the six were in each case the work of two students, 'concentrating upon a single dissertation'. Of the six dissertations, three were as follows: 'On the Limestones of Nittany Valley', by J. W. Eckman and C. A. Smith. 'On the Iron Ores of Nittany Valley' by J. D. Isett and J. N. Banks, 'On the Slags of Iron Furnaces and the Residual Products Obtained in Converting Pig into Bar Iron' by L. C. Troutman and C. E. Troutman. The other theses were on fertilizer, corn, and local plants. These titles indicate that two of the research projects were on geological subjects, and a third was on products of high temperature reactions among minerals; hence, six of the eleven students graduating did their research on projects in fields of geological science. Three more geological theses are listed in the 1863 Catalog, after which the listing of student thesis topics was suspended until 1892. Geology and sometimes also paleontology and mineralogy continue to be listed among the topics taught in every catalog.

After the death of President Pugh in 1864, responsibility for teaching geology appears to have been taken over by biologists (Table I). The 1867 Catalog lists Henry James Clark as Professor of Zoology, Botany and Geology. He was replaced by J. Trimble Rothrock, Professor of Human Anatomy and Physiology, Botany and Geology, and later by William A. Buckhout, Professor of Geology, Zoology and Botany (except in 1871 when Buckhout was Professor of Botany, but the Faculty also included Albert H. Tuttle as professor of Geology and Physiology). In 1879-80, the Catalog lists the chair in 'Geology and Zoology' as vacant. It was filled a year later by Professor Addison L. Ewing. One may suppose, considering the other interests of the professors who taught the geology courses, that they emphasized paleontology, which was in a period of world-wide ascendancy during the latter half of the nineteenth century. Mineralogy may have been taught after Dr. Pugh's death by the Professor of Chemistry. A Department of Geology and Zoology was established in 1882, according to W. F. Dunaway's The Pennsylvania State College History 1946). In 1889, Franklin E. Tuttle joined the Faculty, first as Instructor of Chemistry and Mineralogy, and later as Assistant Professor. The catalogs do not specify who taught each course.

In 1893, a new program in Mining Engineering was added to the eight previously established programs of study in the School of Engineering. The 1893-4 Catalog (p. 85) states that 'this course aims to fit students for practical work in Mining, Geology and Metallurgy.' Magnus C. Ihlseng was added to the Faculty as Professor of Mining Engineering and Geology, and head of the department, along with Thomas C. Hopkins, Instructor in Geology. At about this time, the teaching of mineralogy appears to have been moved to the Mining program. Starting with the 1895-6 Catalog, F. E. Tuttle was listed as Assistant Professor of Chemistry rather than Chemistry and Mineralogy. The 1894-5 Catalog states that the degree of Engineer of Mines was offered with specialty in Geology and Petrography. The practice of listing student thesis topics was again introduced. Geological study was not restricted to the Mining programs, however, in as much as the thesis list includes 'A Geological Survey of Centre County, PA.' by Hugh M. Beaver and Robert W. Wieland in 1895, both of whom were majors in General Science. Indeed, in 1896, Geology was one of the departments in the newly established School of Natural Sciences.

In that same year the Mining Engineering Department became the School of Mines, with Ihlseng as the first Dean. A cutback in State support, however, resulted in the School reverting to a department in the School of Engineering in 1899. Ihlseng resigned. In 1901, Marshman E. Wadsworth, an economic geologist and mineralogist, was appointed Professor of Mining and Geology to head the Department; and in 1903 Edward N. Zern was added to the Faculty as Instructor in Mineralogy. In the same year, George H. Deike, after whom the Deike Building (the present home of Geosciences) is named, received his B.S. degree in Mines and Mining.

In 1906, the Mining program was again separated from Engineering, and a School of Mines and Metallurgy was created. Although Marshman Wadsworth is listed as the first Dean, he was replaced almost immediately by Walter R. Crane, a mining engineer. Lloyd B. Smith was appointed in 1906 as Assistant in Mineralogy and Geology. He was promoted to Instructor in 1907 and Assistant Professor in 1908. The number of geological courses had by this time expanded, with the emphasis (7 out of 9) on economic geology and mineralogy, rather than on paleontology. In 1909, the name was pared to 'School of Mines', the typical title of mining schools throughout the United States at that time. During the next 17 years, the school grew to be the second largest in the U.S. The name was renamed Mines and Metallurgy in 1924. Elwood S. Moore, an economic geologist who had been appointed as Professor of Geology and Mineralogy in 1909, became Acting Dean of the School in 1918 and served as Dean from 1919 to 1922, at which time he returned to the University of Toronto. He was assisted by a variety of junior appointees (assistants and instructors) who remained at Penn State for, at most, a few years each.

Dean Crane established Mining Geology as a separate major in the School of Mines in 1909 with Elwood S. Moore in charge. The first B.S. graduate was Stuart St. Clair in 1912. The first M.S. was Lloyd B. Smith in 1913 working under Professor Moore. It appears to have been easier to earn a Master's degree then than now, as his thesis was only eleven pages plus a few illustrations long. In 1914-15 Stanley H. Cathcart, who obtained his B.S. in Metallurgical Engineering in 1912 and in 1916 was the second M.S. in Geology, is listed as a Teaching Fellow in Geology. He later had a distinguished career with the U. S. Geological Survey, various oil companies, and was State

Geologist of Pennsylvania from 1947 to 1953. By 1915-16, the number of geological sciences courses taught had grown to 21.

Arthur P. Honess, mineralogist and crystallographer, joined the Faculty in 1917, followed a year later by Chesleigh A. Bonine, an economic geologist. Under the guidance of Dean Moore, a reorganization of the School of Mines led to the creation of separate full Departments of Geology and Mineralogy in 1921, with E. S. Moore as Chairman of Geology and A. P. Honess heading Mineralogy. In 1922 Moore was succeeded by C. A. Bonine. Geology and Mineralogy continued to be listed as separate departments under Bonine and Honess, respectively, until 1927, when they were combined into a single Department of Geology and Mineralogy under Bonine. The name was reduced to simply Geology in 1929. In 1927, there was a departmental faculty of six persons: Bonine, Honess, Clair W. Robinson, and three instructors, one of whom was Frank M. Swartz who was later to become Department Head of Geology.

Until 1928, the School of Mines and Metallurgy was fairly typical of the mining schools in many universities throughout the United States. It prepared students primarily for employment in the mining and related industries. These were important in Pennsylvania where coal and steel were the basis of a large part of the State's economy. Representatives of state industrial societies elected six of Penn State's 32 trustees. These men, together with George H. Deike, an alumni trustee, saw the School as an important resource for preparing future leaders in their companies. They wanted a strong Penn State program, and one sensitive to their needs. For this purpose, they found an unusual man. Edward S. Steidle, a 1911 Penn State graduate who was Head of the Department of Mining at Carnegie Institute of Technology, was through their efforts appointed Dean of the School of Mines and Metallurgy.

Edward Steidle was a man of vision. He was a pioneer who introduced new disciplines into the curriculum. He saw the role of the College as being concerned with all aspects of the discovery, exploitation, and processing of natural mineral materials to furnish the raw material and finished products required by an increasingly technological society. Steidle realized that the proper evolution of these industries required thorough knowledge of the physical sciences as they related to raw and processed materials. He changed

the school's name to 'School of Mineral Industries' to describe its broader scope than conventional mining and metallurgy; and he set about assembling a faculty of distinguished scholars in each of the School's disciplines. He also recognized and promoted research and graduate study, in addition to undergraduate education, as an important part of the School's function. He believed the organization of the school should emphasize three main fields: mineral engineering, mineral technology, and the earth sciences.

The Geology program participated fully in this innovative expansion. The present program in Ceramic Science had already grown out of mineralogy courses on clays and cement materials given from 1911 to 1923, at which time Ceramic Engineering became a separate department with its own curriculum. Oil and Gas Production, which was an option in the Geology Curriculum in 1930, was made a separate major in 1931. In 1933, Petroleum and Natural Gas Engineering became a separate department. The geology part was renamed Geology, Mineralogy and Geography to include the interests of newly appointed Raymond E. Murphy. Initially, Chesleigh Bonine was in charge of both the Geology and Petroleum and Natural Gas Engineering Departments.

Geophysics began in the Department of Mining. It was first taught in 1931 by William R. Chedsey, Head of the Department. Geophysics was a very new field at that time, and its utility in finding ore deposits was just beginning to be exploited. To emphasize how important it was expected to become, courses were listed in the catalogs from 1934 to 1939 under 'Mining and Geophysics'. Starting in 1940, geophysics courses were listed separately. To build up expertise in this discipline, Helmut Landsberg was brought from Frankfurt, Germany in 1934 as the first Instructor in Geophysics. However, the scope of 'geophysics' was apparently not clearly understood by Steidle when he hired Landsberg, whose interests did not run toward geophysical surveying. One of the first things Landsberg did at Penn State was start a new meteorological observatory. Some weather observations had been made continuously at the University since William Frear, Professor of Agricultural Chemistry, started them in 1888, but these early observations do not appear to have been linked to the teaching and research programs in any way. Landsberg also built the first seismic observatory in a vault beneath the central wing of what is now called the Steidle Building. He also did important research

in mine ventilation. One of his papers concerns the relation of methane concentrations in mines to local weather. He showed that when air pressure falls, methane escapes more rapidly from the rocks into mine openings, increasing the risk of explosions. When air pressure rises, less methane escapes. Here was a clear case of a useful contribution of basic science to mining technology, in accordance with Steidle's general philosophy. Hans D. Neuberger, another meteorologist, was added to the Mining Faculty in 1937. In 1939, Victor Conrad, an Austrian solid-earth geophysicist, after whom the Conrad Discontinuity is named, was also appointed, but he stayed only one year before moving to Harvard.

In 1941, The Department of Geology, Mineralogy, and Geography was renamed Earth Sciences, and Meteorology was moved there from Mining.

A major change in the nature of the geosciences program occurred with the appointment of Elburt F. Osborn as Head of the Department of Earth Sciences in 1946. At this time the department was reorganized into several divisions: Geology (with F. M. Swartz as Head), Mineralogy (P. D. Krynine), Geography (E. W. Miller), Geophysics (S.J.G. Pirson), and Meteorology (H. D. Neuberger).

Previous to this time, research had been directed primarily toward Pennsylvania problems, especially those related to the mineral industries of the State. Even more than Steidle, Osborn was convinced of the importance of basic scientific research as the foundation of the technological industries. He fostered graduate study and research as the major part of the Earth Sciences program. Before World War II, graduate study had been a relatively minor aspect of the University's interests. Although graduate study was offered as early as 1862, the Graduate School was not established until 1922, and the first doctorates were not awarded in Mineral Industries until 1934, when Gordon R. Pole and Sandford S. Cole, two ceramics majors received Ph. D degrees.

As the research program expanded, emphasis on graduate study, particularly for the Ph.D., became increasingly emphasized in the geosciences. Master's degrees were originally awarded without designation of field, so early graduates with advanced degrees in geosciences may have been overlooked. The first clearly recognizable geoscience M.S. thesis appears to be 'Peculiar

Jointage Caused by a Peridotite Dike in Fayette County, Pennsylvania' by Lloyd B. Smith, a Mining Engineering graduate who worked under E. S. Moore and graduated in 1913. Fourteen additional M.S. degrees were granted between 1918 and 1946. With the appointment of E. F. Osborn in 1946, the number of graduate degrees granted accelerated rapidly. The first M.S. in Geophysics was awarded to Lloyal O. Bacon in 1948 working under Pirson, and in Geochemistry, to Israel Washaw in 1953 working under MacKenzie L. Keith. The first M.S. specifically in Mineralogy went to Della M. Roy in 1949, working under Osborn, although Charles K. Graeber, one of Honess' students who also served as an Instructor in Geology and Mineralogy from 1922-1928, received his M.S. in 'Geology' in 1925.

The first Department of Earth Sciences Ph.D.'s were awarded in August 1951 to Calder T. Bressler in Mineralogy working under P. D. Krynine and John C. Cook in Geophysics working under B. F. Howell, Jr. In 1953, Donald E. Outlaw, working under John P. Miller, received the first Ph.D. in Geology; and in 1955, Arnulf Muan, later to become Head of the Geosciences Department and still later Associate Dean for Research of the E.M.S. College, received the first Ph.D. in Geochemistry working under Osborn. However Muan was not Osborn's first Ph.D. advisee, Rustum Roy earned a doctorate degree under Osborn's direction in 1948 with a major in Ceramics.

In 1953, the name of The Pennsylvania State College was changed to The Pennsylvania State University; and Edward Steidle retired and was replaced as Dean of the College by E. F. Osborn. In the following year all of the Schools, except for the Graduate School, were renamed Colleges. The divisions of the former Department of Earth Sciences and the other Mineral Industries departments all were designated departments, with the same persons in charge, while the former Department of Earth Sciences became the new Division of Earth Sciences! The original subdivisions had been made for several reasons, the most important of which was to provide an environment which encouraged the growth of new ideas. It also separated faculty members who had trouble working together as a team. This was an effective step in all the Divisions.

The organizational structure remained the same until 1963, when the Division of Earth Sciences was reorganized into four departments. In addi-

tion to Geography and Meteorology, these were Geology and Geophysics with L. A. Wright as head, and Geochemistry and Mineralogy with J. C. Griffiths as head.

The forerunner of the present administrative structure was initiated in 1971 when the Division of Earth Sciences was abolished and the two geoscience-related departments in the Division were merged into the single Department of Geosciences with Dr. Arnulf Muan as head. The new department had three sections; Geology, with R. F. Schmalz as chairman; Geochemistry, with A. L. Boettcher as chairman; and, Geophysics with S. S. Alexander as chairman.

In 1975 Dr. Bell retired as Associate Dean for Research and was succeeded in that position by Dr. Muan. This made the appointment of a new department head necessary, the choice being Dr. C. Wayne Burnham. A significant change made almost immediately by Dr. Burnham was the appointment of two coordinators, one for the undergraduate program (Dr. Robert F. Schmalz) and the other for the graduate programs (Dr. E. K. 'Buzz' Graham). Dr. Schmalz rather quickly saw the realities of his position, escaped it in 1977, and left Dr. C. P. Thornton holding it for the next eleven years. The position of graduate programs coordinator has been held by four of the faculty since it was established: Dr. Alexander (1975-1978), Dr. Graham (1978-1981), Dr. Peter Deines (1981-1983) and Dr. David Eggler (since 1983).

The move of Dr. Schmalz from graduate program chairman for geology to undergraduate program coordinator resulted in Dr. D. P. 'Duff' Gold becoming the new program chairman in 1975, a position that he held until 1985 when he was replaced by Dr. Albert Guber, who has continued in that capacity to the present. In 1974 Dr. Boettcher left Penn State for sunnier climates, and his place as graduate program chairman for geochemistry and mineralogy was taken by Dr. H. L. 'Hu' Barnes. In 1978 Dr. Derrill Kerrick took over that job and lasted until 1983 when he was replaced by Dr. Peter Deines, the present incumbent. In geophysics Dr. Alexander remained as graduate program chairman in geophysics until 1985, when he became department head upon Dr. Burnham's retirement. At that time Dr. Graham became the geophysics program chairman.

At about the time when Dr. Alexander took over as department head, a number of far-reaching changes were taking place that had their roots back in the 1950's. At that time, following the end of World War II, the geosciences departments at Penn State (like those elsewhere) markedly increased their faculties. Thirty years later this post-war faculty contingent was approaching retirement, with the result that over a rather short span of time a substantial number of openings occurred, involving the now more unified department in an intensive search for new faculty. More than half a dozen faculty members have been added in the past five years, and most of these have chosen to be affiliated primarily with the department rather than with one or another of the graduate programs. This in turn has precipitated renewed discussion of the structure of the department, a discussion which is still vigorously going on at the present moment.

GEOLOGY DEPARTMENT RECOLLECTIONS

In the Forties, a time when major developments in analytical procedures were taking place, the Department obtained some of the best equipment available for mineral investigations. Before he left the position of instructor in Mineralogy in 1942 to work for the X-ray division of North American Phillips Corp., Bill Parrish had secured from that company one of their first 'Norelco' X-ray spectrometers. A Geiger counter, moved by hand from point to point along a 90 degree arc, was used to take readings of the diffracted X-rays from the specimen. To get a complete pattern took over an hour since it involved taking and recording a count of some twenty seconds duration at each one degree of arc and then plotting the data. But in the days when only a few Geology departments had X-ray machines, most of them -- as in the Physics departments -- home made film types, this unit that gave quantitative information was a major advance, particularly since students could usually be hired to do the routine work. For-tunately the office shared by Griffiths and Bates was big enough to hold the X-ray machine and its attendee. Improvements in X-ray tube construction soon strengthened the intensity of the radiation to the point that counting time could be shortened and a motor drive could be used to move the Geiger counter slowly along the arc, with a recorder charting the output. (This eliminated the student labor need but other work was, of course, found for those individuals having outstanding qualifications.)

The Department was also among the first, if not <u>the</u> first, Geology department in the country to have operational responsibility for and full use of an electron microscope. When Dr. Herbert Insley came to the faculty in 1945 (?), the National Bureau of Standards, where he had been working, was in the process of getting a new one. He arranged for the one they had, one of the first commercial RCA models -- the only kind then available -- to come to the Mineral Industries College. As for most of the early models, there was lots of down-time for repairs and realignment, and the RCA service man was a frequent and welcome visitor; but during the instrument's up-time many

research break-throughs were made in the small room in the basement of the Steidle Building because of the order-of-magnitude increase in magnification attainable over that of the light microscope.

The maintenance costs of expensive instruments like electron microscopes, and the need for specialists to operate them and assist faculty and students in their use, added to the fact that the demands for an X-ray machine 'in every office' was getting to Dean Steidle's nerves (and budget), led to the idea of central instrument laboratories for the use of everyone in the College: the Mineral Constitution Labs. Consequently, most of the third floor of the new Mineral Sciences Building was planned and set aside for X-ray, Electron Microscopy and Diffraction, Spectroscopy, and Analytical Chemistry with accompanying dark rooms and office space for the experts in charge of each section. As is often the case, there were some gaps in the planning that led to incidents, understandable in hindsight but, at the time, not regarded as funny by the 'Powers That Were'. For example, after the planning was done and could not be changed (but before the building was completed) the RCA people pointed out that a third floor location would greatly reduce the achievable resolution of a new electron microscope being purchased because of vibrations generated elsewhere in the building, from the street, etc. That problem was licked by having a special slab of concrete poured into the floor, on which the microscope would sit, thereby effectively damping the vibrations. Another problem of some consequence arose when, after the building was finished and equipment was being moved in, it was found that the huge, grand-piano shaped spectroscope, would not go up the stairwell or fit in the elevator. Solution: take out the appropriate window, knock out enough bricks in the wall on both sides, bring in a crane from another construction site on campus, hoist the instrument up the outside of the building and through the hole in the wall, pay the extra costs, and, except for an occasional joshing, allow the red faces of those responsible for the 'oversight' to gradually return to their normal color.

The 'Labs' not only provided facilities and services that faculty and students would otherwise not have had, but have also served as a mechanism for hiring outstanding people, some of the early ones being Joe Comer in Electron Microscopy, George Brindley in X-ray Crystallography, and Oliver Ingamells and Sam Goldich in Analytical Chemistry.

The World War II years were characterized by accelerated programs, oversized classes, and limited, if any, travel. The Geology faculty, at the beginning of the War, consisted of Bonine, Swartz, Robinson, Honess, Krynine, Myers, and Parrish. Bates replaced Parrish in the Spring of 1942 and Honess passed away toward the end of that year. Classes that would normally have started in the Fall semester of 1942 began in mid-May immediately after the close of that year's Spring semester, and from then on summer sessions were eliminated and one semester followed immdiately after another. Enrollment in the College as a whole dropped off drastically with the enlistment of the male students in the armed forces, but, because of the needs of industry, class sizes in the M. I. School did not change appreciably. Indeed, the pressure was on, and every effort was made to get the students out of school and into critical jobs as rapidly as possible. Faculty teaching loads ranged from 18 to over 30 contact hours per week, depending on the number of lab sections required, and help from student teaching assistantships was not generally available. In the summer of 1942, for instance, four laboratory sections were needed to take care of an enrollment of 98 in Elementary Mineralogy -- in those days a required course for all M. I. School students, even those planning a major in Meteorology. The drop of in-College enrollment was short-lived, for with the return of veterans under the G.I. Bill, the facilities of large colleges became stretched to the limits. P. D. Krynine, an excellent though not always a well-loved teacher and scientist, 'solved' the large enrollment problem in his classes by applying the principal 'you can't make a silk purse out of a sow's ear' (one of his many favorite sayings). He seated the students in order of their grade-point averages, with the brightest in the front row so that he could give maximum attention to those truly deserving it. It was a rare -- albeit a somewhat embarrassing -- achievement to be moved forward on the seating chart during the semester; not too unusual to be moved back.

In the war-time atmosphere (even State College had it) anything that interrupted or lightened the continuous grind was welcome. For the male students taking afternoon mineralogy and petrology labs -- then located on the east side of the Steidle Building -- an interesting and, in the eyes of the students an extremely worthwhile, diversion was provided on certain days by coeds, the self-labeled 'Codettes', who practiced marching (the word is used

loosely) in the field now occupied by Willard Hall. The disruption in the teaching process was generally harmless although on one occasion, in the lab where I was teaching Chemical Mineralogy (usually referred to as 'Blowpipe'), the rush to the windows upon the appearance of the marchers resulted in the spilling of a bottle of hydrochloric acid down the leg of the instructor's new bride, Jinny Bates, who was auditing the class. Heroic measures, namely the rapid spreading of baking soda on the affected limb, forestalled any permanent injury and provided a much more immediate and interesting diversion than that taking place outside.

During this period, research was encouraged but opportunity was limited by both lack of time and money. The only likely sources of small amounts of the latter were the Mineral Industries Experiment Station, then under the direction of A. W. Gauger (a fine, though often brusque gentlemen who was proud of having once been a 'coal-cracker'), and the Central Fund for Research, administered out of Old Main. Since the Experiment Station got its funds from the State to support work on the problems of Pennsylvania's major industries (e.g. coal, slate, oil, etc.), the emphasis was naturally on applied research. However, the M. I. School administration was very supportive of basic research as evidenced by continuing purchases of the most up-to-date instrumentation, as well as by the international reputations of Swartz in Ostracods, Krynine in Sediments, and Honess in etch figures.

Interdisciplinary research was considerably stronger at The Pennsylvania State College than in many otherwise comparable universities, not only within the Mineral Industries School, but across campus. The very structure of the school, and inclusion within it of all closely related earth and mineral science and engineering departments, resulted in close communication and joint projects involving faculty in the various disciplines. Instruments and facilities such as differential thermal analysis equipment and furnaces in Ceramics, grinding machines and floatation cells in Mining Engineering, instruments for measuring porosity and permeability in PNG, were readily available to the Geology faculty, as was the expertise necessary to help them in their use. Thus, in the Forties in the area of mineralogy and crystallography, for example, people like Woldemar Weyl and Sam Zerfoss in Ceramics, H. M. Davis and Harold Read in Metallurgy, and Herb Kellogg in

Mining could always be relied on for help and advice on problems bordering on their fields. On 'the other side of the coin', faculty responsible for the use of the more complicated instruments were encouraged by the interactions to devise improvements and techniques pertinent to the needs of the other disciplines, and, as a spin-off, often found to be helpful in their own research. Indeed, the interdisciplinary nature of problems posed to the specialists in the Mineral Constitution Labs generated many contributions to journals and societies concerned with improvements in analytical instruments and their use. As at present, of course, interdisciplinary liaisons extended beyond the M. I. School. Honess and Zerfoss, for instance, interrelated closely with Mary Willard in Chemistry and Charles Jeffries in Agronomy, Bates and Griffiths with W. P. Davey in Physics and Jim Bartoo in Math, and arrangements could always be easily made with people like Henry Yeagley in Physics, Merrill Fenske in the Petroleum Refining Lab, and Wit Hutchison in Chemistry, among others, to use their facilities.

Tom Bates

Professor Emeritus of Mineralogy

THE DEIKE BUILDING -- HOME OF THE GEOLOGICAL SCIENCES

Penn State's geological sciences graduate and research program was becoming severely cramped for space by the late 1950's. The space needs were in all fields, but were especially acute for the high-temperature phase equilibrium experimental work. In addition, new facilities were needed for the library and for the growing earth sciences undergraduate program. The National Science Foundation had been generously supportive of the experimental research program, and it was the NSF that made possible the construction of excellent facilities to meet the needs. The NSF did this by providing federal grants which would become available if matched by local funds. The matching took place, resulting in two buildings, well-designed and equipped for the geological sciences program.

The first building was constructed in the courtyard of the Mineral Sciences Building. A two-story structure, connected to Mineral Sciences, it provided 5,000 square feet of laboratory space for high-temperature, phase equilibrium research, especially at high pressures with H_2O and/or CO_2 as components. This building, occupied in February, 1962, was a great asset, taking care of the most immediate needs of the geochemistry experimental program. Wayne Burnham was very helpful in volunteering to work with the University physical plant in the design and construction of this facility. Research groups moving into the courtyard building were principally those of Burnham and of Osborn. Meanwhile, Tuttle's high temperature-pressure group had been (1958) provided space in the new Research Unit B, a building constructed on the eastern edge of the campus, and Spackman's Coal Research Section was occupying space in a frame building on central campus.

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*Spackman has written a detailed description of the building, published in Min. Ind., v. 32, No. 7, pp. 1-7, March, 1963.

Construction of the Courtyard Building and Research Unit B were critically important to the expanding geochemistry experimental program, but it was apparent that an additional, new, large building was needed to house the total earth sciences program. A grant of $600,000 from NSF brought forth matching funds of $2,675,000 from the General State Authority to construct the new building. This was the largest NSF grant, to that date, for construction of a university facility -- an indication of the high regard in which this federal science agency held the Penn State earth sciences research and graduate program.

During the period of design and construction of the building, 1963-64, William Spackman played a key role, representing the faculty in working closely with Walter Wiegand, the University's Director of Physical Plant, Planning and Construction, and with the architects to get the facility that the faculty felt was needed. Spackman was tireless in his checking on even the smallest details. The result was a highly functional, completely air-conditioned building* of 117,000 sq. ft., consisting of six stories, atop of which was a meteorology facility, with radar and other modern equipment; and below which were a seismic observatory with seismic pier and recording rooms, and a mass spectroscopy laboratory. To maximize College-wide utilization of facilities, especially the new library, the Mineral Constitution Laboratories, and the shops, the new building was connected to all three stories of the Mineral Sciences building. The upper four floors of the new building were constructed around a central core -- a vertical shaft six feet wide and 96 feet long. It carries all heating, cooling, ventilating and service lines, making all facilities readily available at each of these floor levels. Vertical transportation in the building is provided by three high-speed elevators. Polished slabs of granite, each two feet wide and five feet four inches high, were inset in the walls of the ground floor corridor. These spectacular exhibits, appropriately lighted to show off the features for which each was especially selected, display the range of composition and texture common to the granitic basement rocks of the continent. An oil painting by George Zoretich, commissioned by the Pennsylvania Refractories Industry, hangs on the wall of the lobby.

At a dedication ceremony in 1965, the new Earth Sciences building was renamed Deike (pronounced dike) building, in honor of George H. Deike, an illustrious 1903 graduate of the College in mining engineering. In 1925 he was elected to Penn State's Board of Trustees, and served on the Board continuously until his death in 1963. His role in the development of the College of Earth and Mineral Sciences was critically important. The former School of Mines, established in 1896, and later named the School of Mines and Metallurgy, struggled under five deans from 1896 until 1928, with poor facilities and weak budgets. Mr. Deike, with the effective support of President Hetzel, was instrumental in changing this pattern. Edward Steidle, a 1911 Penn State graduate in mining engineering and at that time professor of mining engineering at Carnegie Tech, was brought to Penn State as Dean in 1928. The name was changed to School of Mineral Industries, and in 1929 a fine, new building was constructed for the School, and named the Mineral Industries Building. It is now the Steidle Building. With strong support for his program from the University Trustees, the mineral industries and the legislature, Dean Steidle built a remarkable educational institution. He served as a leader with great energy and foresight for 25 years.

In 1976, meteorology and geography moved from Deike to the nearby, new Environmental Sciences Building, allowing Deike to become almost exclusively the home of the geological sciences.

E. F. Osborn
September, 1987

75-YEAR CHRONOLOGY OF GEOSCIENCES FACULTY