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Edgar Theodore Wherry

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The election of Professor Edgar Theodore Wherry to the Honorary Life Presidency of the Mineralogical Society of America honors first and foremost his fundamental contributions to the science of mineralogy and his vital services to the society at the beginning of its existence. But it does more. It recognizes that many of his notable achievements in several other disciplines, such as chemistry, crystallography, botany, and ecology are related to mineralogy and that the elucidation of these relationships has been a primary motivating force through much of his life work. In other words, he is above all a naturalist whose influence has extended from the laboratory to the classroom, to the field, and to the public.

Edgar Theodore Wherry was born in North Philadelphia on September 10, 1885, into a family of modest means. He was first influenced toward science in 1900 at the Friends' Central School. His biology teacher, a farmer living in Delaware, made a hobby of collecting plants as he walked to his train each day and then talking about them to his students. This stimulated Wherry's early interest in botany, an interest that some thirty years later became a high point in his career. Several questions that had no answers at that time left an indelible impression on his mind. Neither his teacher nor the books on botany had any explanation for the ranges of certain plant occurrences. Eventually, he himself would supply many of the answers.

While still in high school he attended lectures at the Wagner Free Institute of Science near his home. The ones on chemistry held the strongest appeal and soon he had built a small home laboratory. When he entered the University of Pennsylvania in 1902, he majored in chemistry but maintained his interest in botany, taking part in excursions sponsored by the Philadelphia Academy of Sciences. On one such trip to Pink Hill in Tyler Arboretum, the naturalist guide pointed out that the vast display of pink-blossoming moss phlox was limited to the underlying serpentine but could not explain why. Wherry resolved that some day he would study the association of that plant with the serpentine.

Wherry received his Bachelor of Science degree in chemistry in 1906. Work in an analytical chemical laboratory after graduation provided useful practical experience for a short interval and some funds with which to begin graduate study that same year. He supplemented his scholarships with savings and a small income from lecturing at Wagner in chemistry and geology. By this time, his interest in mineralogy had taken precedence over chemistry. The crystal shapes of chemical salts were an irresistible attraction and led him to collect mineral crystals in the field. His first find was garnet along Wissahickon Creek. The result was that his chemistry lectures at Wagner were so enlivened by exhibits of local minerals, illustrating nature's source of elements in the chemicals studied, that a number of his students were encouraged to take up minerals as a career or a hobby. One of these was Samuel G. Gordon, who was to become the noted Pennsylvania mineralogist. The inspiration toward science gained at Wagner Wherry never forgot; later he would endow, from his own savings, a youth science education center designed to introduce high school students to various fields of science.

Wherry's graduate work in mineralogy was done at the University of Pennsylvania under the guidance of Amos Peaslee Brown, an able and considerate teacher, and in 1909 he received his Ph.D. degree. His thesis, *Contributions to the Mineralogy of the Newark Group in Pennsylvania,* dealt with a wide range of subjects related to the diabase sheets and basaltic flows. His discovery of a flow near Reading was the first find of Triassic basalt in Pennsylvania. Other subjects included the mineralogy and chemistry of contained zeolites, contact metamorphic effects in baked sediments, the origin of boron in associated datolite, and the structure and petrographic features of the mafic bodies.

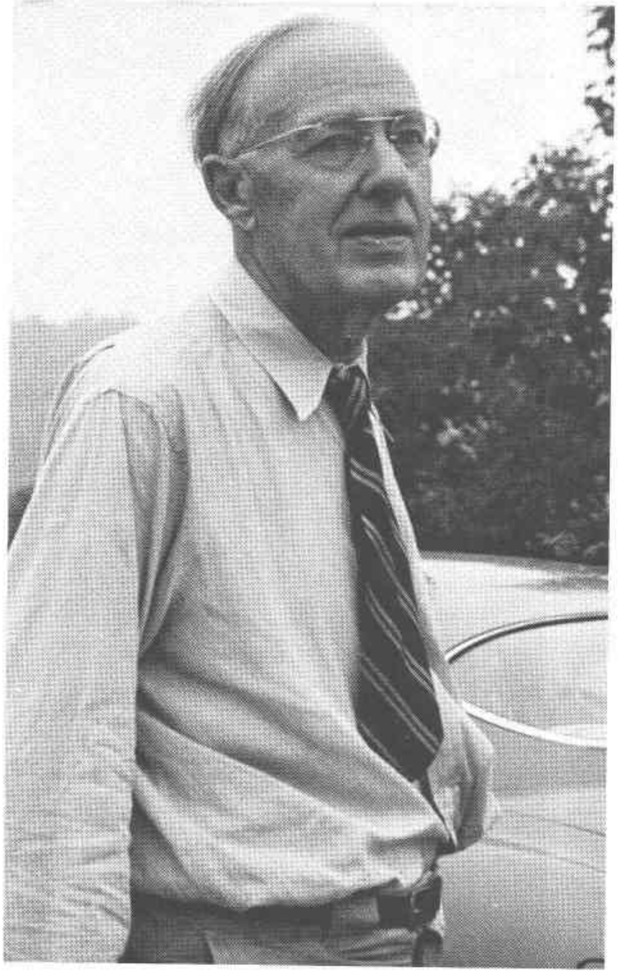
During his final year of graduate study, Wherry was offered an assistant professorship in mineralogy at Lehigh University where he taught from 1908 to 1913. In summer vacations, he secured employment with the U.S. Geological Survey as a field assistant to Professor Florence Bascom of Bryn Mawr College who was then engaged in mapping the geology of southeastern Pennsylvania. He spent the summer vacation in 1910 in Germany studying morphological crystallography under Victor Goldschmidt. Through such broadening experiences, his interests and research branched out into regional geology, igneous petrology, and stratigraphy.

While Edgar Wherry was still an undergraduate, he had begun to publish in a popular mineral magazine, *The Mineral Collector.* His first article appeared in 1904 on the causes of color in minerals (1). This was soon followed by a series, co-authored with Elmer Benge, listing the mineral occurrences and their rock associations in the Philadelphia area (2). In 1908, his paragenetic study of copper minerals within the Triassic of southeastern Pennsylvania was published in *Economic Geology* (3), and at the same time a paper on the determination of boric acid in insoluble silicates, an outgrowth of his thesis work, was published in the *Journal of the American Chemical Society* (4). Further papers on the Newark Group continued to appear, with special emphasis on mineralogical investigation of its included mafic igneous bodies (6,7,10,12). His continuing interest in the Triassic of Pennsylvania resulted in later years in contributed sections in the *Geology and Mineral Resources of the Quakertown-Doylestown District, Pennsylvania,* by Florence Bascom and others (18), in the bulletin *Lehigh County, Pennsylvania,* by Benjamin L. Miller (20), and in the bulletin *Geology and Mineral Resources of Bucks County, Pennsylvania,* by Bradford Willard and others (21). During the investigations of the Triassic, Wherry's interest in botany lost none of its vigor. He considers that his first worthy research paper was a paleobotanical study of silicified wood in the Triassic of Pennsylvania, stressing the environmental origin (8). Further papers on Triassic paleobotany appeared in 1916 and 1933 (13,19).

During Wherry's first year at Lehigh University, he and a friend made a stratigraphic reconnaissance trip, covering the area from the Cambrian outcrops in the Great Valley north to the Coal Measures in the folded Appalachians, traveling by train and trolley and hiking from place to place. North of Mauch Chunk (now re-named Jim Thorpe), Wherry noticed a canary-yellow coating on the rocks in a conglomerate cliff and recalled the description of carnotite in Colorado. Back in the laboratory, he made qualitative tests and found, sure enough, that it was carnotite which he had collected. He reported this at the meeting of Section E, AAAS, at Johns Hopkins University, in December 1908 (5). The occurrence had been noted as early as 1874, but the mineral had been misidentified as autunite. He published the full account of the discovery in the *American Journal of Science* in 1912 (9) and supplemented it in 1914 with additional information in *U.S. Geological Survey Bulletin 580* (11). Even today, he has a vivid recollection of the excitement of that discovery.

In 1913 he was offered and accepted the position of assistant curator of mineralogy and petrology in the Division of Geology of the National Museum of the Smithsonian Institution. His main responsibility was the reorganization of the mineral displays and identification of mineral and rock specimens submitted to the museum. During this period he perfected his optical-crystallographic techniques for mineral determination. One day, a sample of a swelling clay was submitted with a query as to a possible igneous source. Detailed study convinced him that its lack of quartz particles favored a non-sedimentary origin, and he reported it to be an altered volcanic dust. Patent litigation involving a company promoting the use of water-softening equipment and limited to material of igneous origin led to his being sent to South Dakota to examine the clay deposit. The field relations confirmed his theory of volcanic dust origin. His paper (15) suggested that this interpretation might apply equally well to similarly swelling clays known as bentonites. Geologists were soon using his findings to interpret the heretofore unexplained clay beds in widespread geologic strata and to use such metabentonite units as key horizon markers in stratigraphic correlation. Final confirmation of his theory of volcanic origin, which he has described as the "thrill of a lifetime," came when Dr. Clarence Ross made the first plastic-impregnated thin sections of bentonite clays, and the distinctive shapes of altered glass shards were recognized.

Wherry's skill in the use of optical techniques to identify minerals and crystalline materials led to his being called to the Bureau of Chemistry in the Department of Agriculture in 1917 as a crystallographer, the first such governmental appointment. A shorter method than laborious chemical analysis



Edgar Theodore Wherry
Taken by F. Harold Evans at New Jersey Zinc Company mine, Friedensville, Pennsylvania, on June 19, 1955.

was urgently needed for the identification of chemicals in insecticides, drugs, and foods. His work there included determination of the optical properties of such alkaloids as heroin, strychnine, and quinine, and, during World War I, investigation of poisons, some of which had caused serious illnesses. One investigation sought the explanation for deaths from the eating of rhubarb leaves. He found that the leaves contained potassium hydrogen oxalate, an extremely toxic compound. In another case, crystals found in canned fish were suspected of being the work of enemy saboteurs, but on examination, the crystals proved to be quite harmless struvite. Some of Wherry's optical determinations involved organic substances that dissolved in the standard immersion oils. This led him to pioneer in developing the mercury iodide liquids as immersion media. A further innovation was his design of a Bakelite microscope stage in place of the standard metal stage that could not withstand corrosion by the mercury iodide liquids.

When Wherry entered the Department of Agriculture, he was a widely respected professional mineralogist, yet his fellowship with the amateur mineral collectors, begun so early in his career, had never lessened. While a graduate student, he was one of the most active members and field trip leaders in the Philadelphia Mineralogical Society. His close association with student protégés, such as Sam Gordon, continued. It was this rapport with the amateur mineral collectors that made possible his uniquely influential role as a mediator between laymen and professionals in the founding of both *The American Mineralogist* and the Mineralogical Society of America. This story, vital to the history of American mineralogy, has been fully detailed by MSA archivist, Dr. George Phair, in the issue of *The American Mineralogist* commemorating the Fiftieth Anniversary of the Society (Volume 54, p. 1233-1255, 1969). Wherry joined with S. G. Gordon and H. W. Trudell in 1916 to create the new mineralogical journal and was its Managing Editor for the first three years, while also unofficially and without title doing a goodly portion of the editorial work, setting scope and standards, building up the subscription list, and contributing articles. He was named Editor-in-Chief in 1919. As one of the six professional mineralogists instrumental in founding the Mineralogical Society of America in December 1919, he continued as Editor through 1920 and 1921 after *The American Mineralogist* had been made the official journal of the new society. Walter F. Hunt succeeded him in 1922, and in 1923, Wherry was elected the fourth president of the society.

There were no mineral clubs promoting collecting trips when Wherry moved to Washington in 1913, but there were frequent field excursions sponsored by the Wild Flower Preservation Society. Once more his early interest in botany was aroused. On one excursion he was shown a Walking Fern growing on mica gneiss. This was not the normal association with limestone listed for this plant in the literature. Why should this fern grow on two rocks of wholly different chemical character? His mind was challenged once again with the questions about limited plant ranges he had asked himself long ago. Now, however, he was prepared, as a botanically minded mineralogist, geologist, and chemist, to tackle such a problem. So began a new phase of long-continuing field and laboratory studies on plant occurrences out of which would come fresh understanding of soil chemistry in its relation to plant growth. One of his discoveries was that a soil could be very different chemically from the composition of the underlying rock. Thus, the Walking Fern, supposedly an indicator of limestone, was proven not to require a calcareous environment. Many agents—geological, chemical, and botanical—were involved, apart from the usual controls of climate, altitude, and the like. No one had investigated these problems in this way nor discovered this key to explain in geological-chemical terms the vagaries of plant ranges. It is one of Wherry's greatest contributions to ecological science.

In starting these botanical studies in his spare time, he needed a simple means of testing soil acidity in the field. At that point he came across references to the significance of hydrogen-ion concentration in relation to acidity *vs* alkalinity. This resulted in his pioneering development of the application of indicator dyes to measure pH and determine soil acidity, a field method now widely used. A series of chemical-botanical papers on these investigations appeared in 1916 (14), 1918 (16), and 1920 (17). Some of his investigations of soil conditions and acidity were made in New England. His first book, titled *Wild Flowers of Mount Desert Island, Maine,* was an outgrowth of the work in Maine (22).

His investigation of ferns in relation to their geological-chemical environment resulted in numerous publications and brought him active membership in, and soon the presidency of, the American Fern Society. His long-continued interest in ferns was to make him one of the foremost authorities in this botanical field. His guidebooks on ferns of the eastern United States are today among the most widely used.

In 1930, he was called back to the University of Pennsylvania as professor of botany; he regards his courses as having been chiefly concerned with ecology. His lectures, given increasingly to popular audiences as well as to students, were illustrated with his own plant photographs printed on glass slides and delicately tinted by means of water colors. From here on, until his retirement as emeritus professor in 1955, he devoted himself to botanical and plant-ecological teaching and research. Among major publications during this period were his *Guide to Eastern Ferns* (23) and *The Wild Flower Guide* (24). Royalties from the latter very successful guidebook went to the Wild Flower Preservation Society to further its educational activities. One of his larger field and laboratory studies was on the genus *Phlox.* This exacting project on one genus culminated in his Morris Arboretum monograph (25). *The Fern Guide* (26) and *The Southern Fern Guide* (27) were published later.

In addition to appointments and election to various offices, which of themselves are tributes to Edgar Wherry's superior abilities and accomplishments, two honors in particular have given him much pleasure. In 1964, on his seventy-ninth birthday, the Cranbrook Institute of Science awarded him its Mary Soper Pope Medal, in recognition of distinguished achievement in plant research. Another honor, which recognizes his achievements in mineralogy, was the designation in 1950 of a new lead-copper mineral by the name *wherryite.*

Since his retirement, and despite cataract operations which put an end to microscopic work, he has been no less active in botanical research and publication. He remains busily engaged in one of his greatest endeavors, now almost complete, the *Atlas of the Flora of Pennsylvania,* containing 3,000 maps. At the venerable age of ninety, although he is not as strong as he used to be, his mind, memory, and zest for all of nature are as keen as when in boyhood he first felt drawn to plants and minerals. Thus, his dedication to science, touching and interweaving so many disciplines, continues to benefit scientists and non-scientists alike.

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