

Memorial of Richard Conrad Emmons 1898–1993

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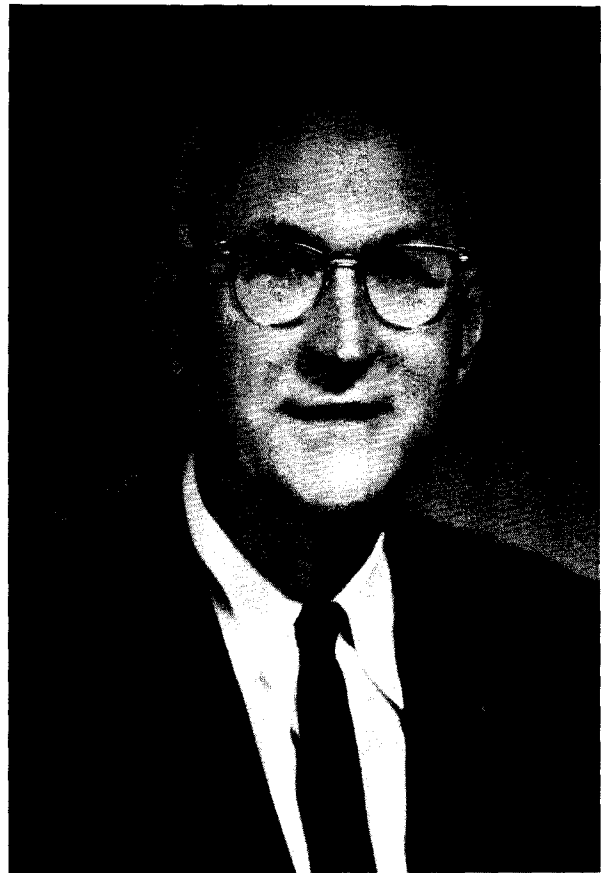
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Con Emmons died on September 4, 1993, just one week past his 95th birthday. He had retired in 1969 after a distinguished 45-year career as a member of the faculty at the University of Wisconsin–Madison.

Con was born August 28, 1898, in Winnipeg, Manitoba, to William Edward and Ellen Jane (McCrossan) Emmons and later moved to Vancouver, British Columbia, where he attended the University of British Columbia. Canadian universities of that time had not yet embraced the current emphasis on training undergraduate-level students for future professional work, so Con got a broad education, which he cherished. He especially enjoyed the Greek classics and philosophy, and he liked to pass on appropriate quotations learned at that time to his own students. Thus: “The purpose of education is not to teach how to earn your bread, but to make the bread sweeter.” Plato in 400 B.C. endorsed that thought with “knowledge acquired under compulsion obtains no hold on the mind,” and “life is lived forward, but understood in retrospect, teaching that it has no plot unless the free mind has inspiration to write it.” Socrates’ comment to Crito was “not life, but a good life, chiefly is to be valued.” Con chose to press this viewpoint on his students in the classroom and in the field around the campfire.

Con developed a love for the outdoors and mountain climbing in his early years. He made hundreds of climbs in the western Canadian mountains. He organized the University of British Columbia Mountaineering Club in the fall of 1917 by posting a notice on the bulletin board. He was surprised to find more women than men at the organizational meeting; before long, the organization thrived, and it is still vigorous today. Mountaineering was a physical challenge, which gave Con a strong constitution. The granitic cores of the mountains intrigued him as well and led him to take courses in geology. Thus he came under the influence of W. L. Uglow, who had an inquisitive attitude that Con admired. “Curiosity is the first and last passion of great minds.” Con decided to forego philosophy in favor of geology. He received a B.A. degree in 1919 and an M.A. degree in 1920. Professor Uglow had studied under C. K. Leith at the University of Wisconsin and urged Con to attend Wisconsin for his Ph.D. degree, which Con did.

The Department of Geology and Geography at the University of Wisconsin in 1920 consisted of six geologists (C. K. Leith, W. J. Mead, A. N. Winchell, F. T. Thwaites, W. H. Twenhofel, and E. Steidtmann) and four



geographers (R. H. Whitbeck, A. K. Lobeck, V. C. Finch, and J. W. Frey). Together, these men formed a well-balanced group and produced many of America’s better geologists and geographers of the day. Leith lectured on structural geology, economic geology, metamorphic geology, and pre-Cambrian geology. According to Con, Mead lectured when the weather required that Leith play golf. Winchell and Steidtmann covered mineralogy and petrology, and Twenhofel taught general geology, sedimentation, paleontology, and the history of geology. Thwaites covered glacial geology and geomorphology.

The department at that time was especially noted as a mecca for pre-Cambrian geology, and Con found several congenial Canadian graduate students there, including R. L. Rutherford, H. T. James, C. O. Swanson, T. B. Williams, and G. B. Barnwell. Con shared an apartment with

† Deceased November 30, 1994.

Barnwell, James, and Williams. Con especially admired C. K. Leith among the faculty. Leith had the teaching ability to make "two plus two makes four" sound like a discovery. His strength was creative insight and a philosophical outlook. When Con asked Leith for a suggestion on a thesis topic, Leith replied, "clay mineralogy." Knowing that it would be difficult to compete with golf for Leith's attention, Con chose to do his research under Winchell. He received his Ph.D. degree in 1924 with a thesis entitled "Studies in Mineral Separation in a Finely Divided State." Con's creative genius was recognized during his graduate study, and Leith offered him a faculty position upon graduation. At the same time, Leith mentioned that the University of Chicago also was looking for a man with Con's training and suggested that Con go to Chicago for a trial period to see how he liked it. Con taught only one quarter at the University of Chicago before deciding that he liked the city of Madison better than Chicago. He wrote to Leith and found that Leith had already sent Con's appointment to the Dean, secure in his belief that Con would return.

Con loved field mapping. As a graduate student, he served in the Canadian Geological Survey as a field assistant to V. Dolmage, mapping the west coast of Vancouver Island. He was assigned one summer to the party of T. T. Quirke, and the next summer to Pentti Eskola. Thereafter he was party chief in charge of mapping a 100-mile strip of Huronian rocks in Ontario between the basement to the north and an already-mapped Huronian section to the south. The area extended from Gardner River near the Soo to Flack Lake. The intent was to map to Sudbury, but a Survey personnel problem required his transfer to the Woman River area. This work led to the publication of Geological Survey of Canada Memoir 143 in 1925 and Memoir 157 in 1929. Thereafter Con did mapping in northern Wisconsin for the Wisconsin Geological Survey. He also set up a field mapping course for the University of Wisconsin near White Lake, Ontario, in the type Huronian section, a course that is still given today.

In the laboratory, Con had a knack for inventing ingenious laboratory equipment. For his Ph.D. thesis on clay minerals, he developed a technique for separating the submicroscopic clay particles using the heat of a radiometer. A static generator consisting of two Beethoven records rotating in opposite directions, back to back, was used to disperse the particles. The dry clay mix was dropped under vacuum (an aspirator) onto an inclined, statically charged plate, from which it sprayed through a strong light beam to a receiving plate below. This caused a separation on the receiving plate of up to three inches based on the color gradation of the particles.

Con concentrated on improving microscopic techniques in his early years on the faculty. He added a fifth axis of rotation to the conventional four-axis universal stage. This stage was applied to a double-variation technique for determining refractive indices, whereby both

the wavelength of the light and the temperature of the immersion liquid could be varied. The method was especially effective when used with Con's set of high-dispersion immersion liquids. These innovations were published as separate papers and later in book form as G.S.A. Memoir 8 (1943, *The University Stage*).

Con's lab was filled with furnaces that he built for various experimental studies involving minerals, ceramics, and metals. In later years he built a gas extraction line to sample and analyze gases released from heated rock samples. He became an expert in glass-blowing techniques for this project. He had a quick, inventive mind and could advise students on the best procedures for their laboratory studies and how to build the requisite equipment. He would never buy if he could build.

As for courses, Con taught mineralogy, petrology, lithology, and, in later years, general geology. He developed new courses in immersion methods, universal stage, and gems and precious stones. This last course proved very popular on campus, despite the heavy dose of optical theory included. On a regular basis young men sought his approval before the big step of purchasing a diamond engagement ring. Con arranged for the class to view special exhibits of gems in local jewelry stores, and that led to his giving evening courses to the jewelers themselves.

Con's greatest interest within geology, however, was petrology and the origin of igneous and metamorphic rocks. He espoused the view, unpopular at the time, that most granites of his acquaintance were not igneous but metamorphic, formed by granitization of preexisting rocks. He also created his own classroom theme, "structure is the key," around which he built both instruction and research. Research along this line led to the publication of G.S.A. Memoir 52 in 1953 (*Selected Petrogenetic Relationships of Plagioclase*), as well as individual papers.

Con was an excellent teacher who enhanced his courses with humor. This kept the students interested and thereby susceptible to learning. For mineral identification quizzes, he might turn out the lights in favor of candles to simulate working conditions underground in a mine. He was also known to substitute homemade maple candy in the form of crystals as one specimen in a quiz. He was great at Christmas time for ribbing the students by making up new lyrics to popular songs, such as "All I Want for Christmas is my Ph.D.," etc. But most students remember him best as teaching them how to think for themselves. One of his departmental colleagues said, "I know of no one who has a greater capacity to stimulate discussion in the classroom and imaginative research in the laboratory and field than Con Emmons."

Con served as departmental chairman at Wisconsin during the difficult postwar years 1945-1950. After the war, unprecedented numbers of students enrolled on campus, but the Department of Geology faculty was sharply reduced by retirements and resignations. Leith, Twenhofel, and Winchell all reached retirement age in

1945. In addition, N. D. Newell and H. E. McKinstry, who had been on leave during the war, resigned to accept teaching positions elsewhere, which left only Emmons, S. A. Tyler, and F. T. Thwaites as a nucleus on which to rebuild the department. The future trend of the department was to be set by Con's appointments. Con made 12 appointments in the five-year period, with the goal of forming a well-balanced group. He made appointments in the fields of sedimentation, stratigraphy, paleontology, stratigraphic paleontology, economic geology, geophysics, general geology, geomorphology, mineralogy-petrology, and X-ray crystallography. At this time also he was recognized on the national level by his election as President of the Mineralogical Society of America in 1944 and as Vice-President of the Geological Society of America in 1945.

Con married Pearl Elizabeth Hocking on June 8, 1926. She preceded him in death on March 19, 1985. They are survived by a daughter, Nancy (Roland) Smith of Madison, a granddaughter, Constance Elizabeth (Bruce) Johnson of Hayward, California, two great-grandchildren, Tyler Conrad and Lauren Elizabeth Johnson, and by nieces and nephews in Canada. Con was also preceded in death by a sister and two brothers. Con was a charter member of Heritage Congregational Church. He was a member of the Madison Downtown Rotary Club since 1945, serving as its President in 1952-1953, and was designated a Paul Harris Fellow in 1983. He was a devoted husband and a loving father and grandfather.

SELECTED BIBLIOGRAPHY OF R. C. EMMONS¹

- Studies in mineral separation in a finely divided state. *Amer. Jour. Sci.*, 16, 423-445 (1928).
- The double variation method of refractive index determination. *Amer. Mineral.*, 14, 414-426 (1929).
- A modified universal stage. *Amer. Mineral.*, 14, 441-461 (1929).
- A set of 30 immersion media. *Amer. Mineral.*, 14, 482 (1929).
- (With J.E. Thomson) Preliminary report on the Woman River and Ridout map-areas, Sudbury District, Ontario. *Geol. Survey Canada Memoir*, 157, 30 p. (1929).
- Plagioclase determination by the modified universal stage. *Amer. Mineral.*, 19, 237-259 (1934).
- (With R.M. Gates) New method for the determination of feldspar twins. *Amer. Mineral.*, 24, 577-589 (1939).
- The contribution of differential pressures to magmatic differentiation. *Amer. Jour. Sci.*, 238, 1-21 (1940).
- (With R.M. Gates) Plagioclase twinning. *Bull. Geol. Sci. Amer.*, 54, 287-299 (1943).
- The Universal Stage. *Geol. Soc. Amer. Memoir*, 8, 205 p. (1943, reprinted 1959).
- A mineralogist's obligation. *Amer. Mineral.*, 30, 87-96 (1945).
- Selected Petrogenetic Relationships of Plagioclase. *Geol. Soc. Memoir*, 52, 142 p. (1953, reprinted 1956).
- (With R.M. Crump and K.B. Ketner) High- and low-temperature plagioclase. *Bull. Geol. Soc. Amer.*, 71, 1417-1420 (1960).
- Granites by recrystallization. *Amer. Jour. Sci.*, 262, 561-591 (1964).
- A tectonic view of the moon: Part I. *Tectonophysics*, 1, 541-547 (1965).

¹ The complete bibliography of Richard Conrad Emmons may be ordered as Document AM-95-566 from the Business Office, Mineralogical Society of America, 1130 Seventeenth Street NW, Washington, DC 20036, U.S.A. Please remit \$5.00 in advance for the microfiche.