Memorial to William Skinner Cooper
1884–1978

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Professor of Botany William S. Cooper of the University of Minnesota (1915–1951) died at Boulder, Colorado, on October 8, 1978, at age ninety-four. Born in Detroit, Michigan, on August 25, 1884, he became preoccupied with mountains at ages eight and nine, while traveling with his father within sight of the Blue Ridge and Adirondack Mountains, and again in 1902 at age eighteen on his first of many trips to the Rockies of Colorado. That fall he entered Alma College, Michigan, and in his junior year was introduced to ecological concepts by Edgar Transeau. He graduated from Alma in June 1906, despite having taken time off in early spring to regain his health in the mountains of North Carolina.

Cooper's graduate studies began at The Johns Hopkins University in February 1907. Although he was by that time an affirmed botanist and had already amassed a notable private herbarium, he disliked the morphological aspects of botany that had been emphasized at Hopkins. He took an excellent elementary course in geology and was helped in library research by Harry Fielding Reid, an eminent glaciologist. Geological explorations were all-important in his scientific development. Always the Colorado mountains were in his mind; patterns of vegetation development that he had observed gradually merged with his knowledge of glacial history. Before the year at Hopkins had ended he had written, in essentially complete form, a paper entitled "Alpine Vegetation in the Vicinity of Long's Peak, Colorado"; it was accepted in 1908 for publication in the *Botanical Gazette.*

In the summer of 1907 he assisted Transeau, teaching at Brooklyn Institute Summer School at Cold Spring Harbor, Long Island, and then climbed Mount Katahdin. The following summer, with forester John Hubbard, he scaled a number of the highest peaks in the San Juan Mountains of southwestern Colorado. Both men narrowly escaped becoming fulgerites during a lightning storm on the summit of Pigeon Peak at an elevation of nearly 14,000 feet. As they stood on the highest point, their raised fingertips crackled, their hair crackled and stood on end, and their pain was intense. When they came down from the topmost rock the pain ceased but they found the sensation so interesting that they climbed up again several times to see how long they could stand it. Ten days later they climbed Mount Sneffels (14,150 ft) where, in a can on the summit, they found a card signed by Rollin T. Chamberlin, Department of Geology, University of Chicago. Perhaps that incident influenced Cooper to continue graduate studies at Chicago.

At that stage of his life, however, Cooper's sheer love of mountains and mountaineering nearly ended an auspicious scientific career. He had developed a writing skill strongly reminiscent of that of John Muir, and he came near devoting his life to it. But that trend ended accidentally, following his exposure to a "typhoid dinner" served at commencement at the end of his junior year at Alma. That dinner brought on sixty cases of typhoid, and six died. His father had a mild attack, and although Cooper himself did not develop any true typhoid symptoms, he felt that the sickness of the following year, which necessitated the interlude in

North Carolina, might have been due to that episode. That health problem, combined with a strenuous month of mountain climbing in the San Juans, which included an especially exhausting final half-mile of running through a marsh to catch a train, may have brought on symptoms of the heart ailment from which he almost expired soon after beginning graduate studies at the University of Chicago in the winter quarter of 1909. His infirmity put an end to all thoughts of strenuous projects comparable to the San Juan adventure, either for research or just for fun. From that time on, science, not adventure, was to come first.

He continued graduate studies at the University of Chicago under eminent teacher and plant ecologist Henry Chandler Cowles, whose pioneer studies on the dynamic physiographic ecology of the Lake Michigan dunes and other features of the Chicago landscape were to change the whole direction of studies in that young science. Courses taught by glaciologist T. C. Chamberlin and geographic geologist R. E. Salisbury, whom Cooper found to be inspiring teachers, influenced all his subsequent research and teaching. Cowles suggested Isle Royale in Lake Superior as a suitable site for a doctoral thesis research that would be compatible with his heart condition. Cooper's Isle Royale study on the development of vegetation was carried out in the summers of 1909 and 1910. He received his Ph.D., magna cum laude, from Chicago in 1911. His major publications on the Isle Royale study soon became modern classics in the field and established Cooper firmly in a career in science. But drama and especially music came to occupy an important part of his life as well. The Civil War, Mormonism, photography, Picasso, and the Restoration Period in English history were his other important interests. His heart condition improved greatly and never restricted his research and teaching activities, but after his retirement a heart pacer was implanted, and he was on his third pacemaker when he died.

Cooper spent the four years after 1911 in California, studying the Redwood forest and the chaparral and related vegetation; while in that region he developed a long-term interest in the strand and dune flora of the Pacific Coast region. He also studied the geomorphology of the dunes in California and Oregon and later carried on studies with smoke bombs to visualize the wind patterns associated with the development of special dune shapes along the Oregon coast. These dune studies were completed after his retirement, and were published (1958, 1967) as Geological Society of America Memoirs.

In the summer of 1914 Cooper visited the Canadian Rockies and studied vegetation development on deglaciated terrain in the vicinity of Mount Robson, British Columbia. That same summer he made a trip to Alaska, exploring for sites where glacial recession and development of vegetation from bare ground into forest would be proceeding so rapidly that one could expect to follow the whole process in a single lifetime. He found these conditions at Glacier Bay, where he went at the suggestion of Lawrence Martin, associate professor of physiography and geography, University of Wisconsin, and co-author with R. S. Tarr (1914) of "Alaskan Glacier Studies of the National Geographic Society." In the summer of 1916 Cooper returned on his first scientific expedition to that region. There he was able to study plant successions from the earliest seedling stages of willows and cottonwoods, through Dryas-mat and willow-alder thicket stages, to spruce forests. He was also intrigued with the fossil forests he found and realized their importance in ascertaining the history of past glaciations and changes in climate.

After his marriage in 1920 to Dorothy Shearer of Minneapolis, Cooper made return trips to the same areas in 1921, 1929, and 1935. His first oral report on the Glacier Bay studies was made to the Ecological Society of American in December 1922. His paper was received with enthusiasm, and he was elected vice-president of the Society in 1927 and its president in 1936. The site of his Alaska studies at Glacier Bay was at once recognized as one that deserved protection on its scenic and scientific merits, and Cooper was chosen to chair a committee of the Ecological Society to explore the feasibility of designating the area as a National Monument or National Park. Those efforts were rewarded in 1925 when President

Coolidge proclaimed Glacier Bay a National Monument. The area is now a candidate for National Park status. A fine peak in the heart of the area was officially named Mount Cooper in his honor on January 10, 1980, by the United States Board on Geographic Names.

Cooper joined the botany staff at the University of Minnesota as an instructor in 1915, became an associate professor in 1927, and a professor in 1929. His major efforts in Minnesota were devoted to teaching and to research on the geological history and changes in the Pleistocene and post-Pleistocene physiography, climate, soils, and vegetation of the state, especially of the Anoka Sand Plain, which lies directly north of the Twin Cities of Minneapolis and St. Paul. The glacial history of that gently southwestward-sloping area that was studded with ponds and small areas of blowout and dune topography had been misinterpreted, Cooper felt sure, by geologist Frederick Sardeson, who had attributed its unusual features to mere wind action on a sandy till substratum.

In the 1920s, in order to understand better the landscape patterns and their causes, Cooper began experimenting with aerial observations and photography; surely he was one of the first scientists in the United States to make use of this great new technique. After a decade of work and a great deal of thought on the topographic patterns, soil profiles, and texture, he published (1935) his now classic work, "The Late Wisconsin and Postglacial History of the Upper Mississippi River." In Cooper's explanation of the formation of the sand plain, he visualized a Grantsburg Sublobe of the Late Wisconsin–Mankato Lobe of the ice sheet, which had been forced *northeastward* and *upslope* from the region of Minneapolis by a massive U-shaped, and probably still ice-cored, terminal moraine left in its southward path by the immediately preceding Cary glacial advance. At its maximum extent, the main Mankato Lobe and the Grantsburg Sublobe blocked the whole drainage of the Upper Mississippi basin to form, at the tip of the sublobe, a glacial lake which he named Lake Grantsburg, for the Wisconsin town now located there. As the sublobe melted back downslope, the glacial Mississippi River moved sideways, slipping across the landscape and leaving an enormous outwash plain dotted with ice-block pit lakes. The small dune sheets that developed later were associated with stream channels where the lowering water table had enabled wind to move the outwash silt and sand before vegetation had become established. Later, during what was then referred to as the Xerothermic period of postglacial climate, dune development was resumed.

A remarkable teacher, Cooper's field courses and seminars excited the students and stimulated their intellectual growth. Many students were greatly influenced by him; one of the most notable was Raymond Lindeman, though not his advisee. The doctoral thesis study of this brilliant young ecologist was centered on Cedar Bog Lake, a former ice-block pit in Anoka County, Minnesota. Although Lindeman died at age twenty-six, he introduced a whole new field of ecological research and conceptualization, which focused on ecosystem development, material and energy flow, and organic productivity (see R. E. Cook, 1977, *Science* v. 98, p. 22–26). Thirteen of Cooper's students were awarded the doctorate, and twenty-four received the master's degree. Cooper published no textbooks, but the following six of his advisees did: R. F. Daubenmire, H. J. Oosting, J. Kittredge, R. R. Humphrey, P. C. Lemon, and F. E. Egler. Another advisee, Dr. John Marr, faithfully assisted Cooper during his many years at Boulder, Colorado, where Cooper had moved upon retirement to be near his mountain property facing Long's Peak. Cooper's wife Dorothy died five months before he did. They are survived by their son David S. Cooper of Nyack, New York, daughter Elizabeth C. Maeck of New York City, and five grandchildren.

Cooper received a number of awards, including honorary doctorates from Alma College and the University of Colorado. A memorial fund in honor of the Coopers has been established for the Boulder Philharmonic Symphony Sojciety, Box 826, Boulder, Colorado 80306.

A longer biography, including a comprehensive list of his publications, his manuscripts,

and his graduate students and their thesis titles will be sent on request. His notes, manuscripts, photographs, negatives, and reprints are to be filed with the University of Minnesota Archives.

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