Born in Oakland, California on 28 November 1928, Norman J. Silberling grew up in Oakland during the years of the Great Depression and World War II. His father, Norman J. Silberling, Sr. (1892-1942), was a professor of economics at the University of California at Berkeley who was a renowned expert in finance statistics. He had a Ph. D. from Harvard University and had been a Rhodes Scholar. His wife, Alice Elizabeth Cornish (1893-1974), was a Latin teacher who had been born and raised in Montrose, Colorado. She was an avid naturalist, particularly interested in botany and bird watching, and she introduced and encouraged her son Norm in those pursuits.

In the stock market crash of 1929, which ushered in the Great Depression, Norman Silberling, Sr. lost nearly everything. The family then moved to Stanford, California, in 1930, where he took a position teaching at Stanford University. Here, Norm spent much of his childhood collecting birds (especially eggs and nests) and plants and learning taxidermy. However, tragedy struck again, when Norm’s father died suddenly in 1942, leaving the family nearly destitute. Publication of Silberling Sr.’s book *The Dynamics of Business* followed in 1943, but made little money for the family (although the book is still in print). Norm’s father had a $10,000 life insurance policy, which Norm’s mother used to buy the house they were renting, which she turned into a boarding house to create income for the family.

The sudden death of Norm’s father pushed Norm further into his natural history pursuits. An avid duck hunter, Norm soon became an acknowledged expert on all the ducks of the San Francisco Bay area. Though only in high school, he was frequently doing research in the collections of the California Academy of Science. At that time, Norm also met the botanist Ira Wiggins (1899-1987) and served as his field assistant in studying the flora of Baja California. Wiggins classic book, *Flora of Baja California*, published many years later in 1980, owed a heavy debt to Norm’s help.

Norm graduated from Palo Alto High School in 1946, and was then admitted to Stanford University, entering at the age of 17. He went to Stanford because tuition was waived for the children of former professors; the family simply could not afford to pay to send Norm to college. Freshman year at Stanford saw Norm struggling with mathematics and chemistry, taking his first geology class during the second semester. A turning point in his life came in the summer of 1947. Professor Siemon
Muller (1900-1970) was working for the U. S. Geological Survey in Nevada studying pre-Tertiary rocks and fossils and needed a field assistant. Spotting Norm in the Geology Department office, Si Muller asked him if he could drive. Norm’s affirmative answer got him a job driving and setting up camp for Muller that summer. Thereby, Norm was introduced to Nevada geology and fell in love with the Great Basin, and with the Triassic fossils that so interested Muller. Thus began Norm’s career-long interest in the rocks and fossils of Nevada that made him one of the foremost experts on that subject.

Norm received a B. S. in geology (magnum cum laude) from Stanford in 1950. By then, his career-long association with the U. S. Geological Survey (USGS) had begun, for in 1948 and 1950, Norm worked as a Geologic Field Assistant in the USGS Branch of Paleontology and Stratigraphy. The work in this capacity was also part of the research that Si Muller was undertaking on Lower Mesozoic biostratigraphy and stratigraphy and on the pre-Tertiary regional geology of Nevada. This initiated his early, close association with Muller, who was to become his doctoral dissertation advisor. Indeed, as Muller’s student, Norm was the last great American member of a dynasty of Triassic ammonoid experts that began with Alpheus Hyatt (1838-1902), continued with his protégé James Perrin Smith (1864-1931), followed by Smith’s student Muller and finished by Muller’s student Silberling.

Graduation from Stanford occurred at the beginning of the Korean War, when Norm entered the U. S. Navy. He did so largely to provide financial support for his mother as well as the medical care she would receive as his “dependent.” Sent to the Pacific theater of operations, Norm was assigned to the U.S.S. Bairoko and served as a ship-board line officer, beginning as an Ensign and rising to the rank of Lieutenant JG. Shore leave in Japan during his Navy service found him bird watching there. In Korea, Norm was in combat many times and was awarded the Korean Service Medal with two combat stars.

The Navy liked Norm so much that they tried to convince him to stay on for a career. But, Norm wanted to be a professional scientist, so graduate school was his next step. Turning down Yale University, Norm returned to Stanford where he soon received his M. S. in geology (1953). The fieldwork with the USGS also began again that year, facilitated by the new USGS office in Menlo Park. But, even though the G. I. Bill supported his graduate studies, Norm was so poor that he still lived at home.

Norm went on to receive his Ph.D. in geology from Stanford in 1957. In 1946, he had found tropitid ammonoids in the Upper Triassic section in the Shoshone Mountains of Nevada, and this became (with financial support of the fieldwork from the USGS) his dissertation topic. It also was the basis of his first published scientific article, in 1956.

After the Ph.D., fulltime employment with the USGS commenced, as a geologist in the Branch of Paleontology and Stratigraphy in Menlo Park, California. Norm remained in Menlo Park from 1954 through 1966, with a two year stint in Washington, D.C., during 1958-1959. During his nine months in Washington, the Survey tried to make a bureaucrat out of Norm, but failed, much as the Navy had nearly a decade earlier, because Norm opted to return to scientific work. By then, work in the Humboldt Range of Nevada pushed Norm’s research back into the Middle Triassic (Anisian). Norm’s research thus expanded from his doctorate and focused on a broader range of Lower Mesozoic (primarily Triassic) biostratigraphy of marine invertebrate megafossils (mostly ammonoids). This prompted collaboration with Canadian paleontologist Tim Tozer (1928-2010), one of the great students of Triassic ammonoids.
Norm and Tim Tozer joined forces to produce an ammonoid-based Triassic timescale and thus published one of the classic mileposts along the path to a global Triassic timescale. Titled “Biostratigraphic classification of the marine Triassic in North America” (Geological Society of America, Special Paper 110), this work built heavily on the pioneering efforts of Frank McLearn (1885-1964) in British Columbia, and Si Muller in Nevada, who had deciphered much of the ammonoid succession in the American Cordillera. Nevertheless, it was Norm and Tim’s masterful synthesis that established a standard Triassic ammonoid zonation that has been tested and elaborated for decades and is still central to many aspects of the ongoing work on the Triassic timescale.

Norm continued to work on the pre-Tertiary regional geology and tectonics of the western USA, including Alaska. The research in Alaska also initiated Norm’s interest in Triassic “flat clams.” Geologic mapping in Nevada supported his tectonic and stratigraphic studies. Thus began a shift in Norm’s research interests, away from biostratigraphy and stratigraphy to the challenging problems of tectonics of the North American Cordillera. Collaboration with Bob Speed (1933-2003) much enhanced Norm’s understanding of tectonic problems in Nevada.

By 1965, the USGS was having budgetary problems and Norm was looking for new challenges beyond his work for the Survey. In 1966, Norm thus moved back into academia, returning to the Department of Geology at Stanford University. Here, Norm advanced from Associate Professor (1966-1971) to Professor (1971-1975) of Geology. At Stanford, he taught courses in earth history (employing the then new knowledge of plate tectonics), carbonate petrology (petrography and sedimentology) and geochronology (biostratigraphy, isotopic and other methods) as well as the summer field course. He supervised many graduate students and was also the advisor to freshman geology students and taught introductory geology to them.

While at Stanford, Norm was very successful in obtaining major grants from the National Science Foundation and the Petroleum Research Foundation. Funded projects included pre-Tertiary tectonic history of the Sonoma Range Quadrangle in north-central Nevada (1968-1969), biostratigraphic studies of Triassic marine invertebrate faunas in northwestern Nevada (1970-1971), stratigraphy and depositional history of Triassic carbonate rocks of the Star Peak Group in north-central Nevada (1973) and stratigraphy and sedimentology of a regional dolomite in east-central Nevada (1974-1975). Perhaps most important was that this funding allowed Norm to continue and finish part of the life work of Si Muller by placing all of Muller’s Triassic fossil collections from Nevada into their precise stratigraphic context. While at Stanford, Norm also met (in 1968) his wife of more than 40 years, Kathy Nichols (1946-- ).

Norm reinvented himself at Stanford, emerging as a structural geologist. But, by the mid 1970s, the geology program at Stanford was moving away from classical geology toward geophysics and geological engineering. So, in 1975, the USGS in Menlo Park (and later in Denver) welcomed Norm back to his position as a geologist in the Branch of Paleontology and Stratigraphy. Nichols and Norm soon finished a monographic study of the Middle Triassic ammonoids at Fossil Hill in the Humbold Range. Indeed, despite the job change, his research was uninterrupted as Norm continued to work on Triassic biostratigraphy, the geology of Nevada and the tectonics of the western USA.

However, a turning point came in 1979 through 1984, when Norm was the chief of a USGS project that defined and characterized the accreted tectonostratigraphic terranes in the conterminous USA. The project included geologic mapping to support interpretation of the stratigraphy, geologic environments and kinematic history of the Walker Lake terrane in Nevada. Norm also participated in a USGS project (with Davy Jones and Pete Coney, among others) to characterize and interpret accreted terranes in Alaska. This work culminated in his oversight of the compilation of lithotectonic terrane maps of the North American Cordillera. In 1985-1986, his interest in terranes took Norm (with K. M. Nichols) to the South Island of New Zealand. Here, they studied the exotic blocks of limestone, chert and basalt in the Esk Head Mélange of the Torlesse terrane. The work on tectonostratigraphic terranes in Nevada also continued through 1991.

In 1994, Norm retired from the USGS. At that time he was made a Pecora Fellow of the USGS, undertaking research on sedimentology, sequence stratigraphy, paleotectonics and subsequent structural disruption of the Antler foreland in the eastern Great Basin of Nevada and Utah. From 1995 through 2000, he was an Affiliate Professor of Geology at the University of Idaho. In 1995, Norm also began working as a consulting geologist (with K. M. Nichols). This work focused on eastern Nevada and western Utah, producing stratigraphic and structural syntheses based on field studies of sedimentary rocks, carbonate petrogra-

phy, sequence stratigraphic analysis and detailed geologic mapping of critical pre-Tertiary exposures where the stratigraphic record is structurally disrupted.

Throughout his career, Norm was an active member of several scientific societies. These included membership in the AGU, and he was a Fellow of the GSA, a AAAS Fellow and Honorary Fellow of the California Academy of Science. Beginning in 1973, Norm was a key member for decades of the IUGS Subcommission on Triassic Stratigraphy.

On 27 September 2011, Norm Silberling passed away in his sleep from heart failure. With his passing, we truly lost one of the great knights errant of the Triassic timescale and one of the great experts on the geology of the American Great Basin.

— Kathy Nichols and Spencer G. Lucas

SCIENTIFIC BIBLIOGRAPHY OF NORMAN J. SILBERLING (1956-2007)


89. Silberling, N.J. and Jones, D.L., editors, 1987, Lithotectonic terrace map of (A) Alaska (west of the 141st Meridian), (B) western Canada and...
southeastern Alaska, (C) western conterminous United States, and (D) Mexico (west of the 91st Meridian): U.S. Geological Survey Miscellaneous Field Studies, Maps MF-1874-A, B, C, and D.


