

# ROCK STARS

## W.H. Twenhofel: Patriarch of Sedimentary Geology

R.H. Dott Jr., University of Wisconsin, Madison, WI 53706, USA

Boyhood on a small Kentucky farm was an inauspicious beginning for “The foremost authority in the world of sedimentation,” as a newspaper reporter described William H. Twenhofel when he retired from the University of Wisconsin in 1945. Twenhofel was among a handful of founders of the specialty now called sedimentology, and his university was one of a few centers of research and teaching in that specialty before 1950.

Twen, or Twennie, as he was known to students and colleagues, was born in 1875 to German immigrant parents near Covington, Kentucky, just across the Ohio River from Cincinnati. He attended public country primary schools, but had to attend a private school to gain a secondary education. Because of his family's modest economic means, Twenhofel began earning his own living when he was a teenager. This infused him with frugality, self discipline, and great capacity for work—qualities that served him well throughout his career. From 1896 to 1904, he taught in local schools during the winter and took other jobs—for example, as a conductor with the Covington Street Railway Company—in the summer. In 1899, he married his childhood sweetheart, Virgie M. Stephens.

During the summers of 1902–1904, Twenhofel studied at the National Normal School in Lebanon, Ohio. After receiving the B.A. in 1904, he taught at the East Texas Normal College in Commerce, Texas.

The rich Ordovician fossils of the Cincinnati area had nurtured the careers of several outstanding American paleontologists, but for Twenhofel it was a delayed reaction. He first taught mathematics and intended to pursue that for postgraduate studies. But in his last year at East Texas, he had to take over the duties of a recalcitrant geology instructor, and that was a turning point. As he told the reporter in 1945, he had become interested in geology by accident. “I've always been a collector. As far back as I can remember, I picked up arrowheads and fossils and saved them.”

By 1907, at the age of 32, Twenhofel had saved enough money to enter Yale University. He quickly earned another A.B. (1908), the M.A. (1910), and the Ph.D. (1912). At Yale, Twenhofel was influenced by Joseph Barrell and Charles Schuchert, the latter of whom was one of those outstanding Cincinnati-born paleontologists. Schuchert suggested a dissertation in maritime Canada to study fossils along the Ordovician-Silurian boundary. Twenhofel

recalled that the area where he worked from 1908 to 1910 was remote and wild, requiring an “expedition which entails hardship. You spend half of your time getting to your destination and half of the remaining time waiting for the rain to quit.” He walked 700 miles around Anticosti Island while his supplies followed by dories rowed just offshore. It was worth it, because “Anticosti is ram-jammed full of beautiful fossils.” He once stayed with a local, “Old Man Hollister, who took care of us the best way he could—dried salmon and bread; no butter, no plates, and only a little molasses in our tea.”

Twenhofel's early Canadian research brought him back to the maritime region for many years. Although the first half of his career was primarily in paleontology and stratigraphy, his presidential address to the Paleontological Society in 1931 foreshadowed a new sedimentation career by emphasizing the importance of sedimentary environments to paleoecology.

Joseph Barrell had interested Twenhofel in how weathering, erosion, depositional environments, and subsidence affect sedimentation. This gave the impetus for Twenhofel's second career. His first contribution came when he joined a 1914 Harvard expedition to the Baltic Sea to compare the lower Paleozoic paleontology and stratigraphy with that of maritime Canada. Once, Twenhofel's small boat grounded in a bay, and when he jumped out, he sank up to his waist in black, stinking mud. This prompted a short article on black shale in the making. Together with dolomite and banded iron formation, the origin of black shale was for years an intractable problem (the origins of these three are still debated). World War I began while Twenhofel was investigating Silurian rocks on the Baltic island of Gotland. He was arrested because he was foreign, but the officer had once been “a Boston cop so I talked my way out of it.”

In 1910, Twenhofel began teaching at the University of Kansas, and in 1915, he became state geologist. In 1916, he moved to the University of Wisconsin. His sedimentation career blossomed with an appointment in 1919 to the National Research Council (NRC) Committee on Sedimentation. This body assembled investigators to survey the newly emerging specialty. Twenhofel remained on the committee until 1949, and he chaired it from 1923 to 1931. He wrote most of *A Treatise of Sedimentation*, published by the committee in 1926. The appearance of this seminal volume and the creation of the Society of Economic Paleontologists and Mineralogists in the same year marked the beginning of modern sedimentology. Twenhofel was a key player in both events, and in 1930 co-founded the *Journal of Sedimentary Petrology*, the first journal in the field. From 1933 to 1946, he was its editor.



William H. Twenhofel (1875–1957) as he appeared during his 29-year career at the University of Wisconsin.



Twenhofel relaxing for a contemplative moment in the field.

Twenhofel had an unusual talent for directing committee efforts. He could get colleagues to work hard and achieve timely completions, which many today would regard as a near miracle. After chairing the Sedimentation Committee, he directed the NRC's Division of Geology and Geophysics (1931–1934) and helped organize the Committee on Stratigraphy. Next he chaired the NRC Committee on Paleocology (1934–1937).

Twenhofel made many additional contributions. In 1935, he co-authored a popular textbook of invertebrate paleontology, and in 1939, he published *Principles of Sedimentation*, the first North American textbook on that subject. In 1941, he co-authored *Methods of Study of Sediments* with Stanley A. Tyler. Studies of the mineralogy of sediments began in Europe around 1900, and accelerated in the 1920s and 1930s as the petroleum industry sought criteria derivable from small drill cuttings for correlation between wells. Variations among accessory minerals in sandstones seemed promising; it was this study of sedimentary mineralogy that had prompted the creation of the *Journal of Sedimentary Petrology*.

With a strong tradition in mineralogy and petrology, the University of Wisconsin was a natural venue for accessory mineral studies, and Twenhofel directed student research on the heavy minerals of several Paleozoic and Precambrian formations. In the long run, however, microfossils proved more valuable for industry, so the heavy mineral era yielded to other themes in sedimentology.

During the 1930s and 1940s, Twenhofel began investigating lake sediments, which complemented pioneering research by University of Wisconsin limnologists. He co-authored papers on lakes with 10 students, including Vincent E. McElvey, who later became the ninth director of the U.S. Geological Survey (1971–1978). Twenhofel also wrote about such topics as Cambrian glauconitic greensands and their potential as a source of potash fertilizer, marine conglomerates and unconformities, deep-sea sediments, and corals and other reefs, but he is remembered especially for emphasizing sedimentary environments. Having “been born with the outdoors in his blood,” he observed all of nature, especially plants and soils. Reflecting his farming

roots, Twenhofel wrote and lectured about the geologic origin of soils and how vital they are to humankind, and he warned of the dangers of soil erosion.

Among the many honors bestowed upon Twenhofel, the greatest was the creation of the Twenhofel Medal, the Society of Economic Paleontologists and Mineralogists' highest award. Multitudes of students remembered W.H. Twenhofel as an inspiring teacher whose lectures were laced with humor and memorable anecdotes. Annual dances for students in the Twenhofels' attic were legendary, and he was reknowned for public outreach. The affection for “Twen” was exemplified by a present from his introductory geology class in May 1944. The accompanying card stated, “Our thanks to you for being the friend of students and youth, as well as the true scholar that you are.”

According to Robert R. Shrock, Twenhofel held the philosophy that an investigator's “every faculty should be used—the *feet* to carry [one] across the strand, along the cliff, and over the rocky wastes; the *eyes* to search out the endless detail of the geological record; and the *mind* to analyze the significance of those details.” The energetic and alert W.H. Twenhofel always practiced what he preached.

*The Rock Stars series is produced by the GSA History of Geology Division. This profile was edited by Robert N. Ginsburg, rginsburg@rsmas.miami.edu.*

### Further Reading

Dunbar, Carl O., 1960, Memorial to William Henry Twenhofel: Proceedings Volume of the Geological Society of America Annual Report for 1960, p. 151–156.

Shrock, Robert R., 1947, William Henry Twenhofel—Honorary Member: American Association of Petroleum Geologists Bulletin, v. 31, p. 835–840.



W.H. Twenhofel (right of speaker) dressed in 1940s' field style on an excursion in central Wisconsin. “The rugged little professor” could outwalk students less than half his age.