ROCK STARS

David White (1862–1935): Pioneer in Coal, Petroleum, and Paleobotanical Studies

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David White, ca. 1912, about the time he became chief geologist of the U.S. Geological Survey.

David White rose from farm boy to teacher in rural New York, from assistant paleontologist to chief geologist in the U.S. Geological Survey (USGS), and then to president of the Geological Society of America. During his 49-year career with the USGS, he provided great leadership and earned acclaim in paleobotany and petroleum geology.

The Early Years

Charles David White was born on his father's farm near Palmyra, New York, on 1 July 1862. David, as he was known throughout his career, came under the influence of a young Dutch immigrant, Daniel van Cruyningham, who worked as a laborer on the White farm. Later, van Cruyningham became principal of the nearby Marion Collegiate where White enrolled, earning his way by farm work and teaching. Van Cruyningham encouraged White to study the flowering plants of the region.

White won a scholarship to Cornell and paid for his expenses mostly by teaching elementary drawing. His mentor at Cornell was Henry S. Williams (1847–1918), who is best known for proposing the "Pennsylvanian System." Williams knew of White's interest in flowering plants and suggested as his bachelor's thesis a study of the enigmatic Devonian plant fossil, *Ptilophyton*, not to be confused with *Psilophyton*, a primitive vine-like land plant. Williams was impressed by White's thesis and his finely executed line drawings.

In 1886, Lester F. Ward (1841–1913) of the USGS inquired of Williams if he had any students who could make accurate line drawings of plant fossils. Ward was working on Cretaceous floras of the western United States. Williams recommended White, who was hired by Ward at a salary of US$900 per annum (~US$45,000 in today's dollar).

When White began his career with the USGS in 1886, paleobotany was in its infancy in North America. The work of five paleobotanists on late Paleozoic floras, before White's contributions, deserves special mention: John S. Newberry (1822–1892) on Ohio floras (1856, 1873); William F. Fontaine and Israel C. White's controversial Dunkard floras (1880); the "Coal Flora" (1879–1883) of Leo Lesquereux (1806–1889); and the geological history of plant fossils (1888) by John W. Dawson (1820–1899). Lesquereux's work is widely considered the founding of paleobotany in North America.

In 1888, White married Mary Houghton of Worcester, Massachusetts, whom he had met at Cornell, where she was a student of literature and history. They lived in Washington, D.C., all their married years and did not have any children. When not burdened by administrative duties, White worked in the Appalachians and out West. He and Mary were also hosts to many people interested in geology, charity, and social service.

Early Career Highlights

On his own initiative and to the delight of Ward, White studied the flora of the Gay Head section, Martha's Vineyard, Massachusetts. This section was considered to be Tertiary by such notables as Charles Lyell on his 1841 visit to the United States. In a paper published in 1890, White established that the flora was of Middle Cretaceous age.

At Ward's suggestion, White reclassified some 100,000 specimens of Carboniferous plant fossils in the Ralph D. Lacoe Collection, which was donated to the U.S. National Museum in 1893. Lacoe was a businessman and amateur collector who had amassed a large collection of plant fossils. After going through the plant fossils in this collection, White was convinced that he could resolve stratigraphic uncertainties in the Pottsville Formation, a terrestrial Pennsylvanian sequence. In 1900, he published his work on the Pottsville floras, showing that his floral zones could be used to resolve stratigraphic uncertainties in various eastern states.

In 1897, White and Charles Schuchert were sent as part of Peary's Expedition to study a meteorite in Greenland. There they discovered what is now considered a classic Cretaceous flora locality.

In 1899, White essentially established modern correlations of the Pennsylvanian sequence with Europe. Although later workers made some refinement to these correlations, his floral zonations are benchmarks in the age and correlations of Pennsylvanian floras.

The work of White in the Anthracite region of eastern Pennsylvania, then the largest producer of coal in the country, led to the discovery by him of millions of tons of coal unknown to coal operators.

Botanist Reinhardt Theissen (1867–1938) was White's field assistant in the very early part of the twentieth century. Thiessen used the thin-section technique to study coal, a technique developed in England in the early 1800s. White and Thiessen studied the origin of coal; their book on coal (published in 1913) disproved the allochthonous origin of coal, the popular theory of the time.

White Discovers the "Death Line" of Petroleum

White was able to relate increasing fixed carbon in coal to an increasing degree of coalification and in 1913 demonstrated that petroleum was not likely to occur where the fixed carbon of coal exceeded 65% to 70% (i.e., that this was a "death line" for oil). This hypothesis and its application established White as an expert on oil and gas exploration. He considered his "carbon-ratio hypothesis" to be his greatest scientific contribution.

Also in 1913, after having been appointed chief geologist of the USGS, White initiated studies of the petroleum potential of the oil shales in the Eocene Green River Formation. White served as chief geologist during World War I and trained many geologists in petroleum geology, a notable proportion of whom became world leaders in this field after the war. White was a member of the War Minerals Committee and did research on oil shales as a possible source of gasoline. As a member of the National Academy of Sciences and the National Research Council, he promoted research on the origin of petroleum. White used gravity measurements to locate anticlines with petroleum. Under his leadership, the first estimates of the petroleum reserves of the United States were made, which led to a new search for petroleum.

People White Inspired

Although he had seemingly boundless energy, partly expressed by climbing stairs three at a time to get to his fourth-floor office at the U.S. National Museum, it was not all directed toward scientific and administrative matters. After the Russian Revolution of 1917 and while he was USGS chief geologist, he did his best to aid scientists who came to the United States. One of the scientists he helped was Taisia Stadnichenko, a brilliant Russian chemist whose career was wrecked by events in Russia. She was hired by White to assist him in his studies of oil shales. "Uncle David," as she affectionately called him, was her mentor at the USGS. They collaborated on several papers on oil shales.

White never missed an opportunity to inspire a young mind, pose a scientific problem, and guide a scientist to its solution. Two other examples of those he inspired and guided were the budding paleobotanists Charles B. Read (1907–1979) and William C. Darrah (1909–1989). Read, White's assistant, in collaboration with Sergius H. Mamay of the USGS, established the modern Carboniferous-Permian megafloral biostratigraphic scheme in 1964.

National Parks

During the late 1920s, White took great pride in the fact that he cooperated with the U.S. National Park Service and even wore its uniform while in the field (see photo below). In the Grand Canyon, in addition to studying Permian floras, White studied Precambrian beds with suspected algal remains.

Honors and Awards

David White never sought monetary rewards or honors of any kind. His many honors were graciously received when they came. His service to science, the country, and mankind were the driving forces of his life.

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FURTHER READING

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White (left) and park naturalist Edwin McKee examining fossils, Grand Canyon National Park, 17 June 1929.