

Centennial of the Wolfcamp Formation*

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Introduction

This year marks a centennial celebration for petroleum geologists in more ways than one. A few months after the founding of AAPG in early 1917, the first description of the Wolfcamp Formation was published in the University of Texas Bulletin No. 1753 titled, “Notes on the Geology of the Glass Mountains” by J.A. Udden, on September 20, 1917.

Johan August Udden ([Figure 1](#)) described a series of outcrops in the Wolf Camp Hills that lie at the southern end of the Glass Mountains, approximately 12 miles northeast of the town of Marathon in Brewster County, Texas ([Figure 2](#)). “Overlying the Gaptank there are some beds which I have called the Wolfcamp,” stated Udden. “Observations on this formation have been made chiefly at Wolfcamp, from which it takes its name. Wolfcamp is the site of an old dwelling-place, not now inhabited. ‘Lobo’ wolves are said to frequent the place.”

“The Wolfcamp consists mostly of shales which vary in color from almost black to gray and greenish-gray. Interbedded with this shale are several layers of limestones which are cemented shell breccia, in places conglomeratic,” he continued.

Two months later, in the University of Texas Bulletin 1762 titled “The Permo-Carboniferous Ammonoids of the Glass Mountains, West Texas, and their Stratigraphic Significance,” by Emil Böse, Udden clarified his involvement in the naming of the Wolfcamp. In an editor’s footnote he credited Böse and fellow researcher Charles L. Baker as co-discoverers of the Wolfcamp Formation.

Continued Research

Starting from that description of a single locality in 1917, subsequent researchers identified and described the Wolfcamp in numerous surface and subsurface locations over a large extent of west Texas. Today the lowermost series of the Permian system in North America is called the “Wolfcampian” as defined on the Correlation of Stratigraphic Units of North America (COSUNA) charts. It is equivalent to the Asselin and Sakmarian Series on the International Commission on Stratigraphy International Chronostratigraphic Chart.

The Wolfcamp Formation has received a great deal of press lately. A recent assessment by the U.S. Geological Survey resulted in the largest estimate of technically recoverable continuous oil and gas reserves ever assessed by the USGS in the United States: 20 billion barrels of oil, 16 trillion cubic feet of associated natural gas, and 1.6 billion barrels of natural gas liquids. And that is just in the Midland Basin portion of the Permian Basin; the Delaware Basin could contain a similar volume.

A Man of Many Accomplishments

Johan August Udden was born at Lekasa, Sweden, on March 19, 1859 and two years later came to America with his parents, who settled in Minnesota. Udden earned his bachelor and master's degrees from Augustana College in Rock Island, Illinois., and taught natural science and civics at Bethany College, Lindsborg, Kansas from 1881 to 1888, then returned to Augustana College as a professor of natural history and geology from 1888 to 1911. During his tenure at Augustana, Udden taught various courses in botany, zoology, physiology, meteorology, and geology and at times he helped out in fields such as history.

In 1911, he became a geologist in the Bureau of Economic Geology and Technology of the University of Texas, and was named director of the Bureau in 1915. In 1914, from a study of cuttings from a deep well in West Texas, he demonstrated the occurrence of extensive deposits of potash salts in the Permian Basin. Today, potash mines in the northern Delaware Basin near Carlsbad, New Mexico, provide 75 percent of the domestic production of potash salts, which are used in the production of agricultural fertilizers.

In 1916, Udden advised the regents of the University of Texas of the probable occurrence of oil and gas in the University lands of West Texas. It wasn't until seven years later that the Santa Rita No. 1, regarded as the first producing oil well in the Permian Basin, began production. Today the University Lands System administers the surface and mineral interests of 2.1 million acres of land across nineteen counties in West Texas for the benefit of the Permanent University Fund (PUF). The PUF is one of the largest university endowments in the United States and benefits more than twenty educational and health institutions across both The University of Texas System and Texas A&M University System.

In 1894, Udden first published on sedimentary processes of the atmosphere, a line of investigation that culminated in an important publication on the mechanical composition of loess and other wind deposits. As an outgrowth of this work he established, with C. K. Wentworth in 1922, a geometric grain-size scale that became the norm in the geological sciences. The grain size classification scale that is commonly called the Wentworth Scale is more properly known as the Wentworth-Udden Scale.

Udden received four honorary degrees: a Ph.D. from Augustana College in 1900, a doctorate of science from Bethany College in 1921, a doctorate of science from Texas Christian University in 1923 and Doctor of Laws from Augustana College in 1929. He held membership in several scientific societies including the American Association for the Advancement of Science, (Fellow, 1906) Geological Society of America, American Association of Petroleum Geologists, Sigma Xi, and the Illinois, Iowa, Oklahoma, and Texas (Fellow) Academies of Science. In 1929 he was elected honorary member of the Society of Economic Paleontologists and Mineralogists. In recognition of his distinguished service in sciences, Udden was knighted in 1911 by King Gustaf V of Sweden.

Future of the Wolfcamp

For most of the 20th century, the Wolfcamp was a secondary target in the Permian Basin, greatly overshadowed by formations such as the San Andres and Ellenburger. Going forward in the 21st century, it is likely that the Wolfcamp will be the premier reservoir for development of oil and gas in the Permian Basin.

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Author

Richard Bain ([Figure 3](#)) recently retired after 37 years with Chevron during which time he worked exploration and development projects in South Louisiana, South Texas and the Permian Basin. His most recent area of focus was a regional characterization of the Wolfcamp Formation in the Delaware Basin.

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Figure 1.
Johan August Udden.

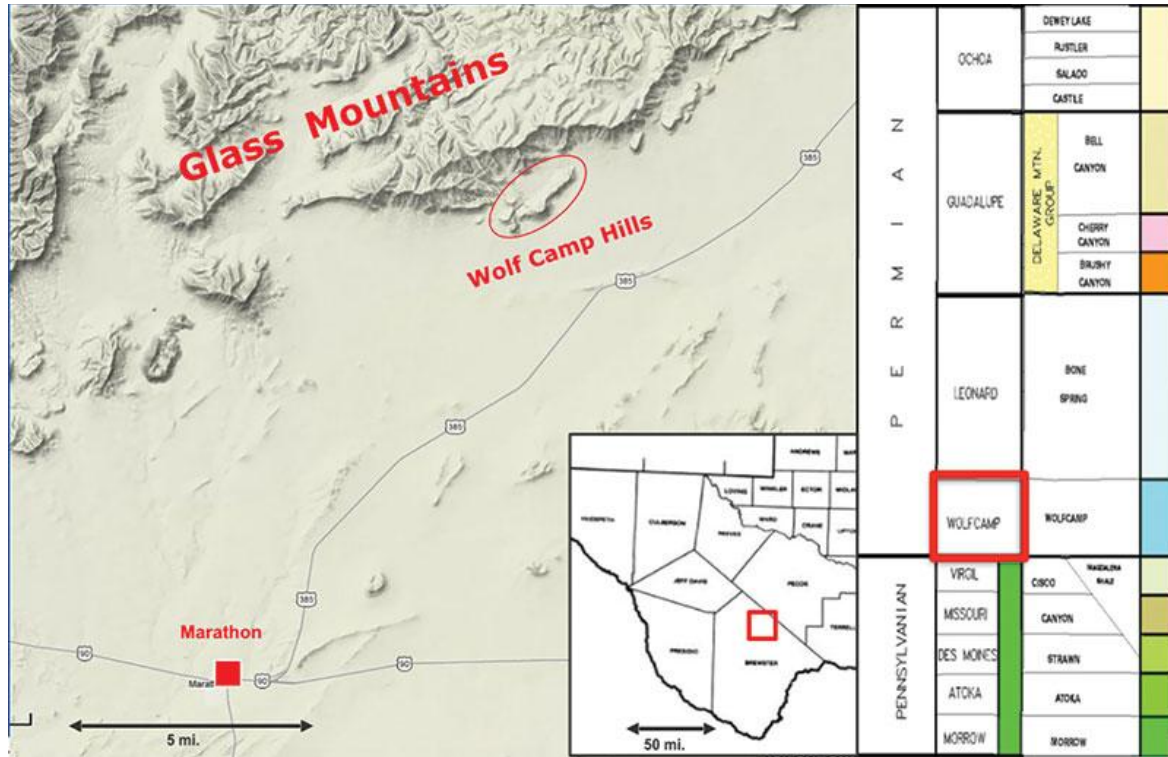


Figure 2. Location map of Glass Mountains, West Texas, and type locality of the Wolfcamp Formation, along with stratigraphic chart showing position of the Wolfcamp



Figure 3. Richard Bain.