

**PRACTICAL TOOLS  
THE BEGINNING OF PROFESSIONAL PRACTICE,  
AND THE FOUNDING OF AAPG: 1900 – 1917**

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Subsurface structure contours have been used as a method in delineating anticlines since the 1870s. In 1902, William T. Griswold of the U.S. Geological Survey, created a technique to map structure contours using spirit leveling, and later, plane table and alidade. Griswold taught this technique to his geologist colleagues, such as Malcolm J. Munn, where it was used to identify anticlinal traps for petroleum exploration.

In 1908, Griswold left the U.S. Geological Survey and started one of the first geological consulting firms in the world with his former colleagues at the U.S. Geological Survey: Edgar McCrary and Fred Hutchinson. The company, W.T. Griswold & Company, also hired an employee named Kessack D. White, a student at the University of Kentucky. After two years, Griswold left to become the Chief Geologist of the Philadelphia Company. The firm was renamed the Hutchinson & McCrary and was in operation for five years in Marietta, Ohio, until it was dissolved in 1912.

In early 1913, Edgar McCrary moved to Tulsa to work for the Guffey-Gillespie Oil Company, where he established the first geologic exploration department within a petroleum company in Tulsa. He brought with him the technique of mapping subsurface structure contours using plane table and alidade. While as Chief Geologist for Guffey-Gillespie Oil Company, Edgar McCrary hired a geologist, J. Elmer Thomas, who would very soon become the first President of AAPG.

Malcolm J. Munn left the U.S. Geological Survey and moved to Tulsa in mid-1913, where he organized and headed the geological department of Gypsy Oil (Gulf Oil) company. This was the second oil and gas company to establish a geological department in the mid-continent. Malcolm Munn was the Chief Geologist with Gypsy Oil from 1913 through 1918.

Edgar McCrary, Malcolm Munn, and Kessack D. White are recognized as founders of AAPG. They showed that the use of the plane table and alidade was cost effective in the creation of detailed structure contour maps. Sydney Powers, in 1926, mentions that the technique was rapidly adopted in the mid-continent region, after it was introduced in 1913. Mapping structure contours using plane table and alidade was the practical technique that made the use of geology indispensable to oil and gas exploration, and enabled the founding of AAPG.

**THE DISCOVERY OF DAQING OILFIELD IN CHINA**

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Daqing oilfield, the largest oilfield in China, was discovered in 1959 and reached its full production, 3 million tons (or 22 million barrels) of crude oil, in 1963, which was about half of the oil production in China that year. Prior to the discovery of Daqing, oil in China was mostly found in the western part of the country in a marine depositional basin. Chinese geoscientists developed a theory of terrestrial oil generation and evoked a shift of the exploration focus from the west to the east and into the Songliao basin which ultimately resulted in the discovery of Daqing.

After the discovery well, Songji-3, a stratigraphic test well was drilled in 1959 from which MOG (Ministry of Geology) and MPI (Ministry of Petroleum Industry) jointly explored the central depression of Songliao basin and delineated the field size. In the early 1960s, MPI with the support of the central Chinese communist party and the state council mobilized nearly the entire country to develop the Daqing oilfield which achieved a remarkable outcome in 1964 by making China self-sufficient in oil and set a “self-reliance” example for Chinese industry.

Today, looking back at the history of the Daqing discovery, many Chinese scholars still argue about who discovered the field. Due to the political influence and academic bias, there is no widely accepted consensus among Chinese academics; however, three Chinese geologists, Li Siguang, Huang Jiqing, and Xie Jiarong are generally regarded as key contributors of Daqing discovery.

**HISTORY AND GEOLOGY LEADING TO THE  
DISCOVERY OF THE UTICA/POINT PLEASANT  
PLAY IN THE APPALACHIAN BASIN**

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The Ordovician Utica/Point Pleasant shaley limestone has long been known as the source rock for conventional Trenton, Black River, Copper Ridge, Rose Run and Beekmantown plays throughout the Appalachian and Michigan Basin. It has all of the correct ingredients; TOC, burial depth, porosity, permeability, seal and over-pressuring. The vast majority of the

hydrocarbons produced in the “Utica” Play are actually from the Point Pleasant Formation, which is Ohio’s terminology for the shelf edge deposits surrounding Trenton Limestone platforms in New York, Ohio, West Virginia, Kentucky, Michigan, surrounding states and Canada.

The Utica/Point Pleasant Shale Play dates back to 1859 when the rock’s Michigan Basin equivalent, the Collingwood Shale, was mined and distilled into oil in Craigleith, Ontario. This endeavor was short lived due to the simultaneous discovery of oil in Pennsylvania. In the late 1880’s Trenton gas was discovered in New York State along the shore of Lake Ontario. This high-pressure discovery was deemed to be from the Trenton Limestone, however it contained a shaley carbonate source rock, similar to the Point Pleasant.

John Galey drilled the deepest cable tool well in the world in 1944 in Butler County, PA, which had significant shows in the Point Pleasant interval. In more modern times several near-shelf-edge conventional Trenton fields were discovered in West Virginia, New York and Ohio. In 2009 Range Resources drilled the first horizontal Utica Point Pleasant test in the United States, located in Beaver County, PA. The well was deemed to be non-commercial and was not turned into line. The following year Chesapeake drilled their Buell discovery well in Harrison County, Ohio.

All of the old shows plus thousands of Trenton penetrations in the Ohio Knox play contributed to Chesapeake’s successful campaign to initiate the “Utica Play” in Harrison and Carroll County, Ohio. Chesapeake paid attention to oilfield history and existing geological data to discover one of the premier unconventional plays in the world!

### **HYPOTHETICAL 1859 NORTH AMERICAN EXPLORATORY PROGRAM**

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As the 1850s came to a close, the pre-modern oil industry was in a state of flux after the collapse in whale-oil production due to overharvesting. The manufacture of coal gas for municipal lighting and heating systems was a mature industry in North America and Europe, and efforts to maximize the by-product yield of liquid oils through modification of the retort process and the choice of raw materials had become a rapidly expanding focus. Thanks in large part to state and provincial governmental surveys, knowledge of North American geology was improving rapidly. By the end of the 1850s a few hundred scientific publications had documented the natural occurrence of hydrocarbons or rocks suitable for coal-oil manufacture in

29 American states and 5 Canadian provinces (using modern political boundaries), with natural flows of petroleum or carburetted hydrogen (methane) gas reported from wells in at least 12 of them. Commercial production of oil at Enniskillen in western Ontario was already underway, initially from surface excavation and hand-dug wells. Even in the absence of the 1859 Drake well at Titusville or the proprietary Benjamin Silliman Jr. report upon which it was based, it is likely that a play concept for petroleum exploration using wellbores would have arisen in the near future.

A hypothetical approach for exploration would have been initial literature research to establish which geographic regions were most prospective, based on the distribution and type of hydrocarbon occurrences, the quality and availability of published descriptions, and market access to population centers. The initial high grading would later have been followed by field research to locate local prospect areas for leasing and drilling. This paper will arbitrarily focus on how exploration priorities would have developed within North America, with the understanding that areas in Europe, the Middle East, Asia, and South America might have had similar promise.

Using these criteria, New York State would have ranked at the top, with geological documentation of petroleum at more than 40 locations, and with transportation corridors to metropolitan markets already in place. Ontario already had production from hand-dug wells at Enniskillen and several other shows to the north of Lake Erie, and would have been regarded as a western extension of the New York play area. Next on the priority list would have been the Ohio - (West) Virginia boundary area along the Ohio River, plus other locations scattered across Ohio, where petroleum and carburetted hydrogen gas were commonly associated with brine wells used in the salt manufacturing industry. Hydrocarbon indications in Kentucky were as good or better than in Ohio, but market access would have been less convenient. California would have completed the top five, with the most prolific surface indications of petroleum for any state, but commercial exploitation would have been hampered by the low quality of its heavy bitumen, and its location remote from major North American markets.

Petroleum seeps associated with earthquakes and volcanic eruptions on other continents had been described on numerous occasions in the European literature, and a search for analogous occurrences in North America would have been prudent. Although volcanoes and earthquakes were uncommon to the east of the Rocky Mountains, bitumen flows were known to respond to earthquakes near Santa Barbara, California, and petroleum had already been found in six states in direct association with igneous rocks. Bitumen shows within the Hartford rift valley of Connecticut/Massachusetts were less impressive than in higher ranked states, but the metropolitan location would have justified serious examination. Likewise,