

FREDRIK TURVILLE THWAITES

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INTRODUCTION

Geologists working in Wisconsin commonly check old field notes in Wisconsin Geological and Natural History Survey (WGNHS) files to see whether earlier geologists left information about their field area. They often find that F.T. Thwaites has been there before them and that his observations and interpretations usually agree with modern ones.

Neither of us ever met Thwaites, but we feel he is one of our closest acquaintances because we continually deal with his observations, interpretations, and idiosyncrasies. Thwaites is best known as a glacial geologist, but he also was an authority on the Paleozoic stratigraphy of Wisconsin and adjacent areas and on Wisconsin geology in general.

This brief biography is nearly the same as that presented at the symposium about Wisconsin geologists at The Geological Society of America meeting in Madison in 1997. This is a chronological review of his life, but it is only a preliminary evaluation of the contributions Thwaites made to geology. A fuller version needs to make use of the large amount of material related to Thwaites in the archives of the WGNHS, University of Wisconsin–Madison Department of Geology and Geophysics, the University of Wisconsin, and the State Historical Society of Wisconsin. Much of the following was taken from two short autobiographies (Thwaites, 1954 and 1961a) and a short biography by Bailey (1980).

THWAITES' EARLY LIFE

Our story begins in 1846 when Thwaites' maternal grandfather

Henry Turville (one of several family members of that name) homesteaded one mile and three quarters south of the capitol (shown in a 1959 map of Madison; fig. 1) nine years after Madison was platted and two years before Wisconsin became a state. Through the years, the farm became crowded with outbuildings, homes for the extended family, a small boat works, and a commercial greenhouse (fig. 2). It is now the Turville Point Conservation Park. The remains of building foundations are hidden in the woods, but daffodils and other nursery plants still flourish.

Meanwhile, Fred's father Ruben Gold Thwaites (1853–1913), son of immigrant Yorkshire parents, moved from Massachusetts to Wisconsin in 1866. Here he worked as a farmhand and schoolteacher and



Figure 1. A 1959 map of Madison showing Thwaites' workplace and homes. The Turville estate is shown in the lower right corner of the map; a more detailed map of the farm is shown in figure 2.

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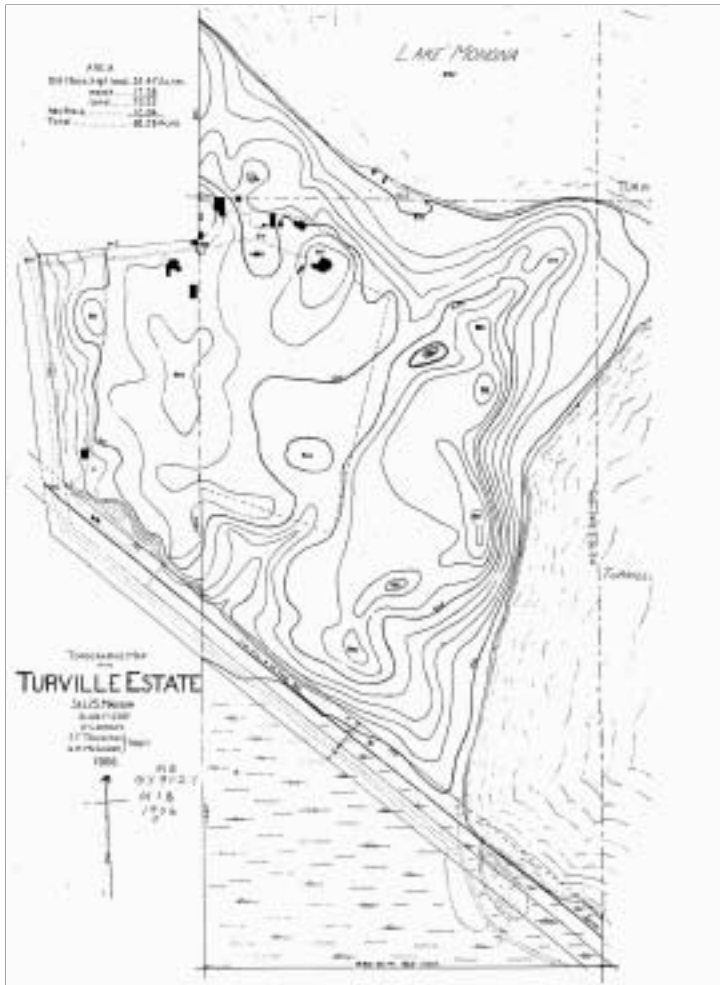


Figure 2. The Turville property, as surveyed by F.T. Thwaites in 1906.

was on the staff of the Oshkosh *Times*; he went back east to Yale and returned to Madison in 1876, becoming the managing editor of Madison's *Wisconsin State Journal*. A decade later he moved to the State Historical Society and soon became its superintendent and secretary. He was a celebrated historian, known for his writings on the settlement of the North American interior, especially during the French period in Wisconsin history, and he edited numerous American historical documents, including the Lewis and Clark journals and the 73-volume *Jesuit Relations*.

In 1882, Reuben married Henry's daughter Jessie Turville (1854–1938). The Turvilles were now considered a "prominent" Madison family. In 1883, Fredrik Turville Thwaites was born; a younger sister died of diphtheria as a baby. During his childhood the family

lived in a mansion with a live-in maid at 505 Langdon Street (later renumbered 260), one-quarter mile east of campus; when he reached his twenties, the family moved to a house on the Turville farm (fig. 2). (We use the modern spelling in this paper, but the family name, along with Fred's middle name, was commonly spelled Turvill or Turvil until early in the twentieth century.)

On the whole, Thwaites seems to have had a comfortable Victorian upbringing. But he nearly died of diphtheria before he reached school age. Until the age of ten, he was home schooled by his mother, who had a botany degree from the University of Wisconsin. He continued to have health problems the rest of his life.

Highlights of Thwaites' early life include several trips that influenced the direction of his later career. When he was ten years old, he accompanied his father and mother on a 1,000-mile trip down the entire length of the Ohio River in a 15-foot skiff with sail. Little Freddy appears as "the boy" in Reuben's (1897) travelogue. This was just one of their many river trips. The family also traveled to Switzerland when he was 13 and Norway when he was 18, and they took a camping trip through Yellowstone Park and the Tetons when he was 19.

MAJOR INFLUENCES: KANSAS, LEITH, AND ALDEN

During his first two years at the University of Wisconsin, he took engineering courses, despite his domineering father's opinion that they were "trade school" courses. His first summer job was measuring depth to water in wells in western Kansas; he said this influenced his shift from engineering to geology, which was somewhat more respectable. In 1906, at age 22, he received his Bachelor's degree, with a senior thesis on the early Paleozoic and the Pleistocene geology of an area just southeast of Madison around Lake Waubesa and Lake Kegonsa.

That summer, he had a fateful encounter with C.K. Leith, who was head of the geology department at the University of Wisconsin during a large part of



Figure 3. F.T. Thwaites at camp on beach near Herbster, doing field work on the sandstone along the shore of Lake Superior. WGNHS photograph 2785, by F.T. Thwaites, circa 1910.

Thwaites' life. He spent the summer working for Leith, who was doing mineral exploration near Cobalt and Sudbury, Ontario. Thwaites and a helper were out in the bush doing dip-needle surveying when the helper developed appendicitis. Thwaites could not get the helper and all the equipment out by himself, so some equipment was left behind and never recovered. As a result, Leith decided Thwaites was irresponsible. From then on, they never got along very well.

The next summer, 1907, at age 23, Thwaites was a field assistant to William C. Alden, who was mapping the Pleistocene geology of southeast Wisconsin for the U.S. Geological Survey, including Thwaites' Master's thesis area. In 1908 (age 24) he received his Master's degree; his thesis was about the early Paleozoic and Pleistocene geology of an area just southwest of Madison, between Middleton, Verona, and Cross Plains, "it being the district traversed by the field excursions of the elementary classes in geology" (Thwaites, 1908). Thwaites was the first to work out the history of glacial Lake Middleton. His faculty advisor for his Bachelor's and Master's theses was N.M. Fenneman, but Alden seems to have been a greater influence; even the shorthand symbols used on his field maps the rest of his life were borrowed from Alden.

"UNFIT TO TEACH"

About this time, Thwaites began hunting for a teaching job in geology. But Leith had decided that he was unfit to teach, so the geology department would not hire him, and Leith would not give him a letter of recommendation. However, he did find a job with the Wisconsin Geological and Natural History Survey. During the summer of 1908 he was a field assistant to Samuel Weidman, who was mapping the Precambrian and Pleistocene geology of northwestern Wisconsin; he seemed to like Weidman but disagreed with many of his interpretations. In 1908 and 1909 he helped state geologist W.O. Hotchkiss with a new geologic road map of the state (Hotchkiss and Thwaites, 1912). In 1909 he began field mapping the Paleozoic geology of the Richland Center area, but had to quit because of illness.

From 1910 to 1912 he studied the Precambrian sandstone along the Wisconsin shore of Lake Superior (fig. 3). He used a small boat with a gasoline engine and was assisted by a Turville cousin. This work was published as WGNHS Bulletin 25 (Thwaites, 1912).

In 1911, at age 27, he was still lacking a letter of recommendation for a teaching job, so he took a half-time job as curator of the geology department's mu-



Figure 4. *Discussing stratigraphy of Cambrian sandstone, 5 miles north of Black River Falls. Left to right: F.T. Thwaites, H.R. Aldrich, E.O. Ulrich, E.F. Bean, R. Bayard, R.N. Hunt. WGNHS photograph 1517, by W.O. Hotchkiss, July 24, 1916.*

seum. The next year, it became a full-time job. He was a “glorified office boy,” but he stuck with it for a frustrating 17 years.

In 1913 Thwaites did some glacial surveying in Glacier Bay for Lawrence Martin, who was internationally known for his Alaskan glacier studies with R.S. Tarr, but is best known in Wisconsin for his *Physical Geography of Wisconsin* (Martin, 1916). According to Thwaites, Alden had mistakenly mapped hummocky sand and gravel in southeast Wisconsin as “terminal moraine,” and he credits Martin with showing him that it actually resulted from the deposition of outwash on stagnant glacial ice, as they had observed in Alaska.

In 1914, after a lapse of a couple of years, Thwaites went to work for the WGNHS again. He examined cuttings from water wells drilled throughout the state and produced a geologic log for each. He continued to do this for the next 43 years. During those years he compiled 2,000 logs.

As a result of knowledge gained during this process, he became the WGNHS expert on the subsurface stratigraphy of the state; he also served as the Survey groundwater geologist most of his life. He was

WGNHS’s only geologist other than the state geologist from 1935 to 1956. For most of that time he received only a token salary for this work. During this period, the WGNHS and the geology department were housed in Science Hall (fig. 1).

A decade associated with E.O. Ulrich began in 1914. Ulrich was a geologist with the U.S. Geological Survey. For a few weeks every summer for several years he studied Paleozoic stratigraphy of the Driftless Area, especially near the Baraboo Hills. Thwaites seems to have been his field assistant and chauffeur much of this time (fig. 4). According to state geologist Hotchkiss, Ulrich was “the best informed man on this continent on the stratigraphy of these formations,” an opinion Thwaites did not share. Ulrich was trying to find evidence for an Ozarkian Period and a Canadian Period between the Cambrian and Ordovician Periods. Thwaites realized that the extra periods resulted from Ulrich’s miscorrelation of formations, and he was not shy about telling him so. Their final falling out occurred in 1924 with a rancorous exchange of letters.

In 1916, W.H. Twenhofel, Lawrence Martin, and Thwaites began field work on the geology of the Tomah and Sparta 15-minute quadrangles in the middle of the Driftless Area (Twenhofel and Thwaites, 1919). That summer, the car replaced horse and bicycle for field transportation. This work was supposed to be published as a U.S. Geological Survey folio. The manuscript was finished in 1922, and years later it was placed in the WGNHS Open-File Series (Twenhofel and others, 1922), but was never published formally because of the stratigraphic disagreements with Ulrich.

TEACHING AT LAST

Through the influence of Lawrence Martin, Thwaites started teaching in the geology department in 1916 when Martin left for the World War. The position was part time and temporary. Thwaites was underweight and did not serve in the war, but he taught plane-table surveying to army trainees. Colonel Martin did not return to the university after the war, and he recommended that Thwaites take over his courses in glacial geology and geologic mapping (fig. 5). At age 32, Thwaites reached his goal of a permanent (but part-time) teaching position in the geology department, while remaining a half-time curator.

In 1922 he produced an early mimeographed version of his future book, which was to be called *Outline of Glacial Geology*. This was frequently updated until published 12 years later.

The years 1926 to 1928 were eventful. He was “fired by Leith,” but the Survey had received a windfall to investigate road materials, including gravel. This apparently paid his salary for two or three years. During this time he began studying the Pleistocene geology of northeast Wisconsin (figs. 6, 7, and 8).

In 1928, he quit his half-time job as museum curator and was hired full time at the instructor level in the geology department; for most of the rest of his career he regularly taught geomorphology, physiography, glacial geology, and geologic mapping. These were popular courses, with large enrollments. His mapping class field trips to Devils Lake in April were especially memorable. It sometimes snowed, and the crew included one or two cooks and a chaperone for the girls. Plane-table mapping was emphasized. At its maximum, it had more than 90 students. His glacial class field trip was usually in May (fig. 5).

That same year, when he was 44 and she was 33, Thwaites married Amy M. Mueller. She had been his student (fig. 5) and a WGNHS secretary. Thwaites said one of the changes marriage brought into his life was he was no longer allowed to carry unwrapped horseradish and swiss-cheese sandwiches to the university in his jacket pocket. In 1931, the first of their three sons was born.

In 1929, on the eve of the Great Depression, the state geologist lost his position on the Wisconsin Highway Commission; money was no longer available to do road material surveys, and the northeast Wisconsin Pleistocene work was discontin-



Figure 5. *Glacial geology class at Lake Michigan shore bluff just south of the present site of Two Creeks Buried Forest Unit of the Ice Age National Scientific Reserve. Amy Mueller, F.T. Thwaites' future wife, is upper right in the group of women; Thwaites is at the right end of first row. WGNHS photograph 3403, by F.T. Thwaites, 1925.*



Figure 6. *F.T. Thwaites at test pit searching for red drift as part of road materials survey, 8 miles northeast of Shawano; assistant's hat, hand, and shovel are sticking out of pit. WGNHS photograph 4284, by F.T. Thwaites, July 25, 1928.*

ued. Thwaites' 1929 and 1930 field seasons were spent on a road-material survey in Illinois.

In 1934, his book, *Outline of Glacial Geology*, was published. It was updated several times and revised in 1945 and 1961. It was widely used as a textbook and was the only comprehensive American review of glacial and Pleistocene geology until R.F. Flint's textbook appeared in 1947.

Much of 1935 was spent preparing for the Wisconsin part of the ninth annual field trip of the Kansas Geological Society. This marathon ten-day excursion covered 1,500 miles in Iowa, Illinois, Wisconsin, Minnesota, and Michigan, and included a 471-page guide book. Thwaites led most of the Wisconsin segment.

Since his twenties, Thwaites had lived in one the houses on the Turville property, but in 1938 his mother died and the Turville estate sold the house, so the Thwaites family had to move. They bought a substantial house at 41 Roby Road in University Heights on the southwest edge of campus, where he lived the rest of his life. There his wife lived until her death in 1980.

In 1938, at age 56, he was promoted from lecturer to assistant professor. He never received higher rank, reportedly because he had refused to learn the French and German required for the Ph.D. degree (in rebellion against his multilingual father?), but probably also because of strained relationships with some other faculty members, including C.K. Leith.

He had been doing field work on the Pleistocene geology of eleven counties in northeastern Wisconsin since 1926. The results were published, with a 1:250,000-scale color geologic map, in 1943 in the *Bulletin of The Geological Society of America*. Aside from his book, this was his most elaborate publication. It remains the authoritative publication about much of that area, even though most of the mapping was done without aerial photographs or published topographic maps; the report also contains a 1:250,000-scale topographic map of the entire area, with a contour interval of 50 feet, that he constructed using an aneroid altimeter.

During the war years of 1943 to 1945 he taught physics to naval recruits, and from 1948 to 1952 he was engaged in unfunded field work on the Pleistocene geology of the Door Peninsula in eastern Wisconsin (Thwaites and Bertrand, 1957). In 1953 he led the Midwest Friends of the Pleistocene through northeastern Wisconsin on their fourth annual field trip. He retired from the department of geology in 1955 and from the WGNHS in 1957 at the age of 71. From late 1955 to early 1958, he was occupied compiling the Wisconsin part of a new glacial map of the United States east of the Rocky Mountains; in letters to H.B. Willman (Illinois State Geological Survey), who was one the chief compilers, Thwaites mentions having trouble with the fine details because his eyes bothered him. He died in 1961 at the age of 77.

A PERSONALITY ALL HIS OWN

He was described as "shy," "introverted," "reserved," "unassertive," "skeptical," "gentle," and "kindly." He apparently had an understated wry wit. Francis Hole, University of Wisconsin soil science professor (emeritus), remembers a field trip in northeastern Wisconsin, when Thwaites commented that he had heard about a hermit living down a side road, so he went down the road and found a whole family of hermits.

He never became a friend of C.K. Leith. On November 11, 1954, the year he retired, Thwaites gave a



Figure 7. F.T. Thwaites (center), German Pleistocene geologist Paul Woldstedt (right), and student A.T. Eberhardt in northern Oconto County. WGNHS photograph 4449, by F.T. Thwaites, September 3, 1928.

talk to the Geology Club. State Geologist George F. Hanson was there and took notes. The title was *History of Wisconsin Geology* (Thwaites, 1954), but it was actually the story of his life. This was the talk he was going to give at a Geology Club banquet, but did not because C.K. Leith attended. Thwaites said he didn't want to cause him to have a stroke.

In that talk he commented that he made a critical decision in his life in 1907 when he turned down a teaching assistantship in mineralogy at Brown University, perhaps the only offer he received. He decided to stay either because of illness or because his work that year with Alden was so enjoyable. What direction might his life have taken if he had left Madison then?

THE THWAITES LEGACY

Thwaites was widely liked and respected as a teacher. In his four decades of teaching he left a lasting impression on hundreds of students. He was the advisor on several dozen bachelor's theses, about a dozen master's theses (including one by Andrew Leith, son of C.K.), and a few doctoral theses, most dealing with Wisconsin geology.

His obituaries described him as knowing more about Wisconsin's geology than any other person. The list of publications that follows suggests the breadth of his interests; in general, he was interested in all aspects of Wisconsin geology, especially the glacial geology, geomorphology, and early Paleozoic stratigraphy. In addition to his publications and extensive field notes, he left behind a variety of manuscripts, including one for a textbook of geomorphology based on the principles of physics.

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Figure 8. F.T. Thwaites (left) with William Heritage, and Victor Hanson, taking advantage of a forestry railroad in northwestern Menominee County. WGNHS photograph 4535, by F.T. Thwaites, October 29, 1928.

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