

J Harlen Bretz (1882–1981): Outrageous Geological Hypothesizer

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J Harlen Bretz.

Experienced geologists know well that their field counts among its most able and stellar practitioners a strong-willed array of “characters.” Outstanding from this pantheon is J (editors take note: insert no period after this one-letter first name!) Harlen Bretz (1882–1981). In his studies of the origin of the Channeled Scabland landscape in eastern Washington, beginning in the early 1920s, J Harlen Bretz provided a type example for what William Morris Davis (1850–1934) subsequently defined as an “outrageous geological hypothesis.”

As a science, geology is as much characterized by its methodology as it is by its down-to-earth subject matter. That methodology, so ably described by Thomas Chowder Chamberlin (1843–1928), one of the professors for Bretz’s Ph.D. studies, is focused on hypotheses. Geological hypotheses, unlike those in physics, are not merely parsimonious conjectures formulated as propositions to be tested or falsified. Geological hypotheses are “working” and even “regenerative” (Chamberlin’s terminology) in that they are meant to be fruitful for further inquiry. Moreover, geological hypotheses can occasionally be outrageous, though such outrage must never be imposed upon what nature presents to the geologist. An outrageous geological hypothesis can only be fruitful if it illuminates the inadequacy of prevailing theories and points toward more productive lines of inquiry.

This outrageous geological hypothesizer was born Harley Bretz (the “J Harlen” came later) on 2 September 1882 in the small farming town of Saranac, Michigan, USA. Though young Harley had interests in many aspects of natural science, his overriding passion was for astronomy. Unfortunately, as an undergraduate at Albion College, he did poorly in mathematics, a failing that he later ascribed to falling out of bed as a toddler and hitting a part of his head—the part that does mathematics. His interests then turned to biology and geology.

After graduating from Albion in 1905, Bretz taught biology for a brief period in Flint, Michigan. In 1907, he and his wife, Fanny, moved to Seattle, Washington, where he taught science at three different high schools over the next several years. During the long summer breaks, he explored the local glacial geology. His mapping of Pleistocene surficial deposits eventually covered the entire Puget Sound region from Centralia and Chehalis to the Canadian border. Bretz used these extensive field studies as the basis of a Ph.D. dissertation in geology from the University of Chicago in 1913.

The “J Harlen” name arose during this period. Bretz’s biographer John Soennichsen quotes Bretz’s daughter, Rhoda: “He invented the Harlen thing, just as he had invented the J in front of his name—made the whole thing up. Harley Bretz was his given name, but it just didn’t ring a bell for him; maybe he didn’t think it sounded professional enough.” In reviewing the submitted Ph.D. dissertation, Rollin D. Salisbury (1858–1922), Bretz’s Ph.D. supervisor at Chicago, asked him to spell out the first name on the author line. When Bretz responded that “J” was his entire first name, Salisbury admonished, “Then never put or allow a typist or printer to use a period after that J.”

Upon receiving his Ph.D., Bretz spent a year as an assistant professor of geology at the University of Washington, but in 1914 Salisbury recruited him to return to the University of Chicago, first as instructor in geology (1914–1915), then as assistant professor (1915–1921). His responsibilities at Chicago emphasized teaching in the field. Perhaps influenced by his own largely self-taught path to geological understanding, and reinforced by his Chicago mentors, Bretz became a lifelong advocate of geological education in the field. He wrote in his unpublished memoirs, “My ideal was to teach geology from the field as much as possible.” He instinctively rejected, “...text book and lecture methods without field work.”

At Chicago, Bretz became renowned as a teacher. Starting in 1915, he was responsible for the field course held each summer in the Devil’s Lake region near Baraboo, Wisconsin. Over the next thirty years or so, “Doc” Bretz served as mentor to hundreds of budding geologists, emerging from their tents near the lake each day, generally during the month of September, just before the start of classes. His teaching method was Socratic. It was the students who made all the discoveries, but they were ultimately guided in their geological hypothesizing by Doc’s questioning. As Bretz wrote in his unpublished memoirs, “I never would tell. I always made them work out their own salvation.”

In 1916, Bretz initiated an advanced field course during the early summer, in which he took small numbers of University of Chicago students to the northwestern U.S. In the summer of 1922, this advanced course moved to the Columbia Plateau region of eastern Washington. Thomas Large, a teacher at Lewis and Clark High School in Spokane, Washington (and one of the founders of the Northwest Scientific Society), aided with local logistical arrangements. In the course of work during the summers of 1922 and 1923, Bretz and his students documented an amazing



Bretz (on left) with University of Chicago geology graduate students standing in front of a Model T that was provided by Thomas Lodge for the field seasons of 1923 and 1924. (Photograph provided by Lodge's grandson, Brian McDonald.)

assemblage of landforms that included coulees, immense dry cata-racts, rock basins, anastomosing channel ways, and gravel bars. Field relations among these features, most notably the multiple levels of divide crossings, led Bretz to propose that an immense cataclysmic flood had swept across the Columbia Plateau in late Pleistocene time, creating the great plexus of channel ways that he named the “Channeled Scabland.”

In a 1923 paper, Bretz concluded, “It was a debacle which swept the Columbia Plateau.” He named this debacle the “Spokane Flood,” thereby initiating the famous controversy. As he well knew, the notion of catastrophic flooding directly challenged substantive and epistemological notions of uniformitarianism that were thought to underpin geology as a science. These uniformitarian principles held that cataclysmic processes were unsuitable topics for proper scientific investigation. To counter this presumption, Bretz conducted extensive field investigations each summer, the results of which he meticulously detailed in more than a dozen major papers from 1923 to 1932.

How was it that this outrageous hypothesis got published? In today’s culture of “publish or perish,” outrageous hypotheses tend to get soundly squelched within the secret rituals of peer review. Today’s younger scientists, wary of their h-index rankings, can be reluctant to expend effort on topics that deviate from currently fashionable paths of inquiry. But Bretz had some advantages in this regard. First, he became tenured shortly before he formulated

his outrageous hypothesis. Second, and just prior to the paper submission to the *Journal of Geology*, he was named to the editorial board of that journal.

Although the “Spokane Flood Debate” would rage on for several decades, Bretz largely abandoned the scabland scene after his decade of intensive fieldwork. He trusted that a resolution of the controversy would eventually be found when others devoted appropriate field investigations to the problem. Beginning in 1933, Bretz initiated new lines of research, beginning with glacial studies as a member of the Louise A. Boyd Expedition to East Greenland. From 1938 to 1961, Bretz devoted considerable research to the origin of limestone caverns. His cave studies in 17 states, Mexico, and Bermuda placed physical speleology on a firm scientific basis, and his insights and energy were important to the late twentieth-century resurgence of karst geomorphic and hydrologic studies in the United States.

Resolution of the Channeled Scabland controversy came gradually, initially with the documentation by Joseph Thomas Pardee (1871–1960) of ice-dammed Pleistocene glacial Lake Missoula in western Montana as a plausible source for the scabland megaflooding. Eventually the accumulating field evidence became overwhelming, particularly when Bretz and others synthesized new data obtained by the U.S. Bureau of Reclamation’s Columbia Basin Irrigation Project in the 1950s. Especially important for convincing skeptics was the discovery that giant current ripples (gravel dunes) cap many of the scabland gravel mounds that Bretz had noted in the 1920s to be immense river bars. By the late 1960s and early 1970s, as the field evidence mounted and as advances were made in understanding the physical processes of high-energy megaflooding, Bretz’s bold hypothesis came to be generally accepted by the geological community.

At age 97, in recognition for more than 70 years of scientific achievements, J Harlen Bretz was honored with the 1979 Penrose Medal of The Geological Society of America. In accepting, Bretz listed his major research accomplishment as follows: “Perhaps I can be credited with reviving and demystifying legendary catastrophism and challenging a too rigorous uniformitarianism.”

FURTHER READING

- Baker, V.R., 2008, The Spokane Flood debates: Historical background and philosophical perspective, in Grapes, R., Oldroyd, D., and Grigelis, A., eds., *History of Geomorphology and Quaternary Geology*: Geological Society, London, Special Publication 301, p. 33–50.
- Soennichsen, J., 2008, *Bretz’s flood: The remarkable story of a rebel geologist and the world’s greatest flood*: Seattle, Washington, Sasquatch Books, 289 p.