

Robert Dietz: From Ocean Floor Mapping to Chasing Meteorite Impacts

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Robert Dietz in 1961, the year his *Nature* paper on sea-floor spreading was published (courtesy of the Univ. of California San Diego Library).

“Life is a rocky road, but along its highways and byways I never met a rock I did not like.” —Robert Dietz (1994)

In his autobiography published shortly before his death, Robert S. Dietz recommends “a scientific career as the best of all possible pursuits.” His life perhaps bears the best testimony to this recommendation: He sailed all the seven oceans, flew over a million miles as a pilot and into the stratosphere, traveled more than a mile deep in the oceans, and his geologic research took him to seven continents.

FROM NEW JERSEY TO ILLINOIS

Robert (Bob) Sinclair Dietz was born on 14 September 1914 in Westfield, New Jersey, USA. His father, Louis, was a civil engineer who struggled to provide for his family during the Great Depression.

His mother, Bertha (née Staiger), was a devout Christian Scientist who died at age 53 while Dietz was in high school, by which time he had rejected all religious beliefs.

Dietz was the sixth child of seven, with a sister and five brothers. His sister, Helen, whom Dietz described as a surrogate mother, worked in a public library. Through her, Dietz became a bookworm and read the popular works of H.G. Wells and James Jeans. He and his classmate, Ralph Hall, who later became a science writer, shared a mutual interest in rockhounding and other aspects of the natural world.

Raised in a penurious way, Dietz developed rat-like instincts for survival. After working two summers at a hotel on the New Jersey coast, he hitchhiked west to the University of Illinois at Urbana during the 1933 Chicago World’s Fair.

For two years at Illinois, he lived in a boarding house for US\$5 a month. His accommodations: a small, windowless room at the end of a hallway. Working part-time for 25 cents an hour with funds

provided by President Franklin Roosevelt’s National Youth Administration helped Dietz survive while also influencing his liberal political leanings. He supplemented his income during junior year by signing up for the Army Reserve Officers Training Corps (ROTC) to earn an extra US\$16 a month. His favorite subjects were geology and astronomy. In his quest for good grades—he graduated Phi Beta Kappa in 1937—he studiously avoided advanced courses in physics, chemistry, and mathematics. Dietz later lamented that this strategy had stunted his education.

THE SHEPARD FACTOR

Dietz had picked the right time and place for a career in marine geology. In his junior year at Illinois, Dietz started a life-long friendship with fellow student Kenneth Orris (K.O.) Emery (1914–1998), who introduced him to professor Francis P. Shepard (1897–1985), a pioneer in marine geology. Emery and Dietz became Shepard’s first graduate students and continued in his footsteps.

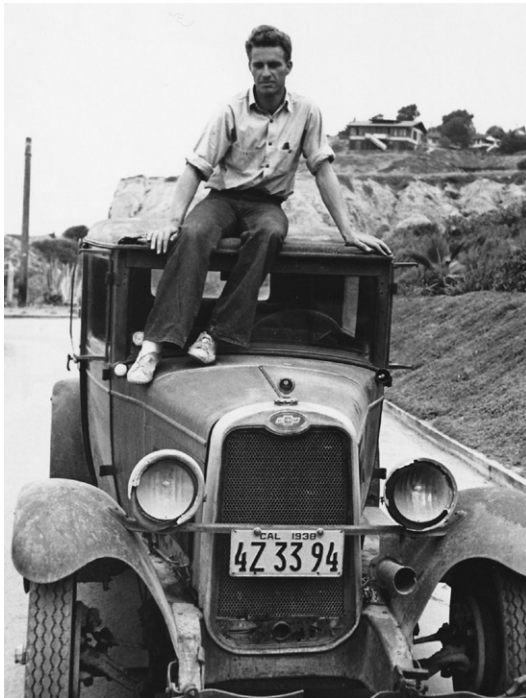
In 1936, Shepard received a US\$10,000 grant (a huge sum at that time) from the Penrose Bequest of the Geological Society of America for bathymetric mapping and locating submarine canyons offshore California. Shepard and his students cruised aboard the 96-foot schooner *E.W. Scripps* of the Scripps Institution of Oceanography for six months. Roger Revelle (1909–1991), later the director of Scripps, was also on board. The seafloor was then terra incognita, and those late 1930s voyages of the *E.W. Scripps* generated pioneering results.

Shepard was meticulous: “He preferred to count the lion’s teeth than consult Aristotle,” as Dietz later recalled. For his M.S. thesis (1939), Dietz researched the submarine phosphorite deposits off the coast of California. For his Ph.D. (1941), he wrote a thesis on the mineralogy of deep-sea clay sediments collected from the same area. This work also described the value of manganese nodules as potential ores of copper, nickel, and cobalt.

SEAFLOOR MAPPING AND PLATE TECTONICS

In 1946, Dietz joined the Navy Electronics Laboratory (NEL) in San Diego. His first job was to study the seafloor as part of Admiral Byrd’s fourth and last expedition to Antarctica. At NEL, Dietz also met and hired Henry William Menard (1920–1986), who later chronicled the seafloor mapping that led to plate tectonics in *The Ocean of Truth* (1986). Menard and Dietz produced the first contoured bathymetric map of the Gulf of Alaska. They also described the Mendocino Fracture Zone, the first of many such features now known to populate the world’s ocean floors at oceanic rift zones. “We wrongly interpreted the nature of this prototype feature which only became apparent some years later in terms of plate tectonics,” Dietz would later observe.

Dietz’ next focus was guyots, which he called flattened seamounts. In 1950, Dietz co-led the joint Navy-Scripps Mid-Pacific Expedition and dredged several of them to test whether they were of Precambrian age. The fossils they recovered dated to the



Robert Dietz as a graduate student in 1938 (courtesy of University of California San Diego Library).

Cretaceous. “This was one of several surprises in marine geology that conditioned some of us in the mid-1950s to become mobilists, eventually accepting continental drift,” he later commented. In 1953, Dietz was a Fulbright Fellow in Japan. This visit resulted in his 1954 *GSA Bulletin* paper, which included a description of a range of drowned seamounts trending northwest from near Midway Island to the Kamchatka Trench, which he named the Emperor Seamounts, each after a Japanese emperor. Dietz later mentioned that he had become a “mobilist” in 1953 in Japan when he became convinced that “trenches were underthrusts on a giant scale.”

From 1954 to 1958, Dietz was assigned to the U.S. Office of Naval Research in London, where he reported on scientific advances in Europe. While in Europe, he met Jacques Piccard (1922–2008), who was developing the bathyscaphe *Trieste*. Dietz collaborated with Piccard to prepare the bathyscaphe for a dive into the Mariana Trench in 1960. This fascinating story is given in the popular book *Seven Miles Down* (1961) co-written by Piccard and Dietz.

Also in 1961, Dietz published his most famous paper on “seafloor spreading” in the journal *Nature*. Independently, Harry Hess (1906–1969) of Princeton University had also recognized seafloor spreading based on oceanographic mapping of the 1950s. In later years, Dietz continued to contribute to our understanding of ocean floor features, especially continental shelf-slope-rise changes. In the early 1970s, Dietz and John C. Holden, a geologist and artist, published several seminal papers on the breakup of Pangea and continental drift, creatively illustrated by Holden.

IMPACT CRATERS AND STRUCTURES

Dietz also pioneered research on the interpretation of lunar craters as impact in origin and the recognition of asteroid impact scars on Earth. Since the 1940s, Dietz actively researched meteorite impacts. Indeed, he intended to write his Ph.D. thesis on his idea about the impact origin the lunar craters. He related what happened in his 1994 autobiographical essay: “As a graduate student I proposed writing my Ph.D. thesis about the surface features of the Moon, but it was turned down as not a subject suitable for scientific contemplation,” he wrote. “The idea was chided as totally bizarre and besides, ‘there was no one to check my field work.’”

From 1941 to 1945, during World War II, Dietz served as an officer in the U.S. Army Air Corps. He attended military flight school in Hondo, Texas, where he also became an instructor. While based in Texas, he flew repeatedly to Meteor Crater in Arizona. The crater’s origin as an asteroid-impact feature convinced him that others surely existed elsewhere on Earth. Dietz later recalled, “Flying around up there, you feel like God looking down and you try to apply geology to what you see. I was fascinated with the aerial view of the Earth which was then quite new.”

In 1946, Dietz published his idea about lunar craters, though the controversy persisted until lunar landings. In 1947, he published, in *Science*, the first of about 20 papers advocating that asteroids have blasted the Earth with craters, too. With geologic uniformitarianism ruling the day, his papers smacked of unholy catastrophism. But Dietz steadily built his case for what he called terrestrial “astroblemes” (star wounds). From 1958 and into the 1980s, he described impact craters and scars in Australia, Germany, India, North America, Russia, and South America.

SCIENTIFIC REVOLUTIONARY

Dietz participated in the two great geological revolutions of the twentieth century. He promoted impacting asteroids as an important geologic process shaping the surfaces of both the Moon and Earth. His seafloor spreading advocacy helped install plate tectonics as the central organizing principle of geology. In doing so he earned some of the highest awards in geoscience including the Penrose Medal of the Geological Society of America (1988).

Dietz died on 19 May 1995 in Tempe, Arizona. His last wish was “to be struck by a meteorite and then fossilized,” but then he would add, “that apparently happened to an Ordovician cephalopod in Sweden.”

SUGGESTIONS FOR FURTHER READING

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