

Bootstrap Geologist: My Life in Science

By Gene Shinn. 2013. University Press of Florida, 15 NW 15th Street, Gainesville, Florida 32611 USA. xii + 297 pages, 34.95 USD, Cloth.

Much of Gene Shinn's professional life has been spent outdoors in the field. And his life in fieldwork reads as if it has been both highly enjoyable and deeply relished. He has spent his time close to, on, in, and especially under warm sea-water as he investigates carbonate reef systems and nearshore environments. In *Bootstrap Geologist*, Shinn describes his career, the projects and questions that have concerned him, the places he has visited and studied, and the people that he has met and worked with. Why "bootstrap"? Eighty-year-old Shinn positions his autobiography as "the life story of a successful self-taught geological scientist, initially handicapped by lack of advanced degrees, who rose to the top of his profession and received its highest award", the Twenhofel Medal of the Society for Sedimentary Geology in 2009. Throughout his account, he emphasizes the practical aspects of fieldwork, describing the many different types of apparatus he has helped to design and build, from underwater coring devices to samplers and lo-tech monitoring equipment. This is the career of a skilled and intuitive "hands-on" technical specialist, an expert at spotting a problem, and devising a means and an apparatus to investigate it.

Following college studies in zoology, Shinn's early career, between 1958 and 1974, was in the oil industry, when he worked for Shell, first in Florida and Texas, then in Qatar and the Persian Gulf, then in Louisiana and Texas again. In 1974, he moved to work for the United States Geological Survey (USGS), where he continued his offshore research, notably as the director of a specialized marine research work group based in Florida. Here, his practical skills were put to good use in keeping the group operational and busy, despite budgetary and other challenges. Retiring from the USGS in 2006, Shinn's career has continued through association with the University of South Florida. So he has seen the research world from three quite different perspectives: as an employee of a large multinational company, as a government servant working for a major federal agency, and as an affiliate with a mid-sized university. His account shows how, despite working under diverse administrative and funding regimes, he has always managed to follow and maintain his research

interests in marine carbonate ecosystems, through tailoring his projects to the circumstances of his employment and taking advantage of opportunities to apply his skills as they present themselves, including such odd applications as exploring hydrogen bomb craters off Pacific atolls.

Taking the mantra of "the present is the key to the past" seriously, Shinn has focused his research efforts on investigating modern carbonate systems, especially subtropical offshore reefs and tidal flats, in the waters around Florida and the Gulf of Mexico, in the Caribbean, off the Philippines, and in the Persian Gulf. Born as a "salt-water conch" on Key West, he spent his late teenage years as much in sea-water as by it, becoming an accomplished spear-fisher and starting a long acquaintanceship with coral reefs. A major thread running through his work has been the way in which marine organisms build up reefs and other biogenic structures and the factors that influence the growth and lithification of reefs. His work is situated at the interface between biological and geological systems, and is therefore notable for the light that it sheds on both. The initial motives for undertaking this modern analogue research were pragmatic, springing from the need to better understand ancient carbonate rocks and especially reef systems because of their role as host rocks for hydrocarbon deposits. He has used the insights gained from work on modern reefs to interpret ancient reefs and carbonate rocks, for example, by coring algal reef mounds in New Mexico. Other applications include the documentation of modern stromatolites off the Bahamas, the recognition of hurricane and storm-derived mud layers in tidal channels near the Bahamas, the elucidation of sabkha stratigraphy in Qatar, and the identification of algal mud production in Florida Bay.

The results from several of Shinn's investigations have challenged conventional views. He describes studies in which his team concluded that "drill mud had not affected the growth of corals" near the Philippines, discovered that "if there was an abundance of junk at the site, there was more fish" when investigating old drill sites off the west coast of Florida, and found "little lasting harm" from offshore drilling near the Florida

Keys. He also studied the movement of groundwater through the carbonate bedrock underlying southern Florida, an issue that has significant implications for assessment of anthropogenic impacts on the environment and the long-term viability of drinking water supplies. This work started in the late 1980s with an investigation of shallow groundwater near a garbage dump in south Florida. He discovered that “pollutants were restricted to freshwater in a highly porous zone above a regional impermeable layer just seventeen feet below the [ground] surface”. In other words, the landfill containment leaked. His later studies in the 1990s, funded in part due to concerns over water levels in the Everglades, showed that pollutants and sewage from expanding developments on the Keys were moving through the highly porous limestone and into sea-waters around the offshore reefs. His team conducted dye-injection experiments to show that the flow of the shallow groundwater beneath the Keys is towards the Atlantic, a phenomenon he attributes partly to “tidal pumping”. However, despite a network of monitoring wells, Shinn and his team were unable to “prove that sewage contaminated groundwater was killing the reefs” due to enhanced algal growth stimulated by nutrient influxes from sewage.

In recent years, Shinn has considered other reasons for reef die-offs. Noting a correlation between die-offs since the mid-1980s and increased input of African dust, he is convinced that, at least in the Florida and Caribbean reefs, this is more than coincidence. Shinn’s research associates have analyzed incoming dust showing that it carries, besides fine-grained clastic material, various biotic materials including bacteria and spores, some of them potential pathogens. Yet dust has been a factor in these ecosystems for millennia; Charles Darwin noted dust fall in mid-Atlantic in 1832 during the second *Beagle* voyage and reported on its organic content (Darwin 1846, *Geological Society Journal* 2: 267-274). What is not clear to me from Shinn’s discussion here is why the dust should have become more deadly for reefs in recent decades.

The results of Shinn’s studies have not always been well received. Conclusions from his dust research are controversial. As he remarks for the Florida Keys drill sites study, his team “didn’t find and document the widespread death and destruction that was expected”

nor did they “find what the public, the media, and the academic community wanted”. Though he has followed the evidence where it led, he does paint himself as a bit of a contrarian. Shinn expresses little interest or confidence in modelling or theory, highlighting that his work has been “very field oriented”. He also has a jaundiced view of permits and regulations that he sees as strangling the capacity to do research, especially in national parks or protected areas. His memoir is fascinating for highlighting changes in research methods between the late 1950s and now. Some of the methodological quandaries we grapple with today were simply not considered decades ago. For example, Shinn writes about using dynamite to create “explosures”, holes in coral reefs, in the early 1960s when “few cared about the environmental effects of dynamite”. It is difficult to imagine explosives as an approved research tool for reefs now! Perhaps not all changes in the research milieu are bad.

Shinn’s writing style is laboured in places and sprinkled with superfluous exclamation marks, but it becomes more readable as the book goes on. There are early digressions into tangential matters that would have been better omitted; the distasteful story of a deeply disturbed physician being one. Shinn’s narrative is more assured and interesting when he is writing about his professional career. I was intrigued by his descriptions of ex-pat life in Doha, Qatar, for example. I enjoyed his stories about various field exploits, including a recurrent fascination with “whittings”, lime mud precipitated from sea-water that forms white cloudy patches in the ocean. Only in recent years has the role of planktic cyanobacteria in these precipitates been recognized. Exciting new research suggests that such ancient mud may be implicated in the origin of some Middle Eastern oil deposits. Shinn hopes this “hypothesis survives the test of time and future investigation”. Certainly, his field observations and substantial research contributions will remain valuable. And anyone interested in modern and ancient reef systems will find much to captivate them in Shinn’s entertaining memoir of his industrious and energetic life in sunshine and sea-water.

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