On January 16, 1832, shortly before Charles Darwin’s 23rd birthday, H.M.S. Beagle, with the young Darwin aboard, made its first stop at São Tiago in the Cape Verde islands off the west coast of Africa. Years later, Charles Darwin wrote:

The geology of St. Iago is very striking yet simple: a stream of lava formerly flowed over the bed of the sea, formed of triturated recent shells and corals, which it baked into a hard white rock. Since then the whole island has been upheaved. But the line of white rock revealed to me a new and important fact, namely that there had been afterwards subsidence round the craters, which had since been in action, and had poured forth lava. It then first dawned on me that I might write a book on the geology of the countries visited, and this made me thrill with delight. That was a memorable hour to me… (Autobiography, p. 81).

Today, few people are aware that Charles Darwin (1809–1882) was an accomplished geologist before becoming renowned as a biologist with *On the Origin of Species* in 1859. Despite his lack of formal training as a geologist, Darwin published major works on the structure and distribution of coral reefs (1842) and geological observations on volcanic islands (1844) and on South America (1846).

INFLUENCES

The irony of Darwin’s success as a geologist was that he had little formal instruction in the subject. In his second year at the University of Edinburgh—before he dropped out—he attended the lectures of Robert Jameson, a champion of Werner’s Neptunist theory, “but they were incredibly dull. The sole effect they produced on me was the determination never as long as I lived to read a book on Geology or in any way to study the science. Yet I feel sure that I was prepared for a philosophical treatment of the subject” (Autobiography, p. 52).

Disgusted by medicine in the days of surgery performed without the benefit of anesthesia, Darwin went on to Cambridge to complete a degree that would prepare him for the Anglican clergy. At the same time Darwin continued his extracurricular pursuit of natural history and met various distinguished scholars, including John Stevens Henslow (botany), Adam Sedgwick (geology), and William Whewell (astronomy and philosophy). Darwin’s enthusiastic interest in science impressed these men, for they became his mentors in various ways. Thus, despite his initial antipathy for geology, Darwin spent the better part of August 1831 on a geological tour of Wales with Adam Sedgwick, who was studying the rocks that he would later define as the Cambrian System.

On this tour I had a striking instance of how easy it is to overlook phenomena, however conspicuous, before they have been observed by anyone. We spent many hours… examining all the rocks with extreme care... but neither of us saw a trace of the wonderful glacial phenomena all around us. (Autobiography, p. 70).

VOYAGE OF THE BEAGLE

At the end of August, Darwin returned home to discover that he had been recommended by his Cambridge professor and mentor, John Henslow, as the naturalist for the forthcoming *Beagle* voyage under Capt. Robert FitzRoy. Darwin was thought suitable for the position more because he was a well-bred gentleman who could socialize with the Beagle’s captain than because of his skills as a trained naturalist. As a welcoming gift, FitzRoy gave Darwin the first volume of Charles Lyell’s *Principles of Geology*, which had been published the year before. Closely reading this volume and the next two sent to him while on the voyage, Darwin became self-taught in geology. “I am proud to remember,” he said, “that the first place, namely St. Iago, [where] I geologized, convinced me of the infinite superiority of Lyell’s views over those advocated in any other work known to me” (Autobiography, p. 101).

Throughout the remainder of the voyage, Darwin “geologized” with excitement and enthusiasm. Writing home to his sisters, he remarked, “There is nothing like geology; the pleasure of the first day’s partridge shooting… cannot be compared to finding a fine group of fossil bones, which tell their story of former times with almost a living tongue…” (Correspondence, v. 1, p. 379), or that he “literally could hardly sleep at nights for thinking over my [geology].” (Correspondence, v. 1, p. 445).

INTRODUCTION

Bernard of Chartres, an 11th-12th century philosopher and teacher, said that we are like dwarfs on the shoulders of giants, so that we can see more than they and for a greater distance, not by any virtue of our own but because we are carried high and raised aloft by their stature.

All of us have our geological heroes, those giants on whose shoulders we stand. To encourage recognition of these luminaries and to provide inspiration for students and young professionals, the GSA History Division presents Rock Stars, brief profiles of our geological giants. If you have any comments on this or subsequent profiles, please contact Robert N. Ginsburg, University of Miami, RSMAS/MGG, 4600 Rickenbacker Causeway, Miami, FL 33149-1098, E-mail: rginsburg@rsmas.miami.edu.
In Chile, on February 20, 1835, Darwin experienced a very strong earthquake and shortly afterward saw evidence of several feet of uplift in the region. Because one important aspect of Lyell's principles was the concept of a steady-state, nondirectional earth whereby uplift, subsidence, erosion, and deposition were all balanced, Darwin coupled in his mind this dramatic evidence of elevation with accompanying subsidence and deposition. Thus he hypothesized, before actually seeing them, that coral reefs of the Pacific developed on the margins of subsiding land masses, passing through the three stages of fringing reef, barrier reef, and atoll.

No other work of mine was begun in so deductive a spirit as this; for the whole theory was thought out on the west coast of S. America before I had seen a true coral reef. I had therefore only to verify and extend my views by a careful examination of living reefs. But it should be observed that I had during the two previous years been incessantly attending to the effects on the shores of S. America of the intermittent elevation of the land, together with the denudation and deposition of sediment. This necessarily led me to reflect much on the effects of subsidence, and it was easy to replace in imagination the continued deposition of sediment by the upward growth of coral. To do this was to form my theory of the formation of barrier reefs and atolls. (Autobiography, p. 98, 99).

When the Beagle visited the Cocos Islands in the Indian Ocean more than a year later, Darwin was able to test his hypothesis of reef formation "by examining the very interesting, yet simple structure and origin of these islands. ... These low, insignificant coral-islets stand and are victorious ... thus do we see the soft and gelatinous body of a polyp ... conquering the great mechanical power of the waves." (Voyage, p. 457, 459).

In his 1842 book on coral reefs, Darwin published a map of the southwest Pacific showing the distribution of fringing, barrier, and atoll reefs. Darwin noted that fringing reefs were concentrated along the coasts of continents that "are for the most part rising areas" whereas barrier and atoll reefs are found in the "central parts of the great oceans [that] are sinking areas" (Voyage, p. 478). (Knowing what we know about plate tectonics, we explain such subsidence by the cooling and accompanying increase in density of submarine volcanic rock as it moves away from active ridges or hot spots.)

Darwin continued on p. 10