In an explorer at heart. As a child I was always drawn to the ocean and the mysterious animal life below its surface. As an adult I’m still captivated by the oceans vast and powerful life-sustaining role on Earth, but I’ve turned my attention away from the charismatic tropical fish, coral reefs and marine mammals that captured my imagination in my youth to a vibrant ocean world of microbes that often goes unnoticed. This world is invisible to our unaided eye — teeming with single-celled bacteria, archaea, protists and viruses, the smallest life forms and among the most difficult to study. They number among the million trillion trillion in ocean waters and deep sediments, surpassing the total number of stars in our solar system.

Researchers in the relatively young field known as geochemistry are just beginning to understand the intricacies of this complex microbial world and how it has changed over the course of Earth’s history. However, what is clear is that the collective metabolic activity of microorganisms in terrestrial and marine environments continues to fundamentally shape the global biogeochemical cycling of carbon and nutrients. Microbes regulate greenhouse gases in our atmosphere and play a foundational role in many important ecosystem services that sustain the diversity and productivity of animals and plants. Quantifying the metabolic roles and interactions of microorganisms in the environment has been far from straightforward. The vast majority of microorganisms in the wild have resisted domestication, with over 99 percent of the microbial species observed in nature not culturable in the laboratory. The profound ecological importance of microorganisms in the global geochemical stage continues to inspire my research, but I am also motivated by the challenge of figuring out how to study and experiment on microbial communities in nature — especially those living in the deep ocean.

As a geobiologist, the ability to work directly in the environment has been invaluable. The exhilaration of seeing firsthand previously unexplored areas of the deep ocean and the promise for new discoveries remains as strong a motivator for me today as on my first dive well over a decade ago.

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