Title
In Person: How Our Adventures Led to Careers in Science

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Author~~s~~ identification: Kolby Jardine is an assistant research professor at the Biosphere 2 ~~center~~facility ~~of~~ at the University of Arizona. Angie Jardine is pursuing a master's degree in hydrology at the same institution. The couple is keeping an online journal to share their environmental science and adventure activities with other aspiring adventure scientists.

Our careers in 'adventure science' began when we were kids, playing outside and learning about the world around us. Today, inspiration for our research on how water, soil, vegetation, and the atmosphere interact with each other comes from our science adventures around the world, whether it's taking in the smells of low tide, rejoicing in the existence of a spring in the desert, watching the lightning storms in the summer monsoon, or marveling at the immense diversity of life in the Amazon rainforest.

~~It took a few false starts and some detours to get to our current positions~~~~Through the process of trial and error, we have realized that oportunites in science and engineering are interdisciplinary. For example, few opportunites are exclusively in biology, geology, or chemistry, but a multitude exist in understanding biogeochemical processes. It has taken us many years of training in a variety of fields~~ Experiencing life outside the lab has been essential to our success in developing a scientific career. We trained in a variety of fields to get to our current interdisciplinary positions, [OK?] and along the way we have come to view science as a great adventure instead of as a job. We learned to be creative, to never stop learning, to take risks, to make mistakes, and listen to our instincts -- before going with the accepted norm.

The importance of outdoor fun

We met in 1995 as undergraduates at the Colorado School of Mines in Golden; Kolby was pursuing chemical engineering and Angie, mechanical engineering. Midway through his degree, Kolby decided to drop out of engineering and pursue biochemistry, inspired by a lab experience in which he researched how microbes influence biogeochemical cycles. ~~Because of our great love for each other and the realization that we wanted to share our lives together, Kolby asked Angie to accompany him to the east coast.~~ After a summer internship in an evolutionary biology lab at Harvard University ~~[ok?],~~ Kolby started a biochemistry degree at New York University in Manhattan in 1997. With the realization that we wanted to share our lives together, Kolby asked Angie to accompany him to the east coast. ~~[This isn't essential since it's implied by the whole story anyway: your personal relationship was, I'm guessing, quite serious by this point. Can we slip something in here or somewhere to be more obvious about it? I do understand if that's too personal a detail.] Meanwhile,~~She~~ Angie~~ finished her engineering degree as a visiting student at the City College of New York and found a job at a small commercial real estate software firm. ~~With~~ Between Angie's long workdays and Kolby's heavy course load and intense research projects, ~~on building self-assembling nanostructures using DNA,~~ we found ourselves suppressing our strong desire to go outside and play.

In 1999, we both entered a Ph.D. program in optical nanotechnology at Arizona State University with ~~the desire to~~ an interest in building nanoscale biomolecular devices. Kolby started working on the *in vitro* production of ATP molecules -- the energy-loaded molecules that power up biochemical processes in living cells -- by mimicking plants' photosynthetic process using artificial, light-sensitive lipid membranes. Angie studied the relationship between the biomolecular structure and the function ~~by working on the extraction~~ of a **membrane-bound bacterial light-harvesting complex** ~~into artificial micelles~~**. [is this still a correct description of you research? Also, can we define here what a light-harvesting system is, and if it was a genetically-modified bacteria?]**

Years of tireless work and the lack of a break led us to burnout. Searching for a way back to happiness, Kolby devoured a book called 'Beyond Backpacking' written by his uncle Ray Jardine, an aeronautical engineer turned outdoor inventor, author, and adventurer. We realized that a long backpacking trip was what we needed to right ourselves. So, one year in to our Ph.D.s, we quit our program, sold all our furniture, books, and computers, and spent the following 6 months training for and thru-hiking the Arizona Trail. **From this journey we learned to focus on skills rather than gear, to live a rigorous physical, mental, and spiritual life, and to develop strong connections with the Earth.**

Inspired by our incredible journey, we returned to Colorado and devoted all of our energy to teaching ourselves the art of traditional rock climbing, cross-country skiing, kayaking, and mountain biking. To sustain ourselves, we both took part-time jobs teaching algebra, chemistry, and microbiology at San Juan College.

Returning to Science

No matter how burned out we were back then and how much we had enjoyed our outdoor adventures since, the experience of suddenly quitting research -- something we had been working toward our whole lives -- had nonetheless been devastating. So, a couple of years later when we went back to research, we were determined to make it work by adopting a perhaps unconventional approach: To this day, we endeavor to blend our research and outdoor activities to the point that they become inseparable adventures.

Kolby returned to graduate school in spring 2003, pursuing a master's degree in atmospheric chemistry at the South Dakota School of Mines and Technology (SDSMT). He worked on characterizing the organic chemistry of forest air by measuring the flux of volatile organic compounds (VOCs), ~~-~~trace gases released into the atmosphere during plant metabolism that exert a large influence on air quality and climate, at the leaf, plant, and ecosystem scales. ~~VOCs are trace gases released into the atmosphere during plant metabolism that are an important component of the global carbon cycle and exert a large influence on air quality and climate.~~ Angie got back into science with a job as a research technician on a tethered balloon-based remote sensing project, retrieving high-resolution spectral information from different land surfaces to better constrain satellite algorithms. She also took graduate courses in geographic information systems and biogeochemistry at SDSMT.

Our fieldwork gave us plenty of opportunities for camping, rock climbing, backpacking, and mountain biking, which further excited us about our science projects. Kolby did field campaigns in grasslands, agricultural fields, and the Black Hills of South Dakota and at Duke University's experimental forest while Angie worked in Custer State Park. We collaborated on one project in which we studied plant hormones and VOC emissions from damaged Alfalfa plants. This research, which was presented at the 2003 Gordon Research Conference on hydrocarbons and the atmosphere in Braga, Italy, won Kolby an early scientist award.

In 2004, we moved to Stony Brook, New York, where Kolby did a Ph.D. in marine and atmospheric sciences. He continued his work on VOCs, measuring their stable carbon isotope composition and exchange rates between plant canopies and the atmosphere and looking at plant physiology. Angie worked as an environmental consultant in coastal ecosystems, mapping the bathymetry of the East River in New York City, searching for endangered moth species on Long Island, restoring wetlands on damaged coastal areas, and conducting water quality tests on tributaries feeding the Peconic Bay. During weekends, we learned about the processes we were studying by navigating the entire coast of Long Island by sea kayak and observing, for example, how ocean currents result from intricate interactions between bathymetry and the local weather.

Our conscious efforts to focus on our love of the outdoors were successful: Unlike our experience with our Ph.D. program in Arizona, our newly chosen fields gave us the chance to experience science in the wild and regularly top up our motivation and energy levels.

The Next Chapter

Of the many skills Kolby learned during his Ph.D., the most important ones were focus, endurance, and the unwillingness to quit whatever the challenges. Following Kolby's graduation, we applied these skills to our most ambitious outdoor adventure to date. In 2008, we became the first people to complete the entire, 3,000-mile Great Divide Route from Mexico to Canada through the Rocky Mountains by tandem bike. Just like during the Ph.D., a multitude of obstacles were thrown in our path: dehydration, exhaustion, deep snow, intense headwinds. We knew that if we focused on the negatives we would miss the glory of the trail, and surely quit. Instead, we focused on the beauty of the landscapes and how changes in water availability had been crafting them over time, how simply we could live, and the abounding wildlife around.

While on the trail, Kolby wrote and published two papers from his dissertation using a solar-powered laptop. He also secured a postdoc position at the University of Arizona's Biosphere 2 center in Tucson[[to characterize the carbon and energy metabolism of terrestrial ecosystems and its impact on climate and air quality. ~~, from the molecular to the regional scale]].~~

After the summer break, we returned to Arizona on a wave of positivity. One year after starting his postdoc at Biosphere 2, Kolby won an assistant professorship there. He has led regional atmospheric chemistry campaigns in the southwestern United States and the Brazilian Amazon, where we are currently based for six months. These campaigns have resulted in the discovery of several new biogenic VOCs previously uncharacterized in the atmosphere.

As for Angie, our Great Divide trip inspired her to dive into two completely new topics for a master's degree at the University of Arizona: hillslope hydrology and geochemistry. Her thesis focuses on the use of rare earth elements as tracers of chemical weathering and hillslope hydrology in the highest elevation site of the Santa Catalina Mountain Critical Zone Observatory. Additionally, she set up a new remote desert field site for the observatory near Biosphere 2.

For us, our journey through science and pursuit of outdoor challenges go hand in hand. Much like many of the Earth system processes we study, our science and outdoor activities form a positive feedback loop where learning in one promotes learning in the other. No matter how short or long our outdoor adventures are, we always come back with fresh new ideas and questions for our research. In turn, our research always generates new goals and methods for our outdoor adventures.