

Leeches in California – A Reflection

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The word “changing” could not better describe the entirety of my liberal arts experience with leeches in the far-from-home state of California. From June 29th to August 11th, a total of six weeks, I studied various species of leeches with Professor Mike Baltzley and fellow research assistant Kaitlin Gibbons at the University of California, San Diego, in an attempt to understand more about the principle elements of an annelid nervous system. But, what I was able to gain from the trip across the country far surpassed what I ever expected. While my understanding of leeches and the many lab techniques available to research them grew immensely, the biggest, most explosive change I experienced was in myself and my goals. What began as a scientific expedition also became a personal exploration, as my out-of-lab experiences and responsibilities taught me what it truly means to be physically, mentally, and confidently independent, and how science in the real world can be just as exciting as it is in the classroom.

By the time I arrived at UCSD in June, I had already been conducting full leech dissections for six months at St. Mary's College of Maryland, under the lab instruction of Professor Baltzley. Under his teaching, I learned how to extract ganglia (one of 21 nerve cell collections in the leech nervous system) from the medicinal leech *Hirudo verbana*, record electrical activity in individual cells in ganglia using an amplifier and a glass electrode, and use fluorescent dyes to visualize the nerve branchings of those cells. However, when I arrived at UCSD, intent on studying the embryonic development of cells in these ganglia, I soon realized how much I still needed to learn. As I progressed through the six weeks in the leech laboratory of Pacific Hall, the California lab instructors expanded my knowledge of leech anatomy, as I learned how to dissect embryonic leeches as small as individual adult leech ganglia, make and modify my own tools for ganglia extractions, manipulate two electrodes at once to record electrical activity from two cells at once, and utilize the full functionality of a

fluorescent compound microscope and million-dollar confocal microscope to observe my results in three dimensions. I began mounting my own tissue samples onto slides for microscope use, and even learned how to make more advanced lab solutions, from embryo saline to the more toxic 4% para-formaldehyde solution. This aspect of the trip most excited the knowledge-seeking part of me that wanted to understand more about what I had been doing with my leech experiments (and what I planned to do), and how to observe the same experimental problems from different perspectives and with different techniques. It even rekindled my interest in the study of leech neuroanatomy and neurophysiology, as my knowledge base expanded and allowed me to view the same questions with a stronger sense of understanding. I was able to form connections between the techniques I had practiced in Professor Baltzley's leech lab and those that the UCSD staff (who had also written the procedures I had been following) taught me. I was finally able to apply what I had learned in class and lab to something outside of the academics, in the real world of science where ideas led to experiments, occasionally repeatable results, and sometimes publishable data.

As I kept a journal of my experiences in the laboratory, however, writing down every single action I took each day and my most important thoughts and concerns, it became apparent that this trip across the country was teaching me more than how to conduct fancier, more creative leech experiments. Even in the leech lab, what began for me as a goal of learning embryo dissections soon became a desire to successfully prepare dye fills in specific cells of the ganglia and mount tissues. As I progressed farther into the lab and accomplished more of my objectives, from wanting to successfully dissect an embryo and impale a sensory cell inside a ganglion to successfully recording from that cell, injecting a fluorescent-marked dye, and mounting the tissue onto a slide before observing the results under a confocal microscope, my academic goals grew more difficult and advanced, but never impossible if I kept pushing. While I didn't collect large amounts of successful data, in the end I had learned and could easily do what I thought I wouldn't be able to accomplish for years at St. Mary's.

My personal goals followed a similar change as the trip progressed. When I agreed to research with Professor Baltzley during the summer in a state three time zones from my family, friends, and home, I was hoping to just be able to live on my own, to be more independent in my ability to make decisions and contribute to the group as a whole. “I feel more comfortable being in CA on my own,” I wrote in my journal on July 3. “No parents or Sam is like being in college, but on the other side of the country without sharing my room with my brother or anyone for that matter is far from anything I’ve ever done.” As I moved past the discomforts of trying to be my own person amidst a completely new environment, I learned how to reconcile my desire to follow my passive personality with my need to be a confident decision-maker. I could intelligently keep pace with my lab mates and room mates, keep track of my personal life, and keep in touch with my family and friends without feeling overwhelmed. What I had thought was independence when I moved onto campus became a strong sense of personal understanding of what I was able to do, what I hoped to do, and my responsibilities as a research assistant, apartment roommate, and Biology college student. Furthermore, what began as a need to develop simple abilities such as cooking more meals than spaghetti and macaroni and cheese and navigating public transportation via MTA buses and bike routes became a chance for me to learn what it was to be an independent person, responsible for my own actions and able to balance the parts of my life in my own way.

My interactions with the San Diegans of UCSD and outside of it also showed me a world different from my own, far away from the classroom and laboratory. When Professor Baltzley, Kaitlin, and I first arrived at UCSD the morning after our flight, Bill Kristan and Kathy French, the heads of the leech lab, happily introduced themselves and took the three of us out to lunch, talking with us on the way to not only break the ice, but to see how we were adjusting to an environment far different from what we knew. This kindness and friendliness defined most San Diegans that I met during my stay, including the rest of the lab team. While many people were eccentric in their own ways, my favorite

example being a bicyclist I met on the way home from downtown who fervently believed in outlandish government conspiracy theories, no one seemed to lose that element of respect for each other. Another thing I quickly noticed was the diligence of the lab team. While I had expected California researchers with plenty of grant money to be easy-going and leisurely, I found that they moved far from slowly, as each was strongly determined to complete his or her experiments, data processing, and even thesis-writing, some in the midst of other out-of-lab worries (from upcoming birthdays to moving into a new house). I soon picked up on their pace, and what I blamed as jet lag in the lab was soon replaced by constant observation under a microscope and fiddling with electrodes and micro-manipulators for hours at a time.

Outside of the lab and San Diego itself, I had to grow accustomed to another culture: my apartment. Room 16A of Matthews Apartments was not, after all, the home of Professor Baltzley the instructor, but Mike Baltzley and Kaitlin Gibbons the suite-mates. St. Mary's is known for its strong student-faculty connections, but the ties I was able to form with Mike during my stay at UCSD showed me a (while initially shocking) very comforting perspective on what it was like to have a professor on the same level as a student. He and Kaitlin, a more-experienced senior herself, both treated me as any other roommate, someone with a valuable opinion and intelligent mind, despite the difference in our years. When it came to shopping, cooking, and touring San Diego, we each could equally contribute to the group. It was something I did not expect when we arrived, but it nevertheless helped me adjust to an environment far different from home. I learned so much from them in terms of living on my own, expressing my individuality, and being comfortable in my own skin that had I not even been in the lab dissecting leeches, I would have left California a better person than when I was when I arrived, someone more ready to face the world.

I returned to Maryland the same way I had left it, landing at the BWI airport in Baltimore on August 11. However, I was far from the same person I was when I departed. From my experiences in

the leech laboratory of UCSD to the people and sites in San Diego and beyond, my perspective on biology and myself both changed. I found my true passion for leeches while drawing myself closer to the real world of biology. In the end, it was far different from the classroom; it was more exciting and worthwhile. I hope to continue my leech research at St. Mary's College of Maryland, and I've even taken a stronger interest in neurology itself, an interest now grounded in real-life encounters and a personal sense of independence and confidence that can only be gained by truly experiencing the liberal arts in the world, not simply reading about it in a textbook. Whether I become a doctor, a researcher, or something far outside the science field, I have become a better person by this experience, and can apply an entirely new range of perspectives and outlooks to any situation life sets before me.