Summer Research Experience 2006

Activities and Comments on my experience at IU

Kathy Daniels, Biology Teacher

8/10/06

The first two weeks were busy with SRI group sessions in the morning and lab experiences in the afternoon. I found the morning sessions to be intellectually refreshing. So many different people from different places, with different teaching experiences and ideas really made for a well rounded group of professionals. It was inspiring learning and sharing informally with each other. Dr. Jose Bonner, his staff, and Indiana University made everyone feel very welcomed and comfortable.

Dr. Jose Bonner challenged us each day of the SRI. He used inquiry methods to teach us about inquiry. It wasn't easy, but that was the fun of it. He helped us grapple with information and struggle with concepts in a novel way that made this workshop experience one of the best seminars I have ever attended.

This summer's experience has also changed my opinion of Indiana University. Before I came here for this workshop, I had only been on campus a few times mostly for theater and music productions. My initial impressions of IU were that it was big, impersonal, and even dangerous, based on media portrayals the last several years. I thought of IU as a party school that was too heavily focused on athletics and Greek organizations. As a result of this summer's experience, I have a very different opinion of IU now. I have found the faculty, staff, and students to be helpful, kind, courteous and well rounded. The professors I met were all so willing to take time to share what they were researching and answer all the questions I asked them -- even when they had no idea who I was! They were patient, intensely knowledgeable, professional and friendly. I would feel great about sending any, or all, of my three sons to IU in the near future. I also feel confident now recommending IU to my biology students and their parents. I have had a marvelous experience and I certainly credit the SRI experience with my change of opinion.

As for the lab experience, it was enlightening as well. The first two weeks I spent the afternoons in Dr. Emilia Martins' lab and then the next 6 weeks I worked in her lab

for the whole day. I was challenged each day to think about the "Big Question" the lab was addressing, what my role or project was, how it fit in with the goals of the lab, and then to reflect on what I had actually done each day.

The first week was such an adjustment from my normal work style as a high school classroom teacher. I was continually amazed at the size of the researcher's questions. It was also a shock to realize and internalize the idea that researchers ***really don't know the answer*** to their research questions -- that's why they are researching! In the high school lab I had become comfortable with "knowing" what my students should find out or learn by doing a lab, but what I was exposed to this summer was a completely different animal! I found that it was OK to not know the answer; in fact the goal of the experiment was to ***find*** the answer, not just to confirm what was already known. Once I came to grips with this shift in paradigm the research became interesting and exciting instead of frustrating and ambiguous. It really made me rethink the process of teaching "science" to my students. I have begun to understand what inquiry truly is! Finding a novel answer versus simply confirming what has already been learned IS what science is all about.

I kept a fairly detailed journal the first two weeks of the experience, but once I started working in the lab all day, I found that it was easier to reflect on the entire experience week by week instead of day by day.

The first week, like I said earlier, was frustrating as I kept finding "real scientists" without what I perceived to be "answers." Everyone knew the questions they were researching, but after hearing a hundred times, "*I don't know, that's what I am trying to find out*" I had an epiphany that SCIENCE is about QUESTIONS! I had always told my students this, but NOW I understood. I did not have a clear idea or direction as to what I was supposed to be DOING at this point, so I immersed myself in trying to help in the lab and learning the methods that are employed in the study of animal behavior.

The second week was much different. A participant from last year's SRI, Deanna Soper, came to work in the lab and she had a much clearer idea of what our main task was to be this summer. She shared with me the grant information about the experiment we were to conduct this summer and suddenly all the pieces began to fall into place. Also, the second week, the post-doc in Dr. Martins' lab announced he would be leaving

in a couple of weeks to pursue a new career in Florida. Since the lab was in the process of constructing and moving the Zebrafish lab from the basement to the 4th floor, my role in the lab took on a new significance. Both Deanna and I began learning as much as possible about the Zebrafish tank system, Zebrafish care, and plumbing. We soon became very familiar with PVC, glue, Lowes, and Bill the carpenter in Jordan Hall. I was suddenly glad I had redone three bathrooms in my house! Who knew I would use my plumber's knowledge again so soon?!

The third and fourth weeks were filled with activity. We developed and perfected a protocol for observing and recording Zebrafish aggression and courtship behaviors. We built experimental set ups including tanks, dividers, and an apparatus out of PVC for dropping simulated heron beaks into the tanks simultaneously. We continued to work on setting up the Zebrafish lab on the 4th floor of Jordan Hall, filling tanks, repairing PVC leaks, installing spigots, water drip tubes, drain tubes, and air hoses for about seventy five 5-gallon fish tanks. Only about two hundred and fifty more tanks to do now!

The fifth, sixth and seventh weeks were spent testing fish and collecting data. We tested six strains of Zebrafish: p-north, p-south, Nadia, TM1, SH, and G-strain, to document their behaviors and size differences. We found initially that sex determination on Zebrafish was quite a challenge. After researching the web we found one professor in Texas that suggested using the presence of the female's cloaca as a way of determining the gender of Zebrafish. When we went back down to the lab, suddenly the task of sexing the Zebrafish became much easier and clearer. No longer did we have to rely on body shape or coloration, both of which are unreliable in determining Zebrafish gender. In total, 144 fish were sexed, tested, video taped and photographed. The live scoring data and photographic measurements of body and fin length were completed during the seventh and eighth weeks of the research experience. The videotape scoring, documenting aggression and courtship behaviors, and water testing of 144 samples containing each fish's hormones will be completed over the next year by Deanna Soper, who has taken a research assistant position with IU in Dr. Martins' lab.

The eighth week has now ended with writing some final thoughts on the whole experience. I am glad to have spent time with Dr. Martins and her staff. The lab is run very professionally and each person, from undergraduate to post-doc, is treated with

respect, trust, and dignity. I felt everyone was encouraging and supportive of the work that was being done on both the lizard research and fish research. I leave to return to my life, my work, and my family, but I have been changed. I have a greater appreciation for research and the rich history of science. Now that I have seen the people who are dedicated to "doing" science, I no long will rush past the historic names mentioned in the textbook. I have a sense of obligation to recognize the people who dedicate their lives to discovering things that haven't been discovered yet. I teach biology, but only because I stand on the *shoulders of giants*!