Molecular Evolution Workshop by the MBL in Woods Hole

By Lydia Baker

I was funded by EDventures to attend the Marine Biology Laboratories (MBL) Workshop on Molecular Evolution this summer (July 21-31, 2013) in Woods Hole, Massachusetts. This intensive ten-day workshop on molecular genetics allowed students to participate in lectures, discussions, and demonstrations of current molecular evolution theory and application. The course also provided the unique opportunity to learn from instructors who had designed the tools in use, while also allowing ample time to approach the instructors in a low-pressure, welcoming environment. The course covered the following topics: phylogenetic analysis, population genetics analysis using coalescence theory, bayesian analysis, maximum likelihood theory and practice, hypothesis testing, databases and sequence matching, molecular evolution integrated at organism and higher levels, comparative genomics, and molecular evolution integrated at lower levels (to name a few).

After completing this workshop, I have a more complete understanding of molecular evolution and the techniques used to manipulate molecular data. I know that my participation in the MLB workshop will serve not only as a foundation to complete my PhD work, but will better inform my post-graduate work. I have a better appreciation for the theoretical, statistical and mathematical basis for my research; this will lead to better choices in experimental design as well as data processing for different types of samples. As just one example, the course covered in depth the algorithms that go into alignments and tree building, and so I know and now understand how to better utilize various programs because I understand underlying assumptions of different programs and can select an approach that is best suited for the specific task.

The MBL workshop will also provided a unique opportunity to network with the instructors as well as colleagues who are also interested in molecular evolution but are not focused on the challenges of working in a marine environment. Working together through such a comprehensive course allowed us to learn and discuss common problems and pitfalls that we have experienced during our research. I was able to connect with peers who are interested in population biology, biogeography, and comparative genomics. My participation in the MBL course helped me to expand on my existing experience and keep up with the newest technologies, in part by networking with developers as well as my peers who are working at the leading edge of these advances.

I intend to share the information I have learned by organizing a short workshop for students, staff and faculty at the University of Hawaii at Manoa, with a live webinar feed to C-MORE participants at its six partner institutions (MIT, MBARI, UCSC, WHOI, OSU, and Columbia). A summary presentation and demonstration will be given, with the goal of informing C-MORE participants regarding the theoretical background and tools employed during the study of molecular evolution. Other participants from the School of Ocean and Earth Science and Technology, and the Department of Microbiology will be welcome (potential audience is >100). By the time I receive my PhD, I expect that I will be prepared to integrate what I've learned into my lesson plans so that I can share my experience with the next generation of scientists.