

# Botanic Garden of Smith College—Summer Internship Opportunity at the Smithsonian Institution Museum of Natural History

## Internship Report 2004

Magdalena Zopf '06

I spent this past summer working as an intern in the Botany Department of the National Museum of Natural History, Smithsonian Institution. My work was funded through the Smith College Botanic Garden, made possible by a donation from Deanna Bates, in honor of Georgia Anne Thomas, M.D. '69, and sponsored at the Smithsonian by Dr. W. John Kress, chair of the Botany Department. Under his guidance, I worked with postdoctoral fellow Dr. Chelsea D. Specht on the molecular phylogeny of the genus *Heliconia*. The goal of this project (to be finished after my departure) is to define the evolutionary relationships between and among heliconia species. In the simplest terms, I was working to obtain and analyze genetic information that would lead to the creation of a “family tree” of the genus.

Our relatively small project was, nonetheless, representative of much of the work done by the curators in the Smithsonian Botany Department. These scientists are fundamentally systematists; their work consists of collecting and documenting plant species, classifying them, and researching the implications of these classifications. They maintain and augment the nation's herbarium. This was somewhat novel for me when I arrived at the Smithsonian. My concept of curation had been shaped by a childhood spent among curators of art museums, where much emphasis was on the public reception of their collections. But then, many things were new to me upon my arrival in Washington, D.C., and, later in Hawaii.

I began my internship at the Smithsonian fresh from Dr. Carolyn Wetzel's Plant Physiology Laboratory class at Smith. Her introduction merged perfectly into my new world; from my first day, the terms and ideas to which she had introduced me were everywhere. Dr. Specht elaborated on these concepts in my training (and during shuttle rides, plane trips, and lunch breaks, over drinks after work, and overlooking Hawaiian valleys—talk of our science and its practice enlivened it all).

Dr. Specht was a wonderful mentor, effective in her role because of her own curiosity. Her answers to my questions were always richly detailed. Her broad spectrum of knowledge was evident, both when she trained me for lab work and when she guided me through my first collecting trip. Because she had only recently begun her fellowship at the museum, we began to learn the nuances of the Smithsonian's LAB (Laboratories of Analytical Biology) facilities together.

Our procedure for gathering data was typical for work of this nature: DNA for all species of *Heliconia* for which we had material was extracted from silica-dried or frozen plant tissue; specific regions of this DNA were amplified using PCR; the PCR products were cycle sequenced; and the resulting chromatograms were aligned and analyzed. The challenge of our work was in finding informative gene regions of the *Heliconia* DNA. With the bananas (family Musaceae) and the gingers (Zingiberaceae), among others, the heliconias (Heliconiaceae) are part of the group of tropical monocots known as the Zingiberales. In 2001, Kress et al. performed an analysis similar to that which I began with Dr. Specht, but at the family level. Species-level analysis of *Heliconia* is complicated by the fact that there is relatively little genetic variation among species. Without sufficient genetic variation, it is difficult to discern the branching order of the genetic tree. Therefore, the majority of my time was spent seeking a gene region with sufficient variation among species' base pair composition to be phylogenetically informative.

The week I was able to spend with Chelsea collecting *Heliconia* specimens at Lyon Arboretum in Hawaii exposed me to another side of the systematic biologist's experience. Ray Baker, Research Associate at Lyon and our liaison, knows every valley of the arboretum like the back of his hand. His help was indispensable in place that is more jungle-like than gardenesque. We may have

For more information about this internship and to apply, contact: Madelaine Zadik at the Botanic Garden: [mzadik@smith.edu](mailto:mzadik@smith.edu)



On a collecting trip on the Big Island

been only fifteen minutes from downtown Honolulu, but winding our way up narrow trails and around dense, tropical plantings on a quest for the elusive specimen, I began to comprehend the exhilaration of field work. The plants—their habits, leaf and flower morphologies, their

coloring—have a vibrancy that is not captured by chromatograms.

Like many Smith women, landscape, and all that the term encompasses, fascinates me. Mentors in the Department of Biological Sciences and the Landscape Studies Program at Smith have guided me on explorations of architecture, population genetics, urban sociology, horticulture, and more.

This summer, I went “micro” and entered a new world—that of the molecular botanist. The Smithsonian LAB, my daytime home for much of

ten weeks, was an environment structured around carefully designed procedure, a place where I reduced fresh plant tissue to microliters of liquid, only to see it blossom again on my computer screen in the form of genetic sequences.

The individuals who helped me to discover this new way of experiencing the world are a tremendous group. I was honored to have the opportunity to work with them, and am indebted to Smith College, the National Museum of Natural History, and, perhaps most importantly, to the donor who foresaw the value of my experience and made it possible.



Mada with John Price, Smithsonian fellow studying Hawaiian biogeography, identifying a specimen in Hawaii



Mada and *Heliconia* at the Lyon Arboretum