

Project Summary – A New Infrastructure for Invertebrate Biodiversity Research in Puerto Rico

With a total of more than 150,000 specimens, the 85-year old collections of insects and terrestrial, freshwater, and marine invertebrates of the University of Puerto Rico at Mayagüez (UPRM), western Puerto Rico, are among the most significant repositories for these groups in the Caribbean region. Located in Mayagüez and on Magueyes Island, these collections were created by outstanding insect and invertebrate specialists working in Puerto Rico and surrounding islands. Holdings are particularly strong in the Hemiptera, Lepidoptera, Coleoptera, Collembola, Crustacea, Mollusca, Echinodermata, and Cnidaria. Collecting and curatorial activities initiated in the 1920s and were maintained throughout the 1980s, resulting in many taxonomically and historically valuable records for the region. The collection activities were accompanied by an exceptional student training program. However, over the past 15 years the invertebrate collections were increasingly neglected, with certain parts scattered throughout multiple buildings and rooms, inaccessible, or inadequately stored and at risk of becoming damaged or lost.

The arrival of new faculty at UPRM with active organismal research programs and strong support from their respective Departments has led to a situation where the collections' potential may again be fully realized. Since 2006 a comprehensive effort was made to rescue, consolidate, curate, and inventory the collections. In addition to preserving a unique research legacy, this revival is significant because of UPRM's tropical location, potential for research, and educational mission. Hundreds or even thousands of Puerto Rican invertebrate taxa remain undescribed or unrevised. UPRM's comprehensive curriculum, and eligibility to receive grants from United States agencies, therefore present special conditions for a highly competitive training and research program in invertebrate systematics. Furthermore, the university has opened a "window of opportunity" by committing nearly \$ 150,000 in faculty release time and matching funds to renovate the Mayagüez-based Entomology Laboratory which would house the new equipment.

Intellectual merit. Here we propose to replace the available and largely inadequate UPRM invertebrate collection infrastructure with a uniform, high-quality system including 20 Viking entomology cabinets, 1000 Cornell-type insect cases, 12,500 corresponding unit trays, 2 slide cabinets, a freezer to implement a regular pest management plan, as well as 32 economic HON cabinets to protect ethanol-preserved specimens in Mayagüez and on Magueyes Island from exposure to natural light. Together with funds requested for a two-year technician and eight undergraduate stipends, these resources will allow us:

1. To curate and transfer ~ 145,000 specimens located at Mayagüez into a single collection room and state-of-the-art cabinet storage system.
2. To similarly upgrade the physical storage conditions and curate the ~ 8500 specimens of the marine invertebrate collection located on Magueyes Island, particularly the ethanol-preserved specimens.
3. To produce a taxonomically updated, species-level inventory of all UPRM invertebrates, to be made available and searchable through a new web portal.
4. To initiate a *Specify* database for approximately 18,000 select Puerto Rican invertebrate specimens of interest, using modern georeferencing and barcoding techniques, and to publish the holdings on-line, along with habitus pictures of nearly 3500 specimens.
5. To train eight undergraduate students in collection-promoting activities such as the elaboration of *Lucid* keys for select Puerto Rican invertebrates including butterflies, herbivorous beetles, aquatic insects, and crustaceans, to be published on-line through the web portal.

Broader impacts. The above objectives are part of a comprehensive and longer-term plan, supported by the UPRM administration, to create a *Research Center for Invertebrate Animals* at the Mayagüez campus location, and thereby revive the aforementioned legacy. The *Center* will be ideally positioned to address the need for systematic studies in the greater Neotropical region, and will allow UPRM to adequately serve as the main repository for vouchers produced by graduate student research projects and other regional invertebrate surveys. Ecological and applied research will benefit immensely from publications of species images, keys, and revisions, particularly in conjunction with the on-line availability of historical, georeferenced invertebrate records via the proposed *Specify* database.