A Peabody Botanical Expedition through the Ecuadorian Andes

By Patrick Sweeney, Collections Manager, Division of Botany and Yale University Herbarium

The northern Andes Mountains extend from Venezuela to northern Peru. This region, with a remarkable range of habitats, is of great botanical interest because of its extensive diversity and endemism; more than half of the plant species within some ecosystems are native to the area. During June and July of 2009, botanists from the Yale Peabody Museum of Natural History’s Division of Botany and the Yale Department of Ecology & Evolutionary Biology conducted a collecting expedition to the Ecuadorian Andes, an exceptional area within this northern Andes region. The high Andes of Ecuador encompasses about 45,000 square kilometers (more than 11 million acres). By some estimates it is home to more than 4,500 species, or 50% more than the Amazonian lowlands of Ecuador, an area almost twice as large.

A. & B. Andean native plants Columellia oblonga (Columelliaceae) and Desfontainia spinosa (Desfontaineaceae). Photos: Patrick Sweeney

C., D. & E. Species of Ecuadorian Viburnum: V. jamesonii (with fruits), V. hallii, and V. stipitatum.

Large photo: Andean native plant Axineae cf. scutigera (Melastomataceae).
The main focus of our expedition was to collect plants in the genus *Viburnum*, a group that has been a long-term focus of study for Dr. Michael Donoghue, Division of Botany Curator and G. Evelyn Hutchinson Professor of Ecology & Evolutionary Biology, his students and post doctoral researchers. The approximately 160 species of shrubs and small trees in this genus are distributed broadly in the Northern Hemisphere and their range extends into the mountains of Asia and Central and South America. In the Andes they are almost wholly confined to areas above 1,200 meters (almost 4,000 feet). The Andean species are among some of the least studied within the genus.

Recent molecular studies of *Viburnum* suggest that most of the Latin American species form a single lineage that may have originated in the Northern Hemisphere and then moved into the high elevation areas of Central and South America, where it subsequently diversified. This is a pattern seen in many other North American genera also found in the South America, where it subsequently diversified. This uplift would have provided a dispersal route for the movement of Northern Hemisphere groups into the Andes, where a combination of diverse habitats and lack of competition drove diversification.

The main goal of our collecting trip was to achieve population-level sampling of all Ecuadorian *Viburnum* species. This will allow us to investigate more deeply the processes that have contributed to shaping the biogeographic distribution and diversification of Latin American *Viburnum*, and also to address taxonomic issues involving the group. We chose to target our initial field work in Ecuador because of the many *Viburnum* species there and because of the excellent support network available to visiting botanists through the Herbario Nacional del Ecuador in Quito and the Missouri Botanical Garden. Along with Professor Donoghue, our team also included Dr. Wendy L. Clement, an post doctoral researcher in the Yale Department of Ecology & Evolutionary Biology, Dr. Erika Edwards, Assistant Professor in the Department of Ecology & Evolutionary Biology at Brown University, and Juan Yépez Cadena, a graduate student at Universidad Central de Ecuador in Quito affiliated with Herbario Nacional del Ecuador.

Our trip was a great success. We collected more than 550 specimens from almost 90 populations and covered an area of Ecuador stretching from the Columbian border south to Peru. Driving more than 2,500 kilometers (1,500 miles), we visited habitats in the Eastern and Western Cordilleras, including grass páramo, shrub páramo, Polylepis forest, lower and upper montane rainforests, and secondary vegetation. Our efforts are now focused on incorporating this newly collected material into our ongoing systematic investigations of *Viburnum* and on planning our next major expedition—to Southeast Asia, another major center of diversity for *Viburnum*.

*M. Viburnum* is common in disturbed habitats such as forest edges and roadsides. Here Botany Collections Manager Patrick Sweeney views a specimen of *V. divaricatum*, an Ecuadorian endemic, along a road near Pacca. Photo: Wendy Clement

*N. Mount Chimborazo. This mountain was climbed by Alexander von Humboldt in 1802. His observations at the time played a central role in the development of his ideas about plant biogeography. Photo: Patrick Sweeney*

*O. The páramo is a northern Andean ecosystem between the upper tree line and permanent snow line. More than 60% of the species in this ecosystem are native. Grass páramos vegetation is dominated by tussock grasses and giant stem-rosette plants such as *Espeletia* (*Asteraceae*) and *Puya* (*Bromeliaceae*). Pictured is a grass páramo near the town of El Angel on the Columbian border. The tall stem-rosette plants in the foreground are *Espeletia pycnophylla*. Photo: Wendy Clement*

*P. Plant preparation along the road near San Gabriel. Left to right: Dr. Wendy Clement, Dr. Michael Donoghue, Universidad Central de Ecuador graduate student Juan Yépez Cadena, and Dr. Erika Edwards. Photo: Patrick Sweeney*