BOTANICAL RESEARCH AND CONSERVATION: COSTA RICA GARDEN



▼ Collaboration—Costa Rica's 155-year history of significant botanical exploration has been marked by collaboration between resident and visiting botanists. The Garden is proud to be part of that legacy through its collaboration with the Museo Nacional de Costa Rica, right, and the Instituto Nacional de Biodiversidad (better known as INBio) to produce the Manual de Plantas de Costa Rica, below. [BH]



Botany attracts tourists— *Eco*-tourism plays a major role in Costa Rica's number-one industry. Besides a large system of national parks (ca. 15% of the total land area), Costa Rica has hundreds of private reserves. Lodges get high marks for having many plants labeled. Popular canopy adventures help to educate by getting people into the forest. [BH]



Geography—Costa Rica is a small country of ca. 51,000 km² with four principal mountain chains, running northwest to southeast, that roughly bisect the country into a wet, non-seasonal, Caribbean slope and a drier, more seasonal Pacific slope. Two of the cordilleras are actively volcanic (Volcán Arenal pictured here). Garden associate William Haber, long resident at Monteverde, has contributed enormously to the botany of the Tilarán range. [AR]

To share knowledge— Parataxonomist Reinaldo Aguilar, visiting researcher Helen Kennedy, and INBio director of botany Nelson Zamora at a Piedras Blancas National Park station. Through Flora Mesoamericana and, more recently, the Manual project, the Garden has promoted the sharing of knowledge about plants among local and international workers. [BH]



🕐 🕶 Habitat extremes— A concentration of extremes from dry savannas (Islas Murciélago in Santa Rosa National Park, right) up to cloud forest (Cordillera Talamanca near División, below) and páramo, back down to rain forests on the Caribbean and southeastern Pacific slopes helps explain much of Costa Rica's biodiversity, very high (currently 9,361 spp. of vascular plants) for such a small country. [BH, SI]







Orchids—Costa Rica's national flower, the Guaria morada (Cattleya AKA Guarianthe skinneri), depicted above on a corner grocery-cafe, is one of 1,340 spp. of orchids currently known from the country. Exploration of the cloud-forest habitats favored by orchids resulted in more than 200 new spp. described from Costa Rica during the period 1993 to 2004. [BH]



V Parataxonomists—Learning field botany at Guanacaste National Park's Pitilla station, Reinaldo Aguilar and Petrona Ríos participate in the first parataxonomy course, 1989. The concept, pioneered by INBio, of training park guards and other local people to collect for a national inventory has worked well. MO botanists and others facilitated by MO have participated in these courses. [BH]



Endemic and rare species—Stenocereus aragonii, above left diagonal, is Costa Rica's largest cactus. Commonly cultivated for hedge-rows and ornament, often abundant where wild, it is endemic to Costa Rica, but not endangered. Guaiacum sanctum, left, another dry-forest species, is slowgrowing and hard to propagate. While not endemic, it has been over-exploited for its hard wood (lignum-vitae) and medicinal value, and is very rare and endangered. Harvesting of G. sanctum in Costa Rica has been prohibited since 1997, and populations are protected in two national parks. Colleagues at INBio and the Museo Nacional are adapting IUCN methodology to apply endangered species categories to all Costa Rican plants. A preliminary analysis of 91 spp. may lead government agencies to increase the current number of timber species prohibited from harvest from just 19 to over 40. [BH]



The Braulio Carrillo National Park— Boasting expansive views of nearly inaccessible forests extending from the continental divide down to the Caribbean lowlands and the Organization for Tropical Studies research station at La Selva (site of ongoing MO collaboration for an online flora), this park is just a 20minutes drive from San José, the Costa Rican capital. [BH]

Population—Almost 40% of Costa Rica's land area is still densely forested—preserved to a great degree by its extreme isolation. Despite extensive conservation efforts, social and economic forces are exerting pressures on the remaining forests. Recent logging on the wet Osa Peninsula (Rancho Quemado, left) has left only Corcovado National Park and few small patches of forest outside. Clearing for cattle left the dry Guanacaste Province relatively deforested long ago. [BH]

Páramo—Cerro Kámuk, at 3,549 m, is Costa Rica's second highest peak, and like most páramos here is dominated by the bamboo Chusquea subtessellata. With 22 species, Costa Rica is a minor center of diversity for this South American genus. Here INBio's Luis González collects plants in conjunction with ground-truthing for a vegetation map of the country—a project of INBio's Ecomapas department. [AG]

A Beaches compete with forests—Many of the more than a million tourists who visit Costa Rica each year come for the beaches, above left. Significant numbers also visit botanical attractions like the cactus and orchid displays at Lankester Gardens (Selenicereus wercklei, one of Costa Rica's 12 endemic species of cacti, above right), and the bromeliad and Heliconia displays at INBioparque (H. lankesteri, one of Costa Rica's 38 native species of Heliconia, below right). Although INBiopark was designed, in part, as a gateway to the country's many national parks and other protected areas, Costa Ricans and especially school children have turned out to be the heaviest users. This, and a surge in the production of popular field guides, spearheaded by INBio, is contributing significantly to the country's bioliteracy program. [BH, BH, AR]

• Gardens—Observant vistors will not fail to notice the abundance of familiar "house plants" growing wild or in yards. Many widely popular ornamentals, like Chamaedorea costaricana, are native Costa Rican species. Exploration, production of floras and taxonomic research provide the basis for popularizing botany, making forest conservation more meaningful to visitors and Costa Ricans alike. [BH]

Recent discoveries—Exploration and study over the last 15 years have resulted in the addition of nearly 1,000 species to the Costa Rican flora, more than half new to science. About 33% of these new records are woody species, including many large trees like Matisia tinamastiana (left) and Ruptiliocarpon caracolito (below right). Many of these new records have come from the southern Pacific coastal ranges (Cerro Nara region, above) and the Osa Peninsula. The far more inaccessible and densely forested southern Caribbean slope remains relatively unexplored. Recent data show that about 1,000 more species of plants are known from Costa Rica's seasonally dry Pacific slope than from the non-seasonal, wet Caribbean slope. Whether that is the result of more collecting on the Pacific slope or its greater heterogeneity of rainfall remains to be seen. [AE, RA, FM]

All new plant discoveries are scientifically informative. Some also have potential ornamental value, such as Bakeridesia vulcanicola, recently found in Costa Rica's southern Pacific coastal range, where it is disjunct from Guatemala. Many other members of the Malvaceae (cotton) family, especially Hibiscus spp., are grown worldwide as ornamentals. [BH]

Rediscovery—Rediscoveries are often just as interesting as new finds. Drymonia peltata was described 138 years ago from Costa and drawing were preserved; the original locality, like the life of collector A. R. Endres, remained shrouded in mystery. This species was recently refound and is once again "in captivity," with obvious

Species pages on line—At least four sites* are developing Internet access to images and information about Costa Rican plants for the general public. Samanea saman, the Rain tree or Cenízaro, an ornamental and timber legume, can be seen on the INBio Web site. Currently, ca. 550 spp. in the Fabaceae (legume or bean) family are known from Costa Rica. [RA]

relatives—Sechium tacaco (above), a close relative of the far more widely cultivated S. edule (Chayote), is Costa Rica's only endemic, edible crop species. Solanum wendlandii (right), native to Costa Rica and Panama, is a widely cultivated ornamental vine. Several Costa Rican highland species of *Solanum* have been studied because they are close relatives of the potato. [BH]

Economic plants and wild

Disjuncts—Amelanchier *denticulata* (above) was known only from Mexico to Honduras, but now has been found in Costa Rica. The family Lepidobotryaceae is represented by Ruptiliocarpon (right), in the Americas, and Lepidobotrys, in Africa. Perhaps oddest of all, the endemic Prosopanche costaricensis (below) is a root parasite on rain-forest trees, while the other two species of Prosopanche parasitize Argentinean dry-forest trees. [BH, RA, BH]

Ephemeral endemism— One of Costa Rica's most spectacular ostensible endemics, Aechmea mariae-reginae, was recently discovered in Nicaragua. Currently, about 1,000 plant species are considered endemic to Costa Rica. Although exploration in other countries may reduce Costa Rican endemism, authoritative documentation of endemic species is, nevertheless, a powerful conservation tool. [BH]

A The Caribbean slope— Costa Rica's Caribbean slope (Moravia de Chirripó, pictured here), especially the steep terrain of the southern half, is relatively unexplored. With 9,361 species of vascular plants accounted for, Costa Rica has one of the world's most thoroughly studied and diverse tropical floras, but many mysteries remain. [FM]

MBG's Barry Hammel (author of text): Barry Hammel (HK) first worked for the Garden as collector for the Flora of Panama during 1978–1979. Subsequently he received his Ph.D. at Duke University and once again, in 1984, was drawn to the Garden, where he has been employed since. In 1989 he sneaked away to live in Costa Rica, where he is now resident, with an office at INBio, and working on the Manual de plantas de Costa Rica.

Research at the Missouri Botanical Garden

With operations in over 35 countries around the globe, the Missouri Botanical Garden collaborates with local institutions wherever MBG botanists conduct research and field work, providing technical expertise, assistance with fund raising, and better communication with the worldwide scientific community.

The research division consists of 37 Ph.D. botanists assisted by 100 support staff and 33 graduate students.

Studies concentrate on the plants of Meso- and South America, sub-Saharan Africa, Madagascar, China, Vietnam, and North America. Individual MBG scientists are specialists in the plants of particular regions, in the systematics and evaluation of major plant families, and in the interactions between plants and people.

The Garden serves as the headquarters for the Center for Plant Conservation and for several major collaborative publications, such as Flora of China and Flora Mesoamericana. Visit our website: www.mobot.org.

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