Racing Against the Clock:

The **Urgent Need** for a Renewed Renaissance of Plant Exploration

James S. Miller

When Charles Darwin left Plymouth on the 27th of December 1831, and sailed on the *Beagle* for South America, it would take him two months before he reached the port of Salvador on the coast of Bahia on the 28th of February 1832. The lengthy trips the early explorers of nature needed to get to and from their destinations not only limited the number of places that they could visit, but also were a serious constraint on what they could bring back.

Transected by the Internet and airlines, today's world is a vastly different place for plant explorers. It is possible to fly anywhere in a day or so and even the most remote reaches of wilderness are seldom more than a few days walk from the closest road. But the complications of travel have been replaced by a confusing tangle of national and international laws that regulate the collection and export of plant material. The goals of plant explorers have changed little in the past few hundred years, but the world in which exploration takes place is decidedly different.

So Much Left to Discover

Despite the ease with which we can now reach the far corners of the planet, we still do not seem within sight of a comprehensive inventory of its plant species. Efforts to harmonize the taxonomy from regional floras into a comprehensive world inventory are only beginning, and there has been no significant decline in the rate of discovery and description of new plant species in the last 50 years. In fact the only reason why the description of new plant species may slow in the next 50 years might be that habitat loss threatens to destroy many of the species that remain undiscovered before they are named. The looming threat from the development required to support a rapidly growing human population adds another tremendously important role for plant explorers and makes the collection and preservation of plant species ever more critical.

While some of the earliest botanical gardens attempted to assemble diverse collections of as many species as possible, most were allied with medical institutions and their living collections, and the compendia they published focused on plants felt to be of use to humans. In the last 50 years the relevance of the total diversity of all plant species to our lives has become increasingly apparent as ornamentals, sources of chemical diversity that fuel drug and agrochemical discovery, and genes that help ensure food security. Modern biological inventories aim to be as comprehensive as possible and conservation efforts include all species as well as consideration of their genetic variability. The later half of the 20th century saw a renaissance in efforts of botanical gardens and museums to inventory the most poorly known reaches of the tropics. Botanists like Paul Standley, Julian Steyermark, and Henri Humbert were followed by Scott Mori (detailed in this issue), Tom Croat, and a wave of others in efforts to reach parts of the tropics that the earliest explorers had merely crisscrossed. The herbarium specimens collected by this generation fueled a completely new level of understanding of botanical diversity in the tropics, but sadly, only a small proportion of the plants discovered have ended up in well curated living collections.

The flow of new and interesting species has always thrilled gardeners and visitors of public gardens, and the ongoing collection and introduction of new species will certainly excite new generations in the future. Plants introduced to gardens can now be seen as protected mini-populations, helping buffer species against extinction should their habitats be destroyed in the wild. Beyond the important role of gardens as gardening and environmental education centers, more emphasis needs to be placed on collections and the number of species they can protect. The world's flora is increasingly threatened by human development, but its conservation is hampered by a lack of critical information—we do not have a comprehensive list of the world's plant species; we do not have a comprehensive list that collates the accessions held in the botanical garden community; we do not have a comprehensive list of the most threatened plant species—and gardens can play a critical role in addressing these problems. Research efforts to

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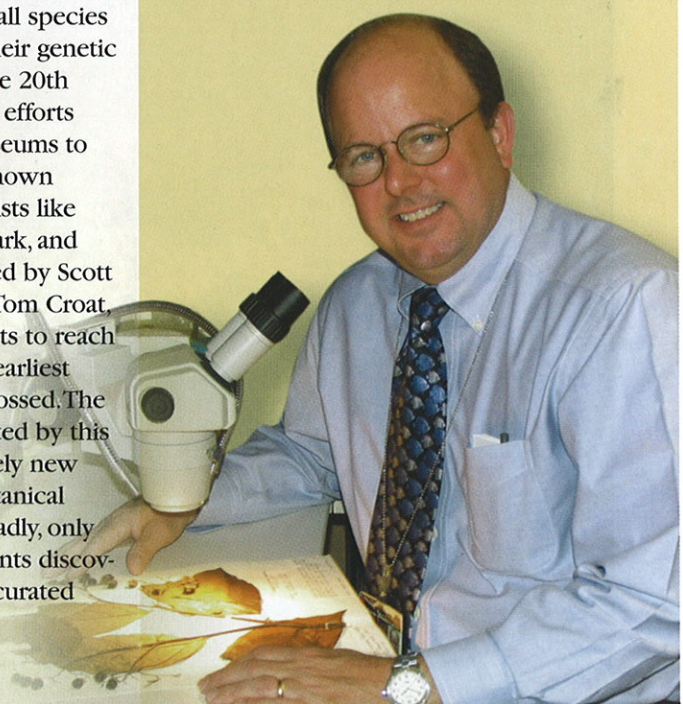

catalog the world's flora can generate the information needed to accurately identify those species at greatest risk of extinction and bring them into cultivation. Gardens probably need to cultivate more than twice, if not three-times, the estimated 90,000 species that are currently being cultivated. But the vast majority of the species that need to be added to collections to ensure their ex situ preservation are from ever increasingly fragmented tropical forests. Another renaissance of plant exploration is desperately needed to comprehensively inventory the plant species in these tropical forests that will be degraded or disappear in the next few decades. Thus, efforts like those of Wayt Thomas (also detailed in this issue) to race against impending destruction of the last remaining parcels of forest in southeastern Brazil need to be repeated in other parts of the tropics.

Supporting Gardens in the Developing World

While protection of wild populations is clearly the ideal solution for protecting biological diversity, it is also abundantly evident that at current rates of habitat loss, botanical gardens must play a key role protecting threatened plant species. Coordinating networks like the Center for Plant Conservation and the California Native Plant Society have done an excellent job assembling collections that ensure protection of the most endangered species of North America. But the majority of plant species occur in developing countries of the tropics, and Northern hemisphere gardens are not an efficient place to expect protection of the tropical flora. Developing countries in the tropics often lack the gardens and scientific staff necessary to achieve success conserving the plants that grow in their own backyards. It will take very strong commitments to partnerships between gardens to successfully support the development and sustainable maintenance of the collections that are needed to conserve the majority of plant species. In a manner similar to sister cities programs, North American and European gardens need to support the sustainable growth and development of existing gardens in the tropical world and also the design and creation of new gardens where they are so desperately needed. All of the world's biota faces tremendous threat, but plants, which are the matrix in which all other terrestrial life exists, are the most cost effective group to preserve and botanical gardens are poised to play the lead role in their discovery, study, and conservation.

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