LANKESTERIANA 7: 121-124. 2003.

NEOTROPICAL ORCHID ECO-TOURISM: EDUCATIONAL EXPERIENCE OF AN ORCHID NEOPHYTE AT THE BOSQUE DE PAZ BIOLOGICAL PRESERVE, CENTRAL VOLCANIC RANGE, COSTA RICA

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Introduction. Nothing prepared me for the experience of seeing epiphytic orchids growing and blooming in the high cloud forest of Costa Rica beginning in 1998. These plants captivated me and were the beginning of a five-year quest to learn more about them. I was fortunate to begin this odyssey by visiting Bosque de Paz, a biological preserve located in the Central Volcanic Range near the village of Bajos del Toro on the Caribbean side of the continental divide near the active volcano, Poas. The purpose of this presentation is to describe the efforts of the owners of the Preserve to attract the interest of orchid professionals and amateur enthusiasts to this mountain haven and to consider more ways in which orchid eco-tourism might be encouraged to grow to the benefit of Costa Rica, orchid science and the conservation of orchid habitat.

Setting, History, and Founding Philosophy of the Preserve. Bosque de Paz Biological Preserve is located in Alajuela Province on the Caribbean flank of the Central Volcanic Range, a part of a nearly continuous arc of active volcanoes extending from southern Mexico to central Costa Rica near 84°W longitude. This chain of volcanic mountains is a consequence of subduction of the seafloor of the eastern Pacific (the Cocos plate) under Central America (the Caribbean plate). Subduction is thus responsible for the mountainous terrain and, together with the prevailing trade-wind patterns, is the primary control on precipitation patterns in Central America and hence for the cloud-forest conditions in that region. Because it is close to the continental divide, it receives precipitation from winds that originate from either side of the divide, and hence receives rainfall even during the "dry" season. The Lodge is at an elevation of about 1400 m and is about 7 km from Poas (at elevation 2704 m). Within this area of about 1000 hectares (about 2500 acres), topographic relief exceeds 1100 m and the highest point is at about 2450 m. The property consists of primary and secondary cloud forest and grazing land that is presently in the slow process of being reforested. Several streams in the Río Toro watershed dissect the property, thus producing steep terrains and riparian and waterfall environments.

The preserve was created by Federico González-Pinto and his wife, Vanessa and their son, Federico Jr., in order to "protect the exuberant flora and fauna in the Central Volcanic Range of Costa Rica", to "create consciousness about the importance of conservation" and, by acquiring specific rainforest habitat and to establish a key corridor for regional biological exchange along the volcanic range. A 22-km-long system of trails gives excellent access to the types of terrains found in the Preserve. Bosque de Paz opened for scientific study and research in 1994 and was opened to the public in 1998 with a spacious lodge of 11 rooms and a first-class dining facility.

Orchids at the Preserve. Because the system of trails requires sustained maintenance to clear branch and tree falls, epiphytic orchids are frequently brought down to eye level. Exceptional falls occurred, for example, during Hurricane Mitch in September of 1998. Sr. González-Pinto and son Federico González-Sotela, Jr. conceived the idea of relocating these plants to make them more accessible to the visitors of the Preserve and sought advice from orchid experts about how these relocations might be done successfully. The owners were fortunate to have Martín Porras-Porras as an employee responsible for trail maintenance and gardening. Porras himself

grows orchids as a hobby and maintains an impressive orchid garden (JARDÍN DE ORQUÍDEAS MARTÍN) in Bajos del Toro that is attracting a growing number of orchid enthusiasts. Under the direction of the owners, Sr. Porras began salvaging and relocating air-fall orchids to the branches of small trees near the Lodge in the mid 1990's. The resulting 75-m-long Botanical Trail was opened in 1996. An orchid garden was also created in the year 2000 by relocating plants to trees surrounding a new assembly building. Eye-level relocations of orchids elsewhere along the system of trails also provide interest for orchid enthusiasts in seeing these plants making a living in a nearly natural state.

The collection of orchids at the Preserve (see the list below) is diverse and reflects not only the showy species but also the smaller, less conspicuous ones, such as those in the Pleurothallid Alliance. Also, very large species, such as some of those in the genus *Maxillaria* that are rarely found in collections or in cultivation, are also strongly represented. The collection is therefore more representative than those usually found in casual collections or in typical public displays in most botanical gardens. The positioning of relocated plants within these display areas is seemingly random, but in fact is based on the 15-year practical experience of Sr. Porras as an orchid gardener. The success of these relocations speaks for itself. These plants generally have survived, produce new growths, usually blossom and often are pollinated, judging from the fruiting and spent seedpods that are evident. It is not known if propagation by the resulting seeds has occurred. In a way, these relocations represent a large-scale botanical experiment in which many orchid species, potential pollinators and symbiotic fungi are juxtaposed in a way that may not exist in the cloud forest itself.

The efforts that the González family has made in creating public access to orchids have resulted in an estimated 20% of their clients being orchid enthusiasts, a high percentage for tropical nature preserves. Orchids at the Preserve also enrich the experiences of birders and others interested in natural history. The preserve has attracted groups of professional orchidists and orchid hobbyists, including the Orchid Association of Japan and botanists from several notable botanical gardens and natural history museums.

Species and Genera Lists for Bosque de Paz and the Environs around the Nearby Town of Bajos del Toro. To my knowledge, there has been no systematic or sustained collection, study and identification of the orchids in this part of the Central Volcanic Range. The following is a partial list mainly based on the collections and identifications of Franco Pupulin of Jardín Botánico Lankester and a very few by myself (asterisks*). Undoubtedly this list is but a fraction of the species present in the preserve (Table 1).

Building an Orchid Eco-Tourism System in Costa Rica and Elsewhere in Latin America. Orchids and orchid growing are increasing in worldwide popularity and public interest. In the last five years, there have been two popular books about orchids that were on the bestseller list of the New York Times. A popular 2002 television program in the BBC/PBS Nova series also raised interest in orchids. There are more than 500 local orchid societies affiliated with the American Orchid Society alone. Moreover, many millions of people grow orchids at home, ranging from those who own large orchid greenhouses or lath houses to the casual windowsill grower.

This group is largely an untapped potential market for orchid eco-tourism, a business opportunity for nations in the tropics, an opportunity for education of citizens worldwide to be better informed about the conservation of tropical orchid ecosystems and about orchid natural history and an opportunity to advance orchid science by encouraging more involvement of enthusiastic volunteers. I believe that orchid hobbyists are no less enthusiastic about orchids than birders are about birds.

Costa Rica is to be commended for the leadership it has taken in conserving its ecosystems and hence preserving its biological resources and diversity. The following recommendations for building orchid eco-tourism are based on my own yearly vacationing experience in the country over the last 5 years and my perceptions of the things that could potentially attract other orchid enthusiasts. Some of these recommendations are obvious.

1. Develop site-specific species lists, likely blooming dates and identification tags on plants in preserves and parks. Knowing where one might find a particular group of species and when one might expect

Table 1. Species and Genera Lists for Bosque de Paz and the Environs around the Nearby Town of Bajos del Toro.

Acineta sp.*	*Maxillaria* cf. *dendrobioides*
Chondrorhyncha picta	*inaudita*
Cryptocentrum sp.	*neglecta*
Dichaea lankesteri	*parvilabia*
pendula	*quadrata**
robusta	*trilobata*
cf. *glauca*	*punctostriata*
*morrisii**	*Miltoniopsis warszewiczii*
Diodonopsis erinacea	*Oerstedella pumila*
Dracula astuta	*Oncidium bracteatum*
*Elleanthus robustus**	*Oncidium* sp. (several unidentified species)*
Epidendrum goniorhachis	*Osmoglossum egertonii**
incomptum	Pleurothallid Alliance: Many other unidentified species
lacustre	*Prosthechea campylostalix*
miserrimum	*pygmaea*
*parkinsonianum**	*Restrepia trichoglossa*
*radicans**	*Scaphyglottis* sp.
Goniochilus lecochilinus	*Sigmatostalix guatemalensis*
Jacquiniella teretifolia	*Specklinia calyptrostele*
Kefersteinia wercklei	*strumosa*
Lepanthes estrellensis	*Stelis immersa**
eximia	*megachlamys*
jimenezii	*Telipogon biolleyi*
*Lockhartia amoena**	*Trichopilia suavis**
*oerstedii**	*Trichosalpinx blaisdellii*
Malaxis hastilabia	*ciliaris**
Maxillaria acervata	*Warszewiczella discolor*
*biolleyi**	*Xylobium squalens**
cf. *brunnea*	

them to flower would help in the planning of vacations around orchids, just as information on the geographic distribution and breeding seasons of birds are useful to visiting birders. This requires sustained on-site record keeping of blooming and careful plant identifications and labeling.

2. Bring more "orchids to the people or take people to the orchids". Seeing orchids in a state close to nature is a far richer experience than seeing them hanging in a lath house or in a greenhouse. Unfortunately, a large fraction of orchid plants occur in the inaccessible forest canopy. Relocations of air-fall plants to low branches like those practiced by Bosque de Paz are a useful first step. Creating aerial tramways is too costly and does not allow for close inspection of plants. Creating "orchid observatories" by building walkways from steep hillside trails to large nearby orchid-bearing trees could provide closer-to-nature experiences. Bringing orchid-bearing logs down from the canopy by pulleys might also be a useful way of bringing orchids and people together.
3. Build tours of orchid destinations that provide a range of experiences for orchid hobbyists. Put together a sequence of orchid destinations that allow people with similar interests in orchids to meet, naturally starting with Lankester Gardens. Advertise such tours in the newsletters and publications of the orchid societies.
4. Provide educational opportunities for nature guides so that they can be better informed about Costa Rica's orchid flora and biology. My experience with perhaps 40 nature guides in Costa Rica is that not more than one in 20 really know very much about Costa Rican orchids and the wonders of tropical orchid biology. An enthusiastic and informed guide can make all the difference. For myself, Federico González Sotela, Jr., although not a specialized guide in orchids but informed through his own self education and native curiosi-

ty, gave me an enthusiastic introduction to the orchids of the Preserve. A national training system does exist for Costa Rican nature guides, but I suspect that orchids are lightly covered, if at all. This situation can be changed with the active participation of orchid specialists.

5. Encourage participation of enthusiastic volunteers in orchid research by providing in-country instruction and facilities for study. Perhaps amateurs can be involved in volunteer efforts to identify and relocate air-fall plants after large tropical storms.
6. Provide more opportunities for CITES-approved in-country orchid sales and foreign shipments. Nothing raises one's excitement in and knowledge of a plant than trying to grow and bloom it yourself at home. I know that under CITES rules one can buy in-flask orchids easily, but facilitating shipment of more-mature plants would be a helpful development.
7. Take advantage of computer and web technology to provide more comprehensive pictorial guides to orchids that aid in the identification and appreciation of orchid genera and species by amateurs. Field guides with identification keys, such as Robert Dressler's Field Guide to the Orchids of Costa Rica and Panama and the volumes in the Flora Costaricensis Series in the journal Fieldiana are extremely useful, but the learning curve for the morphological and taxonomic terminology is steep and daunting and probably beyond most orchid hobbyists. Quality photographic images of both the flowers and plants of orchid species with scales would provide more accessible identification tools for the orchid tourist.

To conclude, looking for orchids has many advantages over birding. It is something that doesn't have to be done at 6 bloody AM. Orchids don't fly off when you try to photograph them or migrate to distant places with the seasons. Moreover, I believe that the community of amateur orchid enthusiasts can do for orchid science and orchid conservation what birders have done for ornithology and for conservation of avian ecosystems.

ACKNOWLEDGEMENTS

I thank the González-family for providing some of the factual details about Bosque de Paz and Franco Pupulin for generously providing me a partial species list. Federico González-Sotela, Jr. gets the credit (or the blame) for introducing me to orchids in the wild. I also thank my friend Dr. Marino Protti (Observatorio Vulcanológico y Sismológico de Costa Rica, Universidad Nacional) for sharing with me his knowledge of the natural history of Costa Rica.

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