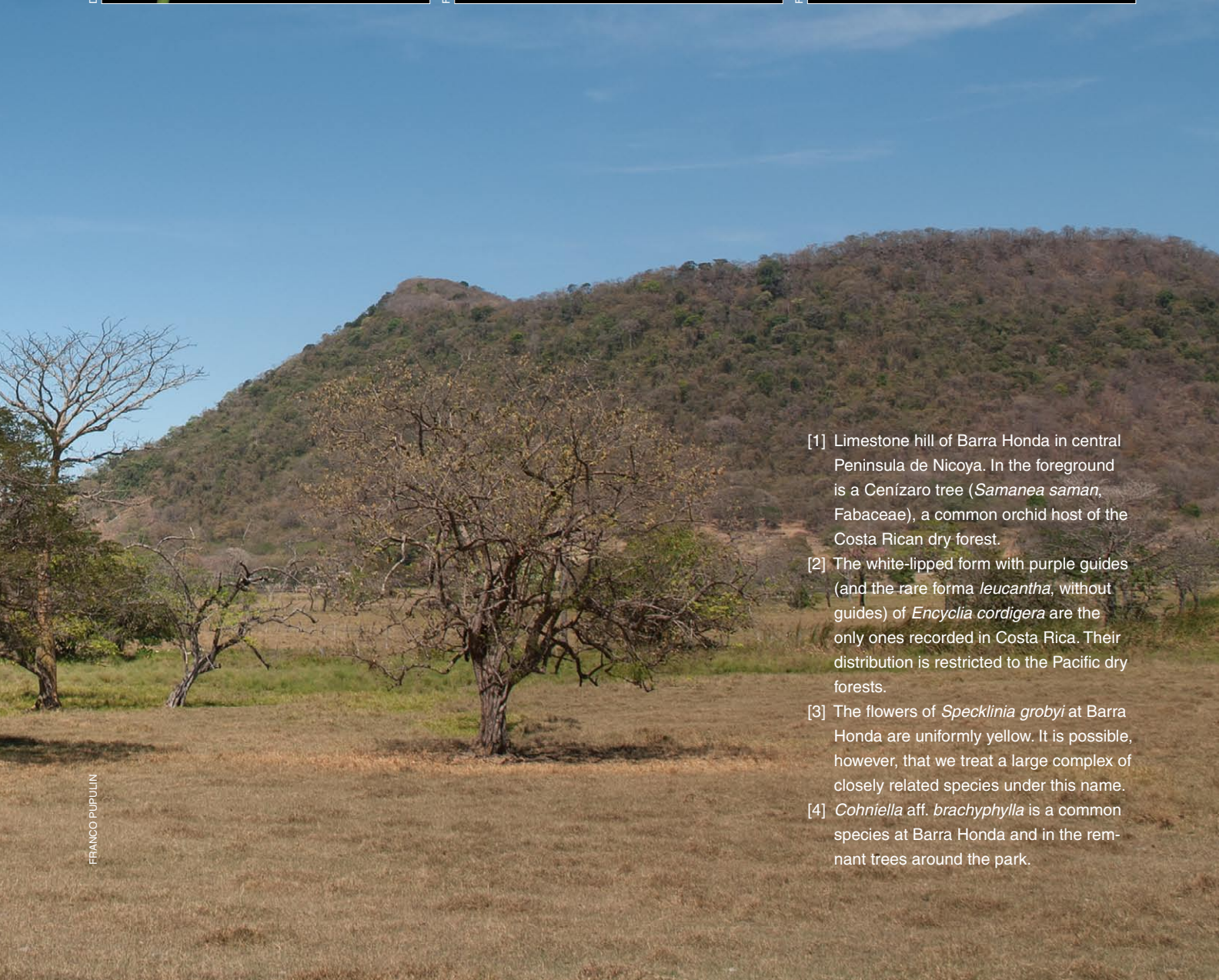


Species from the Dry Side



Looking for Orchids Where You Least Expect Them

BY FRANCO PUPULIN AND DIEGO BOGARÍN



[1] Limestone hill of Barra Honda in central Peninsula de Nicoya. In the foreground is a Cenízaro tree (*Samanea saman*, Fabaceae), a common orchid host of the Costa Rican dry forest.

[2] The white-lipped form with purple guides (and the rare form *leucantha*, without guides) of *Encyclia cordigera* are the only ones recorded in Costa Rica. Their distribution is restricted to the Pacific dry forests.

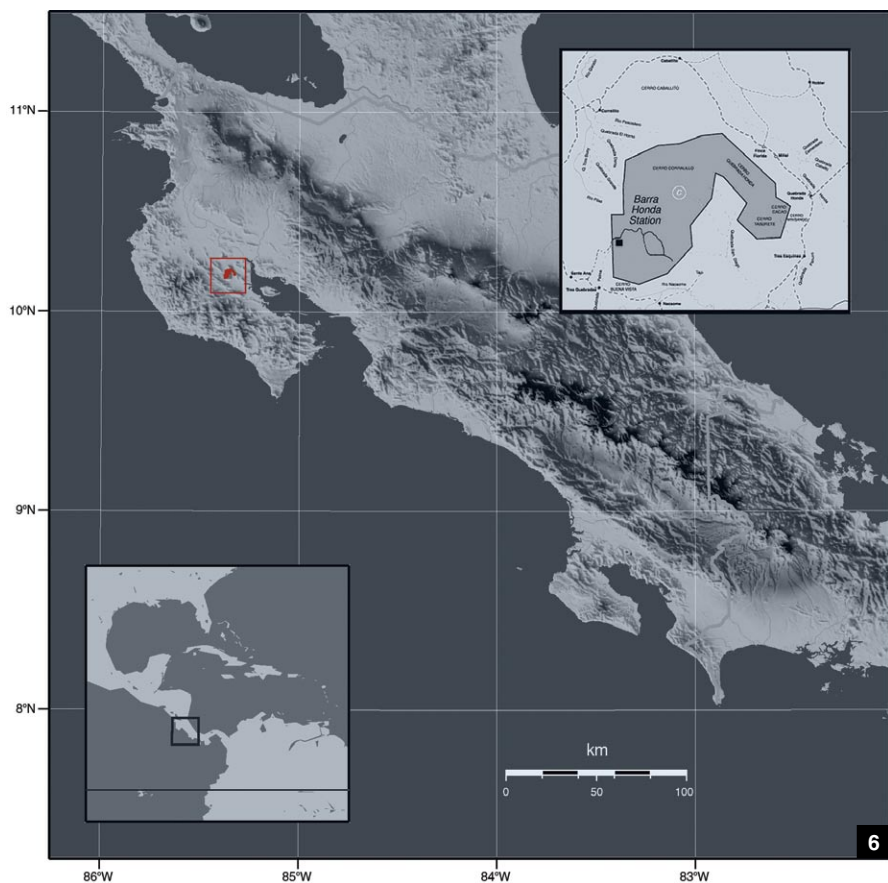
[3] The flowers of *Specklinia grobyi* at Barra Honda are uniformly yellow. It is possible, however, that we treat a large complex of closely related species under this name.

[4] *Cohniella* aff. *brachyphylla* is a common species at Barra Honda and in the remnant trees around the park.



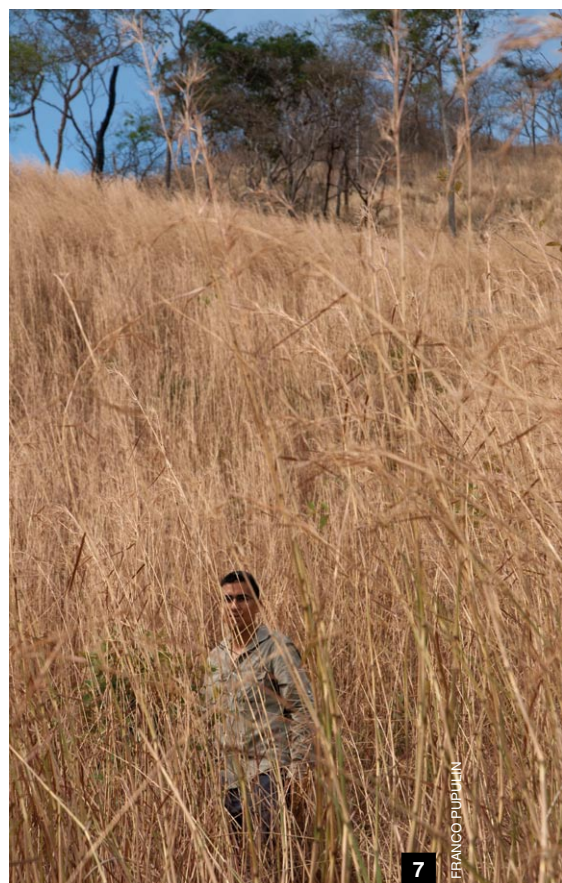
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- [5] The steep hills of Barra Honda arise from the dry lowland plains of the Peninsula de Nicoya.
- [6] The location of Barra Honda National Park in northern Peninsula de Nicoya, Costa Rica.
- [7] Diego Bogarín walking toward the upper hills, among high dry weeds of jaragua (*Hyparrhenia rufa*, Poaceae).

WITH A TERRITORY SMALLER THAN Colorado, packed with 1,600 species of orchids, Costa Rica is probably the country with the highest diversity index in Orchidaceae over the entire planet. Even within Costa Rica, however, orchids are not distributed uniformly. While the temperate lands covered with premontane rainforests at elevations between 3,280 and 6,560 feet (1,000 and 2,000 m) represent a well-known orchid El Dorado, orchids rapidly diminish, both in number of species and plant frequency, in the cooler highlands and the hot, tropical lowlands.

The orchid flora from the highest mountains in Costa Rica is rich in endemic species, mainly groups of the Pleurothallidinae, and it attracted the attention of naturalists since the time of the first plant explorers who visited the country in the second half of the 19th century including Anders Sandøe Oersted, Hermann Wendland, Karl Hoffmann and Auguste R. Endrés. On the contrary, the tropical forest of the basal belt, from sea level to an elevation of 660–980 feet (200–300 m), is perhaps the poorest in terms of epiphytic diversity. Most of the orchid species found

here are widely distributed throughout the Neotropics, with some of the taxa ranging without geographic interruption from Mexico to Peru and Brazil. When a strongly seasonal climate is involved, with a drastic alternation between rains and a prolonged dry period, the trees of the dry forests frequently lose their leaves during the “summer” and support only a reduced number of different epiphytic orchids.

The seasonal dry forests of Central America, extending along the Pacific coast from Mexico to northern Costa Rica, and then again from eastern Panama to the Caribbean coast of Colombia and Venezuela, have the lowest diversity in orchid species among Mesoamerican life zones. In Costa Rica, this kind of vegetation is restricted to the Peninsula de Nicoya and the lowlands of the Pacific drainage in the northern province of Guanacaste. The dry season extends here from mid November to March, with almost five months a year without appreciable rains. In the middle of Peninsula de Nicoya, the climatological station of La Ceiba records an average annual rainfall of about 86 inches (220 cm), with only 90–130 rainy days a year. Minimum and maximum temperatures recorded are 67 F and 91 F (19.3 and 33 C), respectively. The warmest months are from February to April with an average of 96 F (35.8 C). As you can easily imagine, places like these are not exactly orchid paradises, but they remind one instead of African savannas. Within the biogeographic subregion of northern Pacific Costa Rica, the orchid flora of the Peninsula de Nicoya includes species that are exclusively found in seasonal and dry zones, while it represents a climatic barrier for taxa characteristic of the wet Pacific lowlands that do not reach Guanacaste, like *Specklinia corniculata*, *Aspasia epidendroides*, *Ionopsis satyrioides*, *Trizeuxis falcata*, *Prosthechea abbreviata*, *Campylocentrum multiflorum* and *Campylocentrum micranthum*, among others (Bogarín and Pupulin 2007).

As part of Lankester Botanical Garden’s commitment to carry out a complete inventory of the Orchidaceae conserved within the vast system of national parks and other protected areas in Costa Rica, we work also at one of the driest parks, that of Barra Honda in central Peninsula de Nicoya. The park was created in 1974 to protect a unique, intricate system of caves (some of them with pre-Columbian human remains and artifacts dated to approximately 300 BC), which was formed when islets from the Miocene Era were raised above the plains over 70 million years ago. When you approach the park



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[8] Inside Terciopelo Cave, the action of rainwater on soluble limestone produces the deposition of calcium carbonate, resulting in the formation of stalactites and stalagmites.

[9] The entrance of Terciopelo Cave, which descends 200 feet (62 m). The cave has its name from the dead fer-de-lance snake (Spanish “terciopelo”) that was found at the entrance of the cave when it was explored for the first time.

Table 1. Orchid species recorded at Barra Honda National Park.

Species	Epiphyte	Terrestrial	Deciduous	Evergreen
<i>Barkeria obovata</i> (C. Presl) Christenson	x		x	
<i>Beloglottis costaricensis</i> (Rchb. f.) Schltr.		x	x	
<i>Brassavola nodosa</i> (L.) Lindl.	x			x
<i>Catasetum maculatum</i> Kunth	x		x	
<i>Cohniella brachyphylla</i> (Lindl.) Cetzal-Ix & Carnevali	x			x
<i>Cyrtopodium macrobulbon</i> (La Llave & Lex.) G.A. Romero-Gonzalez & Carnevali		x	x	
<i>Dichaea panamensis</i> Lindl.	x			x
<i>Dimerandra emarginata</i> (G. Mey.) Hoehne	x			x
<i>Encyclia cordigera</i> (Kunth) Dressler	x			x
<i>Epidendrum congestoides</i> Ames & C. Schweinf.	x			x
<i>Epidendrum coronatum</i> Ruiz & Pav.	x			x
<i>Epidendrum stamfordianum</i> Bateman	x			x
<i>Epidendrum vulgoamparoanum</i> Hágsater & L. Sánchez S.	x			x
<i>Guarianthe skinneri</i> (Bateman) Dressler & W.E. Higgins	x			x
<i>Habenaria macroceratitis</i> Willd.		x	x	
<i>Heterotaxis sessilis</i> (Sw.) F. Barros	x			x
<i>Laelia rubescens</i> Lindl.	x			x
<i>Leochilus scriptus</i> (Scheidw.) Rchb. f.	x			x
<i>Lophiaris oerstedii</i> (Rchb. f.) R. Jiménez & Carnevali & Dressler	x			x
<i>Malaxis aurea</i> Ames		x	x	
<i>Maxillariella acervata</i> (Rchb.f.) M.A. Blanco & Carnevali	x			x
<i>Oeceoclades maculata</i> (Lindl.) Lindl.		x		x
<i>Pelexia</i> aff. <i>laxa</i> (Poepp. & Endl.) Lindl.		x	x	
<i>Sarcoglottis</i> sp.		x	x	
<i>Sarcoglottis sceptrodes</i> (Rchb. f.) Schltr.		x	x	
<i>Scaphyglottis micrantha</i> (Lindl.) Ames & Correll	x			x
<i>Scaphyglottis stellata</i> Lodd. ex Lindl.	x			x
<i>Sobralia fenziiana</i> Rchb.f.	x			x
<i>Specklinia grobyi</i> (Bateman ex Lindl.) F. Barros	x			x
<i>Specklinia microphylla</i> (A. Rich. & Galeotti) Pridgeon & M.W. Chase	x			x
<i>Stelis quadrifida</i> (La Llave & Lex.) R. Solano & Soto Arenas	x			x
<i>Trichosalpinx reflexa</i> Mel. Fernández & Bogarín	x			x
<i>Trigonidium egertonianum</i> Bateman ex Lindl.	x			x
<i>Tropidia polystachya</i> (Sw.) Ames		x		x

through the arid savannas after crossing the Amistad bridge over the wide mouth of the Tempisque River, you will see in the distance the steep, almost vertical limestone ridges that rise up to 980 feet (300 m) from the surrounding lowland, and constitute the largest part of the 5,680 acres (2,300 ha) of protected area. In 2006, thanks to the support of the Vice-Presidency of Research, University of Costa Rica, and with the help of local rangers, we began exploring the vegetation of the park, which mostly includes secondary, mainly deciduous woods, as the natural vegetation that once covered much of the park has been severely altered by deforestation, fire and cattle ranching.

After the first orchid survey along the limited system of trails at Barra Honda, our hopes of seeing some diversity of orchids in the park was still reduced. In six to seven hours of walking, we spotted just a few individuals (you can count them on your fingers) of the few species you expect to find there: *Catasetum maculatum*, *Encyclia cordigera*, *Laelia rubescens* and a species of *Cohniella* (*Trichocentrum*). Our impression, however, would change soon. Interesting spots were located on the top of Barra Honda peak, a rocky hill with arborescent cacti intermixed with tall trees, as well as in areas at the foot of the limestone cliffs that were difficult to access, where

small rivulets maintain some humidity even during the dry season, supporting reduced patches of gallery forest. Another really unsuspected but worthy orchid spot was one of the highest and driest peaks of the park, Cerro Corralillo. All the original vegetation was cut long ago to make space for a large bean plantation (or “frijolar”), but the site still hosts at its top a meager forest of short trees growing among rocky crevices. Here we discovered a few terrestrial orchids that are not found elsewhere in the protected area.

SPECIES ACCOUNTS Today, almost six years after the beginning of our inventory at Barra Honda, we reached



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the figure of 34 orchid species (Bogarín and Pupulin 2007, Epidendra 2012), including a *Trichosalpinx* new to science (Fernández and Bogarín 2011) (Table 1). Perhaps this is not a number that makes a great effect, but it is almost the same as the number recorded at Manuel Antonio National Park (Pupulin 1998a, 1998b), which hosts large areas of pristine wet forests in central Pacific Costa Rica. Even though some of the taxa we collected and studied at Barra Honda are quite common species in Central America, some others are of particular significance for their rarity or their symbolic status. Furthermore, the floristic work obliges us to critically

revise many of the names “generally” used to identify species of our flora, comparing the living material with historical collections and type materials, often described from distant localities and very different ecological conditions.

Guarlanthe (Cattleya) skinneri is the national flower of Costa Rica. During the first survey at the park, we found a small “epidendrous” epiphyte, which was duly cultivated for the next six years at Lankester until it flowered. It is one of the rarest species in the park, which suffered severely from overcollection. Our specimen is the only documented record at Barra Honda.

To find plants of *Malaxis aurea* was a

[10] *Laelia rubescens* flowers profusely in southern Guanacaste, along the road to Barra Honda.

[11] Widespread along all the Pacific and Caribbean coasts in Costa Rica, *Catasetum maculatum* is variable in flower color. The reddish tones are more common in Barra Honda populations.

[12] The arborescent candlestick cactus (*Stenocereus aragonii*, Cactaceae) form dense populations mixed with other dry-tolerant trees at Barra Honda.

[13] After shedding its leaves, *Beloglottis costaricensis* flowers among rocks and cacti at the beginning of the dry season.



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surprise. Indeed, the species was described from a plant collected by Charles H. Lankester at Las Cónovas at an elevation of 4,260 feet (1,300 m). As Daniel Janzen suggested (pers. comm., 2012), it is probable that in precolonial times the species was distributed all over the country, but it is likely intolerant of agricultural and urban landscapes.

The single collection of *Tropidia polystachya* represents the first record of this species in Costa Rica. It ranges from the Antilles and Florida to Venezuela and Ecuador, including the Galapagos Islands. It is a terrestrial orchid with branching stem and plicate leaves, with a tendency to occur in scrubby and dry forests that seem to be poor orchid habitats (Dressler 1993). Our plant was collected when fruiting.

The study of *Sobralia fenzliana* from Barra Honda allowed us to critically revise the group of species close to *Sobralia decora*, a study that Bob Dressler recently published in this journal (Dressler 2012). The true *Sob. decora* ranges from Chiapas southward to Honduras, where it is substituted by *Sob. fenzliana*, which occurs, at least, in Nicaragua through Ecuador. *Sobralia fenzliana* has larger plants (often reaching to 6½ feet or 2 m in height) and purple flowers, with a white spot at the tip of the lip.

During the dry season, when they are in flower, it is not unusual to spot large specimens of *Encyclia cordigera* on the tallest trees. This is the form with a white lip and small purple nectar guides on the lip callus. In Costa Rica, the white-lipped *E. cordigera* is restricted to the driest regions of the northern Pacific part of the country (Pupulin and Bogarin 2012). The magenta phase has not been documented in Costa Rica.

With flowers more than 2 inches (5 cm) across, *Habenaria macroceratitis* was described from Jamaica. It is known to grow from Florida and Mexico to Costa Rica, as well as in Trinidad and Tobago and in Venezuela. There is no strict consensus over whether this is a unique species (Brown 2002), a variety of *Habenaria quinqueseta* (Luer 1972) or simply a synonym. Its most striking character is the nectar spur, which can reach 6 inches (15 cm) in length. It probably attracts long-tongued sphingid moths for pollination.

Superficially similar to the species of the *Trichosalpinx blaisdellii* and *Trichosalpinx memor* complexes, *Trichosalpinx reflexa* can be mainly distinguished by the narrow leaves, the glabrous sepals and the low central keel on the lip. While *Trichosalpinx ciliaris* is found in Costa



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[14] A small stream flowing through limestone during the wet season. The water at Barra Honda is characterized by high levels of calcium carbonate, which is dissolved in rainwater and deposited by the rivers and streams on the ground and rocks.

[15] Our guide to the highest peak, Don Salomón, approaching Cerro Corralillo with his horse.

[16] A species of *Pelexia* growing among rocks on the higher peak of Barra Honda.

[17] A small terrestrial plant, *Malaxis aurea* spans over many different life zones and different habitats.



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Rica only in the Caribbean watershed, *Tsx. reflexa* is restricted to the semideciduous forests of the Pacific side (Fernández and Bogarín 2011). The plant that served as the holotype for the species was collected at Barra Honda national park.

Small-flowered species of *Specklinia* are a particularly difficult group for identification, and the application of names outside the type localities is often uncertain. We found two species, both of which are rare epiphytes restricted to the remnants of gallery forest. We interpreted one of them as *Specklinia microphylla*, a species described from Mexico, with small leaves and “saffron yellow” flowers.

We adopted the name *Specklinia grobyi* for the other species, but we are conscious that this old name by John Lindley (from a plant from Demerara, Guyana) has been used to identify almost any kind of small, many-flowered *Specklinia* with long inflorescences. Plants at Barra Honda are uniformly bright yellow, while in the original illustration the dorsal sepal, the petals and the lip are striped and blotched with red.

The recent work carried out in Mexico by W. Cetzal-Ix and G. Carnevali-Concha (2010) to clarify the difficult taxonomy of *Cohniella*, helped us identify the single species found at Barra Honda as *Cohniella brachyphylla*. It ranges along the Pacific coast from Mexico to Costa Rica. The diagnostic features of *Coh. brachyphylla* become less obvious in Costa Rican populations, which are at the edge of its natural distribution. A larger sample from Guanacaste to the Valle Central of Costa Rica is needed to better understand species variation in the group.

Among the terrestrial species growing in the scattered vegetation at Cerro



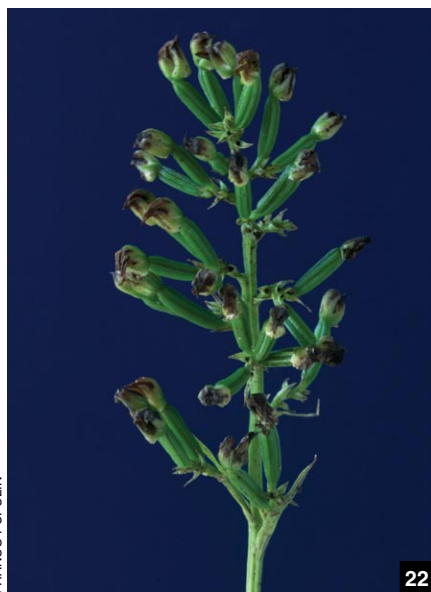
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- [18] The first, two-flowered inflorescence of *Guarianthe skinneri*, collected as a juvenile and flowered in cultivation six years later.
- [19] The white spot on the tip of the lip on a large, dark rose flower distinguishes *Sobralia fenzliana* from *Sobralia decora*.
- [20] *Habenaria macroceratitidis* is perhaps the showiest member of the genus in Costa Rica.
- [21] Plants of *Hab. macroceratitidis* are visible only in the wet season when the plant produces a foliaceous stem. During the dry season the stem and leaves fall after flowering and the plant survives by its underground tuber.
- [22] Collected in fruit, this specimen of *Tropidia polystachya* is the only known voucher of this species for the flora of Costa Rica.



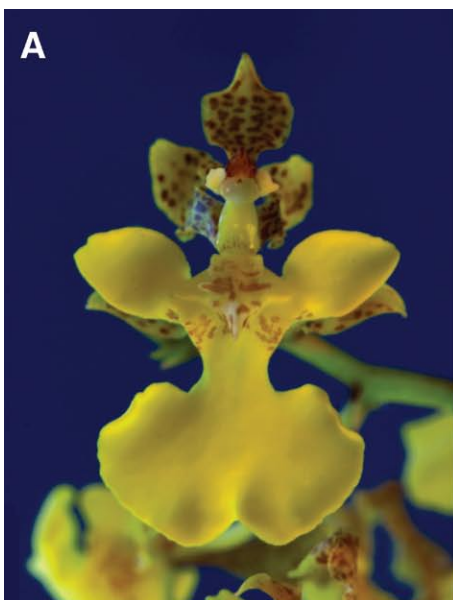
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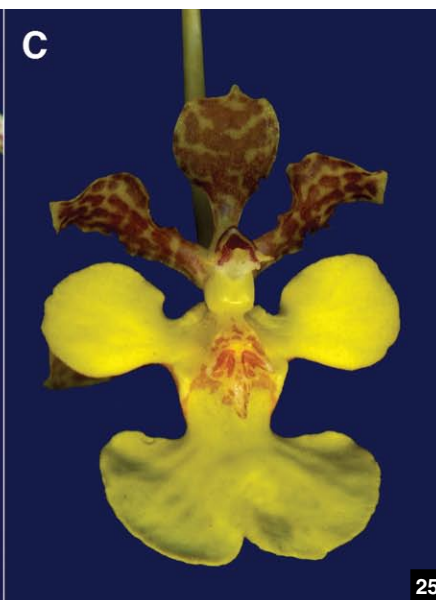
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- [23] *Trichosalpinx reflexa*, recently described from Barra Honda, is the Pacific counterpart of the broadly distributed *Trichosalpinx ciliaris*.
- [24] The multiflowered inflorescences and the "saffron yellow" flowers with pointed sepals make *Specklinia microphylla* one of Barra Honda's orchid gems.
- [25] Variations in flower morphology in *Cohniella* aff. *brachyphylla* from Barra Honda. A. Pupulin 8184. B. Bogarín 9404. C. Bogarín 9409.
- [26] Don Salomón (left) with Franco Pupulin on the peak of Cerro Corralillo. In the background, the basin of the Tempisque River is visible.
- [27] *Pelexia* aff. *laxa*, with brownish rose flowers, was previously known in Costa Rica from a plant collected in 1857.



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Corralillo, we found a few specimens of *Pelexia*. The brownish, tubular flowers with prominent sepals are somewhat reminiscent of *Pelexia laxa*, previously known in Costa Rica from a collection by Hermann Wendland in 1857. *Pelexia laxa* has a broad distribution, ranging from Mexico to Brazil and Argentina, and to Peru and Bolivia along the Andes.

We found two different *Sarcoglottis*, one with green flowers and long floral bracts largely surpassing the ovary, and the other with rose-bronze flowers and much shorter bracts. We identify the first as *Sarcoglottis sceptrodes*, a species collected by the botanist Anders Sandøe Oersted at Segovia, Nicaragua, and Guanacaste, Costa Rica, in environments similar to that of Barra Honda. The type specimens of *Sarcoglottis sceptrodes* present unmistakable long floral bracts exceeding the erect ovary. We still do not have a name for the second species of *Sarcoglottis*. The plants produce leaves during the wet season and are deciduous in the dry season when they flower.

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Acknowledgments

Special thanks to Jorge Eduardo Granados and Dorian Méndez, Administrators of Barra Honda National Park, for their help, hospitality and the facilities offered at the time of conducting this study. Thanks also to park staff and guides for their cooperation and the information provided on the plants under study; Minor Díaz, Reynaldo Orias, Federico Paniagua, Mariano Quesada, Salomón Villagra and Franklin Villalobos for their collaboration in the field; Eduardo Artavia and Oscar Cubero of Projects Abroad for their support and interest during the visits; and to the staff of research and horticulture of Lankester Botanical Garden. This paper is part of the project “Flora de orquídeas del Parque Nacional Barra Honda,” number 814-A7-058, supported by the Vice-Presidency of Research, University of Costa Rica. A special acknowledgment is extended to the Ministerio de Ambiente y Energía (MINAE), Sistema Nacional de Áreas de Conservación (SINAC) and Área de Conservación Tempisque (ACT) for issuing the necessary permits to conduct this study under the Scientific Passport No. 010925, Resolution No. 042-2005-OFAU.

Franco Pupulin is a senior research professor at the University of Costa Rica, where he works as director of research with Lankester Botanical Garden. He is especially interested in the systematics and evolution of advanced orchid groups in subtribes Oncidiinae, Pleurothallidinae and Zygopetalinae. Pupulin is working on several monographic and floristic projects on Neotropical orchid floras. Author of

[28] The green flowers subtended by long floral bracts that exceed the length of the ovary distinguish *Sarcoglottis sceptrodes*.

[29] An as yet unidentified species of *Sarcoglottis*, growing sympatrically with *Srgt. sceptrodes* on the peak of Cerro Corralillo at Barra Honda.

[30] Plant of *Sarcoglottis* sp., with spotted leaves growing among rocks and cacti. During the wet season, the plants have the leaves arranged in a basal rosette. In the dry season, the leaves fall and the plants begin to flower.

almost 200 scientific articles and several books on the orchids of the Mesoamerican region, he is a research associate of the Oakes Ames Orchid Herbarium at Harvard University and the Marie Selby Botanical Gardens, Sarasota, Florida. (email franco.pupulin@ucr.ac.cr).

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