RUIZ, PAVÓN, AND DOMBEY: ORCHIDS MAKE STRANGE BEDFELLOWS

CAROL SIEGEL

ON OCTOBER 4, 1957, the Soviet Union shocked the world by successfully launching Sputnik I. Although the first artificial satellite was only the size of a beach ball and transmitted to Earth for less than a month, it caught the world's attention and the American public off-guard. On November 3, a more impressive Sputnik II was launched carrying a heavier payload and a dog named Laika. History was changed forever. The United States, in a tailspin, created NASA, invested heavily in science and math education, and launched satellites of its own. The Space Race had begun. Nobody was exactly sure why the United States needed to beat the Russians into space or onto the moon, but it was a matter of national pride, and countries were eager to show they were the best.

It wasn't that different in 1775. Instead of competing for supremacy in space, 18th century European nations competed for domination in the plant world. The Age of Discovery had cracked open exciting and unknown lands, and a stream of daring adventurers rushed to explore the botanical riches of these new green corners of the world. In a contest for national pride and world status (in a way that seems strange to us today), nations engaged in a "Botanical Race." Every nation wanted to find new plants. Bringing back exotic plants from the jungle then was like bringing back rocks from Mars would be today. Rich monarchs would pay a fortune for exotic treasures for their new botanic gardens. For three exciting centuries, France was the master of plant hunting and dominated the botanical world. France gained great prestige by sponsoring more of the voyages of botanical discovery than any other nation—until England snatched her title with Captain Hook's voyage to the Pacific and the rise of Kew Gardens. Spain, on the other hand, had a reputation for being backward intellectually and was among the last to get into botany. Anxious for prestige in this important field, Spain's King Carlos III desperately wanted to shore up the sagging Spanish botanical reputation and decided to join with France on an epic botanical journey.

This is the story of this joint Spanish-French expedition to Peru and Chile that lasted 11 years. (If you take into account the work of their successors, the "agregados" Tafalla and Manzanilla, it lasted 38 years!) It brought together three unlikely explorers whose epic adventures and misadventures through earthquake, fire, shipwrecks, disaster, and illness is the stuff of legends. The expedition brought back important medical, botanical, mineral, zoological, and archeological wonders and was the talk of its time. Their journey was, at different times, inspiring, tragic, or hilarious. Although they did not set out specifically to discover new orchids, the expedition journeyed to countries which were orchid wonderlands, and the explorers enriched the orchid world with their many important orchid discoveries.

Who were Ruiz, Pavón and Dombey?

Ruiz, Pavón, and Dombey were the last three people who should ever have been sent anywhere together. Despite the fact that Charles III, King of Spain, was the uncle of France's King Louis XVI, the two countries were very competitive and had no great love for one another. The new minister of the Indies, José de Gálvez, who would assume control of the venture, had a thinly-disguised aversion to the French. The trio of explorers distrusted each other from the beginning. They were certainly ill-matched. The French Dombey was an educated, ten-year veteran of the field with vast experience. The Spanish Ruiz and Pavón were 21-year-old pharmacy-trainees from rich families with limited botanical knowledge and no field experience. Because Spain wanted to assure its superiority in the venture, the two young Spaniards were even put in charge of the expedition and in charge of Dombey!

The Extraordinary Dr. Dombey

In 1776, Joseph Dombey was a 34-year-old sophisticated French physician and man-about-town. Tall, handsome, dark-skinned, and slender, he was a favorite of the ladies and perennially in debt. A gambler and lover of pleasure, he devoted himself equally to work and study. Although he was orphaned at 13, he nonetheless was an outstanding student and graduated from the famous University of Montpellier in 1767 as a Doctor of Medicine. He became deeply respected for treating the sick and the poor at his own expense. Montpellier was well-known for its garden, and Dombey soon became fascinated with plants and natural history, botanizing in the Pyrenees, the Alps, and the Vosges. It is to be remembered that plants and medicine were intimately linked in the 18th century since plants were the source of the medicines of the age. (Even today, one-third of all drugs are plant-based.) Dombey presented his fine herbarium or dried plant collection to Bernard, the eldest of the four famous Jussieu brothers, who then tutored him further in botany. Amiable and generous, Dombey made many friends in Paris and deepened his knowledge with the aid of Parisian botanists who welcomed him into their circle. It is a mark of Dombey's vigor and virility that he is said to have unbelievably travelled all the way from Paris to Madrid (791 miles) on foot, gathering plants all the way. When France decided to send a scientific expedition to South America, Dombey was the natural choice. By the time of the expedition,

Dombey was an experienced traveler, a knowledgeable botanist, a distinguished physician, and a grown man. However, there was a problem.

The problem was that Spain controlled Peru and Chile, and nothing could be done without Spanish permission. Eager to assure Spanish glory in this matter, Spain had many conditions before allowing the expedition, and Dombey cooled his heels for two years and two months in Madrid before he was finally underway. The scales were always weighted against Dombey, and he was exploited at every turn. First, the Spanish specified that "two Spanish professors," Hipólito Ruiz López and José Pavón Jiménez ("Ruiz and Pavón") must accompany Dombey. It had to be a joint expedition headed by these two "professors," and they were to be in charge. Jealous that the French might gain some advantage, Spain insisted that Dombey must be accompanied at all times by one of the two Spaniards. To prevent his ever publishing before the Spanish, he was not allowed to employ an artist in the field to document his findings. Moreover, when he returned, he had to leave duplicates of his plants with his notes with the professors of the botanic garden at Madrid, for them to select the best and him to keep the worst.

The Two Professors

Dombey was not impressed with Spanish botany or with these "professors." He called them either his "indolent friends" or his "two students." They had received a limited amount of botany education from Gómez Ortega, the Chair of Botany, at the existing botanical garden, who was influential in selecting them. Ruiz had worked as a pharmacist in his uncle's pharmacy and would not get a license until 1790. Pavón would never get his pharmacy license at all. It is a reflection of the sad state of botany in Spain at the time that they were the best that could be found. Certainly, the two quickly learned all that Dombey could teach about botany, the preparation of dried plants, and the creation of herbaria. It cannot be denied that they grew during the expedition and produced wonderful, important botanical works and made many fine and important discoveries.

Despite Dombey's hopes, he was not given much respect. The Spanish chose Ruiz as first botanist because of his "naturally wise nature and his greater proficiency in botany." Dombey was referred to as a "botanico-naturalist in the capacity of accompanying member to the Spaniards of the same profession." As Alice M. Coates remarked, "It says much for Dombey's enthusiasm and good nature that he ever embarked at all."

That Ruiz and Pavón had never been out in the field before is obvious from what Ruiz brought with him to the forests and jungles of South America. Ruiz later wrote that the three often emerged from the jungle nearly naked and bleeding from the brambles and bushes, covered with sores, sweaty, grimy, and totally exhausted. Yet the inexperienced Ruiz brought to those distant

Hipolito Rui

outposts a solid silver chamber pot! In addition, he carried with him five suits, including one of silk, three pairs of velvet breeches and seven plain white ones, a fine cotton cloak and two leather cloaks, six sleeping caps, two dressing gowns, 14 shirts, two new black hats, 12 pairs of shoes, six ties, four handkerchiefs, and some leggings. In addition, he carted through the jungle three pairs of sheets, four hand towels, eight napkins, four tablecloths, a chintz bedspread, two pillows, four pillow cases, a sleeping bag, a china washbowl, a mirror, a bottle case with glass flasks, liquor and a demijohn of wine, a musket and ammunition, cooking utensils, 28 reams of paper, baling wire, a box of tools, two campaign tents, and some books. All were destroyed in the great fire that destroyed the hacienda at Macora, Peru, in 1785 except the silver chamber pot which was melted beyond use. The leader of the expedition was in for some rude awakening on this long and arduous journey. He definitely would not need velvet breeches or white pants to climb through the muck and mud.

Peru: An Orchid Wonderland

The expedition never specifically set out to discover orchids. However, Peru is literally covered with orchids, and only a blind man would fail to notice them.

Sobralia dichotoma

Phragmipedium caudatum

The book *Orchid Species of Peru* notes that it has been estimated that the country has between 3500 and 4000 species of orchids in 224 genera, many still waiting to be discovered high in the Andes. (It is to be remembered that recent spectacular orchid finds like *Phragmipedium besseae* and *Phragmipedium kovachii* were discovered in Peru.) Orchids have been a part of Peruvian life since the time of the Incas. The native language of the Incas was Quechua, still spoken by many Peruvians today, and there are Quechua names for various orchids—"Urito" for *Lycaste*, "Huapagana" for *Sobralia*, and "Huagancu" for *Masdevallia*, and "Tahuatahua" for *Sobralia dichotoma*, for example. There is a song natives sing in front of *Masdevallia amablis* in the ruins of Chavin de Huantar in the Ancash province and close to the Kuelap ruins in the Amazon province. Translated it reads:

> Beautiful Huagancu (*Masdevallia*) flower
> That blossoms in the heights
> What will you say when I carry
> You planted in my heart?

The explorers did not really "discover" the orchids of Peru. They merely introduced them into Europe. Dombey himself sent home to France a stunning collection of new orchids confirming botanist Joseph de Jussieu's feeling that Peru was a marvelous orchid habitat. The orchids he sent home soon became the rage of Paris, and at the end of the 18th century, collecting orchids became an obsession of the rich in France.

Orchid Heaven at Tarma

However, it was not without trial and tribulation that they found the orchids. In 1779, the group made an arduous crossing of the Andes to Tarma 120 miles northeast of Lima, a place carpeted with orchids. It was a difficult journey that left the men gasping for breath on mountains that were three miles high. One of their mules drowned in an icy stream, and all but one driver deserted during the upward climb, stealing three animals. They crossed a rawhide bridge one cold midnight, in hail and rain, on their hands and knees. Then they hired another driver who stole their cargo and yet another mule. They crossed the cordillera under intolerable sun although there was snow all around. Ruiz fell into a gorge formed by rain, and his mule fell in after him pinning him to the ground. The horse tied to the mule was trapped, and when his halter was cut, the horse ran away. Finally, the fat injured mule had to be hoisted out of the gorge and carried out. If it had not been so awful, their misadventures were almost comic.

However, Tarma was worth the trip. They spent 11 months in this gorgeous village. At 10,000 feet (3048 meters), it had luxuriant hills covered with flowers. The found anemones, peperomias, valerians, viburnums, berberis, alstroemeria, salvias as well as orchids, orchids, orchids. They found five different maxillarias, eight epidendrums, *Sobralia dichotoma*, *Cypripedium grandiflorum* (now *Phragmipedium caudatum*), two humboltias now known as *Anathallis acuminata*, and *Stelis purpurea*, three gongoras, and some satyrium which have also been reclassified. They described for the first time *Masdevallia uniflora, Anguloa uniflora, Lycaste ciliata* (now *Sudamerlycaste ciliata*), *Oncidium* (now *Cyrtochilum*) *aureum*, and many more. In the village of Muña, they found *Cypripedium grandiflorum* (now *Phragmipedium caudatum*), *Anguloa uniflora, Maxillaria ciliata* (now *Sudamerlycaste ciliata*), *Max. grandiflora, Max. undulata, Epidendrum corymbosum, Epi. nutans* (now *Epi. ruizianum*), *Epi. paniculatum, Epi. parviflorum, Fernandezia* (now *Dichaea*) *laxa*, *F.* (now *Maxillariella*) *punctata*, *Humboltia* (now *Pleurothallis*) *cordata*, *Humboltia* (now *Resterpia*) *contorta*, *Humboltia* (now *Stelis*) *oblonga*, *Humboltia* (now *Stelis*) *parviflora* and *Humboltia* (now *Pleurothallis*) *revoluta*. In Pozuzo, they found *Gongora quinquenervis, Sobralia biflora, Sob. dichotoma, Epidendrum* (now *Epi. woytkowskianum*) *coronatum*, *Epi. cristatum, Epi. viride,* and *Epi. equitans*. It was truly an orchid paradise. All specimens were dried with sulfur to prevent the ravages of insects.

Caccacacca

Ruiz especially mentions *Maxillaria bicolor* (now *Cyrtochilum aureum*) which the natives called "caccacacca" which means "joined pavement." Where the plants grew, the pseudobulbs so densely covered the ground that it looked as though the ground were paved with

them. The bulbs were tender, juicy, and easily chewed and exuded an abundant juice that was a clear as water. The natives, Ruiz related, assuaged their thirst by drinking this liquid. Six pseudobulbs were enough to relieve thirst, and the natives thus avoided having to descend to the bottom of the gorge to take a drink. Ruiz reported that the explorers had tried this and suffered no ill effects.

Ruiz Falls in Love with Orchids

Ruiz fell in love with orchids, and in his diary, said that,

> The orchid family is so abundantly represented in the gorges of Huassahuassi that it would be hard to find another locality where so many species and so many individual plants grow. The ground, the cliffs, and the trees are covered with them. It would seem that, from the time of creation, the natural destiny of these regions was for orchids in preference to the myriad other plants, large and small… Notwithstanding the abundance of orchids in these gorges, the same and other species are not lacking along the lower parts of the mountain slopes or along the edges of the jungle in the provinces of Panatahuas, Huamiles, Xauxa, etc. Even in the depths of the forests themselves, untold numbers of orchids hang on trees and cliffs.

He exulted that the ground was:

> ….covered with a multitude of plants, whose perpetual fragrance and aroma delight and refresh the sense in such a way that it is as if the land invited one to never leave. Of all the plants, the most abundant are those in the or-

Anguloa uniflora

Sudamerlycaste ciliata

Cyrtochilum aureum

Epidendrum paniculatum

Masdevallia uniflora

> chid family, whose bulbs, laid out over the face of the ground, cover the most dry and rocky terrain like a stone pavement, and the varied colors of their strange and precious flowers give a special tint to the unusual pavement of nature.

Ruiz was so overwhelmed by the quantity and variety of orchids that he prepared a monograph on the subject. Unfortunately, the orchid manuscripts were burned in an unfortunate hacienda fire at Macora, and 500 drawings and descriptions of orchids were destroyed. In addition, in the shipwreck of the *San Pedro de Alcántara*, 200 drawings of orchids (as well as 600 drawings of other families of plants) were lost. Ruiz attempted to replace many of these losses, but he never redid the monograph and hoped that other botanists, in the years ahead, would visit these localities and complete the monograph.

Epidendrum parviflorum

Rediscovering the Lost *Masdevallia Uniflora*

The first *Masdevallia* species discovered by the botanists was named *Masdevallia uniflora*. Ruiz gives the local name as "rima rima." It was found in rocky places near Huassahuassi and was the species on which the whole genus was named. The genus was named for Jose Masdeval, a Spanish physician and botanist who was in the forefront of medicine, developing new treatments for deadly epidemics like typhoid and smallpox. *Masdevallia* has had a lot of taxonomic changes since the 18th century. *Masdevallia* has recently been dismantled into 20 genera, most coined by Luer, who is the authority on the taxonomy and has done a lot of work in this group.

In 1893, Florence Woolward included the species in Part 5 of her monograph and said, "Since its discovery more than 100 years ago, *Max. uniflora* has never again been met with, and there is no record that its habitat has since been visited by any botanist. It has never been in cultivation, and is only known to botanists as a dried plant." As late as 1958, Dodson and Frymire, in an article on *Masdevallia* in the *American Orchid Society Bulletin*, reaffirmed, "Interestingly, this species upon which the genus was based has not been rediscovered." The article goes on to speculate that the habitat may already have been destroyed and notes that the original location could not be found on a modern map.

Thrillingly, *Masdevallia uniflora* is indeed not gone. A living plant of *Max. uniflora* Manning was seen in cultivation in 1977 when it was unknowingly sent in a consignment of orchids to the United States. Jorgé Meza, respected Peruvian orchid hunter, had collected and grown a few of the plants in 1975 and included them in

orchids sent to J & L Orchids of Connecticut. It flowered in their nursery in 1977. They sent a living specimen to Dr. Carlyle Luer of the Missouri Botanical Garden, who declared that it was indeed the presumed-lost *Max. uniflora*. There were only four dried specimens of this plant, all 200 years old in herbaria. The newly discovered plant was a different color but matched in all other ways.

A month later, another one of the plants flowered for J & L, this time collected by Rudolfo Stumpfle in Peru. It was a slightly different color, but all the plants were collected in the cloud forests around Huassahuassi. Luer called it *Max. rimarima-alba*, the Quecha Indian name for the plant and acknowledged possible confusion.

In November 1998, three Europeans, led by Willibald Koniger, experienced explorer of Peru, went to a village called Taba with only 15 houses. After an hour walk, they found *Max. uniflora* with a few flowers and several pods, and they declared that *Max. rimarima-alba* was a close relative.

Ruiz and Pavón Establish New Orchid Genera

In the *Flora of Peru et Chilensis* in 1794, many other new genera besides Masdevallia were named by Ruiz and Pavón. The genus *Anguloa*, whose large and fragrant flower is sometimes called the Tulip Orchid, was named by them in honor of Don Francisco de Angulo who was the Director of Mining at the time. It is found in the Andes from Venezuela to Peru.

When they found a species of *Bletia*, they named the genus after Don Luis Blet, a chemist who developed medicines. It is widespread, found from Florida, Central America, the Caribbean, and into South America as far as Peru

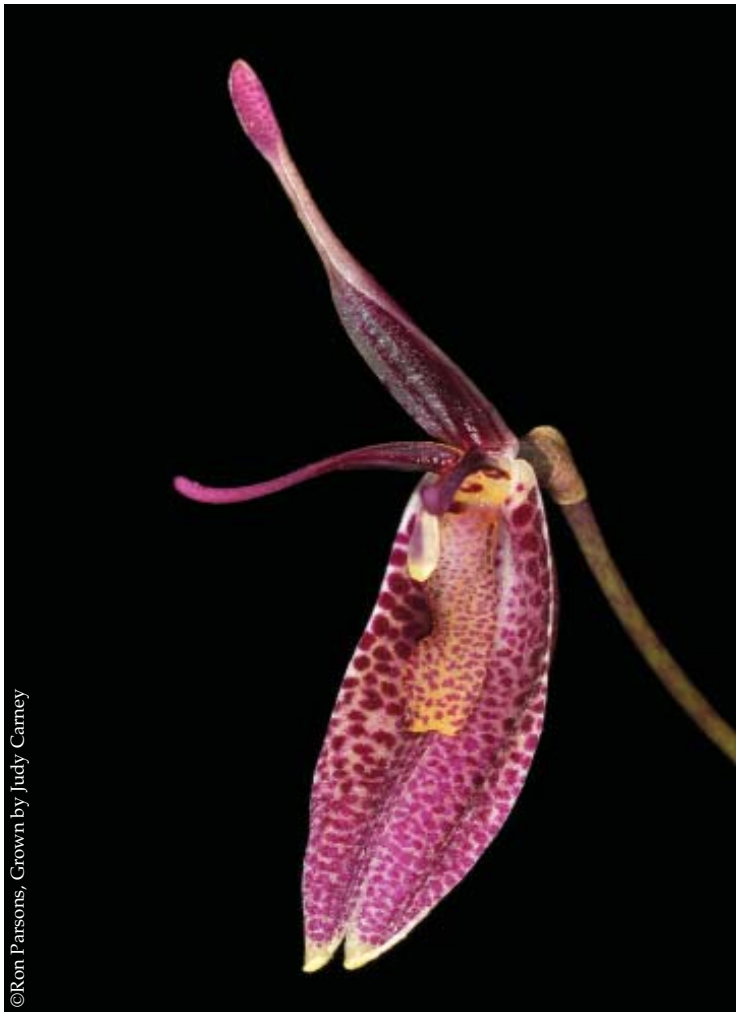
In 1794, they announced the genus *Fernandezia* to honor a Spanish doctor and botanist Gregorio Garcia Fernandez. Species in the genus are small epiphytes that grow in cloud forest in Peru.

The richly fragrant *Gongora* was a genus proposed to honor Don Antonio Caballero y Gongora, the viceroy of New Granada (present day Colombia, Ecuador, Panama, and Venezuela). There are 67 species ranging from Mexico to Peru and Bolivia.

The genus *Maxillaria* was also established by Ruiz and Pavón. Several groups have been segregated from *Maxillaria,* and genus status is sometimes recognized for *Camaridium, Ornithidium,* and *Pseudomaxillaria*.

Rodriguezia was named for a Spanish botanist named

Epidendrum nutans



Restrepia contorta

Rodriguezia lanceolata

Manuel Rodriguez. The genus is found in tropical zones and is mainly epiphytic.

Sobralia was described in the *Prodromus* in 1794. It was dedicated to Don Francisco Martinez de Sobral, royal physician of King Carlos IV, who, in 1785, experimented with cinchona extract sent by Ruiz and Pavón. It is found from Mexico to Peru.

Ruiz and Pavón Discover a Multitude Of Orchids

There has always been a question about exactly which orchids the explorers found. Researchers have never been exactly sure. In dire financial straits, Pavón sold off much of the herbarium later in life as well as many original drawings. Of the series of the *Flora Peruviana et Chilensis*, only three of the planned eleven volumes and five supplements were eventually published. The seventh volume, which was to include the texts and illustrations of the orchids, remains unpublished. The destruction by fire, of the hacienda in Macora, Peru, resulted in the loss of Ruiz's monograph on orchids with 500 drawings and descriptions, and a shipwreck lost another 200. Two hundred years have passed, and there are many taxonomic difficulties and errors as well as vague plant descriptions especially by Ruiz. The short orchid descriptions published in 1798 left the identity of many orchids uncertain.

The brilliant, erudite Franco Pupulin in 2012 did a service to the field by publishing a critical study of the unpublished orchid illustrations that were conserved in the Archives of the Real Jardin Botanico (RJB) in Madrid. Even in the absence of a good herbarium sample, an illustration can give voice to which orchids were found. Botanical illustrations, in an age without photography, were very important to show the Expedition's progress and document the live plants which changed when they were dried. Moreover, very few live plants ever survived the arduous sea voyage back to Europe. The expedition is estimated to have produced over 4500 illustrations. Of these, 2230 botanical illustrations and 24 zoological plates are still conserved in the Archives of the RJB. The Archives conserve 98 orchid illustrations corresponding to 88 species that were intended for the *Flora Peruviana et Chilensis* and for their successor Tafalla's own *Flora Huayquilensis*

The artists, then called "draughtsmen," accompanied the explorers into the field and were paid the same amount as the botanists. Isidro Galvez and Joseph Brunete and Francisco Pulgar painted most of the conserved illustrations of Peru and Chile. Jose Gabriel Rivera accompanied the later explorers Juan José Tafalla and Juan Augustin Manzanilla on their expedition to Guayaquil. He painted mainly Ecuadorian plants. A later artist, Francisco Xavier Cortes Alcocer of Quito drew three from Ecuador conserved in the Archives.

Following instructions, all the plates are drawn in black ink and tempera on heavy paper measuring 37.0 by 26.5 cm. A thin black line in tempera or ink and another broader gray line frame the prints. They are signed by the artist on the bottom left of the painted frame. Most bear the name of the species assigned as well as the original numerations. They are mainly signed in Ruiz's handwriting and are numbered in keeping with the order of the Flora.

Pupulin identifies many orchid species found by the explorers using the illustrations as a guide. (The expedition is considered to consist of the travels of Dombey, Ruiz and Pavón to Chile and Peru, followed by the activities of Tafalla and Manzanilla who continued in Peru and then into Ecuador.) The following list is of the species described or named or drawn for the first time by Ruiz and Pavón. I have placed basionyms or older names by Ruiz and Pavón in parentheses.

Acianthera polystachy (humboldtia polystachya), Anguloa uniflora, Bletia catenulata, Cyrtochilum ligulatum (Maxillaria ligulata), Cyrtochilum parviflorum (Bletia parviflora), Cyrtochilum triphyllum (Maxillaria triphylla), Dichaea laxa (Fernandezia laxa), Epidendrum cordatum, Epidendrum coronatum, Epidendrum corymbosum, Epidendrum cristatum, Epidendrum ferrugineum, Epidendrum paniculatum, Epidendrum parviflorum, Epidendrum viride, Gongora quinquenervis, Maxillaria longipetala,(Dendrobium longipetalum), Maxillaria platypetala (Dendrobium platypetalum), Maxillaria prolifera (Dendrobium proliferum), Maxillariella punctata (Fernandezia punctata), Maxillariella ramosa (Maxillaria ramosa), Maxillaria undatiflora (Dendrobium

undatiflorum), Pleurothallis cordata (Humboldtia cordata), Pleurothallis revoluta (Humboldtia revoluta), Restrepia contorta (Humboltia contorta), Rodriguezia ensiformis, Rodriguezia lanceolata, Sauvetrea laevilabris (Maxillaria laevilabris), Sobralia biflora, Sobralia ciliata (Bletia ciliate), Sobralia dichotoma, Stelis acutiflora (Humboltia acutiflora), Stelis oblonga (Humboltia oblonga), Stelis parviflora (Humboltia parviflora), Stelis purpurea (Humboltia purpurea), Sudamerlycaste ciliata (Maxillaria ciliata), Xylobium undulatum (Maxillaria undulatum), and *Xylobium variegatum (Maxillaria varegata).*

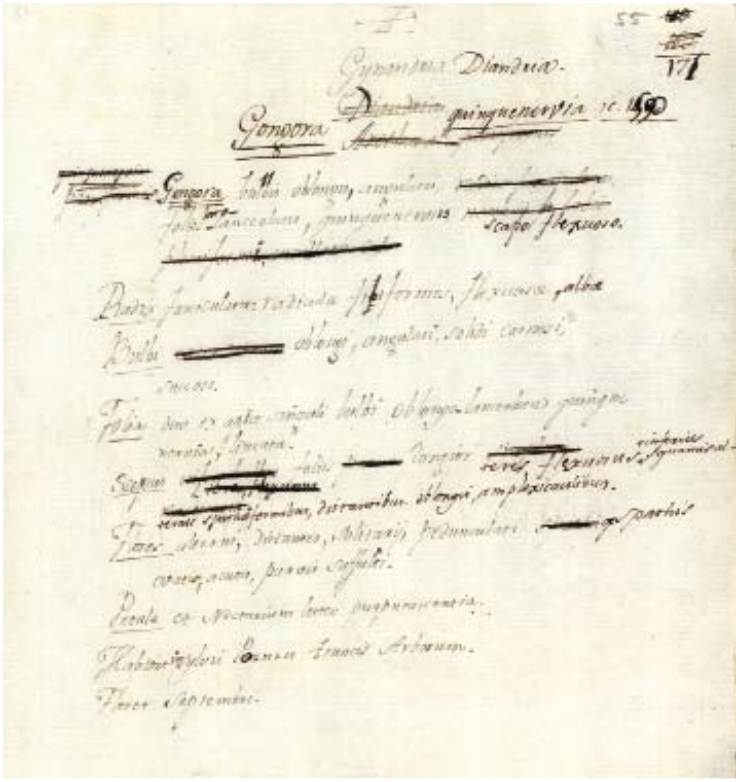
The extraordinary riches that the expedition found underline what an orchid paradise Peru was at the time. Unfortunately, at the present time, several orchid species are gone. Just six hours from Lima, an area known as the Valley of the Orchids in the department of Junin, has required government protection because of orchid depredation. According to Instituto Nacional de Recursos Naturales (INRENA), an agency for the protection of Peruvian natural resources, 332 orchids are on the brink of extinction because of expanding agriculture, mining, logging, urban development, cattle ranging, and deforestation. It would be a pity to lose the botanical riches that were so exciting to Dombey, Ruiz and Pavón. It is especially important since many orchids continue to be discovered including 61 new species in the past two years at Machu Picchu.

The Quest for Quinine

The expedition was specifically sent to find plants of commercial or medicinal use. At the top of the list was cinchona, the tree that produced *quina* or quinine. An earlier botanist and explorer, Joseph Jussieu, had studied cinchona stands and made an extract, but he went mad, and his writings had been lost. A miracle medicine that effectively treated the scourge of malaria, quina was a high-priority prize, and the explorers devoted themselves to finding it. The first thing that Ruiz published when back in Spain was his *Quinologia*, a 103-page study of cinchona that Ruiz financed himself. The drug was touted as a cure-all. As Robert Steele says in his book on the expedition, "No monger in patent medicines ever made wider claims for a tonic than Ruiz utters in support of the miracle remedy, *quina*." It could be taken in myriad ways—in pills, diluted wine, preserves, water, or powdered. It could even be applied as a plaster to a wound. Among the catalogue of ills that Ruiz claimed *quina* cured were these:

> "It thus cuts simple or complex intermittent fevers, malignant putrefactions, nervous malignancies, exanthemas, putrid effects of smallpox… periodic toothaches and spread of gangrene… fevers from measles when complicated by decay. It fortifies the weakness of the intestines, prevents miscarriages, and is useful against excessive collapse of the lungs."

Perhaps his laundry list was a little exaggerated. It was, however, true that quina was a wonderful treatment for malaria. The explorers learned to make an extract of the bark and shipped 40 lbs. of the extract to Europe. Ruiz was concerned that poor practices, hacking down whole trees at the base, were decimating the stands and suggested the need for conserving the land and planting more trees on a quina farm. He mentioned that a collector could now spend 20 days in the jungle without finding even one usable tree. For him, government regulation was the answer. He also felt that proper drying and packaging of the product would prevent waste and spoilage. In addition, training in the differentiation of the seven species of the tree would result in collecting only those varieties which made effective medicines like *Cinchona officinalis* (*C. nitida*). His suggestions sound amazingly modern and ecologically aware.



Caption?

Ruiz carried on a long battle with José Celestino Mutis, botanist and explorer in New Granada (Bolivia), who claimed that there were only four varieties of *cinchona*: orange, red, yellow, and white. Mutis believed that the orange kind was the only true variety to cure malaria and that the best trees came from Bolivia and not from Peru. Ruiz was incensed and, not wanting to give up his trees' superiority, made the ridiculous claim that the trees of Bolivia grew at lower elevations and were therefore inferior. Ruiz was, moreover, truly annoyed that Mutis made absolutely no mention of him in his book on quinine, *Arcano de la quina*, and Ruiz published a supplement to his own book in which he made fun of Mutis and his ideas. Author A. R. Steele notes, "The derisive and childish nature of many of their remarks detracts seriously from their scientific stature."

Today, scientists recognize about 150 species. It is a taxonomically difficult group, and it is no wonder there

was so much controversy. French chemists finally, in 1820, showed that quinine was the element in the bark that was the anti-malarial and showed that the variety from Bolivia (called "calisaya") was the best. The chaos during the wars for independence in Peru and Bolivia resulted in collectors stripping the areas of bark. In the end, foreign governments engaged in intrigue and smuggled out seed and plants for cultivation in more easily accessible areas. Ultimately, the Dutch made Java the center of *cinchona* production, and both Peru and Bolivia lost out.

Chilean Interlude

In 1781, the explorers went to Chile. Ruiz called Chile "an earthly paradise." The explorers were particularly impressed with what they called "the Chilean pine," now known as *Araucaria araucana*, or the Monkey Puzzle tree. The magnificent 50-100 foot tall trees were named for the warlike Araucanian Indian tribe which inhabited the region. The popular name, "Monkey Puzzle tree" comes from the strange configuration of the branches, which would be difficult even for a nimble monkey to climb. When lightning destroyed the mainmast of the warship *San Pedro de Alcántara*, sailors were delighted to find hundreds of the tall thick trees to make a replacement, and the trees began to be cut for marine use. Dombey, Ruiz, and Pavón thought they had found a new pine species. However, botanists in France thought it was an entirely new genus. Lamarck called it *Dombeya* and Antoine de Jussieu and José Cavanilles named it *Araucaria*, the name that stuck. They tried to send back living trees to Spain, but they were lost in a shipwreck.

The three were so impressed with the trees of Chile that they named three for themselves and for their old teacher Gómez Ortega. Named to honor Ruiz, *Ruizia fragrans* (now known as *Peumus fragrans*) is a small fragrant evergreen tree that was used as a cure-all by the Indians. Ruizia is a shrub named by Cavanilles. Named to honor Pavón, *Pavonia semperins* (now known as *Laurelia sempervirens*) is called The Laurel of Chile, a beautiful, fragrant tree that is excellent for uses in carpentry. *Pavonia* today is a shrub named by Cavanilles. Named to honor Ortega, *Gomortega nitida* (or *Keule*), is a tall, leafy tree second in beauty only to Chilean pine. It has exquisite dark red wood which takes a high polish.

In Concepción, Dombey was the savior of the village during a rampaging epidemic. With generosity and unselfishness, he treated the sick and the poor for free, stamping out the epidemic in two months. The bishop so wanted to keep him in the village that he offered him a generous salary and the hand of a beautiful rich young maiden. Though tempted, Dombey was overcome by a sense of duty and declined the offer. However, he happily recalled "the sweet satisfaction of being paid for my trouble by the tears of the poor who overwhelmed me with affection."

Caption?

The Versatile M. Dombey (And Where in the World Did He Get All That Money…)

Dombey was regarded as an all-around 18th century man, and he was sent with a "shopping list" of scientific things to do for France and Spain. He analyzed, at his own expense, the mineral waters of Chuchiu for five months at the request of local Spanish authorities. He was specifically sent to find a source for cinnamon. The French and Spanish used huge quantities of cinnamon in their chocolate. Spain itself used 500,000 lbs. of cinnamon in chocolate and 100,000 lbs. more in medicine and seasoning every year. American consumption was 600,000 lbs. Spain hoped that the trees found by Gonzalo Pizarro in 1540 in Quito could make them cinnamon-independent. The Dutch colony of Ceylon, with a monopoly on cinnamon, was getting a peso for every pound of cinnamon consumed, and Spain was eager to be free of this burden. Unfortunately Dombey found that the cinnamon of South America had a bitter taste which limited its usefulness. Cinnamon is made from the bark of the *Cinnamomum zeylandicum* tree, and Dombey found that the South American tree was a different species, *Laurus indica*.

In addition to cinnamon, Dombey was sent to search

Caption?

Caption?

for nitrates along the Peruvian coast. Saltpeter deposits containing nitrates were indispensable to gunpowder productions. The mineral was so valuable that in France there were people called "saltpeter gatherers" who combed the rubble of old buildings possibly made from earth or limestone containing the nitrous material. They were despised because they were allowed to dig even in the homes of people while they were living there. Dombey sent back samples of the saltpeter, but Gomez Ortega did not think they were useful. Ironically, Dombey did not realize that there were huge fields of sodium nitrate to the south, and Chile became an important source for this product.

Dombey also sent back to France large quantities of platinum. Its high melting point made it difficult to work with, and it was neglected until the 18th century. The French learned it was soluble in nitric acid and Comte de Milly learned to make platinum ductile. Dombey sent 20 lbs. of platinum to France while in Spain and accumulated another 38 lbs. by 1779. In the end, 160 lbs. of platinum were shipped to Europe.

While in Chile, Dombey spent three months, at his own expense, examining the local mercury mines. Mercury was essential for mining silver, and sources were drying up. He found a mercury mine at Xarilla near the port of Serena and a gold mine, too. He returned with a load of ore and hopes for forty sites. He reported that there were many trees in the area for smelting the ore and that the climate was ideal. Unfortunately, despite further efforts by others, the mines never panned out.

He introduced cactus to France and sent home grand specimens. Nobody was sure if they were even plants at all, but their flowers, fruit, and shapes amazed everyone. Dombey, himself, thought they were vegetables. His work in Peru led to a cactus craze in France, and soon everyone wanted one.

In Huánuco, Dombey was shown natural rubber by the local Indians and was fascinated and intrigued by its possibility. He went to Lima in 1780 to get more funds to penetrate into the Amazon to get more rubber. When he returned with the money, Tupac Amaru, a descendent of the Incas, was leading a bloody uprising. Tens of thousands of people lost their lives in the unrest. The villagers were terrified, and Dombey generously offered the leaders of Huánuco a great sum of borrowed money plus 64 bushels of wheat and the same of beans to feed local soldiers to help fight the bloody Indian attack. The city refused the gift but raised the money on their own to defeat Tupac Amaru. Still wanting to help, Dombey set aside the food for the benefit of the patients in the hospital and the poor.

There has always been the mystery of where

Dombey got all his money! There are many examples of Dombey's giving away money and medicine to the poor during epidemics in Peru and Chile. Moreover, he was always lending money to Ruiz, Pavón, and the others although he was paid only 30% of what they were. He fought for better pay from the French, but then he was only making 60% of what the others were. Dombey received 6000 livres a year (worth $60,000 today), but Arthur Steele said he spend 100,000 livres a year (about a million dollars a year!) He did not even draw his salary when he was in Chile. He bought expensive platinum, gemstones, and archeological curiosities everywhere he went. He bought King Louis XVI an Incan robe worth seven month's salary. He had two servants who cost him more than all the money he earned. He also had to pay for all his supplies, packing and shipping to Europe himself, something which Ruiz and Pavón did not have to do. He paid for many of his scientific trips himself as when he examined the quicksilver mines in northern Chile (which cost him 2 ½ times his annual salary). Dombey was no stranger to debt, and, before he left for Peru, he had had to pay half his year's salary to pay off all his debts. However, he claimed that he left South America debt-free. It has been speculated that he had many friends who gave or lent him money. Others have suggested, intriguingly, that he was a great favorite of the ladies in Lima who invited him every night he was there to play cards with them. His good looks and charm are thought to have distracted the ladies from their card-playing skill, and he was rumored to have won a great deal of money at cards, enough to finance his magnanimous ways. In that case, he was a very lucky gambler! Unfortunately, in the real cards dealt in life, he was not always that lucky.

Dombey Goes Home The Conflict Escalates

In 1784, Dombey sailed home on *El Peruana*, the same boat he had arrived on. Deafness and dimming sight, scurvy, and melancholy made him want to leave the trials and tribulations of the expedition. His gums were bleeding, his appetite was gone, and he often lost balance and fell. When he arrived in Spain on February 22, 1785, his 43rd birthday, he had spent six years in South America. He had lost all his hair on the voyage and nearly died of dysentery, a harrowing voyage on a broken boat where 32 people died. Thankfully, he disembarked with his life and all 73 cases of his artifacts and plants.

Ruiz and Pavón, who remained another five years, were terrified that Dombey would publish his flora of Peru and Chile before they did. Ruiz hurriedly wrote to Minister José de Gálvez:

> The eagerness that I have recognized in M. Dombey to magnify his work even at the cost of my labor, and to hurry up and print it under his name, has obliged me to double my vigilance to enlarge and perfect my own, without neglecting a detailed index. I am convince that with an opportunity to publish, our monarch will in no wise wish to award France the glory of printing first, all the more since our nation has so few (works) of its kind, and has spent and is spending so much for this cause. Ours, in comparison with M. Dombey's is much superior, not only because the drawings go with it, but because his is less orderly; and although he has inserted in his descriptions many of mine, I have achieved, as far as I'm concerned, better "incubation."
>
> This explanation and the effort that he has revealed to finish and correct his from mine, makes me fear also that by some pretext he will manage to get hold of my work there (in Spain). Thus, it doesn't seem vain to me to warn Your Excellency to take care and not entrust it to a printer who is not loyal.

What are the lengths that the Spanish would go to in order prevent Dombey's publishing first? It has never been proven, but Dombey claimed that attempts were made in Madrid to poison him and that an attempt to stab him with a sword on his doorstep had failed, but had killed someone else instead. They took botany very seriously, indeed, in the 18th century!

Ruiz and Pavón Lose Their Collections in a Shipwreck

Before Dombey left for Europe, he had given duplicates of every plant specimen in his collection to Ruiz and Pavón so all three had identical plants as per the agreement before the trip. To avoid argument between the French and Spanish, Dombey's plants were shipped on the *El Peruano* and those of the Spanish on the ill-fated *San Pedro de Alacánzar*. The latter jinxed ship began to leak, and the captain, afraid of being called a coward, sailed anyway. By the time the boat limped into Talcahuano, Chile, 31 containers of living plants had been swept overboard, and nearly three feet of water was pouring into the hold every day. The ship pulled into Rio de Janeiro after a huge storm in the Falklands and sailed against the best advice of the captain of the port. The ship's captain, mistaken as to where they were, went to bed as the ship slammed against the coast of Portugal and sunk. 39 people died, millions of gold and silver pesos, and all 55 crates of the botanists' work went down. The majority of the gold and silver was recovered, but all of Ruiz and Pavón's five years of work, including Dombey's donation, was gone for good. Dombey's share of the collections, all 73 cases, made it intact to Cadiz, Spain with Dombey.

This did not sit well with the Spanish. It looked as though Dombey and France had everything and that the Spanish had wound up with nothing. Despite the fact that Dombey had already given half his collection to the Spanish, the Spanish insisted that he give half of

his remaining half to them as well, now that the shipwreck had robbed them of their specimens. The Spanish impounded his botanical cargo and five chests of personal property. They stored his collection in a damp warehouse, and his living plants died. Dombey was outraged, but he was not allowed to leave until the French government conceded half his collections. The Spanish got 37 boxes out of his 73—plants, seeds, bark, herbs, woods, resin, shells, animals, bird fish, Indian artifacts, decorated vases, gold, silver, copper, mercury and a share of the 160 lbs. of platinum for chemical experimentation. He got his personal property back only after he agreed not to publish before Ruiz and Pavón. Despite the huge number of boxes of specimens that Dombey gave the Spanish, Ruiz claims in his diary that Dombey only gave a few skeletons of plants with very few notes and occasional descriptions! However, Dombey was not completely exploited. He managed to irk the Spanish no end by rushing his diary out of Spain and miscellaneous manuscripts to the master of the French frigate *La Bellone* for delivery to the Minister of Foreign Affairs in Paris. The Spanish were, at least, cheated out of that.

Dombey knew he could not publish a good flora because he was never allowed to have an artist draw anything. He had also agreed on paper not to publish a flora. Practically, there was no way to stop him. It was a little late to stop publication. At least ten species of plants that Dombey had sent in previous shipments were flourishing in the Royal Botanical Garden in Paris. Charles Louis L'Héritier, a wealthy member of the French Académie des Sciences, got permission from the king to make drawings and engravings of the garden's plants. By the time Dombey arrived, the plates were coming off the press to be part of a book on the newly-discovered plants.

Dombey returned to France with a great deal of fanfare, celebrated as a national hero. He was presented to King Louis XVI and Marie Antoinette who gave him money and a royal salary. Even though deprived of much of his collection, he still had retained about 1500 plants specimens including 60 new genera. He was a darling of the court, and some of his bird specimens were stuffed and placed in artificial trees to delight the queen.

However, he was racked with what they called "melancholy." He refused an offer of 100,000 livres (a million dollars) for duplicates of his collection from Catherine the Great. He gave them, instead, to colleagues. In 1786, he was offered a position at the prestigious Académie des Sciences, but he declined the honor. Physically and mentally exhausted, he went to live with female relatives in Lyon where he was a doctor to the poor. In a fit of depression, he burned all his papers.

In the meantime, L'Héritier, who cared nothing for promises to the Spanish, published the controversial plates. He was given the privilege of writing the descriptions of Dombey's herbarium by Count Buffon, director of the royal museum and custodian of the Dombey collection. He was to draft a catalogue, have drawings made, put the descriptions in order and publish first the genera and then the species as soon as possible.

We remember the Ruiz and Pavón were paranoid that Dombey might beat them to the press. Even so, L'Héritier had the nerve to write to the two men in 1786 saying that because of Dombey's ill health, the publishing of the flora had been turned over to him. Could he possibly have future discoveries to make the flora complete? He further graciously irritated them by saying, "I will see to it that the public is not unaware of how you have had a part in the work." He even sent them the first two fascicles (sections of a book published as a series) of *Stirpes novae*, which included some of the drawings of Dombey's plants. The next month, he sent a third fascicle with a new idea for promoting the publication. He wanted to send them a prospectus for selling the books. Did he do it to annoy them? How it must have infuriated Spain! They complained to France that it was a violation of the contract between the two countries; France supposedly asked L'Heritier for the plants back. L'Héritier was attending court in Versailles when all this became known, and he left word that he was going to his estate in Picardy. In a Keystone Cops comedy, the botanist hastily packed up the plants with the aid of his wife and the painter Redouté, absconded in the night with it all to Calais, and fled to England. He told English Customs that he was there at the invitation of Sir Joseph Banks (who was out of town and unaware of the whole thing). Despite initial hostility from Banks, whose permission had never been asked, he became a frequent visitor at the Banks home and sent him duplicates from the herbarium.

In England, he started verifying Dombey's classification by comparing them to those in Banks's herbarium. In all, he hid out in England for 15 months, publishing, by 1789, five fascicles of his *Stirpes novae*. In the end, he had only published 22 plates and received some criticism on his scholarship. The French effort shows some spunk, but it did not detract from Ruiz and Pavón's fine *Flora*.

Dombey Gets Caught Up in the French Revolution

The Revolution consumed all of France with the storming of the Bastille in 1789 and the beheading of the King and Queen by 1794. Dombey was a surgeon at a military hospital, but, eager to escape the bloodshed and chaos, accepted a diplomatic position in the United States. In 1794, he set out from Le Havre, but his ship put in at Guadeloupe, a French dependency in the West Indies. Turmoil from the Revolution had continued there, and Dombey was thrown into prison at Port-á-Petre. A large crowd demanded the famous man's release and demanded that those who threw him into prison be punished. Trying to placate the crowd,

Dombey fell into the river seemingly lifeless, was rescued, fell ill, recovered, and set sail again. His ship was then attacked by British pirates who arrested him, disguised as a Spanish sailor. He was imprisoned again on the island of Montserrat where he died in 1794. In the concluding passage of NOTICE HISTORIQUE SUR JOSEPH DOMBEY, his biographer J. P. F. Deleuze concludes:

> Thus, after passing a life of perpetual agitation, and exposed to a thousand dangers, the victim of injustice, and robbed of the fruit of his labors, fell Dombey, without a friend to console him, and in distant captivity; - adding one to the list of those who have died martyrs to their zeal for natural history, But whilst we deplore his destiny, let us not consider it as without alleviation, Let it be remembered this his death arrived at that awful period when so many meritorious men were subjected to the revolutionary ax; that through his whole life his sentiments of benevolence, patriotism, and generosity were never diminished; that supported in the midst of dangers by his love of science, the idea of enriching his country never forsook him; that even his misanthropy, whilst it estranged him from the indifferent, attached him the more closely to a few friends, and the melancholy which cast a shade over his latter days, never changed the amiability of his character. Happy in the recollection of the good he had done to his contemporaries; happy in the foresight of the advantage posterity would reap from his discoveries, he knew how to find enjoyments beyond the power of man to embitter. Long accustomed to disappointment, he gave up every project, renounced every hope, and despising both fame and fortune, in the midst of the most turbulent times, lived only to friendship and virtue.

Dombey is commemorated in *Dombeya*, a genus of about 100 species of ornamental evergreen trees and shrubs. Named by Cavanilles, they are native to tropical Africa and the Mascarene Islands. Ironically, Dombey never visited those places or saw those plants.

L'Heritier also fell to the Revolution. In August 1800, L'Heritier, after returning from England, was hacked to death with a saber by revolutionaries close to his home. His son was one of the suspects in the murder. The next year, the family sent the Dombey collection of plants and manuscripts to the Museum d'Histoire Naturelle, renamed from Jardin du Roi (the King's Garden) since the revolution.

The Diary of Ruiz Found in The British Museum

In 1788, Ruiz and Pavón returned home to Spain. Although publishing the accounts and findings of their expedition was a top priority to Spain and to them, years passed before anything was published. Spain was plagued by war, turmoil, and financial difficulties, and publishing had to wait. One of the most fascinating documents published was Ruiz's *Relación*, his diary. The diary of Hipólito Ruiz, written over 200 years ago, is the surviving extraordinary document of an extraordinary expedition. The journals he kept in Peru and Chile are very detailed and reveal his broad interest in science and local culture. Much of his journal deals with descriptions and local uses of plants, and Ruiz identified and classified thousands of plants of different genera and species. The Indian use of the plants for medicinal and practical use is carefully noted. He notes plants that make women fecund, keep bugs away, drive people insane, and cure hemorrhoids. However, he also devotes attention to a fascinating array of subjects. He brings alive the customs and culture of Indian life, fashion and economic life, racial characteristics, secular and church architecture, mineralogical finds, animals, birds, fish, economic conditions, the creation of dye, and he makes these 200-year-old descriptions seem vibrant and real. He pours his heart into this moving account of eleven years of dedication, frustration, deprivation, and physical hardship.

The story of the diary of Ruiz would make the plot of a wonderful movie. The diary itself had an unbelievably complex journey. Thought lost for 150 years, Ruiz's manuscripts were rediscovered in the partly bombed library of the British Museum (Natural History) by Jaime Jaramillo-Arango and his wife. Jaramillo-Arango, an eminent Colombian surgeon and diplomat, was writing a book on the conquest of malaria. His research took him and his wife to the British Museum where they accidentally stumbled upon the original and complete manuscripts of Ruiz's *Relación histórica del Viage que hizo á los Reynos del Peru y Chile el Botánico dn. Hipólito Ruiz en el año de 1777 hasta el de 1788, en cuya época regresó a Madrid*.

There were originally three hand-written manuscripts of the diary, successively corrected. The first was donated to the Museo Nacional de Ciencias Naturales in Madrid by Father Augustín Barreiro who transcribed it. It was published in Spanish in1931 and in English in 1940. The other two versions of the manuscript were the ones found in the library of the museum. Recognizing the value of the manuscript he had just stumbled upon, Jaramillo-Arango transcribed and published a combined edition of two of the versions.

Richard Evans Schultes, who translated the diary into English with Jaramillo-Arango's wife, says:

> Few are the manuscripts…about which can be recounted such an odyssey: handwritten two centuries ago in Lima, Peru; lost for 150 years; found in wartime in a bombed museum in London, by a Colombian ambassador who recognized its scientific and historical merit; published in the original Spanish in Madrid; translated by an American botanist in the depths of

the Amazon jungle of Colombia; typed and improved by the discoverer's wife in Bogotá, in the original home of the Colombian Academy of Letters; refined in a 16th-century castle in northern Italy, on a rocky island on the New England coast, and in the mountains of Jalapa, Mexico; financially support in its final phases by American and international institutions, and finally published by a botanical press in Portland, Oregon.

Ruiz's diary shines a light on just how difficult his eleven years must have been. On a trip to Pozuzo, he talks about how afraid he was of the wildcats, bears, wild boars, and other large beasts that lurked in the jungle. He mentions how they had to walk some days four to eight leagues (12-24 miles), returning at night, cut to pieces, loaded with plants, and covered with itchy, running sores. Danger was everywhere, and rotten trees, avalanches of earth, falling rocks, and torrential rains kept them in constant danger of falling off cliffs or getting crushed to death. He and the others were often sick, contracting fevers or purulent skin diseases, incapacitated for days, and the artist Brunete even died. On four different occasions, Ruiz and company saw months and even years of work disappear in seconds in one disaster or another. The hacienda fire in Macora destroyed his manuscript of the journey to Chile and all their supplies and provisions and the results of two years of labor and plant materials. There was the sinking of the *Buen Consejo* and the shipwrecks of the San Pedro of Alcántara, first on the Chilean coast and then off Portugal with a tragic loss of valuable plants and manuscripts. Ruiz claimed he almost went crazy.

As Ruiz exclaimed:

> Why do it? We spent every penny we earned in Peru and left as poor as church mice, for we had not engaged in any business other than the fulfillment of our mission. Only the defense of honor or business interests could force one to travel over such an abominable path… undergoing the continual fatigue, falls, blows, heat, thirst, hunger, bad weather and suffering that fell to the lot of the botanists because of the rough and rugged character of those tangled jungles.

Like any tourist, he thinks the natives are odd and strange, and he reveals the racist attitudes of the Spanish of his day to the Negro, the Indian, and especially the mulatto whom he thinks are lazy and immoral thieves. He claims that they do not seek honor or dignity and respect only harsh treatment. He believes that their inbreeding produces degenerate physical and moral monsters whose bad qualities were imitated by the whites who lived with them.

He mocks the ladies of Lima who spend all their food money on fancy clothes and ridiculous shoes and then eat little or nothing rather than live in rags. He claims that the mules pulling coaches eat better than the dressed-up ladies. He tells the story of a woman who spent 25 pesos a day on flowers but only two reales a day on her children's bread. The flowers covered the stench of her poverty.

Interestingly, he reveals that the Indians believe that certain illnesses are transmitted by minute animals that can't be seen, amazingly recognizing the infectious nature of many diseases. Because of this, he relates the alarming fact that the Indians burn alive the contagiously ill, those who have been in contact with them, and all their possessions to avoid the spread of disease. He mentions the introduction from Peru of the potato in Madrid, the cultivation and preparation of coca, as well as technical information on quinine trees and the conditions of the bark gatherers. Surprised, he notes that the Indians, although they had quinine in their midst, were ignorant of its medical value and had to be shown how to use it to treat fevers. He shows his sense of humor when he talks of a plant which, when eaten, causes horses and mules to lose the hair of their manes and tails, which does not grow back for a long time. He says that water that has had these leaves crushed in it also causes men to go completely bald. He notes that his group did not want to try it—but that it might be good to use it on your beard. He is endearingly excited about phosphorescent fish and glowworms, two of which in a jar allowed him to read a book in the dark.

It is amusing to note that the diary is only about Ruiz himself. He only refers to Dombey in his preface and in an unflattering way, at that. He mentions that Dombey only gave a few fragments of plants with very few notes and an occasional description and was a disappointment. The outstanding naturalist seems to have been intentionally slighted. Of Pavón, Brunete, Galvez, Tafalla or Pulgar, the other botanists and illustrators on the trip, there is simply silence, and we learn little about them or their contribution. Ego? Discretion? It is, after all HIS diary, and so he is the center of story. When Ruiz's son Anthony later described his father's travels, he makes very few references to Pavón, fewer to Brunete and Gálvez, and barely a mention of Dombey. Every discovery is said to have been made by Ruiz, and rarely does the word "they" appear. On the other hand, the Deleuze biography of Dombey has no reference to Ruiz or Pavón until p. 17 and then only two more references to them for the rest of the book. The three were competitive into posterity and throughout their written words.

Nonetheless, Ruiz's diary is extremely well-written, chatty, and full of valuable information. As Schultes notes, "As a writer, Don Hipólito can compete with any of the famous chroniclers who, in accounts which will live forever, have handed down to us narratives of great events in connection with the Spanish discovery and conquest of America."

America Rescues the Flora

The diary was written by Ruiz alone. The first vol-

ume of the great work of both Ruiz and Pavón, *Flora Peruviana et Chilensis*, did not appear until 1798, ten years after Ruiz and Pavón's return. The intervening years tell a comic tale of trying to find suitable accommodations for their enterprise and trying to squeeze enough money out of the Spanish government to pay for printing. By 1793, five years after their return, they had not even had the paper they needed ordered. Twenty-five years after the volumes appeared, the publisher Sancha still had not been paid.

Spain had sent expeditions to New Granada, New Spain, and the Philippines and did not have money to publish all the results. It was constantly at war and was in terrible economic and political condition. To be fair, Ruiz and Pavón, although incompletely published, were the ONLY ones whose work saw print at all. Because Spain was effectively broke, the King appealed to the Americas to raise money to publish this work. He said, that after all, the work was about the Americas and would benefit them. Nearly all the persons and organization he wrote to in the Americas sent money, and the drive was a success, raising 41, 900 pesos, a substantial amount at the time. As the years went by, in a very modern move, the government dipped into the *Flora* funds for other purposes, and it is not clear whether they ever paid it all back. The books never sold in the Americas, were mainly given as gifts, and always sold poorly in Europe. Even when they put out editions without pictures, designed for the less affluent, at a small price, few sold. Nonetheless, they are marvelous publications of great botanical value.

In 1794, the *Prodromus*, the introduction to the *Flora*, introducing 136 new genera and containing 37 plates, was completed, bound for presentation to their majesties and put on sale. After 40 years, 2/3 of the *Prodromus* had never found takers. Ruiz and Pavón brought back from Peru and Chile some 3000 plants descriptions and more than 2000 drawing. Years later, an inventory revealed 2,980 different dried plants in their herbarium and 2, 264 illustrations. They had more than enough material for a dozen volumes. The series of the *Flora Peruviana et Chilensis* saw only three of the planned eleven volumes and five supplements eventually published because of financial difficulties. The tomes were to take on the systematic coverage of all the plants found in Peru and Chile, classified according to the Linnaean system. No longer in favor today, the system was based strictly on sexual characteristics of the plants and was in vogue at the time.

Volume I covered 277 species found in Peru and Chile in the first four classes of Linnaeus. The botanists named four new genera *Jovellana, Alonsoa, Anthodon*, and *Ohigginsia* (=*Hoffmannia Sw*). There were 106 plates made up of 219 figures.

In 1799, they published Volume II with 251 species belonging to the fifth class of Linnaeus, including ten species of *cinchona*. It included 116 plates of 203 figures. Two new genera were created, one of which, *Leonia*, honored Francisco León, a big supporter of the publication.

Volume III appeared in 1802 with 223 descriptions of species in Classes V to VII with 176 figures on 104 plates. Seven new genera appeared: *Bonapartea* (=T*illandsia* Linn), *Lapargeria* (for Napoleon's Josephine), *Luzuriaga* (for a Spanish botanist, chemist and physician, *Guzmania* for a pharmacist and naturalist), *Cosmibuena* in honor of a Peruvian saint, *Isidrogalvia* (=*Tofieldia* Huds) in honor of their artist, and *Conanthera*.

Volume IV was ready for the printer in 1804 with 164 species of Classes VII-IX with four new species of *quina*. 100 plates had been done, but it languished for lack of funds. It was a century and a half before a facsimile edition was printed. Work went ahead for Volume V, but the French army entered Madrid four days after Charles IV abdicated in 1808, and plans for publication collapsed.

In 1816, Ruiz died at 62, and with him died further publication of the *Flora*. Pavón, who survived until he was 86, did no further work on the books. He was reduced to poverty and busied himself profitably selling off pieces of their herbaria, technically the property of Spain itself, to Aylmer Bourke Lambert, a British botanist and collector of means. Many sets of prints and drawings were also sold. A junta later investigated Pavón's role in the missing herbaria plants and drawings, but he was old, and they did not pursue. Spain, however, was not pleased when the Swiss botanist Augustín Candolle said he was going to publish all the Peruvian plants in Lambert's "magnificent herbarium." To the last, Spain was jealous and competitive of other's nation's influence in botany. Even if they could not finish the job, they did not want anyone else to do it either.

Then as now, nations competed for prestige and status. The expedition of Dombey, Ruiz and Pavón added to the glory of France and Spain. Through trial and tribulation, pain and triumph, the three explorers, despite it all, made a stunning contribution to orchids and to all of botany.✾

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Carol Siegel, a retired English teacher and medical office manager, has been president and newsletter editor of the Greater Las Vegas Orchid Society for several years. She lectures on many subjects at societies, museums, and universities around the country and has written articles on Nevada's native orchids in addition to many for the *Orchid Digest*. Carol leads groups of Clark County school children on tours of the Springs Preserve, a museum and nature center complex.

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