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How Many Orchid Species?

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Abstract. In the 1980s, careful estimates of the size of the Orchidaceae clustered around 19,000. A new provisional checklist suggests 24,500 species of orchids, approaching the "improbable maximum of 25,000," as seen by John Atwood. Recent lists from Mesoamerica agree closely with the 20% increase indicated by the provisional list. Will the next two decades bring in another 5000 new orchid species? The answer is unknown, but there are clearly many new species to be found in tropical America. Showy, new, large-flowered species are relatively few, rather the vast majority of species are small-flowered, if not microscopic. Ephemeral flowers, such as *Sobralia, Palmorchis,* and the Triphoreae, have special problems associated with their identification, for which most field-collected herbarium specimens are nearly useless. In practice, most large-flowered orchids are poorly represented by herbarium specimens, and even many small-flowered species are scarce in the herbaria. Only abundant and widespread species, such as *Epidendrum radicans* or *Habenaria monorrhiza,* are really well represented in the herbaria. In Central America, it is interesting to compare Costa Rica, with its tradition of resident naturalists, with Panama, where resident naturalists have been very few. Now the Panamanian orchid flora is rapidly catching up with Costa Rica, but both countries have significant areas that are poorly sampled. Much work remains to be completed, but when someone looks for them, many more new species will appear.

Key words: Alpha taxonomy, systematics, plant collections

Introduction

I'm told that Linnaeus, in his later years, expected a few hundred new plant species to be found in Africa and other remote areas. He really thought that we had named most of the world's flora. Since then, many others have thought that we really knew most of the world's flora, but new species continue to appear nearly everywhere. We need to know as much as we can about the world's flora and fauna, both for practical purposes and for more intellectual motives. Current attitudes favor molecular systematics, which undoubtedly has a great deal to offer, over "old-fashioned taxonomy" (Wheeler et al. 2004). Much of the real pressure against "old-fashioned taxonomy" comes from university administrators, who lust after overhead from large grants. Old-fashioned taxonomy may need a bit of travel money from time to time, but it is quite inexpensive as compared to molecular work. Molecular analysis has greatly improved classification above the species level, but it has limited use at the species level. To be honest, most molecular work would be quite meaningless without "old-fashioned" identification and documentation of the samples analyzed.

A recent issue of *Systematic Botany* has a paper and a commentary on the decline of local plant collection in the United States and the problems this causes in studying speciation, extinction, changes in distribution, and invasion by exotic species (Prather et al. 2004a, 2004b). Even here, in the United States, we do not know enough about what grows where. How much worse must the problem be in tropical areas?

In the 1980s, several attempts were made to calculate the size of the Orchidaceae (Atwood 1986), with the totals clustering around 19,000 species. New species continue to appear, and careful study often revives supposed synonyms. A recent tentative checklist (Govaerts et al. 2003) indicates 24,500 as the probable number of orchid species currently known. This number approaches the "improbable maximum of 25,000 species" as seen by Atwood (1986). Thus the numbers have increased by more than 20% in the last 20 years. Checking the still incomplete manuscript of the Orchidaceae for the *Flora Mesoamericana* and recent checklists for Costa Rica and Panama (Pupulin 2002a, Correa in press), again indicates an increase of ca. 20% since 1979. I do not expect new species to stop appearing this year, or even this decade.

It is interesting to contrast our growing knowledge of the orchid floras of Costa Rica and Panama, neighboring countries with relatively friendly botanical competition. Costa Rica had many resident naturalists and botanists in the early 1900s. This is reflected by the frequent use of the epithets: *alfaroi, acostae, biolleyi, bradei,* or *bradeorum, brenesii, jimenezii, lankesteri, pittieri, sanchoi, tonduzii, valerioi,* and *wercklei,* all honoring naturalists who sent material to Europe or the United States. In Panama, C.W. Powell was virtually the only resident who regularly

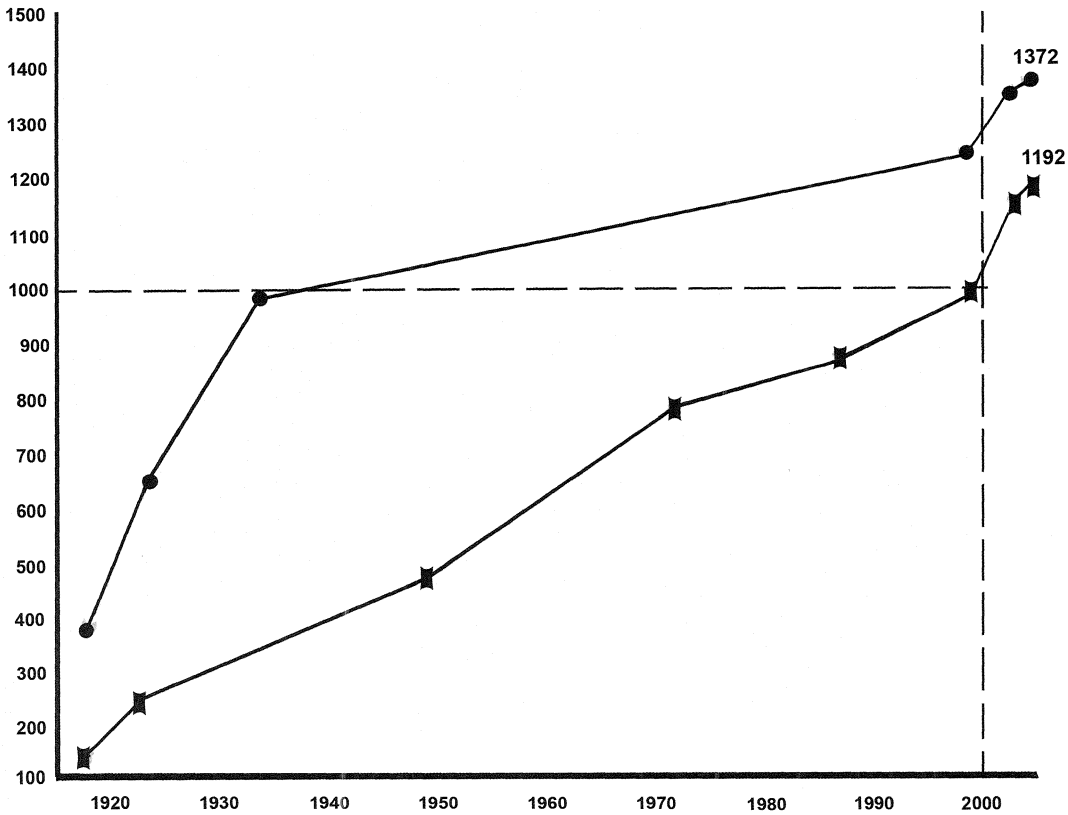

FIGURE 1. The numbers of orchid species recorded for Costa Rica (●) and Panama (✖) in floras and checklists, beginning with the checklist by Schlechter (1918) through current lists as of early 2004, with some known but yet unnamed species in the final count for each country.

prepared specimens for study. Logically, Panama, with the greater area and high mountains at each end, should have the richer orchid flora, and FIGURE 1 suggests that Panama is rapidly catching up with Costa Rica, although much of Darien is still quite hazardous for plant collectors.

My contention that orchid floras are poorly sampled is supported by the rather frequent finding of the same inconspicuous, unnamed species almost simultaneously in two or more widely distant places. When I was first sampling the cloud forest orchids of Cerro Jefe in Panama, several tiny orchids that I found were soon identified as species that Hawkes and Heller had just described from Nicaragua. Some of these species have not been found in Costa Rica, but I'm sure they are there. Similarly, Franco Pupulin recently described *Ornithocephalus montealegreae* from Costa Rica (Pupulin 2002), while Cal Dodson was preparing to describe the same species from Ecuador.

One would expect large and showy orchids to be better sampled than tiny plants with nearly microscopic flowers, but the pattern is more complex than that. Very small flowers are, certainly, poorly represented in herbaria. A good example is the genus *Stellilabium.* The flowers are very small or tiny, and in Central America the plants are usually quite leafless at flowering, with a flattened rachis as the primary photosynthetic organ. In 1969, I saw a small flowering tree in central Panama and pulled down a branch to press material of the tree. Once it was in hand, I noticed funny little string-like things on the twigs, some of them with tiny purple flowers. Thus, I collected an unusually complete collection, which became the type specimens of *Stellilabium aciculare* in 1999. This species seems to be one of the commonest species in Costa Rica and Panama. At that time, I published three other species, and Franco Pupulin continues to find new species. Now that he has the "search image," one of his recent emails said that it was "raining stellilabiums."

Botanical collectors can scarcely overlook

plants with larger and more colorful flowers, but really showy species are poorly represented in museum collections. In remote wilderness areas, at least, one would expect large-flowered species to be collected more often then less conspicuous ones. I think, in fact, that in settled areas, local residents remove most of the large-flowered plants not hidden in the treetops, before any botanist gets there. Michael Grayum (pers. comm.) complained that when a Costa Rican plant collector working for INBio finds the national flower, *Guaria morada* (*Guarianthe/Cattleya skinneri*), in flower, he takes the plant home to mother, wife, or girlfriend, rather than pressing a specimen. Mike said that if he ever found such a plant in bloom, he would mash (press) as many specimens as possible. Of course, it is usually relatively easy to cut off an inflorescence, an older pseudobulb, and a couple of older leaves, to make a good specimen without harming the plant, either in the field or in the garden. However, I don't recommend this for *Stellilabium.*

A special problem occurs in those orchids with ephemeral flowers, such as *Sobralia, Epistephium,* or *Triphora.* The flowers last only a few hours and are produced irregularly. Even when one is in the field on the right day, the flowers are usually pressed in the field, to be dried hours or days later. By the time the specimen reaches a drier, the flowers are liquefied and leave only a spot on the paper. With *Sobralia* growing in the greenhouse, I press the flowers at 8 am and put them on the drier at once, and they are dry by noon with well-preserved color, though some details may be lost even in alcohol. The flowers of *Telipogon* are nearly as bad. The flowers of this high-elevation genus are not ephemeral, but they are very delicate. If the flowers are carefully spread, pressed, and mounted "face up," so that one can see the details without softening the flower, the specimen can be quite useful, but if the flower is folded, no non-destructive way exists to soften the flower, and the specimen is useless.

In this day and age, I believe the best way to sample the flora is for specialized collectors to search for particular plant families or types of plant, and prepare herbarium specimens carefully. I remember (vaguely now) that in my student days, the general collector usually collected *Asclepias curassavica* and all of the ubiquitous "damned yellow comps" but overlooked less showy plants of great interest. Whenever I traveled by bus in Mexico, and the bus broke down (not infrequently), I could almost always find quite interesting orchids or Euphorbiaceae nearby, while the driver worked on the bus.

I must emphasize the importance of local enthusiasts and "orquideolocos." If someone working on orchid classification is in the area, they are almost always delighted to help. Certainly we need to educate them about the importance of locality data and to emphasize the botanical interest even of ugly little flowers.

There is no doubt that the authors of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) had good intentions, but it is equally true that good intentions may not be enough. In the last orchid conservation symposium held at Selby Gardens (1997), a representative of CITES explained that orchid growers wishing to exhibit their plants on the other side of an international boundary, but unable to take the plants across legally, could legally take cut flowers to the exposition. Jim Ackerman then asked, "You mean that they can import flowers legally, but if we press one of those flowers to make a permanent record, it becomes illegal contraband." "Well, yes, as the law now stands, that's true," was the response. I strongly feel that pressed specimens, flowers in alcohol, and tissues in silica gel are not "commerce," in any sense of the term, and should not be affected by CITES.

In the last few years, it has been my pleasure to visit Panama nearly every year. It has been a pleasure, in part, because Lic. Kruskaya Melgarejo, of ANAM (Panamanian Autoridad Nacional de Ambiente), recognizes the importance of botanical research and cheerfully grants CITES permits for materials to be used in research (with the understanding, of course, that duplicates of all pressed specimens are deposited in the University of Panama Herbarium). In most countries, one must obtain a collecting permit and sometimes even a permit to do research; however, in many cases, it is very difficult, expensive, or quite impossible to obtain a permit to export pressed specimens, spirit material, or tissue samples in silica gel. In many cases, the bureaucrats and the politicians feel that "our botanists" should do all of the research. Local botanists, however, are not so foolish. Plant classification has been and should be an international activity. Plant species rarely respect international boundaries. Further, no one anywhere can be a specialist on 25,000 orchid species. One must specialize in one or two of the more than 50 tribes or subtribes or one of the "supergenera," such as *Bulbophyllum, Dendrobium, Epidendrum,* or *Pleurothallis,* each of which demands at least a lifetime of dedicated study. Here, in the United States, we do not have enough botanists to have many specialists on orchid classification. No one country can hope to keep up with this constantly expanding plant family without international cooperation.

In summary, lots of undescribed orchids are

out there, but we won't know about most of them unless someone looks for them, preferably before their habitats are destroyed.

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About the Author. Robert L. Dressler was born in the central USA, in the Ozark Mountains, in 1927 and came out to civilization (California) at the age of 10 years. Since his formative years, he was very interested in the woods and nature. At university, the combination of a mediocre zoology professor and an excellent botany professor guided him once and for all toward botany. He received his doctorate in biology from Harvard University in 1957 and worked at the Missouri Botanical Garden 1957–1963, when he went to the Smithsonian Tropical Research Institute. He lived a bit more than 20 years in Panama, studying classification and ecology of orchids, especially natural pollinization. Now residing in north Florida, he is associated with the Missouri Botanical Garden, the Herbarium of the University of Florida, and the Marie Selby Botanical Gardens, where he serves as a senior scientist and a founding member of the *Selbyana* editorial board. The author of several books, he is now working on the *Flora Mesoamericana* project.