

AROID COLLECTING IN WESTERN SOUTH AMERICA

Thomas B. Croat

Missouri Botanical Garden, Box 299
St. Louis, Missouri 63166, U.S.A.

While no reliable figures are available for numbers of species in most of South America, field studies and herbarium work offer ample evidence that the region of western South America from Colombia to Peru contains the richest array of aroid species in the world. Madison (1979) has already reported on the paucity of aroids in the relatively flat but admittedly vast expanse of the Brazilian State of Amazonas (seventy species) and Bunting (1979) in his recent synopsis of the aroid flora of Venezuela reports only one hundred, eighty-four indigenous species. Species diversity is much greater as one moves westward toward the Andes and is great even at lower elevations resembling those in Amazonas of Brazil. Nevertheless, species diversity is greatest at middle elevations up to about fifteen hundred meters. Probably the richest area for numbers of aroid species is along the western slope of the Andes in Colombia and Ecuador, particularly to the north in the Department of Chocó of Colombia. Parts of this area have the highest rainfall (11,770 mm per year) of any part of the world and contain the only examples of pluvial forest in the neotropics. While the area is only beginning to be explored there are strong indications that it will yield the richest aroid flora of any place on Earth.

This richness in the adjacent country of Panama, which, though small, is also rich in aroid species, containing (conservatively) three hundred, twenty-five species of aroids. Diversity drops off markedly as one goes north into Central America. Costa Rica probably contains an aroid flora of fewer than two hundred species and the aroid flora is even poorer to the north of Costa Rica.

Thus it was with great expectations that I set off on my trip to western South America. I began in Ecuador and continued through Peru and returned by way of Colombia. In all, nearly two thousand aroids were collected and sent back alive. Herbarium specimens, notes and photographs were accumulated as well. My principal objective on the three month trip was to locate as many members of the bird's-nest *Anthurium* group as possible. Thus the search for this group (technically, section *Pachyneurium*) set the basic itinerary of the trip.

The bird's-nest anthuriums range widely ecologically which gave me reason to collect in a wide range of habitats all aroid epiphytes. The group is one of the most well adapted for arid areas because the rosulate habit, with a close whorl of leaves on a short stem, allows the plant to accumulate debris which stores nutrients. Though the leaves do not hold water, as in the tank bromeliads, the rotting debris allows the plant to retain water. This group also has the most densely rooted stems and many of the upper roots are negatively geotropic growing upward between the petioles into the mass of debris.

In Ecuador I went in search of one bird's-nest species which had been collected along the coast north of San Vicente (near Bai'a de Cara'quez). I would never have approached this uninviting and arid region of sand dunes and low bluffs with leafless scrub forest had I not been lead there by a specimen I had seen which was purportedly collected there. Even as I cursed myself for having driven so far on what I was certain would be a 'wild goose chase' I found it, a new bird's-nest *Anthurium* species looking similar to species I later found in wet areas on the eastern slopes of the Andes. In the bargain I collected still another species, *Anthurium linguifolium* Kunth (Fig. 4). This species was previously known from only a single specimen. Surprisingly it also turned out to be a member of section *Pachyneurium*.

While, as already mentioned, species diversity is great along the western slope of the Andes from the Ecuadorian Province of Esmeraldas to Panama, it becomes too arid south of Esmeraldas. Thus I felt fortunate to find another species further south in a slightly more humid part of souther Ecuador in the Province of El Oro. This turned out to be *A. barclayanum* Engler.

The number of species increases immensely on the eastern slope of the Andes of southern Ecuador. This humid region of high species diversity extends along the eastern slopes of the Andes north into Colombia and south into Peru while the arid region of the Pacific coast which begins in Manabi', Province of Ecuador, extends all the way to Chile and is very poor in aroid species.

The road from Loja to Zamora and on to Guallaquiza was very rich but badly destroyed except for rich pockets of vegetation in the most inaccessible areas. A single steep slope above the Ri'o Zamora between Loja and Zamora yielded several beautiful *Anthurium* species including a species closely related to *Anthurium michelii* Guillaumin (Fig. 5) of Costa Rica and Panama.

On the return to Quito (between Loja and Cuenca) I passed through some of the most ruggedly beautiful terrain I have ever seen (but alas it contained few aroids). One exception was *Anthurium acoyanense* Sodiro (Fig. 6) growing on a steep roadbank in a largely deforested area north of Loja. On the way, I went to the Province of Canar (quite by accident I should say). Driving in the early morning fog, I missed the turn-off to Chunchi and Riobamba and found myself descending into the moist forested regions southeast of El Triunfo on the border of Guayas Province. I later found out that this

is the only sensible way to get from Cuenca to Riobamba as the other road, though appearing shorter, is rough, winding, unpaved and hours longer! The "mistake" was profitable and yielded many interesting species including *Anthurium rircayanum* Sodiro (Fig. 7), another bird's-nest *Anthurium*.

Other interesting trips in Ecuador included trips to both sides of Volcán Pichincha west of Quito including the Nono-Tandayapa-Mindo Road and the San Juan-Chiriboga-Santo Domingo Road (old road to Santo Domingo from Quito). At the highest elevations I encountered *A. gualeanum* Engler (Fig. 1) with its purplish spathe almost enclosing the spadix. At somewhat lower elevations one encounters *A. ovatifolium* Engler (Fig. 3) with its leathery leaves having unusual venation.

Other trips I made in Ecuador included journeys to Baeza and Lago Agrio with side trips to the Río San Miguel north of Lago Agrio and to Coca (Puerto San Francisco de Orellana) south of Lago Agrio on the Río Napo. Return to Quito was by the Tena-Puyo-Ambato road and a side trip was made from Puyo on the road to Macoa. This entire region (commonly spoken of locally as the "oriente") including the provinces of Napo and Pastaza, is very rich in species, many of which are new to science. This area, though perhaps the richest in Ecuador, was unfortunately not readily available to the Jesuit Luis Sodiro when he so avidly collected and described Araceae (especially *Anthurium*) in the late nineteenth and twentieth century.

While I had collected with a rented car in Ecuador, in Peru I collected mainly by flying to major collecting areas. Although this got me around the country quickly, it did not give me as much flexibility. I had to rely on cabs and trucks for local transportation. Again, the bird's-nest anthuriums dictated the itinerary. My first trip to Cuzco Department and to Quillabamba by train was to collect two bird's-nest species. Knowing that one of the species I was searching for was common along the railroad from Cuzco to Quillabamba, I planned to collect at one of the stops on the way down, but failed to see it at or near any station until the train was ready to pull out. Having seen it once near a station, I laid elaborate plans to get it on the way back the next day and did so in a hurried scramble by the partial light of the locomotive headlight.

The next trip in Peru was to Tingo Maria in the Department of Huanuco where I was met at the airport by Sr. Jose' Schunke, a long-time plant collector and old friend. We collected around Tingo Maria late that day and discovered an unusual species of *Homalomena* (Fig. 8) with flowers having the strong smell of anise. The next day we went on to Tocache Nuevo in the Department of San Martin and collected in that region which netted several additional bird's-nest anthuriums.

Since my special airfare plan allowed repeated return trips to Lima, the material collected on each trip was accumulated there. I was housed at the Botanical Garden belonging to San Marcos University where I dried my herbarium vouchers. Succeeding trips

were made to the Pucalpa area where I visited the Parque Alexander Von Humbolt, an area of virgin forest which is relatively dry and rather poor in aroid species, then on to Tarapoto where relatively little forest remains. However I found an interesting area along the road between Tarapoto and Moyobamba. In addition to two species of sect. *Pachynerium* I found the rare *Xanthosoma tarapotense* Sodiro (Fig. 9) which is the largest species of the genus with divided leaves.

The trip to the Iquitos area and a boat trip up the Ri'o Nanay finished off a successful trip to Peru and I left for Bolivia. In Bolivia I was aided by Dr. Stephan Beck, a botanist with the German group of ecologists who have an active institute in La Paz. A number of trips were made in Bolivia including trips to the Valle de Zongo, northeast of La Paz, where I found *Spathanthemum orbignyanum* Schott (Fig. 10) which is common in shady areas under the cliffs along the road. A second trip was made to the Cochabamba area where I went northeast to Villa Tunari. The area is badly cut over but much wetter and lower than Valle de Zongo and had a much richer aroid flora. An intervening area midway between Villa Tunari and Cochabamba at about 2000 meters elevation proved the most interesting, but even this area, a dripping wet moss forest, proved disappointing in comparison to comparable life zones nearer the equator. Another trip with Dr. Beck to Coranavi turned up *Anthurium grande* N.E.Br., a handsome member of section *Calomystrium* (relatives of *A. andreanum*), *Anthurium coripatense*, *A. weberbaueri*, and *A. paraquayense* as well as several other as yet unidentified species were collected on this same trip. Most of the forest along the route has been removed except for the steep and often inaccessible slopes along the precipitous route past Coroico. The lower elevations around Caranani are badly deforested but we managed to find an interesting area bordering a small river north of Caranavi along the road to Guanay.

From Bolivia I returned to Quito and travelled overland to Colombia where I made a trip from Pasto to Macoa located in the Territory of Putumayo. Again the vegetation was badly destroyed around Macoa but most of the intervening area east of Sibundoy is virgin forest on steep slopes between Pasto and Sibundoy. The paramo is a flat, cold area given over largely to herbaceous plants and low shrubs but especially to unusual, unbranched, densely pubescent plants of the genus *Espeletia* in the Compositae family. Just beyond the paramo is an area of low vegetation with several species of *Anthurium*. I was able to collect at will here because of a road block caused by two stuck trucks. Such delays, a curse to the average bus traveller, are a godsend for botanists providing they occur in a rich area. It is otherwise necessary to dismount and hope there will be other transportation coming along when you need it.

The next trip in Colombia was made from Popoyan in Cauca Department to the Merenberg Biological preserve in the Department of Huila. Though not notably rich in species, the area contains many species I had not previously seen elsewhere as relatively few collections have been made from the Department of Huila.

Though other trips were made in Colombia, the highlight of the three-month expedition was a trip to Quibdo' in the Department of Choco'. On this trip I was accompanied by a student from the University of Antioquia in Medellin, Alvarro Cogally. Using a truck donated to the Medellin Botanical Garden by the Missouri Botanical Garden. We drove as far as the Choco' frontier the first day. The first part of the trip is very unexciting botanically, but the botanical interest of the route improves greatly about fifteen miles beyond the continental divide (west of Bolivar). The road deteriorates but it is passable most of the time even in a small vehicle if you are skillful at dodging the craters left by heavily overweight trucks. This region is one of the most exciting for aroids and will unquestionably yield many new species. The previously collected herbarium specimens from the area indicate an unusual richness with most of the species represented by a single unnamed specimen.

The trip into the Choco' Department brought to completion the three month expedition for aroids in western South America and provided just the stimulus needed for lagging enthusiasm brought on by such a long period of collecting in often much less exciting areas. The trip to western South America provided the opportunity to obtain most of the known members of sect. *Pachyneurim* from the region. Other trips planned for central and southern Brazil, the Guianas and Venezuela during 1982 will hopefully enable me to successfully complete a revision of the bird's-nest anthuriums.

NEWS AND NOTES

Josef Bogner of Munich, Germany has resigned as Director of this society.

Mrs. Sue Thompson is now at Carnegie Museum, Pittsburg, Pennsylvania.

Circular S-280, issued by the Florida Agricultural Experiment Stations, University of Florida, Gainesville, Florida describes and illustrates in color a new pathogem-free selection of *Dieffenbachia maculata*, derived through tissue culture. This cultivar is designated as Perfection — 137 B.

ERRATUM

In Vol. 5, Issue No. 1, on page 24, Figure 25 is incorrectly labeled *Homalomena* sp. It should be *Schizmatoglottis* sp.