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REFERENCES

A PHYTOGEOGRAPHIC ANALYSIS OF ARACEAE OF CABO CORRIENTES (CHOCÓ, COLOMBIA) AND COMPARABLE LOWLAND TROPICAL AMERICAN FLORAS[1]

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ABSTRACT

We studied the Araceae of the Cabo Corrientes region on the Pacific Coast of Colombia and compared its aroid flora with those of La Selva (Costa Rica), Barro Colorado Island (Panama), Bajo Calima (Colombia), Río Palenque (Ecuador), and Iquitos (Peru). We found 114 native species in 14 genera at Cabo Corrientes; the largest genera were *Anthurium* (38 species), and *Philodendron* (36), which together accounted for 65% of the species. Seventy-four percent of the species were exclusively epiphytic or hemiepiphytic. Most of the epiphytic species belonged to the genera *Anthurium*, *Philodendron*, *Rhodospatha*, *Syngonium*, *Monstera*, and *Stenospermation*, the latter three containing exclusively epiphytic or hemiepiphytic species. The flora of Araceae of Cabo Corrientes was most similar to that of La Selva, Barro Colorado Island, and Bajo Calima; similarity with Río Palenque was low. Our findings support Lellinger's view that the Chocó biogeographic region extends to the Nicaragua-Costa Rica border and is divided into a northern and a southern flora.

Key words: Araceae, aroids, Chocó biogeographic region, Colombia, species richness, tropical rainforest.

RESUMEN

Estudiamos la flora de Araceae de la región de Cabo Corrientes en la Costa Pacífica de Colombia y la comparamos con la flora de aráceas de La Selva (Costa Rica), La Isla de Barro Colorado (Panamá), Bajo Calima (Colombia), Río Palenque (Ecuador) e Iquitos (Peru). En Cabo Corrientes encontramos 114 especies nativas distribuidas en 14 géneros; los géneros más grandes fueron *Anthurium* (38 especies) y *Philodendron* (36), los cuales comprendieron 65% del total de especies. Setenta y cuatro por ciento de las especies fueron exclusivamente epífitas o hemiepífitas. La mayoría de especies epífitas pertenecieron a los géneros *Anthurium*, *Philodendron*, *Rhodospatha*, *Syngonium*, *Monstera*, y *Stenospermation*, siendo los últimos tres géneros exclusivamente epífitos o hemiepífitos. La flora de Araceae de Cabo Corrientes fue más similar con la de La Selva, La Isla de Barro Colorado y Bajo Calima; la similaridad con Río Palenque fue baja. Nuestros resultados coinciden con los de Lellinger que señalan que la región del Chocó biogeografico se extiende hasta la frontera de Costa Rica con Nicaragua y está dividida en una flora norteña y una flora sureña.

Colombia is probably the world's richest, but most poorly known, country for Araceae in South America (Croat, 1992). Colombia's biodiversity, well documented for other groups of organisms (e.g., McNeely et al., 1990; Henderson et al., 1995), is due to the complex mountain system of the country and its location on the crossroads between North and South America. Croat (1992) has suggested that the richest area for Araceae in the country is the Pacific slope of the Andes and the adjacent wet lowlands. This area comprises most of the Chocó biogeographic region, which, as currently defined, stretches from the western slopes of the Andes of Colombia and Ecuador to the Pacific Ocean and from eastern Panama to central coastal Ecuador (Gentry, 1982). The Andean mountains have effectively isolated this region for millions of years, resulting in a high degree of endemism for plants and animals (Gentry, 1993). This fact, coupled with a rainfall that exceeds five meters per year in many areas (Gentry, 1986) and the absence of a long dry season, cause the Pacific lowlands to be an amazing expression of aroid diversity.

The aroid flora has been extensively documented in only one locality in the Pacific lowlands of Colombia (Bajo Calima) (Bay, 1996), although a preliminary survey of another lowland locality (Bahia Solano) has

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been published (Croat, 1992). This paper presents the results of a detailed study of Araceae at a second lowland locality, the Cabo Corrientes area, located on the Pacific coast in the Department of Chocó. We compare the aroid flora of Cabo Corrientes with those of other localities in southern Central America and northern South America and discuss the affinities of the biogeographic Chocó flora.

Materials and Methods

Study Site

The study was centered at El Amargal Biological Station, located on the Pacific coast of Colombia 11 km north of Cabo Corrientes. The Cabo Corrientes area is a small peninsula in the Department of Chocó, at the southern end of the coastal Serranía del Baudó. The peninsula is 15 km long and ca. 6 km wide and ranges in elevation from sea level to about 120 m; its terrain is deeply dissected by numerous creeks and small rivers, resulting in an abrupt topography of hills and ravines covered by scarcely disturbed tropical rain forest. The total area of the peninsula is ca. 8000 ha; our sampling covered ca. 2.5 km from the coastline to the east, thus including a total area of ca. 4000 ha.

Collections and Comparisons

We collected Araceae at El Amargal from July to September 1998, January to March 1999, and June 2000. Specimens were collected near the visitors' house at the Biological Station, along the trail to the nearby village of Arusí, along the Arusicito river ca. 2 km east of the Station, and at the southern end of the peninsula near Cabo Corrientes. Canopy plants were collected by using tree climbing equipment. Specimens were identified at COL and MO and all identifications were confirmed by Thomas Croat (COL) and/or Michael Grayum (MO).

We compared the aroid flora of Cabo Corrientes with available treatments of aroid floras for five localities: La Selva Biological Station in Costa Rica (Croat & Grayum in Wilbur et al., 1994); Barro Colorado Island (BCI) in Panama (Croat, 1978); Bajo Calima on the Pacific lowlands of Colombia (Bay, 1996); Río Palenque on the coastal lowlands of Ecuador (Dodson & Gentry, 1978, complemented with more recent information, Grayum, 1996); and the Iquitos Reserves in Amazonian Peru (Vásquez, 1997). Information for all localities was complemented with more recent data from the W³ TROPICOS database (2006) at the Missouri Botanical Garden. The complete data set for all localities is available upon request from the first author.

Data Analysis

We compared the aroid floras of all pairs of localities using Sørensen's index (Mueller-Dombois & Ellenberg, 1974). For all localities, we excluded from the analysis those species that were introduced and we assumed that all unidentified species were not shared between localities. Thus, our similarity index for any two localities will slightly underestimate similarity if some of the excluded species prove to be shared.

Results

Species Diversity

At Cabo Corrientes we found 114 native species of Araceae belonging to 14 genera and two introduced species (Appendix 1). The largest genera were *Anthurium* (38 species) and *Philodendron* (36 species). Together both genera comprise 65% of the local aroid flora. Nine of the species were new records for South America. Twenty-one species (19%), two subspecies, and one variety were new to science (Appendix 1). Of particular interest is the finding of a new subspecies of *Anthurium eminens*, a species so far known only from the Amazon basin.

The pooled data for the six localities gave a total number of 362 species. Only two of the species, *Philodendron inaequilaterum* and *Syngonium podophyllum*, were shared by the six localities; 267 species occurred only at one locality, 41 of them at Cabo Corrientes. The species-richest area was Bajo Calima, followed by Cabo Corrientes and La Selva (Table 1). The largest genera for the pooled floras were also *Anthurium* and *Philodendron*. In all cases *Philodendron* was predominant, except at Cabo Corrientes and Bajo Calima, where *Anthurium* surpassed *Philodendron* by three and two species, respectively. The overall predominance of *Philodendron* over *Anthurium* agrees with Croat's (1994) statement that *Philodendron* is much more abundant at lower elevations than *Anthurium*.

All similarity indices between localities were low (Table 2). Similarities in species richness of Río Palenque and Iquitos with the other localities were the lowest. The highest similarity between two localities was between La Selva and BCI and between La Selva and Cabo Corrientes, although these figures were not much different from the similarity indices of Cabo Corrientes with Bajo Calima and BCI. In contrast, similarity of Bajo Calima with any of these localities, except with Cabo Corrientes, was low.

Generic Diversity

Of 19 genera composing the pooled floras, most (11) were shared by all six localities, whereas only a few

Table 1. Generic and specific richness of native Araceae in six neotropical lowland localities.

	Anthurium	*Caladium*	*Chlorospatha*	*Dieffenbachia*	*Dracontium*	*Heteropsis*	*Homalomena*	*Monstera*	*Montrichardia* Crueg.	*Philodendron*	*Pistia* L.	*Rhodospatha*	*Schismatoglottis* Zoll. & Moritzi	*Spathiphyllum*	*Stenospermation*	*Syngonium*	*Urospatha* Schott	*Xanthosoma*	Total
La Selva	25	1	0	7	1	1	1	10	0	30	0	2	0	5	2	7	1	4	97
Barro Colorado Island	13	1	0	3	1	0	1	3	1	17	1	2	0	2	1	2	0	3	51
Cabo Corrientes	38	1	2	4	1	1	3	6	0	36	0	5	0	4	4	7	0	2	114
Bajo Calima	49	2	1	3	1	0	1	5	0	47	0	3	0	2	14	3	0	4	135
Río Palenque	14	1	2	2	0	1	1	4	0	19	0	2	0	1	1	4	0	1	53
Iquitos	20	1	0	8	1	4	2	6	1	28	1	1	1	1	1	1	1	2	80

(5) occurred at only one or two localities (Table 1). The number of genera at Iquitos (17) was higher than that of all other localities (either 13 or 14 genera). *Chlorospatha* was the only genus present at the two Colombian sites and at the one in Ecuador, but lacking at the other localities.

GROWTH HABITS

The aroids of Cabo Corrientes are terrestrial, epiphytic, or hemiepiphytic (Table 3). Of the total number of species, 33 (28%) were true epiphytes, 52 (44%) were true hemiepiphytes, 29 (26%) were terrestrial, and two (2%) were either hemiepiphytes or terrestrial. Of the 14 native genera found at the study site, seven were exclusively terrestrial and four were totally epiphytic (true epiphytes or hemiepiphytes). The only genus that showed all three different habit types was *Anthurium*.

USES

Five of the native species are used locally by African-Colombian people for medicine, construction, or magical-religious purposes. Leaves of *Anthurium trilobum* ("tres dedos"), *Anthurium panamense* ("hoja seca"), and *Dracontium spruceanum* are used for treating snake bite. The aerial roots of *Heteropsis oblongifolia* ("piquigua") are used as cords for binding house beams and are reputed to be the best binding material in the region. As a consequence of pressure on this resource, populations of *Heteropsis* are now severely depleted. Live plants of *Dieffenbachia longispatha* ("hoja de chucha") are planted at one of the front corners of dwellings as a protection against witchcraft. Additionally, two common, well-known, introduced species, *Xanthosoma sagittifolium* ("otó") and *Colocasia esculenta* ("achín") are cultivated in the nearby village of Arusí. Their starch-rich tubers are used for human and animal food.

Discussion

The number of aroid species in the Cabo Corrientes area is higher than the total number of species listed for this family by Forero and Gentry (1989) in the whole Chocó Department, even though their list includes the western slopes of the Cordillera Occidental. This fact stresses the poor knowledge of the aroid flora of the Chocó Department. Thus, for example, Grayum (1996) noted a marked absence of *Philodendron* subg. *Pteromischum* (Schott) Mayo in this department and suggested that there might be a discontinuity of distribution of the group in this area. However, at Cabo Corrientes we found ten species of this subgenus, which represents 45% of all the species of this group known in Colombia. Of these ten species, *Philodendron croatii* and *P. rayanum* are new records for the South American flora.

The poor knowledge of the Araceae of this region reflects both the incomplete exploration of the area and the bias of recent inventories, most of which have studied forest composition in terms of trees, ignoring the diversity represented in other growth forms, as pointed out by Galeano et al. (1998b). The latter authors found that at Cabo Corrientes and nearby areas the Araceae were by far the most species-rich family, accounting for 10.3% of all vascular plants. Not surprisingly, the biogeographic Chocó has been

Table 2. Sørensen's index matrix for paired comparisons of aroid species richness at six neotropical localities.

Locality	La Selva	BCI	Cabo Corrientes	Bajo Calima	Río Palenque	Iquitos
La Selva	1	0.392	0.391	0.216	0.160	0.124
BCI	0.392	1	0.329	0.150	0.154	0.183
Cabo Corrientes	0.391	0.329	1	0.355	0.205	0.114
Bajo Calima	0.216	0.150	0.355	1	0.191	0.056
Río Palenque	0.160	0.154	0.205	0.191	1	0.105
Iquitos	0.124	0.183	0.114	0.056	0.105	1

pointed to as the world's richest region for Araceae (Croat, 1992).

The richness of Araceae in this region is probably due to a combination of a high level of endemism and the great affinity of its flora to that of southern Central America. The high level of endemism in the Chocó, estimated for all plant groups to be near 20% (Gentry, 1982), is evidenced for the Araceae by the large number of new species found in the two detailed studies so far carried out in the lowlands (Bay, 1996; Croat & Mora, 2004; Croat et al., 2006): 37% of the 205 species in the pooled floras of Bajo Calima and Cabo Corrientes were new to science. The fact that most of these species have not been found before in better-explored Costa Rica or Panama suggests that they may be endemic to the Chocó.

The affinity of the Chocó flora with that of southern Central America has been shown by many authors (e.g., Gentry, 1982; Croat, 1992; Galeano, 1992; Bernal & Galeano, 1993; Grayum, 1996; Galeano et al., 1998a). In fact, 73% of the aroids of Cabo Corrientes are also found in Central America, and 48% of all aroid species are known only from Central America and the Chocó region (Mora et al., unpublished data). Sørensen's similarity indices for the six aroid floras (Table 2) further stress this affinity: the similarity of Cabo Corrientes with La Selva and BCI is comparable to that between La Selva and BCI. Interestingly, Río Palenque and Bajo Calima seem to have a lower affinity with Central America. In fact, the similarity indices between La Selva and other sites to the south showed an abrupt reduction at Bajo Calima, despite its closeness to Cabo Corrientes. On the other hand, Río Palenque showed a low similarity with all of the above-mentioned localities, despite its purported affinity to the Chocó biogeographic region (Gentry, 1982, 1986); the similarity indices between Río Palenque and other localities were comparable to those of Iquitos.

The strong affinity of the Cabo Corrientes aroid flora with that of southern Central America suggests that the northern limit of the Chocó biogeographic region does not lie near the Panama-Colombia border, as suggested by Gentry (1982, 1986, 1993) and as currently recognized, but the region may extend north to the border between Nicaragua and Costa Rica, as initially stated by Lellinger and de La Sota (1978). On the other hand, the dissimilarity of Bajo Calima and Río Palenque with Central America, in terms of aroids, supports Lellinger's (1975) distinction, based on ferns, of a northern and a southern Chocó flora. According to Lellinger, the division between both fern floras would be near the southern boundary of the Chocó Department (i.e., near Bajo Calima). If Bajo Calima indeed lies near the contact area between Lellinger's northern and southern Chocó floras, this might perhaps explain its extreme endemism in aroids, indicated by the fact that 54 of the species found by Bay (1996) were new to science. High endemism had already been noted by Gentry (1982) for the Bajo Calima and neighboring areas in the Valle Department, as well as for Río Palenque. The low similarity between the aroid floras of the latter localities suggests that endemism in the southern Chocó flora is not uniformly distributed, and that at least two areas of endemism may exist. Unfortunately, the poor floristic knowledge of the lowlands in the intervening Cauca and Nariño Departments of Colombia currently prevents any further analysis.

Table 3. Growth habit of the Araceae of Cabo Corrientes, Chocó, Colombia. All species within each genus have that particular growth habit unless otherwise noted with the number of species in parenthesis. One species of *Philodendron* and one of *Rhodospatha* are either terrestrial or hemiepiphitic.

Terrestrial	Hemiepiphytes	Epiphytes
Anthurium (8)	*Anthurium* (1)	*Anthurium* (29)
Caladium	*Heteropsis*	*Stenospermation*
Chlorospatha	*Monstera*	
Dieffenbachia	*Philodendron* (32)	
Dracontium	*Rhodospatha* (6)	
Homalomena	*Syngonium*	
Philodendron (4)		
Rhodospatha (1)		
Spathiphyllum		
Xanthosoma		

Literature Cited

Bay, D. 1996. Araceae of the Bajo Calima region, Colombia. Unpublished Ph.D. Dissertation, Saint Louis University, St. Louis, Missouri.

Bernal, R. G. & G. Galeano. 1993. Las palmas del andén Pacífico. Pp. 220–231 *in* P. Leyva (editor), Colombia Pacífico, Vol. 1. Fondo FEN Colombia, Bogotá.

Croat, T. 1978. Flora of Barro Colorado Island (Panama Canal Zone). Stanford Univ. Press, Stanford.

———. 1992. Species diversity of Araceae in Colombia: A preliminary survey. Ann. Missouri Bot. Gard. 79: 17–28.

———. 1994. Taxonomic status of neotropical Araceae. Aroideana 17: 33–60.

——— & M. M. Mora. 2004. New taxa of Araceae from Cabo Corrientes in Chocó, Department of Colombia. Aroideana 27: 90–129.

———, D. C. Bay & E. D. Yates. 2006. New taxa of *Anthurium* (Araceae) from the Bajo Calima region (Valle, Chocó), Colombia and Ecuador. Novon 16: 25–50.

Dodson, C. H. & A. H. Gentry. 1978. Flora of the Río Palenque Science Center, Los Ríos, Ecuador. Selbyana 4: 1–628.

Forero, E. & A. H. Gentry. 1989. Lista Anotada de las Plantas del Departamento del Chocó, Colombia. Biblioteca José Jerónimo Triana 10, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá.

Galeano, G. 1992. Patrones de distribución de las palmas de Colombia. Bull. Inst. Franç. Études Andines 21: 599–607.

———, J. Cediel & M. Pardo. 1998a. Structure and floristic composition of a one-hectare plot of wet forest at the Pacific coast of Chocó, Colombia. Pp. 551–568 *in* F. Dallmeier & J. A. Comiskey (editors), Forest Biodiversity in North, Central and South America, and the Caribbean: Research and Monitoring. Man and Biosphere Series 21, UNESCO, Paris.

———, S. Suárez & H. Balslev. 1998b. Vascular plant species count in a wet forest in the Chocó area on the Pacific coast of Colombia. Biodivers. & Conservation 7: 1563–1575.

Gentry, A. 1982. Phytogeographic patterns as evidence for a Chocó refuge. Pp. 112–135 *in* G. T. Prance (editor), Biological Diversification in the Tropics. Columbia Univ. Press, New York.

———. 1986. Species richness and floristic composition of Chocó region plant communities. Caldasia 15: 71–79.

———. 1993. Riqueza de especies y composición florística. Pp. 200–219 *in* P. Leyva (editor), Colombia Pacífico, Vol. 1. Fondo FEN Colombia, Bogotá.

Grayum, M. H. 1996. Revision of *Philodendron* subgenus *Pteromischum* (Araceae) for Pacific and Caribbean tropical America. Syst. Bot. Monogr. 47: 1–233.

Henderson, A., G. Galeano & R. Bernal. 1995. Field Guide to the Palms of the Americas. Princeton Univ. Press, Princeton, New Jersey.

Lellinger, D. B. 1975. A phytogeographic analysis of Chocó Pteridophytes. Fern Gaz. 11: 105–114.

——— & E. de la Sota. 1978. The phytogeography of the Pteridophytes of the Departamento del Chocó, Colombia. Res. Rep. Natl. Geogr. Soc., Washington, DC.

McNeely, J. A., K. R. Miller, W. V. Reid, R. A. Mittermeier & T. B. Werner. 1990. Conserving the World's Biological Diversity. The World Bank, World Resources Institute, IUCN, Conservation International, Washington, DC.

Mueller-Dombois, D. & H. Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Wiley and Sons, New York.

Vásquez Martínez, R. 1997. Araceae. Pp. 737–756 *in* 1997. Flórula de las Reservas Biológicas de Iquitos, Perú: Allpahuayo-Mishana, Explornapo Camp, Explorama Lodge. Pp. 737–756 Monogr. Syst. Bot. Missouri Bot. Gard. 63.

W³ TROPICOS ver. 1.5. 2006. <http://mobot.mobot.org/W3T/Search/vast.html>, accessed 26 May 2006.

Wilbur, R. L., Collaborators. 1994. Vascular plants: An interim checklist. Pp. 350–378 *in* L. A. McDade, K. S. Bawa, H. A. Hespenheide & G. S. Hartshorn (editors), La Selva: Ecology and Natural History of a Neotropical Rain Forest. Univ. Chicago Press, Chicago.

Appendix 1. Checklist of the Araceae of Cabo Corrientes, Colombia, and growth habits of the species. E, epiphytic; H, hemiepiphytic; T, terrestrial. Genera are in bold; taxa marked with solid circles are new species (Croat & Mora, 2004) and the two marked with an asterisk are introduced.

Taxon	Habit	Voucher
Anthurium		
acutangulum Engl.	E	Mora 10 (COL, MO), Mora & Croat 281 (COL, MO)
acutibacca Croat & M. M. Mora•	E	Mora 39 (COL, MO), Jácome 335 (COL), Mora & Croat 363 (COL, MO)
amargalense Croat & M. M. Mora•	E	Mora & Croat 385 (COL, MO)
arusiense Croat & M. M. Mora•	E	Mora & Croat 352 (COL, MO), Jácome 414 (COL)
brownii Mast.	E	Mora 32 (COL, MO), Mora & Croat 323 (COL, MO)
cogolloanum Croat & M. M. Mora•	E	Mora 64 (COL), Mora & Croat 393 (COL, MO)
colonense Croat	E	Mora & Croat 313 (COL, MO)
cucullispathum Croat	E	Mora 76 (COL, MO), Mora & Croat 316 (COL, MO)
cuspidatum Matuda	T	Mora & Croat (COL)
debilis Croat & D. C. Bay•	T	Mora 7 (COL)
dwyeri Croat	E	Mora & Croat 357 (COL, MO)
eminens Schott ssp. *longispadix* Croat & M. M. Mora•	E	Mora 33 (COL, MO), Mora & Croat 331 (COL, MO)
formosum Schott	T	Mora 62 (COL, MO), Mora & Croat 347 (COL, MO)
friedrichsthalii Schott	E	Mora 24 (COL, MO), Mora & Croat 318 (COL, MO)
galeanoae Croat & M. M. Mora•	E	Mora & Croat 329 (COL, MO)
grandicataphyllum Croat & M. M. Mora•	E	Mora 66 (COL, MO), Mora & Croat 376 (COL, MO)
hacumense Engl.	E	Jácome 224 (COL)
hodgei Croat, M. M. Mora & Oberle•	E	Mora & Croat 391 (COL, MO)
kunthii Poepp.	E	Jácome 419 (COL)
lancifolium Schott	T	Mora 4 (COL, MO), Mora & Croat 301 (COL)
michelii Guillaumin	E	Mora 45 (COL, MO), Mora & Croat 375 (COL, MO)
morae Croat•	E	Mora 31 (COL, MO), Mora & Croat 343 (COL)
obtusilobum Schott	E	Mora 41 (COL, MO), Mora & Croat 382 (COL, MO)
obtusum (Engl.) Grayum	E	Mora 30 (COL), Mora & Croat 349 (COL, MO)
pallidicaudex Croat & M. M. Mora•	T	Mora 43 (COL, MO), Mora & Croat 344 (COL, MO)
paludosum Engl.	E	Mora 23 (COL, MO), Mora & Croat 365 (COL, MO)
panamense Croat	E	Mora 14 (COL, MO), Mora & Croat 276
prominenerve Croat & M. M. Mora•	T	Mora 28 (COL, MO), Mora & Croat 332 (COL, MO)
propinquum Sodiro	T	Mora 48 (COL, MO), Mora & Croat 315 (COL, MO)
ramonense Engl. ex K. Krause	E	Mora & Croat 314 (COL)
ravenii Croat & R. A. Baker	E	Mora 32 (COL), Mora & Croat 277 (COL, MO)
rotundistigmatum Croat	E	Mora 55 (COL, MO), Mora & Croat 374
salvinii Hemsl.	E	Mora & Croat 356 (COL, MO)
trilobum Hort. Linden ex André	E	Mora 18 (COL, MO), Mora & Croat 312 (COL, MO)
variilobum Croat & M. M. Mora•	T	Mora 11 (COL, MO), Mora & Croat 350 (COL, MO)
warocqueanum Moore	H	Mora 47 (COL, MO), Mora & Croat 295 (COL, MO)
sp. indet. 1 [sect. *Porphyrochitonium* Schott]	E	Mora & Croat 363 (COL, MO)
sp. indet. 2 [sect. *Digittinervium* Sodiro]	E	Mora & Croat 385 (COL, MO)
Caladium		
bicolor (Aiton) Vent.	T	Mora 154 (COL)
Chlorospatha		
kolbii Engl.	T	Mora 50 (COL, MO), Mora & Croat 345 (COL, MO)
mirabilis (Mast.) Madison	T	Mora 56 (COL), Mora & Croat 304 (COL, MO)
Colocasia		
esculenta (L.) Schott*	T	Mora & Croat 392 (COL)
Dieffenbachia		
davidsei Croat & Grayum•	T	Jácome 356 (COL), Mora & Croat 303 (COL, MO)
longispatha Engl. & K. Krause	T	Mora 72 (COL), Mora & Croat 394 (COL, MO)
nitidipetiolata Croat & Grayum•	T	Mora 49 (COL), Mora & Croat 270 (COL, MO)
tonduzii Croat & Grayum	T	Mora 51 (COL), Mora & Croat 310 (COL, MO)
Dracontium		
spruceanum (Schott) G. H Zhu	T	Jácome 399 (COL), Mora & Croat 335 (COL, MO)

Appendix 1. Continued.

Taxon	Habit	Voucher
Heteropsis		
oblongifolia Kunth	H	Jácome 390 (COL), 401 (MO)
Homalomena		
erythropus (Mart. ex Schott) Engl. ssp. *allenii* Croat•	T	Mora 38 (COL), Mora & Croat 271 (COL)
peltata Mast.	T	Mora 77 (COL, MO), Mora & Croat 301 (COL, MO)
wendlandii Schott	T	Mora 75 (COL, MO), Mora & Croat 336 (COL, MO)
Monstera		
adansonii Schott	H	Mora & Croat 324 (COL, MO), Jácome 423 (COL, MO)
var. *laniata* (Schott) Madison	H	Mora 65 (COL), Mora & Croat 324 (COL, MO)
amargalensis Croat & M. M. Mora•	H	Mora & Croat 324 (COL, MO), Jácome 423 (COL, MO)
dubia (Kunth) Engl. & K. Krause	H	Mora 54 (COL, MO), Mora & Croat 340 (COL, MO)
minima Madison	H	Jácome 280 (COL)
obliqua Miq.	H	Mora 53 (COL, MO)
pittieri Engler	H	Jácome 280 (COL)
pinnatipartita Schott	H	Mora 42 (COL, MO), Mora & Croat 306 (COL, MO)
spruceana (Schott) Engl.	H	Mora 26 (COL), Mora & Croat 265 (COL, MO)
Philodendron		
alliodorum Croat & Grayum	H	Jácome 226 (COL), Mora & Croat 285 (COL, MO)
amargalense Croat & M. M. Mora•	H	Mora & Croat 280 (COL, MO), Mora & Croat 320 (COL, MO)
angustilobum Croat & Grayum	H	Mora 60 (COL, MO)
bakeri Croat & Grayum	H	Jácome 228 (COL)
croatii Grayum	H	Jácome 369 (COL)
ensifolium Croat & Grayum	H	Jácome 337 (COL)
fragrantissimum (Hook.) Kunth	H	Mora 37 (COL)
grandipes K. Krause	T	Mora 27 (COL, MO); Mora & Croat 272 (COL)
grayumii Croat	H	Mora 16 (COL, MO), Mora & Croat 264 (COL, MO)
hebetatum Croat	H, T	Mora 67 (COL, MO), Mora & Croat 325 (COL, MO)
hederaceum (Jacq.) Schott	H	Mora 76 (COL), Mora & Croat 319 (COL, MO)
heleniae Croat	H	Mora 36 (COL, MO), Mora & Croat 321 (COL, MO)
ichthyoderma Croat & Grayum	T	Mora 74 (COL), Mora & Croat (COL)
immixtum Croat	H	Mora & Croat 354A (COL, MO)
inaequilaterum Liebm.	T	Jácome 263 (COL)
jodavisianum G. S. Bunting	H	Mora 3 (COL, MO), Mora & Croat 339 (COL, MO)
laticiferum Croat & M. M. Mora•	H	Mora 9 (COL, MO)
ligulatum Schott	H	Mora 17 (COL, MO), Mora & Croat 266 (COL, MO)
longipedunculatum Croat & M. M. Mora•	H	Mora 61 (COL)
opacum Croat & Grayum	H	Mora 71 (COL, MO), Mora & Croat 359 (COL, MO)
panamense K. Krause	H	Mora & Croat 369 (COL, MO)
platypetiolatum Madison	H	Mora 29 (COL, MO), Mora & Croat 322 (COL, MO)
rayanum Croat & Grayum	H	Jácome 322 (COL)
rhodoaxis G. S. Bunting ssp. *lewisii* Croat & Grayum	H	Jácome 243 (COL), Mora & Croat 292 (COL, MO)
roseocataphyllum Croat & M. M. Mora•	H	Mora 63 (COL, MO), Mora & Croat 384 (COL, MO)
sagittifolium Liebm.	H	Jácome 238 (COL), Mora & Croat 280 (COL, MO)
scalarinerve Croat & Grayum	H	Mora 12 (COL, MO), Mora & Croat 277 (COL, MO)
senatocarpium Madison	H	Mora & Croat 326 (COL, MO)
strictum G. S. Bunting	T	Mora 59 (COL)
subhastatum Engl.	H	Mora & Croat 355 (COL, MO)
sulcatum K. Krause	H	Jácome 355 (COL)
sulcicaule Croat & Grayum	H	Jácome 219 (COL)
tenue K. Koch & Augustin	H	Mora 57 (COL), Mora & Croat 348 (COL, MO)
tripartitum (Jacq.) Schott	H	Mora 127 (COL), Mora & Croat 316 (COL, MO)
sp. indet. 1	H	Jácome 262 (COL)
sp. indet. 2	H	Mora 68 (COL), Mora & Croat 327 (COL)

Appendix 1. Continued.

Taxon	Habit	Voucher
Rhodospatha		
brachypoda G. S. Bunting	H	Mora & Croat 361 (COL)
monsalveae Croat & D. C. Bay•	H	Mora 40 (COL)
moritziana Schott	H, T	Mora 1 (COL, MO), Mora & Croat 282, 287 (COL, MO)
pellucida Croat & Grayum	H	Jácome 426 (COL)
wendlandii Schott	H	Jácome 248 (COL)
sp. indet. 1	H	Mora & Croat 299 (COL)
Spathiphyllum		
dressleri Croat & F. Cardona•	T	Mora & Croat 366 (COL)
friedrichsthalii Schott	T	Mora 25 (COL), 91 (COL, MO), Mora & Croat 387 (COL, MO)
phryniifolium Schott	T	Mora 15 (COL), Mora & Croat 328 (COL, MO)
laeve Engl.	T	Mora 5 (COL, MO), Mora & Croat 311 (COL, MO)
Stenospermation		
angustifolium Hemsl.	E	Mora 20 (COL, MO), Mora & Croat (COL, MO)
latifolium Engl.	E	Mora & Croat 263 (COL)
multiovulatum (Engl.) N. E. Br.	E	Mora 13 (COL), Mora & Croat 279 (COL, MO)
robustum Engl.	E	Mora 34 (COL), Mora & Croat 275 (COL, MO)
Syngonium		
erythrophyllum Birdsey ex G. S. Bunting	H	Mora 69 (COL), Mora & Croat 290 (COL, MO)
macrophyllum Engl.	H	Mora 21 (COL), Mora & Croat 368 (COL)
chocoanum Croat	H	Mora 7 (COL, MO), Jácome 380 (COL)
podophyllum Schott	H	Mora & Croat 341 (COL, MO)
triphyllum Birdsey ex Croat	H	Mora & Croat 334 (COL, MO)
Xanthosoma		
daguense Engl.	T	Mora 19 (COL, MO), Mora & Croat 268 (COL, MO)
var. *amargalense* Croat & M. M. Mora•	T	Mora & Croat 300 (COL, MO), Jácome 400 (COL)
sagittifolium (L.) Schott & Endl.	T	No voucher (pers. comm., Croat)