The current status of *Anthurium* sect. *Porphyrochitonium* (Araceae) and allies, with many new species from Central and South America

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ABSTRACT

One hundred twenty taxa of *Anthurium*, mostly belonging to *Anthurium* sect. *Porphyrochitonium*, are described as new. Of these, 76 taxa (75 species and one variety) are from Central America:

A. abelardoi Croat, A. alatipetiolum Croat, A. albifructum (Croat) O. Ortiz & Croat, A. alexespinosae Croat, A. ariztutense Croat, A. attenuatifolium Croat, A. aurantiifructum Croat, A. bajobonitense O.Ortiz & Croat, A. belenense Croat & O. Ortiz, A. bergii Croat, A. berguidoi Croat & O.Ortiz, A. billdarcyi Croat, A. billhahnii Croat, A. boqueronense Croat, A.botijaense Croat, A. bratsiense Croat, A. brunneum Croat, A. carrionii Croat & O. Ortiz, A. chaconii Croat, A. churchillii Croat, A. comincoense Croat, A. cuadrosii Croat, A. deneversii Croat, A. diversurense Croat, A. doroteryense Croat, A. duocostatum Croat, A. edtysonii Croat, A. flagellum Croat, A. floresii Croat & O. Ortiz, A. gerardoi Croat, A. glandulicostum Croat & O. Ortiz, A. granditepalum Croat, A. gregneversii Croat, A. guaboense Croat, A. guadalupeae Croat & O.Ortiz, A. heraclioanum Croat, A. hughchurchillii Croat, A. iguanitense Croat, A. insolitum Croat & O.Ortiz, A. jicoteense Croat, A. jimfolsomii Croat, A. kensytsmae Croat, A. kittredgeanum Croat, A. lellingeri Croat, A. loratum Croat, A. mercadoi Croat & O.Ortiz, A. minimum Croat, A. monroi Croat, A. morrisii Croat & O.Ortiz, A. muscidiradix Croat & O.Ortiz, A. neei Croat, A. nutans Croat, A. orosiense Croat, A. paulmaasii Croat, A. perangustum Croat, A. polancoi Croat, A. robertii Croat, A. sabanitense Croat, A. scottmorii Croat, A. sknappiae Croat, A. stockwellii Croat, A. sueae Croat, A. sukutense Croat, A. tarrazuense Croat, A. tayuticense Croat & O.Ortiz, A. toroense Croat, A. tsaiae Croat, A. tscuiense Croat & O.Ortiz, A. tuquesense Croat, A. vanninii Croat, A. veraguense Croat & O.Ortiz, A. wendlingeri G.M.Barroso var. horichii Croat,

A. wiehleri Croat, A. zachdufranianum Croat & O.Ortiz, A. zapatae Croat, A. zhui Croat.

A further 44 new species are described from South America:

A. acaimense Croat & W.Vargas, A. alejandroi Croat, A. barfodii Croat, A. bueyense Croat, A. certeguense Croat, A. chiriacoense Croat, A. claudiae Croat, A. cojimiesense Croat, A. coquiense Croat, A. davidneillii Croat, A. friedrichii Croat, A. gladysmartineziae Croat, A. gruesoi Croat, A. habitense Croat, A. jimgribianum Croat, A. jimwestii Croat, A. juanguillermoi Croat, A. koesteri Croat, A. lamanense Croat, A. lobinii Croat, A. luzmariae Croat, A. mercedesense Croat, A. minutiareolum Croat, A. minutiglandulum Croat, A. miriamiae Croat, A. nonoense Croat, A. oblitum Croat, A. omarescobarii Croat, A. orellanense Croat, A. ortizii Croat, A. palevedoi Croat, A. pallidifibrum Croat, A. palmitasense Croat, A. pedernalense Croat, A. purpuribacca Croat, A. sursumtepalum Croat, A. tarapuiense Croat, A. unguiense Croat, A. vlastimilii Croat, A. yatuense Croat, A. zakii Croat.

Keywords: Anthurium, sect. Porphyrochitonium, sect. Decurrentia, new species, Neotropics.

INTRODUCTION

Anthurium sect. Porphyrochitonium is one of the largest sections of Anthurium with between 350–400 species. Already 357 species have been named (but not all published) and 333 species have been entered into the Lucid Anthurium Key. This paper will be the first in a series that will formally publish these species. The section is perhaps the most well-defined section in the genus, yet it remains unrevised, largely owing to the large number of unresolved species. The section is characterized by being relatively small plants, typically with short stems, short internodes, usually persistent, fibrous cataphyll fibers, and blades that are usually much longer than broad and rarely cordate or even subcordate at the base, with the lower surface and sometimes the upper surface glandular-punctate. Another distinctive feature is the usual presence of more than one ovule per locule (usually 2–4 per locule) and berries that are depressed medially, often somewhat quadrangular or rectangular in cross-section and broader in one dimension than in the other dimension. Chromosomally the section is based on 2n=30 (Croat & Sheffer, 1983). Aneuploids have been reported in *Anthurium bakeri* Hook.f., *A. bicollectivum* Croat, *A. lancifolium* Schott and *A. scherzerianum* Schott (Croat & Sheffer, ibid.). Gene flow throughout the group is demonstrated to be common (Croat & Sheffer, ibid.).

Footnote: A few species which are not classified as sect. *Porphyrochitonium* but which can easily be confused with this section are included here because they will otherwise be construed as members of the sect. *Porphyrochitonium*. These are mostly members of sect. *Decurrentia* but can easily be confused with sect. *Porphyrochitonium*. These are *Anthurium aurantiifructum* Croat, *A. boqueronense* Croat, *A. chaconii* Croat, *A. doroteryense* Croat and *A. vlastimilii* Croat. In addition, one new species, *A. gerardoi* Croat, is in sect. *Calomystrium* series *Rupicola*, another group which can be confused with sect. *Porphyrochitonium*. (See Appendix).

Species of *Anthurium* sect. *Porphyrochitonium* are an important component of most humid to wet neotropical forests (Croat, 1988). While the relatively small size of the plants ensure that they are never the dominant group in any local area, their ubiquitous presence and their small size (making them easy to collect) ensure that they are very common in the collections from nearly any Andean aroid flora within the altitudinal and elevational range of the section. The large numbers of similar species in given localities means that it is not uncommon to find several species mixed by inexperienced collectors under a single collection number. In parts of northwestern South America, such as in the Departments of Chocó and Valle del Cauca of Colombia, members of Anthurium sect. Porphyrochitonium are so common as to exceed all other Anthurium sections combined in terms of numbers of individuals. The section is particularly common in lowland areas but remains an important element of the vegetation up to 1500 m. It is probable that areas of high species diversity for Anthurium sect. Porphyrochitonium will be found to correlate with areas of high amounts of rainfall (Gentry, 1988; Croat, 1992).

While the section vaguely resembles members of sect. *Urospadix* from eastern South America (and were seemingly confused with them by Engler) most Urospadix do not have glandular punctations and when black-dotted, the black area is typically not button shaped with distinct margins as is the case in *Porphyrochitonium*. Moreover, sect. *Urospadix* have typical *Anthurium* berries that are rounded in cross-section and usually obvoid as well as by having only 1 ovule per locule. Berry color is also less diverse, largely being red to purple at maturity while the berry color of sect. *Porphyrochitonium* is more diverse, ranging from red, yellow, or orange to violet-purple to lavender-blue or white. In addition to the above, the two sections are seemingly not overlapping in range, most being separated by as much as 3000 kilometers.

Anthurium bakeri, the only widespread species in the section (occurring from Central America to the West Indies and South America) occurs in far Westen Acre State of Brazil (73° W) and in southern Venezuela (Amazonas) at 65° W as well as in Guyana (Essequibo) at 58° W but both of the latter localities are in a region where no *Urospadix* occur. Finally, molecular studies have shown the two groups to be consistently and significantly distinct (Temponi, 2006).

Anthurium grex Porphyrochitonium was first described in 1860 by H.W. Schott, who recognized 28 nomenclaturally valid but rankless 'greges' (flocks) of Anthurium species (Schott, 1860), and it was later raised to formal sectional status by Engler (1878: 55). Schott based it on a single species, Anthurium scherzerianum Schott. He included two other species currently recognized as members of sect. Porphyrochitonium in other greges (Croat & Sheffer, 1983). Anthurium lancifolium Schott was placed in grex Acamptophyllium along with three other species all of which are now considered members of sect. Urospadix, a group which typically lacks glandular punctations. Anthurium friedrichsthalii Schott, was placed in grex Leptanthurium Schott, a small but natural group (Croat, 1975; Delannay & Croat, 2020) with few flowers per spiral, uniovulate ovaries, and a base chromosome number of 10. It does not easily accommodate Anthurium friedrichsthalii despite its superficial resemblance to A. gracile (Rudge) Schott (Croat, 1975).

Engler's 1905 revision of Anthurium recognized A. scherzerianum as the only member of sect. Porphyrochitonium, but he included a number of species of typical Porphyrochitonium (as redefined by Croat & Sheffer, 1983) in sect. Urospadix, including A. andinum Engl., A. aureum Engl., A. barbacoasense Engl., A. curvatum Sodiro, A. durandii Engl., A. firmum Engl., A. glanduligerum Engl., A. julospadix Sodiro, A. lancifolium Engl., A. littorale Engl., A. myosurus Sodiro, A. paludosum Engl., A. punctatum N.E.Br., A. silvicola Engl., A. sulcatum Engl., A. tenuispica Sodiro, A. trianae Engl., A. tenuifolium Engl., A. turrialbense Engl. (currently a synonym of A. bakeri), A. umbricola Engl., and A. umbricola var. rupicola Engl. In addition, he included a few other typical members of Anthurium sect. Porphyrochitonium in sect. Xialophyllium (A. angosturense Engl. A. filiforme Engl. and A. tenuinerve Sodiro), sect. Polyneurium Engl. (A. densinervium Engl.), sect. Tetraspermium (A. margaricarpum Sodiro), sect. Pachyneurium (Schott) Engl. (A. hacumense Engl.), and sect. Episeiostenium (A. bakeri). He also followed Schott in erroneously placing A. friedrichsthalii in sect. Leptanthurium, then added another species, A. acutangulum Engl. as well. All of these species that Engler placed in other sections are not unusual or different in any way from the other members of sect. Porphyrochitonium and it is difficult to imagine why they were placed where they were. Engler did not seem to recognize the importance of the glandular punctations on the blades in defining this group. Engler usually did not even mention the dark glandular punctations in his descriptions of most of the species and yet these glandular punctations are the easiest character to observe and the most reliable character for identifying the section. At the time of the completion of Engler's 1905 revision of Anthurium there were 28 currently valid names already described in Anthurium sect. Porphyrochitonium either by Engler himself or by earlier authors. Sodiro described an additional ten species of Anthurium sect. Porphyrochitonium (Sodiro, 1905), which were not included in Engler's revision. These were Anthurium cachabianum Sodiro, A. fuscopunctatum Sodiro, A. navasii Sodiro, A. pedunculare Sodiro, A. pellucidopunctatum Sodiro, A. plantagineum Sodiro, A. quinquesulcatum Sodiro, A. rhizophorum Sodiro, A. spathulifolium Sodiro and A. tenuispica Sodiro.

No modern revision exists for *Anthurium* sect. *Porphyrochitonium*. The last revision, in Das Pflanzenreich (Engler, 1905), treated only one species in the section, whereas my (T.B.C.) estimates put the total at well over 500 species, many of which are new to science. Engler did include 30 species clearly belonging to *Anthurium* sect. *Porphyrochitonium* elsewhere in his revision, mostly in sect. Urospadix (Schott) Engl., but also in sect. *Episeiostenium* (Schott) Engl., sect. *Tetraspermium* (Schott) Engl., and sect. *Xialophyllium* (Schott) Engl. Thus, the last revision is completely out of date, and it is very important that this species-rich ornamentally important group be revised. One would have to investigate groups of invertebrates to encounter similar statistics regarding new species.

A few additional species were described before the senior author's own involvement with Anthurium. Kurt Krause published Anthurium porschianum K.Krause and A. ramonense Engl. ex K.Krause in 1932 (Krause, 1932). Other species of Anthurium sect. Porphyrochitonium published after the turn of the century include A. chiriquiense Standl. (Standley, 1940) and A. terryae from Panama (Standley & Williams, 1952), A. apaporanum R.E.Schult. from the Amazon basin (Schultes, 1958) and A. wendlingeri G.M.Barroso (Barroso, 1965). In addition, there were two species described by Bunting during his work with the Araceae for the Flora of Venezuela, A. angelorum G.S.Bunting (Bunting, 1975) and A. subscriptum G.S.Bunting (Bunting, 1986).

Thus, 18 species were described after the last revision by Engler and before the senior author's involvement with *Anthurium* sect. *Porphyrochitonium*. This left a total of 44 species in the section. One of these, *Anthurium porschianum* Burret ex K.Krause, proved to be synonymous with *A. acutangulum* bringing the total number of recognized species to 43 by the time the senior author began work on sect. *Porphyrochitonium*.

The senior author's own taxonomic efforts with *Anthurium* sect. *Porphyrochitonium* included describing four new species, *A. alatipedunculatum* Croat & R.A.Baker, *A. austinsmithii* Croat & R.A.Baker, *A. louisii* Croat & R.A.Baker and *A. utleyorum* Croat & R.A.Baker from Costa Rica with Richard Baker at the Field Museum (Croat & Baker, 1979). This was followed by a revision of *Anthurium* from Central America, first for Middle America (Croat, 1983) then for Panama (Croat, 1986). While the Middle American revision generated no additional new species in sect. *Porphyrochitonium* at the time, the Panama Revision yielded 36 new species in sect. *Porphyrochitonium* mostly known only from Panama at the time but now in some cases also found to be ranging into Costa Rica or Colombia. The total number of species in Central America was 40 before the species in this paper are considered.

Recent studies on material collected in Panama and Costa Rica since the senior author's last revisions in the 1990s have shown that many additional new species occur there. This paper describes 11 new species for Costa Rica and 62 new species for Panama. Thus, the total number of known species of sect. Porphyrochitonium for Central America is 127 with an additional two varieties. Costa Rica has 30 taxa (29 species and 1 variety) whereas Panama has 113 taxa (111 species and 2 varieties). Only 15 species are presently known to occur in both countries. The fact that so many species have turned up in Central America in the past 25 years despite the Missouri Botanical Garden's current emphasis on South America is an indication of the complexity and diversity of sect. Porphyrochitonium. The plants are often small and owing to their generally similar leaves are overlooked by collectors. Areas that have already been studied, such as Central America, give an indication of the degree to which the group has been overlooked. The earlier floristic accounts for the Araceae of Central America including Panama (Standley, 1928, 1944), Costa Rica (Standley, 1937) and Guatemala (Standley & Steyermark, 1958) included few species of Anthurium sect. Porphyrochitonium. In addition to being inaccurate by including many synonyms, the treatments also grossly undercounted the number of existing species. Standley included only four species in his Flora of the Canal Zone (Standley,

1928). The Flora of Costa Rica (Standley, 1937) included an additional seven names representing eight species for the country. The Flora of Panama, which included only seven species of Anthurium sect. *Porphyrochitonium* (Standley, 1944) was particularly unrepresentative. Thus, Standley, the principal compiler of Araceae in Central America treated only 11 species of sect. *Porphyrochitonium* for Central America while there are at least 126 species known from Central America today. While Standley treated only seven species in *Anthurium* sect. *Porphyrochitonium*, in Panama alone there are 111 species plus 2 varieties known in the section today. While Costa Rica has 12 new species, only one of them also occur in Panama.

The discrepancy between the number of species reported by Standley and the number reported here was in part due to a poor understanding of the collections that existed at the time (many were simply misdetermined), but also to the fact that most collections of Araceae have been made since I began my work with the family in the late 1960's (and especially between 1968 and 1986 when I began working principally in South America). During this time, the Missouri Botanical Garden still had a regular full time collecting program in Panama and there were vast increases in the number of species collected and identified. Since the treatment of Araceae in the Flora of Panama (Standley, 1944), some genera, such as *Philodendron* have increased from 12 species to 115 species known today or a ninefold increase since 1944. *Anthurium* was as dramatic with a sevenfold increase from 37 known species to 289.

South America

No meaningful floristic studies have been made for *Anthurium* sect. *Porphyrochitonium* in South America, excepting Venezuela which is now relatively well-known floristically (Bunting, 1979; Croat, 1985; Croat & Lambert, 1987). Few species are known from this part of South America and only *A. apaporanum*, *A. bakeri* (from Amazonas in southern Venezuela) and *A. angelorum*, *A. bernardii* Croat, *A. fernandezii* Croat, *A. gehrigeri* Croat, *A. gonzalezii* Croat and *A. smithii* Croat from the Cordillera de la Costa and the Cordillera de Mérida are known. The senior author's own efforts with South American Porphyrochitonium began with Croat & Lambert (1987).

The Guianas are even weaker than northern Venezuela in representation of sect. *Porphyrochitonium*, with only two species, *A. apaporanum* and *A. bakeri*, known in all three of the countries of the Guianas, and in the Venezuelan Guyana.

Even on the eastern slopes of the Andes and in western Amazonia, only a few species were known until recently. The effort to study the area of northern Peru in the Department of Amazonas between the Río Santiago and the Río Cenepa brought the discovery of the greatest concentration of sect. *Porphyrochitonium* in the Amazon drainage. This area was explored by Dr Brent Berlin who was conducting anthropological studies and hired a series of local collectors between the years 1972 and 1980. They turned up several new *Porphyrochitonium*. Rodolfo Vásquez of the Missouri Botanical Garden began working in the area as early as 1981. Working with Camilo Díaz and others, Vásquez made a concerted effort to collect in the region between 1993 and 1999. This resulted in the Flora of the Río Cenepa (Croat et al. 2005). This work has 15 species of sect. *Porphyrochitonium* all of which were new to science except *A. apaporanum*. The new species were *A. apanui* Croat, *A. atamainii* Croat, *A. baguense* Croat, *A. chinimense* Croat, *A. diazii* Croat, *A. huashikatii* Croat, *A. rubiokayapii* Croat, *A. leveauii* Croat, *A. ligulare* Croat, *A. mostaceroi* Croat, *A. penae* Croat, *A. quipuscoae* Croat, *A. tsamajainii* Croat, *A. tunquii* Croat and *A. yamayakatense* Croat.

The only species known in the section from Bolivia, *Anthurium beckii* Croat & Acebey was published in preparation for the Araceae for the Bolivian Checklist (Croat & Acebey, 2005).

A later publication (Croat et al., 2010b) included additional species of sect. *Porphyrochitonium* from the related region in the Cordillera del Cóndor (Delannay & Croat, 2021) and in an area to the north at the base of the Cordillera de Cutucú. *Anthurium collettianum* Croat was described from the Amazon lowlands of eastern Ecuador near the border with Peru and *A. nangaritense* Croat was from southeastern Ecuador in the Cordillera del Cóndor.

A paper (Croat et al., 2013) describing 11 new species from Latin America included a single *Porphyrochitonium* species, *Anthurium betsyae* Croat, from the region between Tarapoto and Yurimaguas — known for lots of endemic species, as well as one from the Chocó region, *A. quinonesiae* Croat, where new species of sect. *Porphyrochitonium* are abundant.

There are only 16 species in Peru that are endemic to the region of northern Peru in Amazonas State. *Anthurium apaporanum* and *A. bakeri* are the only widespread *Porphyrochitonium* in the Amazon Basin.

Although it is probable that additional new species will be found on the eastern slopes of the Andes between Colombia and Bolivia, the fact is that, despite considerable collecting in the region, the total number of species in sect. *Porphyrochitonium* from the eastern slopes of the Andes in the Amazon drainage and the slopes of the Cordillera de la Costa in Venezuela appears to be only 30. Except for those from the Cordillera de la Costa, the drainage of all these species is into the Amazon Basin.

The distribution of *Anthurium* sect. *Porphyrochitonium* is richest on the western slopes of the Andes from central Ecuador to northern Colombia and Panama. Perhaps the greatest concentration is in the Chocó region. Only a few studies have been concluded in this vast stretch south of Panama

In Ecuador, there is considerable richness, but few definitive studies have yet been completed. A study of the ENDESA reserve in Pichincha Province of Ecuador at 650–800 m elevation in a Premontane wet forest life zone (Croat & Rodríguez, 1995) turned up only four species, *A. aureum* Engl., *A. cabuyalense* Croat & J.Rodr., *A. margaricarpum* Sodiro and *A. rodrigueziae* Croat, two of them described there for the first time.

The richest assemblage of species of sect. *Porphyrochitonium* in Ecuador is in the northwest corner of the country in Esmeraldas and Carchi Provinces (especially the former). A study of the Araceae of Esmeraldas Province, especially the Lita-San Lorenzo region has been ongoing for the past 22 years with revisions for *Philodendron* (Croat et al., 2016) and for *Anthurium* sect. *Polyneurium* (Croat et al., 2019) having been published. An ongoing investigation of sect. *Porphyrochitonium* by the senior author and REU (NSF Research Experiences for Undergraduate) student Anna Dmitreiva with more than 100 species for the region will be ignored for purposes of this paper because that project is not finished.

In Colombia, the richest area thus far surveyed is a region in the lowlands of the Pacific slope near Buenaventura in Valle del Cauca Department. The region called Bajo Calima located between the Bajia de Málaga and the Río Calima was surveyed by Tom Croat & Dorothy C. Bay, a student who did her Ph.D. thesis on the Araceae of the region (Croat et al., 2006). The area is in a transitional zone between Tropical wet forest and Tropical rain forest life zones. This small region turned up 17 species of *Anthurium* sect. *Porphyrochitonium* with eleven new species: *Anthurium calimense* Croat & D.C.Bay, *A. cordobense* Croat & D.C.Bay, *A. cylindratum* Croat & D.C.Bay, *A. joaquinense* Croat & D.C.Bay, *A. langendoenii* Croat & D.C.Bay, *A. lautum* Croat & D.C.Bay, *A. malaguense* Croat & D.C.Bay, *A. oxyanthum* Croat & D.C.Bay, *A. perviride* Croat & D.C.Bay, *A. verrucosum* Croat & D.C.Bay and *A. wattii* Croat & D.C.Bay. In addition, another new species was found sterile, and was left undescribed, but is included in this paper (*Anthurium miriamiae* Croat). The Bajo Calima region had five other species that had already been described from the region or were described from elsewhere (Central America). These were *Anthurium barbacoasense* Engl., *A. filiforme* Engl., *A. friedrichsthalii* Schott, *A. paludosum* Engl. and *A. vallense* Croat.

A floristic survey from another area on the western slope of Colombia in Chocó in the area of Cabo Corrientes (Mora et al., 2006) yielded only 12 species of sect. *Porphyrochitonium*, five of which were new (and one not published owing to being sterile) (Croat & Mora, 2004). The El Amargal Reserve in this area where the study was carried out by Marcela Mora for her undergraduate thesis, is a region in a *Tropical wet forest* life zone. Species occurring there are A. acutangulum Engl., A. acutibacca Croat & M.M.Mora, *A. amargalense, A. arusiense* Croat & M.M.Mora, *A. dwyeri* Croat, *A. friedrichsthalii* Schott, *A. grandicataphyllum* Croat & M.M.Mora, *A. hacumense* Engl., *A. lancifolium* Schott, *A. paludosum* Engl. and *A. ramonense* Engl. ex K.Krause.

Only one montane site in western South America has been studied, that of La Planada in Nariño Department in Colombia. Most of the 10 species in sect. *Porphyrochitonium* found there were new to science and five out of six were described as new (Croat et al., 2009). One sterile collection was not published. The published species were *Anthurium chucunesense* Croat, *A. keatingi* Croat, *A. lakei* Croat & Pu Huang, *A. pazii* Croat and *A. restrepoae* Croat. Engler (1898) published *Anthurium umbricola* Engl. which also occurs there. Four additional new species that were sterile were not published. This study is important in that it shows how much less rich the distribution is at high elevations in contrast to lower elevations.

In northwestern Colombia, for the area believed to be the richest region for Anthurium sect. Porphyrochitonium, all that exists is a provisional checklist containing only a small fraction of the Araceae from the Chocó (Forero & Gentry, 1989). That list contained 91 species of Araceae with only 15 members of sect. Porphyrochitonium out of 53 species of Anthurium. A conservative estimate of the number of species of Anthurium in sect. Porphyrochitonium in the Chocó Department would be at least 150 species. In another paper, where 35 new species of Araceae were published from Colombia (Croat et al., 2010a), another new member of sect. Porphyrochitonium, Anthurium dylanii Croat was published from Chocó Department. Since such a small portion of the area of greatest richness for the group has been explored, it is assumed that the total number of published species will more than double, which is typical for other groups of Araceae that have been revised. Thus, the estimate for the total number of species in sect. Porphyrochitonium is well over 500 species. Finally, two of the species included in the Anthurium of Panama (Croat, 1986), A. amnicola Dressler and A. sytsmae Croat which had been reported as members of Anthurium sect. Porphyrochitonium have proven to be unusual members of a new subsection (Rupicola Croat) of Anthurium sect. Calomystrium (Croat, Whitehill & Yates, 2007). These species, part of a small group of lanceolate-leaved rheophytes which also include A. antioquiense Engl., A. antrophyoides Killip, A. callejasiii Croat, A. chocoense Croat, A. palacioanum Croat, A. vanderknaapii Croat and A. werffii Croat, are much like sect. Porphyrochitonium in having short internodes and small lanceolate leaves but they lack the typical glandular punctations. They will not cross with other members of sect. Porphyrochitonium but will cross with more typical members of sect. Calomystrium such as Anthurium andreanum Linden. This has allowed many interesting hybrids, especially the introduction of a lilac-colored flower into the typical cut-flower breeding program owing to the lilac-colored spathe in A. amnicola Dressler.

Materials and Methods

Herbarium specimens were studied from nearly all herbaria devoted to neotropical studies but especially major herbaria in Europe, North America, western South America and Central America, specifically AAU, AGUAT, B, BH, BIGU, BM, BR, C, CAS, CHAP, CHOCO, COL, CR, CUVC, DUKE, E, EAP, ENCB, F, FMB, GH, GOET, GUAT, HUA, HNMN, HULE, HUT, INPA, IAN, JAUM, K, L, LE, LOJA, LPB, M, MEXU, MG, MOL, NY, P, PMA, PSO, Q, QCNE, QPA, R, RJ, S, SEL, TEFH, QPA and VEN. While most herbaria have been visited repeatedly all but those in Venezuela were revisited in the past 5 years.

The Lucid Anthurium Key is an unpublished multi-entry key that contains 1640 species of known *Anthurium* which have been fully described, including all published species and others described and pending publication. It is used as a means of assuring the novelty of any new entity. It is a multi-entry key designed to eliminate any species which does not contain the specified set of characters chosen (those attributed to the species in question). Thus, it works to eliminate from a list all species that lack the characteristics of the plant in question.

Descriptions are based on a model published by Croat & Bunting (1979) that attempts to standardize descriptions to make them more easily comparable. An attempt has been made to include the features of both fresh vegetative material and the appearance of dried leaves where appropriate. Certain features of living plants are predictably modified, eg. a narrowly rounded vein rarely retains that shape but is invariably made narrower and often acute on drying. Other features such as soft and peaked epidermal cells on understory plants become predictably areolate on drying as the soft cells and epidermis collapse inward. Petioles which are frequently subterete and weakly sulcate in life are invariably narrowed adaxially and the sulcus becomes deeper with sharper margins. Thus, a petiole described as sharply and deeply sulcate might in life be only subterete and weakly to moderately sulcate. The senior author has cultivated and prepared specimens from thousands of plants and some information can be extrapolated based on this experience.

TAXONOMY

Anthurium sect. Porphyrochitonium (Schott) Engl.

Anthurium sect. Porphyrochitonium (Schott) Engl. in Martius, Fl. Bras. 3(2): 55 (1878).
Anthurium grex Porphyrochitonium Schott, Prodr. Syst. Aroid.: 438. 1860
Type: Anthurium scherzerianum Schott.

Typically epiphytic to hemiephytic but frequently terrestrial; internodes short or rarely elongated; typically 1 cm diam. or less, sometimes to 3 cm diam.; roots typically moderately dense with more than one root per internode, commonly moderately short but not typically clustered and directed upward, rarely flattened and forming a subglobose root mass; cataphylls typically persistent and fibrous, most frequently erect, sometimes disheveled and spreading, frequently with fragments of epidermis, rarely persisting intact. Leaves usually clustered near apex; petioles typically subterete but at least weakly sulcate adaxially, narrowly rounded abaxially, sometimes sharply 3-sided or 3-sided-winged, about as long as the blade or shorter than blade, rarely longer than blades; blades longer than broad, most commonly narrowly ovate to elliptic or oblanceolate, rarely ovate, usually acuminate at apex, usually acute at the base, rarely subcordate at base, usually subcoriaceous, rarely thin or coriaceous, usually moderately bicolorous; major veins typically prominent; midrib always raised on both surfaces, convex, narrowly rounded to acute above, convex, narrowly rounded, acute or 3 or more ribbed or winged below; primary lateral veins usually more prominent than collective veins, sometimes with the collective veins more prominently sunken; collective veins usually 1 pair, sometimes with 2 pairs, rarely with 3 pairs, the inner pair arising from near the base, the 2nd pair usually from near the base, usually not ending at the apex, the 3rd pair usually margining out in lower $\frac{1}{3}$ of the blades; glandular punctations on at least the lower surface, often also on the upper surface; tertiary veins typically not prominent. *Inflorescence* typically erect, typically moderately long-pedunculate, frequently short-pedunculate, rarely long- pedunculate; peduncle terete, triangular to quadrangular, sometimes winged-ribbed; spathe typically lanceolate and spreading to reflexed, sometimes erect, less frequently ovate, rarely ovate-cordate, not typically enshrouding spadix, usually green, rarely reddish or purplish to yellow or bright red; spadix typically oblong to short-tapered, often long-tapered, frequently green, often colored, reddish, orange, purplish, purplish violet to lavender. Infructescence typically erect, often pendent; berries typically sub- quadrangular at apex with a deep depression, commonly red, yellow, orange, violet-purple to lavender-blue or white; seeds typically 4 per berry, sometimes 6-seeded; mesocarp juicy and sweet. Chromosomes usually 2n= 32, but also 2n=30, 2n=31, 2n=29 (Croat & Sheffer, 1983).

Geographical distribution of Anthurium sect. Porphyrochitonium

Anthurium sect. Porphyrochitonium ranges from Mexico (Chiapas) to Colombia and Ecuador on the Pacific slope of the Andes and to Venezuela and the Guianas, south to the northern rim of the Amazon Basin in Peru and Ecuador, with lesser areas of diversity in the Andes of Venezuela (Croat & Lambert, 1987). Distribution of species is uneven across the range, with centers of diversit y apparent in Panama, Colombia, and Ecuador, especially at lower to middle elevations in the western Andes of Colombia and Ecuador. The most widespread species, A. bakeri, ranges from Mexico to southern Venezuela and the Guianas. The group is particularly diverse at or near sea level in rain forests in northwestern Colombia in the Departments of Chocó and Valle.

In Central America species diversity in general increases approaching northwestern Colombia, (see Appendix). Only a single species in the section occurs in Mexico, Guatemala, and Belize (*A. bakeri*), two species in Honduras, none in El Salvador, five species in Nicaragua, 31 in Costa Rica, 112 in Panama and an unknown but likely very much higher number for Colombia. In all, there are only 31 species for all Middle American countries (Belize, Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica).

As is true for many other genera (Croat, 1992), the northwestern part of South America, especially on the Pacific slope in Colombia and adjacent Ecuador, is rich in species of *Anthurium* sect. *Porphyrochitonium*. It is currently difficult to predict the actual number since most of the collections remain unstudied, especially material at the herbarium in Bogotá, Colombia (COL), where all the unicate collections of A. H. Gentry and E. Forero are deposited for their studies on the floristics of the Chocó (Forero & Gentry, 1989). The region of Bajo Calima (Croat et al., 2006) and the area around Quibdó in Chocó Department remain the only areas reasonably well studied. Yet this represents a minuscule part of the region where the section is richest.

In contrast to the richness in the northern part of South America, few species of sect. *Porphyrochitonium* occur in the Amazon Basin and no species occur in the Southern Cone (Zuloaga & Belgrano, 2015) or even in the southern part of the Amazon basin except for one species in Bolivia. Until recently only *Anthurium apaporanum* and *A. bakeri* were known to occur at

lower elevations in the Amazon basin. Even on the Pacific slope, species are most abundant at lower elevations and diminish as elevation increases. For example, at Bajo Calima at less than 150 m (Valle Department of Colombia) there are at least 30 species, while at the ENDESA Reserve (Pichincha Province, Ecuador) at 650 m there are only four species and at the La Planada Reserve (Nariño Department, Colombia) at 1900 m there are only eleven species.

NEW SPECIES DESCRIBED HERE

1. Species from Central America

Anthurium abelardoi Croat, **sp. nov**. — Type: COSTA RICA. Limón Province: Limón Cantón, El Progresso, area of inundated soils, Fila Matama, Valle de La Estrella, 09°47'20"N, 83°07'30"W, 1600 m, 24 Apr. 1989, *G. Herrera & A. Chachón 2765* (holotype, MO-4371692). Figure 1.

Diagnosis: Anthurium abelardoi is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short, slender internodes, stiffly erect, reddish brown cataphyll fibers, the weakly sulcate petioles about 1/3 as long as the blades, the oblong-lanceolate long-acuminate blades glandular-punctate on both surfaces, narrowly rounded at the base and with the collective veins increasingly more remote from the margin above the middle (except near the very tip).

Epiphytic; internodes short, 1.4 cm diam.; cataphylls 3.7 cm long, stiffly erect, drying reddish brown, fibrous with fragments of brown epidermis, the fibers eventually manila. Leaves with petioles 10.5–17.5 cm long, 2–3 mm diam., terete, weakly sulcate with petiolar punctations, drying yellowish brown; geniculum 0.7-1.2 cm long, drying darker than petioles; blades oblong-lanceolate, 24.7–35.8 cm long, 3.9-6.0 cm wide (averaging 30×5), 6.0-6.3 (averaging 6.15) times longer than broad, broadest midway, 2.0-2.4 (averaging 2.2) times as long as petioles, long-acuminate with last 1.5 cm less than 1 mm wide, narrowly rounded at the base, subcoriaceous, weakly bicolorous, drying brown and weakly glossy above, grayish brown and weakly glossy below; midrib with sparse glandular punctations or with no punctations, drying narrowly rounded, finely ribbed and concolorous above, narrowly rounded, ribbed and concolorous below; primary lateral veins 15 or 16 per side, departing midrib at 55-60°, scarcely more prominent than interprimary veins, drying weakly and narrowly rounded and concolorous above, narrowly rounded and concolorous below; collective veins only one in number, arising from the 1st pair of primary lateral veins, 2–7 mm from margin, more prominent that primary lateral veins; antemarginal vein present; basal veins 1 pair; upper surface sparsely dark glandular-punctate and minutely granular-ridged and pustular upon magnification; lower surface densely dark glandular-punctate and minutely and irregularly granular-ridged upon magnification. Inflorescence with peduncle ca 20 cm long, drying subterete, weakly sulcate; spathe reddish, drying ca 4.5 cm long, ca 0.8 cm wide, lanceolate with no punctations, coriaceous and reddish brown; spadix green when immature, uniform and weakly tapered, 5.3 cm long, 0.6

cm diam.; flowers about 3 visible per spiral, drying 1.7–1.8 mm long and 1.4–1.7 mm wide; tepals minutely granular and sparsely pustular on drying; lateral tepals 1.2–1.3 mm wide, the outer margins 2-sided, inner margin rounded; stamens not observed. *Infructescence* not seen.

Distribution and ecology — *Anthurium abelardoi* is known only from the type locality in Costa Rica in Limón Province at 1500 m elevation in a Tropical wet forest life zone.

Etymology — *Anthurium abelardoi* is for Abelardo Chachón Gamboa who was a parataxonomist for a now abandoned program to collect insect and plant collections for the Department of Natural History of the National Museum of Costa Rica. He collected many interesting and new species, including this one.

Comments — *Anthurium abelardoi* is similar to both *A. lancifolium* Schott and *A. austin-smithii* Croat & R. A. Baker, both of which differ in having lanceolate or ovate-lanceolate blades clearly broadest below the middle and in having the collective veins less than 2 mm from the margin in the upper 8 cm of the blade. *Anthurium lancifolium* also differs by having the blades lanceolate to ovate-lanceolate and broadest clearly below the middle.

In the Lucid Anthurium Key, *Anthurium abelardoi* tracks to *Anthurium cuasicanum* Croat from Darién Province in Panama, *A. gracilispadix* Croat from Cerro Colorado in Chiriquí Province and *A. pageanum* Sodiro. *Anthurium cuasicanum* differs by having much smaller lanceolate leaf blades less than 16 cm long with the leaf base acute and the collective veins closer to the margins (especially toward the apex (1–5 mm from margin). In contrast, the leaf blades of *A. abelardoi* have a rounded leaf base and the collective veins rather remote from the margins (2–7 mm) even approaching the apex. *Anthurium gracilispadix* differs by having blades lanceolate to lanceolate-elliptic with attenuate bases. *Anthurium pageanum* differs by having a triangular petiole and typically grayish drying blades.

Anthurium alatipetiolum Croat, **sp. nov.** — Type: PANAMA. San Blas (Kunayala): El Llano-Cartí Road, 7 miles N of Interamerican Highway, ca. 09°15'N, 79°00'W, ca. 550 m, 14 Mar. 1985, *G. McPherson & T. B. Croat 6852* (holotype, MO-3208937). **Figure 2.**

Diagnosis: Anthurium alatipetiolum is a member of sect. *Porphyrochitonium* characterized by its epiphytic habit, short internodes, reddish brown, more or less parallel cataphyll fibers, long-petiolate leaves, 5-winged petioles, elliptic-oblanceolate, weakly acuminate blades drying grayish with glandular punctations on both surfaces, the collective veins arising from one of the lower primary lateral veins as well as by its long-pedunculate inflorescence, 4-winged peduncles, linear-lanceolate green spathe and a long-tapered green spadix.

Epiphytic; internodes short, 1.3 cm diam.; cataphylls 5.3–5.5, cm long, persisting as redbrown, more or less parallel fibers with reddish brown epidermis. *Leaves* long-petiolate; petioles 5.5–14.4 cm long, 3 mm diam., 5-winged, broadly and sharply sulcate adaxially, sharply 3-ribbed abaxially, drying yellowish brown; geniculum 5 mm long, drying darker than pet-



Figure 1. Anthurium abelardoi Croat. Holotype: Herrera 2765.



Figure 2. Anthurium alatipetiolum Croat. Holotype: McPherson & Croat 6852.

ioles; blades elliptic-oblanceolate, 14.2-26.4 cm long, 4.7-8.1 cm wide (averaging 21×7), 3.0–3.3 (averaging 3.2) times longer than broad, 1.9–2.6 (averaging 2.1) times as long as petioles, gradually acuminate at apex, attenuate at base, subcoriaceous, drying moderately glossy on both surfaces, dark green above, drying greenish gray above, paler and gray below; midrib glandular-punctate on both surfaces, narrowly raised and concolorous above, narrowly raised below, drying acute, slightly darker than surface; primary lateral veins 14 per side, departing midrib at 45° near middle, drying narrowly rounded, slightly paler above, narrowly rounded and slightly darker below; tertiary veins drying weakly raised above and below; collective veins arising from 3rd primary lateral vein, 4 mm from margin; basal veins 1 pair; antemarginal vein present; ; upper surface densely granular, glandular-punctate; lower surface sparsely granular, glandular-punctate. Inflorescence with peduncle 39.2–40.4 cm long, 4-winged; spathe green, reflexed-spreading, 4.8–4.9 cm long, 5–6 mm wide, linear-lanceolate, drying moderately coriaceous, yellowish brown; spadix green, sessile, long-tapered, 9.4-11.1 cm long, 4-5 mm diam.; flowers 3 visible per spiral, drying 3.2-3.5 mm long and 2.5-2.8 cm wide; tepals minutely granular on drying; lateral tepals 2.4 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. Infructescence not seen.

Distribution and ecology — *Anthurium alatipetiolum* is endemic to Panama, known only from the type locality in San Blas (Kunayala) Province at 550 m elevation in a Tropical moist forest life zone.

Etymology — The species epithet is derived from the Latin '*alatus*' (meaning winged) and '*petiolus*' (petiole) referring to the winged petioles.

Comments — Anthurium alatipetiolum is seemingly most closely related to A. pageanum Sodiro which differs by having a merely 3-angled petiole. It also differs by lacking the brownish speckling on the lower blade surfaces. Anthurium alatipetiolum is also similar to both A. acutangulum Engl. and A. ramonense Engl. ex K.Krause but both differ in having a subterete, not 5-winged petiole and by having blades typically more than 30 cm long.

Diagnosis: Anthurium albifructum is a member of sect. *Porphyrochitonium* characterized by an epiphytic habit, short internodes, persistent cataphyll fibers, long-petiolate leaves, subterete petioles which are equal to or longer than the blades, the elliptic, gray-green-drying blades with moderately indistinct primary lateral veins, glandular punctations on both surfaces and a long-pedunculate inflorescence with a green spathe, a spadix that is green at anthesis and greenish white berries.

Anthurium albifructum (Croat) O.Ortiz & Croat, comb. et stat. nov. — Anthurium lancifolium Schott var. albifructum Croat, Monogr. Syst. Bot., Missouri Bot. Gard. 14: 125–126. F. 92. 1986. — Type: PANAMA. Chiriquí: N of San Félix, along mining road 18–27 mi N of Pan-American Hwy. (above turn-off to Chame or Escopeta), 1200–1500 m, ca. 08°34'N, 81°52'W, T.B. Croat 33099 (holotype, MO-2381151). Figure 3.



Figure 3. Anthurium albifructum (Croat) O.Ortiz & Croat. Holotype: Croat 33099.



Figure 4. Anthurium alexespinosae Croat. Holotype: Espinosa 5635.

Epiphyte or terrestrial; internodes short, to 1.5 cm diam.; cataphylls to 3.0 cm long, intact, reddish brown, fibrous with fragments of brown epidermis. Leaves with petioles 22.7-28.6 cm long, 1.0–1.5 mm diam., subterete, drying acutely sulcate, greenish brown; geniculum 1.2 cm long, drying darker than petioles; blades elliptic, 12.8-27.3 cm long, 4.6-8.1 cm wide (averaging 21 × 7), 2.6–3.5 (averaging 3.0) times longer than broad, broadest midway, 0.7–1.1 (averaging 0.9) times as long as petioles, abruptly acuminate at apex (acumen to 2.5 cm), base acute, subcoriceous, moderately bicolorous, dark green and matte-subvelvety above, moderately paler and semiglossy below, drying gray-green, matte above, yellowish green-brown to grayish green-brown, semiglossy below; midrib drying narrowly acute, and slightly darker above, narrowly raised, short linear-granulate and slightly paler below; primary lateral veins 18–20 per side, departing midrib at 45–50° drying narrowly rounded, and concolorous above, narrowly raised and concolorous below; collective veins arising from only one pair of basal veins, 3-4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate (glands dark brown and weakly raised); lower surface glandular-punctate, entirely areolate upon magnification, matte-subvelvety surface, finely textured, minutely subgranular with ridges sometimes evident. Inflorescence erect, long-pedunculate with peduncle to 40 cm long, drying brown; spathe lanceolate, 2.7–5.0 cm long, 3–10 mm wide, green, reflexed-spreading, drying coriaceous and yellowish brown; spadix sessile, white to greenish white, uniformly and weakly tapered, 2.7–5.2 cm long, 3–5 mm diam., drying yellowish brown; flowers 4 visible per spiral, drying 2.2 mm long, 2.7 mm wide; tepals drying minutely granular; lateral tepals 1.5 mm wide, outer margins 2- or 3-sided, inner margin rounded; stamens not emergent. Infructescence erect, spathe persistent; berries obovoid, white before maturity, becoming tinged with purple-violet at base at maturity, all the berries emerged throughout spadix at full maturity, obovoid, rounded at apex, with punctiform raphide cells in upper three-fourths of berry; seeds (boiled up) $3.5-4.0 \times 2.4-2.6 \times 1.5$ mm thick, 2 per berry, oblong-obovoid, rounded at base, truncate or oblique at apex, flattened on one side, lacking any apparent appendage.

Distribution and ecology — *Anthurium albifructum* is known only from Panama at the type locality in Bocas del Toro on Cerro Fábrega at 1300 m in a Premontane rain forest life zone.

Etymology — The species epithet is from the Latin '*albus*' (white) and '*fructus*' (fruit) referring to its white berries.

Comments — Anthurium albifructum is probably closest to A. lancifolium Schott but that species differs by having blades that are typically thicker, broadest below the middle and with much more prominent primary lateral veins. In the Lucid Anthurium Key, Anthurium albifructum tracks to A. crassitepalum Croat from Darién Province in Panama which differs by having blades that dry brownish, having the upper midrib more nearly convex, not narrowly rounded and drying more or less acute on upper surface, having the upper blade surface more conspicuously glandular-punctate and by having the tepals markedly thickened in dry condition. Anthurium cuasicanum Croat, also from Darién Province, differs by having smaller (less than 16.5×5.3 cm), lanceolate leaf blades that are more nearly rounded at the base.

Paratypes: PANAMA. Chiriqui, vicinity of Boquete, SW slope of Cerro Pate de Macho, virgin forest, 1630–1780 m, 08°46'N, 82°25'W, 18 June 1987, T.B. Croat 66394 (MO); Bocas del Toro: Caribbean slope of Cerro Fábrega at foot of 'Falso Fábrega' in Palo Seco Reserve, second NW tributary (on map) of Río Culebre Pavón Camp, 09°09'51"N, 82°39'41"W, 1300 m, 22 Mar. 2005, A.K. Munro & S. Cafferty 4857 (BM, INB, MEXU, MO, PMA).

Anthurium alexespinosae Croat, sp. nov. — Type: PANAMA. Colón: Coclé del Norte, Minera Panamá, Donoso, helipad C24, UTM 547251 993610, 65 m, 13 Mar. 2010, A. Espinosa & L. Kelvin 5635 (holotype, MO-6414024; isotype, PMA). Figure 4.

Diagnosis: Anthurium alexespinosae is a member of sect. *Porphyrochitonium* and characterized by its terrestrial habit, short internodes, cataphylls with short, parallel, pale fibers, subterete petioles drying grayish green and weakly and narrowly sulcate, 0.4–0.7 times as long as blades on the larger leaves, the narrowly lanceolate and oblong-lanceolate, narrowly acuminate blades which dry grayish green, with bases acute, midrib narrowly and prominently raised above, primary lateral veins moderately obscure, a single pair of collective veins about as prominent as the primary lateral veins, glandular punctations on both surfaces but moderately obscure above, as well as by the long-pedunculate inflorescence with a reflexed green spathe, the moderately stipitate, white, short, weakly tapered spadix and violet-purple berries.

Terrestrial; internodes short, 7–10 mm diam.; cataphylls (3.7)4.1–4.3 cm long, persisting as a dense mass of fine, mostly erect, pale grayish brown fibers. Leaves with petioles 2.7-11.8 cm long, 2 mm diam., subterete, weakly and narrowly sulcate, sparsely glandular-punctate, drying gravish green; geniculum 6–7 mm long, drying darker than petioles; blades narrowly lanceolate to oblong-lanceolate, 10.6-21.1 cm long, 2.7-4.3 cm wide (averaging 16×3), 3.6-6.1(averaging 4.8) times longer than broad, 1.4-3.9 (averaging 2.5) times as long as petioles, narrowly acuminate but the tip abruptly rounded with a weak apiculum at apex, acute at base, drying subcoriaceous, grayish green and weakly glossy above, grayish green and weakly glossy below; midrib drying narrowly raised, sparsely glandular-punctate and paler above, narrowly convex, finely ribbed and paler below; primary lateral veins 10(11) per side, departing midrib at 35–40°, drying weakly and narrowly rounded, paler above, weakly and narrowly rounded and paler below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from the only pair of basal veins, 3–4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface sparsely glandular-punctate, moderately smooth on magnification; lower surface consciously glandular-punctate, moderately smooth on magnification. Inflorescence with peduncle sparsely glandular-punctate, 15.1 cm long; spathe green, reflexed, 3.1 cm long, 1.2 cm wide, oblong-lanceolate, drying moderately coriaceous, gravish green; spadix white, stipitate 5 mm, short and cylindroid-tapered, 3.4 cm long, 4 mm diam., drying yellowish brown; flowers 5 visible per spiral, drying 2.0 mm long and 1.9 wide; tepals smooth, very minutely granular on drying; lateral tepals 1.9 mm wide, inner margin rounded, outer margins 3-sided; stamens not exserted. Infructescence with berries violet-purple.

Distribution and ecology — *Anthurium alexespinosae* is endemic to Panama, known only from the type locality in Colón Province at 65 m in a Tropical wet forest life zone.

Etymology — *Anthurium alexespinosae* is named in honor of Panamanian botanist, Alex Espinosa who, along with Kelvin Lorenzo collected the type specimen. Alex has contributed to the knowledge of the traditional use of plants, especially medicinal plants. He worked for many years at the University of Panama, Faculty of Pharmacy, at the Centro de Investigaciones Farmacognósticas de la Flora Panameña (CIFLORPAN) and has participated in many floristic studies throughout Panama, making many important collections.

Comments — Anthurium alexespinosae is most similar to A. lancifolium Schott which differs by having typically much larger blades with more prominent primary lateral veins and a much more long-tapered acumen with the upper surface very weakly glandular-punctate as well as by having a usually more stiptitate spadix. It is also similar to A. rupicola Croat that differs by having leaf blades more than 7 times longer than wide.

Anthurium ariztutense Croat, **sp. nov.** — Type: PANAMA. Veraguas: vicinity of Cerro Arizona-Cerro Tute, above Santa Fé and Altos de Piedrea, along trail to summit; 08°30'N, 81°10'W; 1000–1200 m, 28 July 1988, *G. McPherson* 12803 (holotype, MO-3584284). **Figure 5**.

Diagnosis: Anthurium ariztutense is a member of sect. *Porphyrochitonium* recognized by its epiphytic habit, short internodes, fibrous cataphylls, long-petiolate leaves, subterete, weakly sulcate petioles, narrowly ovate-elliptic and prominently acuminate blades with downturned tips, prominently sunken collective veins, glandular punctations on both surfaces and especially by its long-pedunculate inflorescences with the peduncles longer than the petioles and by the stamens which remain emergent throughout the spadix.

Epiphyte; internodes short, 1 cm diam.; cataphylls 4 cm long, dark brown, soon pale fibrous with fragments of epidermis. Leaves with petioles 5.0-24.5 (38.5) cm long, drying 1.5-2.0 (2.5) mm diam., subterete, weakly sulcate, drying deeply and sharply sulcate, semiglossy, densely glandular punctate; geniculum 1.2-1.3 cm long, terete, drying darker, closely and acutely longitudinally ridged, sometimes transversely ridged; blades narrowly ovate-elliptic, 9.0-12.7(16.8) cm long, 2.1-4.6(6) cm wide, 2.1-2.6 times longer than wide, (0.5)0.8-1.4 times longer than petioles, narrowly and sharply long-acuminate and downturned at apex, rounded at base, drying moderately coriaceous, yellowish gray and matte above, greenish gray to yellowish gray, matte below; midrib usually drying narrowly rounded to much thicker than broad in a deep valley, concolorous, sparsely glandular-punctate above, narrowly rounded, in part with an acute medial rib, glandular-punctate below; primary lateral veins 5 or 6 per side, departing midrib at 30–40°, drying deeply sunken and concolorous above, narrowly concolorous and glandular-punctate below; tertiary veins obscure; collective veins arising from near the base, spreading at nearly a 90° angle at the base, 3-6 mm from the margins, deeply sunken above, much more so than the primary veins; upper surface densely glandular-punctate, longitudinally wrinkled-ribbed; lower surface dark glandular-punctate, granular and areolate-ridged. *Inflorescence* erect; peduncle 18.3–29.7(41.0) cm long, drying 2 mm diam., yellowish green, finely and irregularly ribbed; spathe lanceolate, 1.7–2.3 cm long, 0.8–1.1 cm wide, spreading; spadix sessile or stipitate 3–4 mm, 2.1–3.0 cm long, 4–5 mm diam., pink to brown; flowers (4)5–6 visible per spiral, 2.5–3.1 mm long and wide; tepals densely granular, matte, lateral tepals 1.0–1.8 mm wide, inner margin rounded, outer margin 2-sided; stamens held at surface of tepals, remaining emergent throughout spadix; anther 0.3 mm long, 0.6 mm wide; thecae narrowly ovoid, weakly divaricate. *Infructescence* not seen.

Distribution and ecology — *Anthurium ariztutense* is endemic to Panama, known only from the type locality in Veraguas Province at 1000–1200 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium ariztutense* is named for the type locality on the massif that comprises Cerro Arizona and Cerro Tute located in Veraguas Department near Santiago.

Comments — Anthurium ariztutense is closest to A. tutense Croat, a species with which it has been confused but that species, while also occurring in the same area and having long-pedunculate inflorescences, has proportionately much shorter petioles, rarely up to 10 cm long and have leaf blades usually acute at the base.

Paratype: PANAMA. **Veraguas**: Parque Nacional Santa Fé, La Sabaneta, bosque achaparrado, vertiente caribe, 08°40'34"N.80°59'31"W, 2140 m, 30 Sept.,. 2014, *Batista*, J.A. Camp. M. *Perret. & S. Rodríguez* 1191 (MO-6600601).

Anthurium attenuatifolium Croat, **sp. nov.** — Type: PANAMA. Veraguas: Vicinity Santa Fé, along road between Santa Fé and Calovebora, 1.7 mi past Alto Piedra School, 1.5 mi beyond Quebrada Cosilla (previously referred to as Río Primero Braso), 08°31'28"N, 81°07'50"W, 570 m, 13 July 1994, T.B. *Croat & G. Zhu* 76852 (holotype, MO-04612789). **Figure 6.**

Diagnosis: Anthurium attenuatifolium is a member of sect. *Porphyrochitonium* and is character ized by its epiphytic habit, short internodes, more or less parallel cataphyll fibers, glandular-punctate petioles sharply flattened adaxially with medial rib and acute abaxially, oblong-elliptic, acuminate blades which dry greenish with glandular punctations on both surfaces, the collective veins arising from basal veins as well as the spreading-reflexed green spathe and long-tapered green spadix.

Epiphyte; internodes short, 1 cm diam.; cataphylls 3.2-3.7 cm long, acute, persisting, fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 4.5-23.4 cm long, 3-4 mm diam., glandular-punctate, more or less 3-sided, sharply flattened adaxially with medial rib, acute abaxially, drying yellowish brown; geniculum 5-13 mm cm long, drying darker than petioles; blades oblong-elliptic, 21.6-36.6 cm long, 5.8-9.6 cm wide (averaging 28×7), 3.6-4.5 (averaging 4.0) times longer than broad, broadest at midpoint, 1.3-5.0 (averaging 3.2) times as long as petioles, gradually acuminate at apex, (acumen to 1.8 cm long), attenuate at base, subcoriaceous, drying olive-brown



Figure 5. Anthurium ariztutense Croat. Holotype: McPherson 12803.

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Figure 6. Anthurium attenuatifolium Croat. Holotype: Croat 76852.

and matte above, yellowish olive-brown and semiglossy below; midrib drying narrowly raised, finely ribbed, sparsely glandular-punctate and darker above, narrowly rounded, some acute, ribbed, sparsely glandular-punctate and darker below; primary lateral veins 11 or 12 per side with moderately prominent interprimary veins, departing midrib at 60°, drying weakly and narrowly rounded, paler above, narrowly raised and darker below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from only pair of basal veins, 5 mm from margin, moderately loop-connected; basal veins one pair; antemarginal vein present; upper surface conspicuously glandular-punctate, uniformly and minutely granular; lower surface conspicuously glandular-punctate, smooth and irregularly dark speckled on magnification. Inflorescence with peduncle 13.6–22.4 cm long; spathe green, 5.1–7.8 cm long, 5–10 mm wide, spreading-reflexed, narrowly elliptic, drying moderately coriaceous, yellowish olive-brown; spadix medium green, stipitate 3 mm, very long and weakly tapered, 9.9-13.9 cm long, 3-5, mm diam., drying yellowish brown; flowers 2 (3) visible per spiral, drying 2.4 mm long and 1.6 mm wide; tepals matte, minutely granular on drying; lateral tepals 1.7 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. Infructescence with berries pale red-orange, flat at apex with a minute depression.

Distribution and ecology — *Anthurium attenuatifolium* is endemic to Panama, known only from the type locality in Santa Fé Province at 570 m elevation in a Premontane wet forest life zone.

Etymology — The species epithet is derived from the Latin '*attenuatus*' (meaning attenuate) and '*folium*' (meaning leaf), referring to the attenuate leaf blade.

Comments — Anthurium attenuatifolium is seemingly most closely related to A. pageanum Croat which differs by having a merely 3-angled petiole. It also differs by lacking the brownish speckling on the lower blade surfaces; A. zhui Croat that differs by having dark purplish, sharply triangular petioles and narrower dark brown drying blades

Paratypes: PANAMA. **Veraguas**: Valley of Río Dos Bocas on road between Alto Piedra (above Santa Fé) and Calovebora, along road, 08°33'03"N, 081°10'17"W, 350–400 m, 29 Aug 1974, T.B. Croat 27442 (MO); Valley of Río Tercero Braso beyond Escuela Agricola Alto Piedra above Santa Fé, 08°32'45"N, 81°09'58"W, 500–600 m, 29 Aug 1974, T.B. Croat 27323 (MO).

Anthurium aurantiifructum Croat, sp. nov. — Type: PANAMA. Bocas del Toro: Oleoducto Road near Continental Divide, Fortuna Dam area, 1000 m, 8°48'N, 82°12'W, 5 Feb. 1984, W.W. Churchill, G. de Nevers & H. Stockwell 4217 (holotype, MO-3210677). Figure 7.

Diagnosis: Anthurium aurantiifructum is a member of sect. *Decurrentia* and is characterized by its small size, epiphytic habit, short, slender internodes, persistent cataphyll fibers, elongated, bluntly C-shaped to sharply flattened petioles almost as long as or longer than the blades, the linear-oblong epunctate long-attenuated dark grayish-brown eglandular blades with the collective veins arising from the base and and more prominent than primary lateral veins as well,

a long-pedunculate brownish inflorescence which equals or exceeds the length of the leaves as well as by a green tapered spadix with 2 flowers visible per spiral.

Epiphytic; stem more than 11 cm long, the lower internodes short or to more than 1 cm long, 4–6 mm diam.; roots sparse and slender, some to 15 cm long; cataphylls 3–4 cm long, becoming fibrous and sub-parallel. Leaves more or less erect; petioles 12.5-16 cm long, 2.5-3.0 mm diam., bluntly C-shaped, sulcate, drying dark grayish brown; geniculum 0.6-1 cm long, drying slightly thicker and darker than petioles; blades linear-oblong, 12.7–16.5 cm long, 1.2–2.2 cm wide (averaging 16×2), 6.3–10.5 times longer than broad, broadest midway, 0.6–1.0 times as long as petioles, long-attenuated to narrowly long-acuminate at apex, narrowly acute at base, subcoriaceous, slightly bicolorous, drying dark grayish brown and matte, grayish brown, matte below; midrib weakly raised and eglandular on both surfaces, concolorous, drying bluntly acute and paler above, narrowly rounded and concolorous below; primary lateral veins 9-10 per side, departing midrib at 25-30°, scarcely more visible than upper surface, granular on both surfaces, drying bluntly acute and paler above, narrowly convex and concolorous below; collective veins arising from base or the lower pairs of basal veins, 1-2 mm from margin, more prominent than primary lateral veins; basal veins 2 pairs; upper surface eglandular, weakly and minutely granular; lower surface eglandular, conspiciously granular and granular ridged. Inflorescence erect with peduncle 15-17.5 cm long, drying reddish brown; spathe oblong, green, reflexed, drying 1.8-2.1 cm long, 3-5 mm wide, coriaceous, green to reddish brown; spadix green, tinged brownish, scarcely tapered to apex semiglossy, 4.2–6.6 cm long, 4–5 mm diam., drying reddish brown, bluntly rounded at apex; flowers 2 visible per spiral, drying 3.2 mm long, 1 mm wide; tepals granular on drying; lateral tepals 2.5 mm wide, inner margin rounded, outer margins 3-sided; stamens not emergent; pistils darker green; Infructescence with berries orange, more or less globose, 6 mm diam.

Distribution and ecology — *Anthurium aurantiifructum* is known only from Bocas del Toro and Coclé Province at 900–1000 m in a *Premontane rain forest* or *Tropical wet forest* life zones.

Etymology — The species epithet is from the Latin 'aurantiacus' (orange) and 'fructus' (fruit).

Comments — Anthurium aurantiifructum is most similar to A. tuquesense Croat in general appearance because it has similarly long, narrow blades and a long-pedunculate inflorescence with a long-tapered spadix but that species is a member of sect. Porphyrochitonium with glandular-punctate lower blade surfaces and proportionately much shorter petioles. Anthurium aurantiifructum may also be confused with A. chacoense Croat which differs by having the inflorescences shorter than the leaves and a spadix that is less than 4 cm long.

In the Lucid Anthurium Key, *Anthurium aurantiifructum* tracks to two other members of sect. Decurrentia, *A. boqueronense* Croat, which differs by having proportionately shorter petioles and more elliptic leaf blades as well as a proportionately shorter peduncle as well as *A. carrasquillanum* Croat, which differs by having proportionately longer petioles and peducle as well as by having only a single pair of basal veins. It might also be confused with similar members of sect. *Porphyrochitoniium*, namely *A. crassiradix* Croat which differs by having a V-shaped



Figure 7. Anthurium aurantiifructum Croat. Holotype: Churchill et al. 4217.



Figure 8. Anthurium bajobonitense O.Ortiz & Croat. Holotype: Ortiz et al. 1570.

petiole, blades which are generally broadest below the middle with a rounded leaf base and a well-developed secondary collective vein; *A. crassitepalum* Croat, which differs by having thinner, more elliptic, acuminate blades with a single pair of collective veins; *A. friedrichstahlii* Schott, which differs by having much longer, more linear blades and proportionately much shorter petioles and *A. oxystachyum* Croat, which differs by having thinner leaves with lanceolate blades with a single pair of rather remote collective veins.

Paratype: PANAMA. Coclé: Vicinity of La Mesa, N of El Valle de Antón, along east edge of Cerro Gaital, on hogback ridge leading to summit, 08°37'N, 80°08'W, 900–1000 m, 13 July 1987, T.B. *Croat* 67231 (MO).

Anthurium bajobonitense O.Ortiz & Croat, sp. nov. — Type: PANAMA. Colón: Parque Nacional Portobelo, Cascajal. Área boscosa al los alrededores de Bajo Bonito, bosque húmedo con precsenci de muchos cuerpos de agua. 09°30'55"N, 79°31'56"W, 165 m, 17 Aug. 2013, O.Ortiz, L.Martínez, A.Cubilla, J.I.Dojirama & J.Dojirama 1570 (holotype, PMA-107460). Figure 8.

Diagnosis: Anthurium bajobonitense is a member of sect. *Porphyrochitonium* and is characterized by its lithophytic habit, short internodes, persistent short fibrous cataphylls, moderately long-petiolate leaves, sulcate petioles, elliptic-lanceolate prominently acuminate moderately bicolorous blades which are acute at the base with 1 pair of essentially straight collective veins that are moderately close to the margins and with glandular punctations on both surfaces as well as by the moderately long-pedunculate inflorescences with a small lanceolate erect-spreading spathe, and a prominently stipitate pale yellowish green spadix.

Growing among stones on rocky stream bank; internodes short, 1.0-1.5 cm diam.; cataphylls 4.0-4.5 cm long, weathering to moderately straight red-brown fibers, persisting. Leaves with petioles 23-25 cm diam., drying deeply sulcate adaxially, dark brown, finely many-ribbed circumferentially; geniculum 2.0-2.3 cm long, drying blackened; blades elliptic-lanceolate, 32.3–37.4 cm long, 9.9–10.6 cm wide, 3.2–3.5 times longer than wide, 1.4 times longer than petioles, acuminate at apex, acute at base, subcoriaceous drying medium gray-brown above, moderately paler, pale to medium yellow-brown and semiglossy below; midrib drying narrowly rounded, concolorous, finely narrow-ribbed, glandular-punctate above, narrowly rounded, slightly darker, finely many-ribbed, sparsely glandular-punctate below; primary lateral veins 10 or 11 per side, departing midrib at 40-45°, drying narrowly rounded, scarcely iscernable above, narrowly rounded, sometimes glandular-punctate below; collective veins 1 pair, arising from near base, 5-6 mm from margin, sunken above, narrowly raised below, more prominent than primaries; upper surface finely areolate-granular and weakly glossy sparsely glandular-punctate; lower surface finely granular-striate, conspicuously round glandular-punctate. Inflorescence erect, much shorter than leaves; peduncle 31.5 cm long, terete; spathe drying 5 cm long, 6 mm wide, dark green, erect-spreading with the margins turned up; spadix prominently stipitate (stipe 9 mm long, 7 mm diam.,) drying 7.4 cm long, 4 mm diam., pale yellowish green (slightly yellowish in distil 2 cm), matte; flowers 4-5 per spiral, 2.2-2.4 mm long, 2.0–2.3 mm wide; tepals drying yellow-brown, matte, weakly granular; lateral tepals 1.2–1.4 mm wide, inner margin rounded, outer margin 2- or 3-sided; stamens included, anthers 0.3 mm long, 0.6 mm wide, thecae ovoid, moderately divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium bajobonitense* is endemic to Panama, known only from about 160 m on the Caribbean coast in Colón Province in a Tropical wet forest life zone.

Etymology — The species is named for the type locality at Bajo Bonita in the Portobelo National Park.

Comments — Anthurium bajobonitense is seemingly closest to A. friedrichsthalii Schott in its general appearance (leaves of similar size and shape) but that species differs by having a thicker, usually whitish, sessile spadix. In the as yet unpublished key to the species of Anthurium from Central America Anthurium bajobonitense is closest to A. albifructum Croat which differs by having petioles longer than the blades with elliptic leaf blades and a sessile spadix.

Anthurium belenense Croat & O.Ortiz, sp. nov. — Type: PANAMA: Veraguas: Río Belén, Recodo Catalina, al este del campamento, 08°48'51"N, 80°45'38"W, 259 m, 15 Dec. 2013, *A. Espinosa, A. Zapata, W. Gaona, R.* Rodríguez, *M. Saez & S. Olivare 6259* (holotype, MO-6600603; isotype, PMA). Figure 9.

Diagnosis: Anthurium belenense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent reddish brown cataphyll fibers, sharply 3-sided petioles, oblanceolate-elliptic, short-acuminate, moderately coriaceous blades which dry brownish and are glandular-punctate only on the lower surface with the midrib acute below and with moderately obscure primary lateral veins, a single pair of collective veins 3–5 mm from the margin as well as distinct antemarginal veins; also by the moderately long-pedunculate inflorescence, angular-winged peduncles, green, lanceolate, erect-spreading spathe and very long-tapered, green spadix 50–100 times longer than wide.

Epiphytic; internodes short, 1.5–2.0 cm diam.; cataphylls 3–5 cm long, dark reddish brown, fibrous. Leaves with petioles 8.4–19.8 cm long, 4–5 mm wide, sharply triangular, broadly sulcate adaxially with sharply erect margins, faintly ribbed medially, acutely angular abaxially; geniculum 1.0–1.3 cm long, drying darker than petiole shaft; blades oblanceolate-elliptic, 21.7–28.5 cm long, 5.8–8.1 cm wide (averaging 25×6.4 cm), 3.4–4.7 times longer than wide, 0.4–0.7 times as long as petioles, acute to obtuse and weakly acuminate at apex, acute to cuneate at base, moderately coriaceous, drying dark gray-brown and matte above, weakly glossy and medium brown below; midrib acute and concolorous above, narrowly rounded to acute and darker below; primary lateral veins 10–12 per side, departing midrib at 50–65°, inconspicuous and sometimes minutely undulate on upper surface, weakly raised, concolorous and sometimes minutely undulate below; collective veins one principal pair arising from the base, straight and 3–5 mm from margin but with a distinct antemarginal pair of veins; upper surface minutely wrinkled, eglandular, often purplish speckled; lower surface diffusely and weakly pale-speckled, conspicuously dark-glandular. *Inflorescence* erect; peduncle 16–34 cm, longer

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Figure 9. Anthurium belenense Croat & O.Ortiz. Holotype: Espinoza et al. 6259.



Figure 10. Anthurium bergii Croat. Holotype: Croat 81377.

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Figure 11. Anthurium bergii Croat. Croat 81377. Habit of living plant.

than petioles, usually acutely angular, sometimes angular-winged, drying reddish brown; spathe yellowish green, 8.5–9.0 cm long, 7–10 mm wide, erect-spreading; spadix green, narrowly long-tapered, 22.5–31.0 cm long, 4 mm diam., 50–100 times longer than wide; flowers 3 visible per spiral, 4.6–5.2 mm long, 1.7–2.1 mm wide; tepals drying dark brown, moderately smooth; lateral tepals 1.8–2.1 mm long, very broadly rounded on inner margin, very broadly 2-sided on outside margin; stamens barely visible above tepals, 0.2 mm long, 0.8 mm wide. *Infructescence* not seen.

Distribution and ecology — *Anthurium belenense* is endemic to Panama, known only from Veraguas and Coclé Provinces at 200–259 m in a *Tropical wet forest* or *Premontane rainforest* life zone.

Etymology — *Anthurium belenense* is named for the type locality near Belén in Veraguas Province in the Parque Nacional Santa Fé.

Comments — Anthurium belenense most closely resembles darker drying specimens of *A. pageanum* Croat but that species differs by having upper blade surfaces glandular-punctate and by having a much shorter, less long-tapered spadix, typically 15–25 times longer than wide. *A. belenense* is also similar to *A. gracilispadix* Croat, *A. crassiradix* Croat and *A. paludosum* Engl. *Anthurium gracilispadix* differs by having petioles flattened adaxially with erect margins, leaf blades glandular-punctate on both surfaces and inflorescences with shorter spadices (5–10 cm vs. 22–31cm); *A. crassiradix* differs by having leaf blades narrowly ovate-oblong, inflorescences with 5–6 flowers visible in the principal spiral and 8–10 flowers in the alternate spiral; *A. paludosum* differs by having coriaceous, persisting intact cataphylls, petioles D-shaped to subterete and inflorescences with cylindrical spadices scarcely tapered at apex.

Anthurium bergii Croat, **sp. nov**. — Type: Cultivated at Selby Gardens 2002–259 ex PAN-AMA. Kunayala Province: El-Llano Cartí Road, originally collected by Wally Berg, Sarasota, vouchered 15 Oct 1997, *T.B. Croat 81377 (holotype, MO-05098524*; isotypes, K, PMA, SEL, US). **Figures 10 & 11**.

Diagnosis: Anthurium bergii is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, cataphyll fibers persisting in a more or less intact reticulum, sharply sulcate petioles, the oblong-lanceolate blades with 2 pairs of basal veins and glandular punctuations on both surfaces as well as by its green, reflexed spathe and the faintly violet-purple, weakly glossy, uniformly and weakly tapered spadix.

Epiphytic; internodes short, ca. 5 mm diam.; roots 5 mm diam., descending, green becoming light brown, elongate; cataphylls existing intact, reddish brown, finally deciduous. Leaves with petioles subterete, 15–18 cm long, drying 3–4 mm wide, sharply sulcate, drying grayish brown; geniculum 1.5–2.2 cm long, drying transversely fissured, darker than petioles; blades oblong-lanceolate, 24.5–37.4 cm long, 8.8–13.5 cm wide (averaging 31 × 11), 2.5–3.3 (averaging 3.0) times longer than wide, 2.3–3.6 (averaging 2.7) times longer than petioles, broadest below middle, gradually acuminate at apex, acute at base, subcoriaceous, drying weakly glossy

to matte, slightly bicolorous and gray; midrib bluntly acute above (drying acute at least above middle), convex and paler below, drying yellowish brown, narrowly ribbed; primary lateral veins 17 or 18 per side, departing midrib at 50°, flat above when fresh, drying weakly raised on both surfaces but scarcely more prominent than the interprimary and tertiary veins; collective veins arising from 1st pair of basal veins (innermost basal vein) slightly more prominent than primary lateral veins, drying weakly raised both surfaces, 4–7 mm from margin; antemarginal veins present; basal veins 2 pairs; upper surface smooth, glandular-punctate; lower surface glandular-punctate, densely granular on magnification. *Inflorescence* erect-spreading at anthesis, later pendent; peduncle tinged reddish, 35.7–58.2 cm long, drying sharply sulcate; spathe linear-lanceolate, green, reflexed, drying 4.6–14.3 cm long, 5–6 mm wide, yellowish brown; spadix faintly violet-purple, weakly glossy, uniformly cylindroid and weakly tapered, drying 11.2–41.9 cm long, 4–5 mm wide, brown; flowers 6–7 per spiral, drying 2.5–2.6 mm long, 1.4–1.5 mm wide; tepals minutely granular on drying; lateral tepals 1.4 mm wide, the outer margins 2-sided, inner margin rounded. *Infructescence* not seen.

Distribution and ecology — *Anthurium bergii* is endemic to Panama, known only from the type locality on the El Llano-Cartí Road in Panamá Province at 350 m elevation in a *Premontane wet forest* life zone.

Etymology — *Anthurium bergii* is named in honor of the late Wally Berg, a collector of Bromeliaceae from Sarasota, Florida who collected the type. Wally was a collaborator with the staff at Selby Gardens, especially with the late Harry Luther, a Bromeliaceae specialist then at Selby Gardens.

Comments — Anthurium bergii perhaps most closely resembles A. bicollectivum Croat based on the size and shape of its blades but that species differs by having a second pair of collective veins that usually extend to the apex of the blades whereas the second pair of collective veins for A. bergii merge promptly with the margin near the base. In the Lucid Anthurium Key, Anthurium bergii keys out with two other species, A. curvilaminum Croat and A. crassilaminum Croat, both of which it resembles because of its markedly arching blades in live condition and by having the collective veins rather remote from the margins. Both of those species differ by having blades 3.0–5.6 times longer than wide, the collective veins arising from the base of the blade and by lacking a short second collective vein.

Anthurium berguidoi Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Darién: Serrania de Cañasas, Reserva Privada Chucantí, Cascada Chucantí, 08°37'41'N, 78°26'51"W, 699 m, 28 Aug. 2014, *O.O.Ortiz 2435* (holotype, MO-660592; isotype, PMA). **Figures 12–15**.

Diagnosis: Anthurium berguidoi is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial or rupicolous habit, short internodes, persistent fibrous cataphylls, sulcate petioles which dry circumferentially ribbed, more or less oblong–elliptic, narrowly acuminate blades that are glandular dotted only on the lower surface, are acute at the base and have only a single pair of basal veins as well as by its green, lanceolate, reflexed spathe and scarcely tapered spadix



Figure 12. Anthurium berguidoi Croat & O.Ortiz. Holotype: Ortiz 2435.


Figure 13. Anthurium berguidoi Croat & O.Ortiz. Ortiz 2435. Habit of living plant.



Figure 14. Anthurium berguidoi Croat & O.Ortiz. Ortiz 2435. Inflorescence.



Figure 15. Anthurium berguidoi Croat & O.Ortiz. Ortiz 2435. Infructescence.



Figure 16. Anthurium billdarcyi Croat. Holotype: D'Arcy 11259.

that ranges from lilac to rose and finally orange during flowering and becomes cream-colored in fruit with red berries.

Terrestrial or rupicolous herb; internodes short, 1.1-1.4 cm diam.; cataphylls 6.0- 6.5 cm long, persisting as grayish fibrous with tiny narrow fragments of dark brown epidermis. Leaves with petioles 4-9 cm long, 3.0-4.6 mm diam., terete, sulcate adaxially, drying narrowly sulcate, multi-ribbed circumferentially, medium orange-brown on drying; geniculum 6-17 mm long, drying blackened; blades oblong-oblanceolate to oblong-elliptic, 15.6-45.7 cm long, 3.3-8.1 cm wide (averaging 29 x 5), 3.6-8.1 (averaging 5.5) times longer than wide, 3.6-8.6 (averaging 6.2) times longer than petiole, broadest at middle or slightly above middle, narrowly acuminate at apex, narrowly acute at base, moderately coriaceous, weakly bicolorous, dark green above, light green below, drying dark greenish brown, matte above, yellowish brown and weakly glossy below; midrib narrowly round-raised above, triangular below; primary lateral veins to ca. 20 per side, only weakly apparent above, easily visible below, drying weakly visible above, weakly raised, narrowly rounded and concolorous, moderately granular below; collective veins 1 pair, arising from the base, 3–7 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface smooth, eglandular; lower surface densely and weakly thick pale granular, densely and conspicuously dark glandular-punctate. Inflorescence erect, shorter than leaves; peduncle 16.5-28.0 cm long, terete, drying ca. 1 mm diam., several-ribbed; spathe green, lanceolate, reflexed, 3.4-3.6 cm long, 8-9 mm wide, drying, lanceolate, drying coriaceous and reddish brown; spadix subsessile (stipe to 10 mm long in life), 4.0-5.5 cm long, 4–5 mm diameter, rose-colored with lavender during anthesis, orange after anthesis, becoming cream-colored in fruit, drying narrowly rounded at apex, dark brown. flowers 6 visible per spiral, drying 1.7-2.5 mm long, 1.5-2.3 mm wide; tepals drying minutely granular; lateral tepals 1.3 mm wide, inner margin rounded, outer margins 2-sided; stamens withdrawing beneath the margin of the tepals leaving the pollen on surface of tepals. Infructescence with tepals cream and berries red, drying 5-7 mm long, beaked at apex; seed 1 per berry, whitish.

Distribution and ecology — *Anthurium berguidoi* is endemic to Panama, known from the type locality in Darién Province in the Serrania de Cañasas near the border of Panama Province at about 700 m and in Panama Province near Chepo in *Tropical wet*, *Premontane wet* or *Tropical moist forest* life zones.

Etymology — *Anthurium berguidoi* is named in honor of biologist and conservationist Guido Berguido who has made great efforts to preserve the forests of Chucantí, located in the last section of uplifted hills in the range of the Majé Mountains.

Comments — Anthurium berguidoi is similar to A. curvilaminum Croat but that species differs by having primarily lateral veins less closely spaced and not prominently raised on drying and by having a dark burgundy spadix (versus violet-purple (B & K blue-purple 5/2.5) (Berlin & Kay, 1969). In the Lucid Anthurium Key, Anthurium berguidoi tracks to Anthurium acutibacca Croat & M.M.Mora which differs by having a much longer stipe on the spadix and by its red berries; A. belemense Croat & O.Ortiz, which differs by its very long-tapered, green spadix Croat et al., 2022

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which is 50–100 times longer than wide; *A. juanguillermoi* Croat, which differs by having much longer, proportionately narrower leaf blades and longer peduncle with a narrowly linear-lanceolate spathe 4.2–13.6 cm long and *A. marginellum* Sodiro which differs by its much longer petioles being about as long or longer than the blades and blades that are only about 3 times longer than broad.

Paratypes: PANAMA. Panamá: Distrito Chepo; Río Serrano, 4.7.18, Z. Mijango, K. Vega, C. Pineda, J. Guerra 596 and 507 (both MO, PMA); Serrania de Majé forest along small streams near the headwaters of Río Pirati, 09°00'N, 78°35'W, 100–150 m, S. Knapp & J. Mallet 5150 (MO).

Anthurium billdarcyi Croat, **sp. nov.** — Type: PANAMA. Colón: Along road to Iguanita from main Colón to Portobello Highway, 09°28'N, 79°39'W, 390 m, 7 Apr. 1977, W.G. D'Arcy 11259 (holotype, MO-2589173). **Figure 16**.

Diagnosis: Anthurium billdarcyi is a member of sect. *Porphyrochitonium* and is characterized by its short stem, short internodes, short cataphylls persisting more or less intact, long-petiolate leaves, petioles which are sulcate adaxially with a medial rib and slightly shorter than blades, narrowly oblong-elliptic, narrowly long-acuminate blades which dry dark brown above and moderately paler grayish yellow-brown below with a single pair of collective veins arising from the base and moderately more prominent than the primary lateral veins as well as by the long-pedunculate inflorescence with a short, green, erect-spreading spathe and short, weakly tapered, brown, stipitate spadix.

Terrestrial (fide W. D'Arcy, pers. comm.); internodes short, 4 mm diam.; cataphylls 1.8 cm long, acute at apex, persisting intact, with reddish brown epidermis. *Leaves* with petioles 16.2– 18.2 cm long, 2 mm diam., sulcate adaxially with a medial rib, drying yellowish brown; geniculum 3 mm long, drying darker than petioles; blades narrowly oblong-elliptic, 20.6–21.9 cm long, 4.0-4.2 cm wide (averaging 21 × 4), 5.0-5.5 (averaging 5.2) times longer than broad, broadest about midway, 1.2-1.3 (averaging 1.25) times as long as petioles, gradually long-acuminate at apex, (acumen 1.0–1.5 cm long), acute at base, drying subcoriaceous, dark brown and matte above, grayish yellow-brown and weakly glossy below; midrib drying narrowly raised, finely ribbed throughout and darker above, narrowly convex, finely ribbed throughout and paler below; primary lateral veins 12-14 per side, but scarcely more conspicuous than the interprimary veins, departing midrib at 45°, drying weakly and narrowly rounded, concolorous above, weakly and narrowly raised and concolorous below; collective veins arising from 1st pair of basal veins, 2.5–3.5 mm from margin; basal veins 1 pair; upper surface eglandular, densely and markedly pale-granular above; lower surface irregular at high magnifications but not markedly granular, conspicuously glandular-punctate. Inflorescence with peduncle 15.7 cm long; spathe green, erect-spreading, 2.5 cm long, 5 mm wide, lanceolate, drying moderately coriaceous, yellowish brown; spadix brown, stipitate 5 mm, weakly tapered, 4.2 cm long, 3 mm diam., drying yellowish brown; flowers 4 visible per spiral, drying 2.1 mm long and 1.9 mm wide; tepals minutely granular on drying; lateral tepals 1.1 mm wide, the inner margin rounded, outer margins 2-sided; stamens retracting below tepals, 0.15 mm long, 0.6 mm wide, thecae weakly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium billdarcyi* is endemic to Panama, known only from the type locality in Colón Province near the Río Iguanita on eastern slopes of the hills leading up to the Santa Rita Ridge, NE of Portobello at 390 m in a Montane rain forest life zone.

Etymology — *Anthurium billdarcyi* is named in honor of the late Dr William G. D'Arcy (1931–1999), who worked at the Missouri Botanical Garden and collected the type specimen. Bill was a specialist on the Solanaceae and was in charge of the Flora of Panama when it was finally completed in April 1980. D'Arcy was a polymath of sorts at the Garden, the guy you went to for questions about nomenclature, Latin and other languages, the history of botany and many other things. Originally an economist, Bill came to botany late in life after becoming interested while living in Tortola in the British Virgin Islands.

Comments — In the Lucid Anthurium Key, *Anthurium billdarcyi* tracks to *A. jefense* Croat that differs by having the leaf blades usually obtuse and short-acuminate to narrowly short-acuminate, usually drying coriaceous and somewhat grayish rather than having the leaf blades narrowly long-acuminate at apex and drying subcoriaceous, dark brown above with the cataphylls mostly drying intact as in *A. billdarcyi*. *Anthurium billdarcyi* may also be confused with *A. longistipitatum* Croat and *A. nutans* Croat, both of which differ by having more coriaceous blades which are rounded at the base as well as by having petioles much shorter than the blades.

Anthurium billhahnii Croat, sp. nov. — Type: PANAMA. Coclé: Between Continental Divide above El Copé (Alto Calvario) and Río Blanco, a 5-hour walk to the north, 08°38'N, 80°36'W, 1000 m, 13 Dec. 1980, *K. Sytsma, W. Hahn & T. Antonio 2424* (holotype, MO-29003272). Figure 17.

Diagnosis: Anthurium billhahnii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short densely rooted stem, fibrous persistent cataphylls, short-petiolate leaves, petioles drying narrowly and sharply sulcate adaxially and prominently several ribbed abaxially, oblong-elliptic, brown drying leaf blades acute to weakly short-acuminate at apex and attenuate at base, with a single pair of basal veins, a rather prominent antemarginal vein, many primary lateral veins which dry much less conspicuous than the collective veins as well as by the erect inflorescence held among the leaves, an erect yellowish spathe and a purple cylindroid spadix which is 7–10 times longer than wide.

Epiphyte; internodes short, 1.4 cm diam.; cataphylls 2.1–2.3 cm long, acute, persisting semiintact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 2.7–4.1 cm long, 2–3 mm diam., narrowly and sharply sulcate adaxially and prominently several ribbed abaxially, drying reddish brown; geniculum 4–6 mm long, drying slightly darker than petioles; blades oblong-elliptic, 10.5– 18.7 cm long, 2.9–4.4 cm wide, (averaging 14×4), 3.4–4.4 (averaging 3.8) times longer than broad, broadest midway, 3.4–4.8 (averaging 4.2) times as long as petioles, weakly short-acuminate at apex, attenuate at base, drying subcoriaceous, brown and matte above, reddish brown and weakly glossy below; midrib drying narrowly acutely ribbed to irregularly acute-ribbed, and paler above, acute, glandular-punctate, finely ribbed and darker below; primary lateral veins 8 per side, departing midrib at 60°, drying narrowly rounded, slightly paler above, finely ribbed and slightly darker below; secondary veins scarcely more visible than surface above, prominulous below; collective veins arising from the only pair of basal veins, 5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface epunctate with conspicuous, small, mound-like, concolorous bumps; lower surface conspicuously glandular-punctate, smooth; Inflorescence erect; peduncle 10.7–10.9 cm long; spathe yellowish, erect, 3.2–4.3 cm long, 1.0–1.2 cm wide, oblong-lanceolate, drying coriaceous, reddish brown; spadix purple, stipitate 6–11 mm, cylindroid, 3.6–4.1 cm long, 4–6 mm diam., drying reddish dark brown; stipe drying 3–4 mm long, 2.7 mm diam.; flowers 7 visible per spiral, drying 2 mm long and 1.7 mm wide; tepals minutely granular on drying; lateral tepals 1.2 mm wide, inner margin narrowly rounded; outer margins 3-sided; stamens not exserted. *Infructescence* not seen.

Distribution and ecology — *Anthurium billhahnii* is endemic to Panama, known only from the type locality in Coclé Province at 300 m in a *Premontane wet forest* life zone (not distant from *Premontane rain forest* life zone).

Etymology — *Anthurium billhahnii* is named in honor of William Hahn, who is currently associate dean and associate research professor of biology at Georgetown University, Washington, D.C. His research focuses on plant molecular systematics, conservation genetics, and the evolution of monocots, particularly Arecaceae, and systematics of Oenothera and diatoms. He received his B.S. in biology from Washington University, St Louis (1985), his M.S. in botany from Cornell University (1990) and his Ph.D. from the University of Wisconsin (1993). His Guyanan collections date from his service as resident collector for the Biological Diversity of the Guiana Shield Program (1988–1989).

Comments — *Anthurium billhahnii* is similar to *A. scottmorii* Croat from the Cerro Jefe region which occurs at about the same elevation but that species differs by having more grayish drying blades (often with a proportionately much longer petiole), the inflorescence much longer than the leaves with the spathe reflexed.



Figure 17. Anthurium billhahnii Croat. Holotype: Sytsma et al. 2424.



Figure 18. Anthurium boqueronense Croat. Holotype: Knapp & Sytsma 2411.

Croat et al., 2022

Anthurium boqueronense Croat, sp. nov. — Type: PANAMA. Colón: Ridges and drainage NW of Mina Boquerón #1 (manganese mine), near end of road past Salamanca; Río Boquerón drainage, 09°20'N, 79°35'W, 12 Dec. 1981, *S. Knapp & K. Sytsma 2411* (holotype, MO-3041699). Figure 18.

Diagnosis: Anthurium boqueronense is a member of sect. *Decurrentia* and is characterized by its small size, epiphytic habit, short internodes, mostly fibrous cataphylls, short, sulcate petioles, oblong-elliptic blades which dry grayish, the long-pedunculate inflorescence with a green linear-lanceolate spathe and a slender green spadix.

Epiphyte; internodes short, 3-4 mm diam; cataphylls 3.0 cm long, mostly intact, reddish brown, becoming fibrous with fragments of brown epidermis. Leaves with petioles 4.7-5.1 cm long, 2–3 mm diam, terete, sulcate, drying grayish brown; geniculum 0.5 cm long, drying darker than petioles; blades oblong-elliptic to narrowly elliptic, 15.0-18.8 cm long, 4.7-5.1 cm wide (averaging 16 × 5), 3.1-3.7 (averaging 3.4) times longer than broad, broadest midway, 4.2-4.4 (averaging 4.3) times longer than petioles, acuminate, acute at base. drying subcoriaceous, gray-brown and weakly glossy above, gray-green-brown and semiglossy below; midrib drying narrowly rounded, short-linear-granulate and slightly darker above, narrowly raised, ribbed adaxially and concolorous below; primary lateral veins 17 per side, departing midrib at 55–60°, drying narrowly rounded, densely and minutely granular and concolorous above, bluntly acute and concolorous below; collective veins arising from the only pair of basal veins, 3–5 mm from margin; basal veins 1 pair; antemarginal veins present; upper surface eglandular, densely and minutely granular with deep-red speckles upon magnification; lower surface eglandular, densely dark reddish brown speckled (speckles irregular). Inflorescence with peduncle 14 cm long, drying terete and brown; spathe 2.7 cm long, 2 mm wide, green, spreading horizontal, drying coriaceous and reddish brown; spadix green, long, uniform and weakly tapered, 3.6 cm long, 3 mm diam., drying dark brown; flowers about 3 visible per spiral, drying 2.8 mm long and 2.3 mm wide; tepals minutely granular and sparsely pustular on drying; lateral tepals 1.8 mm wide, the outer margins 2- or 3-sided, inner margin rounded; stamens not emerged, anther born on the narrow filament, ca. 1 mm long and wide. Infructescence not seen.

Distribution and ecology — *Anthurium boqueronense* is known only from the type locality in Colón Province of Panama at 300–400 m in a *Tropical moist forest* life zone.

Etymology — The species is named for the type locality at the mine at Boquerón and the Río Boquerón.

Comments — *Anthurium boqueronense* keys out with *A. glandulicostum* Croat, a species in sect. *Porphyrochitonium*, which has larger, glandular-punctate blades which are broadest well above the middle as well as an inflorescence which is much shorter than the leaves and a shorter peduncle.

Anthurium botijaense Croat, sp. nov. — Type: PANAMA. Colón: bajando el río Botija, recorrido en dirección 87° SE hacia la communidad de San Benito, 11 June 1996, *A. Zapata, J. Polanco, D. Mosquera & W. Martínez 1180* (holotype, MO-5548505; isotype, PMA (not seen). Figure 19.

Diagnosis: Anthurium botijaense is a member of sect. *Porphyrochitonium* and is characterized by its epiphyte habit, conspicuous red-brown persistent cataphyll fibers, short-petiolate leaves, narrowly oblong-linear, semi-erect blades which dry grayish above and yellow-brown and glandular-punctate beneath with a conspicuously sunken collective veins and obscure primary lateral veins as well as by the long, sessile, scarcely tapered, pale green spadix with 10–12 flowers visible per spiral.

Epiphytic; internodes short, 2 cm diam.; cataphylls 6.5-13.0 cm long, drying red-brown, persisting as closely parallel, mostly pale fibers. Leaves with petioles 13 cm long, drying graybrown, matte, sharply and deeply sulcate adaxially, sharply 1 low-ribbed abaxially, several weak-ribbed on sides, densely granular, lacking glandular punctations; geniculum 1.5 cm long, darker and more shrunken than petiole, blades narrowly elliptic-linear, 91 cm long, 7.3 cm wide, 12.4 times longer than wide, 7 times longer than petioles, acuminate at apex, acute at base, moderately coriaceous, dark green above, much paler below, drying gray-brown, matte above, grayish yellow-brown, weakly glossy below; midrib drying convex in valley, finely ribbed, paler, minutely glandular-punctate above, much thicker, narrowly round-raised, matte, finely and acutely ribbed, eglandular, slightly darker than surface below, primary lateral veins 30-40 per side, departing midrib at 30-40°, scarcely apparent above, drying weakly raised and scarcely more apparent than interprimary veins below; collective veins arising from base, 6–9 mm from margins, more deeply sunken than primary lateral veins above, narrowly raised below; upper surface eglandular, ridged-granular at higher magnifications; lower surface finely ridged, conspicuously dark glandular-punctate, the glands mostly raised, blackish, often sunken medially. Inflorescence erect; peduncle 27 cm long, 2 mm diam.; spathe linear-lanceolate, 16 cm long, 1.7 cm wide, green, reflexed; spadix pale green, 16 cm long, 4 mm diam., 40 times longer than broad; flowers 10-12 visible per spiral, 1.4 mm long, 7-9 mm wide; tepals moderately smooth, dark brown; lateral tepals 8–9 mm wide, inner margin broadly rounded, outer margin 3-sided; stamens not seen. Infructescence not seen.

The current status of Anthurium sect. Porphyrochitonium ...



Figure 19. Anthurium botijaense Croat. Holotype: Zapata et al. 1180.



Figure 20. Anthurium bratsiense Croat. Holotype: Herrera 5195.

Distribution and ecology — *Anthurium botijaense* is endemic to Panama, known only from the type locality in Colón Province at ca. 100 m elevation in Tropical wet forest life zone.

Etymology — The species is named for the type locality along the Río Botija in Colón Province.

Comments — Anthurium botijaense is seemingly most closely related to A. kittredgeanum Croat with which it shares many flowers visible per spiral. That species from the mountains of Darién at 450–500 m elevation differs by having broader, less narrowly elongated leaf blades to only 7.2 times longer than wide, more distinct primary lateral veins and a stipitate, pale yellow spadix. Anthurium botijaense has been confused with A. redolens Croat, a species which differs by having shorter and proportionately broader leaf blades, mostly 45—60 cm long that range from 4.5–8.2 times longer than wide with a typically stipitate, usually lavender spadix with 10–13 flowers per spiral.

Anthurium bratsiense Croat, sp. nov. — Type: COSTA RICA. Limón: Cantón de Talamanca: Bratsi, Amubri, Alto Lari, Kivut, 09°24'15"N, 83°05'16"W, 1300 m, 6 Mar. 1992, *G. Herrera 5195* (holotype, MO-4352078; isotype, INB). Figure 20.

Diagnosis: Anthurium bratsiense is a member of sect. Porphyrochitonium and is characterized by its epiphytic habit, short internodes, short, dark brown cataphyll fibers, short sulcate petioles, oblong-oblanceolate, acuminate blades which are eglandular on the upper surface and dry dark grayish brown and 3.3–6.2 times longer than the petioles as well as by the long pedunculate inflorescence which exceeds the length of the blades.

Epiphytic; internodes short, 3–5 mm long; cataphylls 2.5–3.0 cm long, mostly intact, reddish brown, becoming fibrous with fragments of brown epidermis with reddish brown speckles and punctiform on inside of cataphylls. *Leaves* with petioles 4.0-6.6 cm long, 1-2 mm diam, terete, short sulcate, drying brown; geniculum 0.4-0.7 cm long, drying slightly darker than petioles; blades narrowly oblong-oblanceolate, 21.8-24.8 cm long, 3.6-3.7 cm wide, 5.9-6.7 times longer than broad, broadest midway, 3.3-6.2 times longer than petioles, long-acuminate, acute at base, drying papyraceous, brown and weakly glossy above, yellowish brown, and weakly glossy below; midrib drying narrowly rounded to round-raised, short linear-granulate and slightly paler above, narrowly rounded, linear-granulate, pustular and darker below; primary lateral veins 6-8 per side, departing midrib at 30-35°, drying weakly and narrowly rounded and concolorous above, narrowly rounded and concolorous below; collective veins arising from the only pair of basal veins, 2–4 mm from margin; basal veins 1 pair; antemarginal veins present, upper surface eglandular, densely granular, sometimes pustular; lower surface densely glandular-punctate, weakly granular, sometimes dark spotted, sparsely pustular. Inflorescence with peduncle 29.2 cm long, red-green, drying terete, weakly sulcate; spathe 2.8-5.0 cm long, 4–5 mm wide, reddish green, drying coriaceous and reddish brown; spadix reddish green, uniformly and weakly tapered, 6.2 cm long, 0.3 cm diam., drying brown; flowers about 3 visible per spiral, drying 2.0 mm long and 1.7 mm wide; tepals minutely granular on drying; lateral tepals 1.0 mm wide, the outer margins 2-sided, inner margin rounded. Infructescence not seen.

Distribution and ecology — *Anthurium bratsiense* is known only from the type locality in Costa Rica in the Cantón de Talamanca at 1300 m in a *Lower montane rainforest* life zone.

Etymology — The species epithet refers to the type locality at Bratsi in the Cantón de Talamanca in Limón Province.

Comments — *Anthurium bratsiense* is closest to *A. austinsmithii* Croat & R.A. Baker which differs by having proportionately longer petioles, and proportionately shorter peduncles. A. bratsiense has oblong-oblanceolate leaf blades broadest above the middle and 3.3–6.2 times longer than petioles whereas *A. austinsmithii* has blades broadest below the middle and 1.8–1.9 (–2.4) times longer than petioles.

Anthurium brunneum Croat, sp. nov. — Type: PANAMA. Panama: El Llano-Cartí road, 5 mi from Pan American Hwy., virgin forest on steep slopes; along trail through forest (west side of road), 350 m, 16 July 1987, *T. B. Croat 67347* (holotype, MO-3609894). Figure 21.

Diagnosis: Anthurium brunneum is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, semi-intact network of cataphyll fibers, sharply V-sulcate petioles, brown-drying blades and moderately long-tapered greenish spadix.

Epiphyte; internodes short, 1.7 cm diam.; cataphyll fibers persisting semi-intact. Leaves with petioles narrowly rounded to acute abaxially, sharply V-sulcate adaxially; blades oblong-elliptic to oblong-oblanceolate, 30-40 cm long, 9-11 cm wide, 3.3-3.5 times longer than wide, 3.3-4.6 times longer than petioles, short-acuminate at apex, acute at base, moderately coriaceous, moderately bicolorous, dark green and semiglossy above, paler and semiglossy below, drying moderately dark brown on both surfaces; midrib convex and slightly paler above, sharply acute and paler below, drying darker than surface below; primary lateral veins 16–20 per side, arising at 50-65°, narrowly quilted-sunken above, pleated-raised below, darker than surface; tertiary veins moderately obscure; collective veins arising from the base, 4–7 mm from margin, weakly sunken and about as conspicuous as primary lateral veins above; upper surface moderately smooth, eglandular; lower surface moderately granular, glandular-punctate. Inflorescence erect-spreading; peduncle 25-30 cm long, 1-ribbed (opposite spathe); spathe linear-lanceolate, green, spreading, 8-10 cm long, 1.5-2.2 cm wide; spadix moderately long-tapered, 10-12 cm long, 6–8 mm diam., greenish; pistils square-raised; flowers 6–7 visible per spiral, 2.3–3 mm wide in both directions; lateral tepals 1.5 mm wide, inner margin rounded, outer maging 2-sided; stamens not seen. Infructescence not seen.

Distribution and ecology — *Anthurium brunneum* is endemic to Panama, known only from the type locality in the Isthmus of Panama in Panama Province at 350 m elevation in a *Premontane wet forest* life zone.

Etymology — The species epithet is from the Latin '*brunneus*' (meaning brown) referring to the color of the dried leaf blades.

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Figure 21. Anthurium brunneum Croat. Holotype: Croat 67347. Habit of potted plant.

Comments — *Anthurium brunneum* is most similar to *A. iguanitense* Croat which has blades of similar shape and size with a long peduncle but that species differs by having proportionately much shorter petioles, blades that dry gray with the primary lateral veins scarcely visible on the upper surface.

Anthurium carrionii Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Colón: Coclé del Norte, 08°50'14"N, 080°38'32"W, Botija Pit, area 3, 30 Sep. 2012, *J.F. Carrión, K. Viquez & R. Flores* 873 (holotype, PMA-0108507). Figures 22–25.

Diagnosis: Anthurium carrionii is a member of sect. *Porphyrochitonium* and is distinguished by its epiphytic habit, short brown loose cataphyll fibers, sharply acutely C-shaped petioles with an obtuse medial adaxial rib and a much thickened pulvinus, narrowly elliptic short-acuminate blades which are weakly glandular-punctate and minutely areolate on upper surface as well as by the short-pedunculate inflorescence with a slender green reflexed spathe and 3 flowers visible per spiral on the short spadix which is about 1 mm diam.; spathe 5 mm wide, reflexed, green, drying dark brown; spadix 3 visible per spiral with the stamens retracted below the level of the tepals.

Epiphyte; stem short, slender; internodes short, less than 1 cm diam.; cataphylls 1.5 cm long, persisting as few dark brown, moderately coarse, loose fibers. Leaves with petioles 1.0-1.3 cm long, sharply C-shaped with margins drying acute with an obtuse medial rib, irregularly and folded-ridged adaxially with a much-thicked pulvinus at base, this more finely ridged than the remainder of petiole; blades narrowly elliptic, 7.2-10.7 cm long, 2.2-2.5 cm wide, 3.1-4.8 times longer than wide, 6.5-8.9 times longer than petioles, short-acuminate at apex (acumen 5-6 mm long), narrowly acute at base, subcoriaceous, scarcely bicolorous, drying dark graybrown; midrib drying narrowly raised with the dried epidermis easily flaked off, concolorous in apical half, paler in lower half above, drying weakly raised and finely ribbed, slightly paler below; primary lateral veins (4)5(6) per side, departing midrib at 20-25°, weakly visible on both surfaces; tertiary veins not visible; upper surface sparsely and weakly glandular-punctate, minutely areolate, with thin epidermis, this capable of flaking free, the epidermis exposing deep hole under the dark glandular punctations; lower surface drying finely ridged, conspicuously dark glandular-punctate. Inflorescence erect; peduncle 5.5 cm long, drying dark brown, 1 mm diam.; spathe 5 mm wide, reflexed, green, drying dark brown; spadix 4.6 cm long, 3.5-3.8 mm diam.; flowers 3 visible per spriral, 2.0-3.0 mm long and wide; tepals 1.3 mm wide, broadly rounded on inner margin, 2-sided on outside; stamens retracted below the level of the tepals. Infructescence not seen.



Figure 22. Anthurium carrionii Croat & O.Ortiz. Holotype: Carrion et al. 873

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Figure 23. *Anthurium carrionii* Croat & O.Ortiz. *Carrion et al. 873.* Flowering hand-held plant in field.



Figure 24. *Anthurium carrionii* Croat & O.Ortiz. *Carrion et al. 873.* Both surfaces of blade and juvenile infructescence.



Figure 25. *Anthurium carrionii* Croat & O.Ortiz. *Carrion et al. 873*. Flowering plant in field.



Figure 26. Anthurium chaconii Croat. Holotype: Chacon 229.



Figure 27. Anthurium chaconii Croat. Paratype: Rodriguez 11667.

Distribution and ecology — *Anthurium carrionii* is endemic to Panama, known only from the type locality in Coclé Province at near sea level in a *Tropical moist forest* life zone.

Etymology — *Anthurium carrionii* is named in honor of Juan Fernando Carrión who collected the type specimen.

Comments — In the Lucid Anthurium Key, *Anthurium carrionii* tracks to *Anthurium cuasicanum* Croat, which differs by having proportionately longer petioles (almost as long as blades), more brownish-drying more long-acuminate blade and a much longer peduncle. It also keyed to *Anthurium oxystachyum* Croat which differs by having leaf blades broadest well below the middle and by having petioles equal to or longer than the blade.

Anthurium chaconii Croat, **sp. nov.** — Type: COSTA RICA. Limón: Parque Internacional La Amistad Sunidii (Agua de Venado), Croriña, 09°25'15"N, 82°59'00"W, 600 m, 19 July 1989, *A. Chacón 229* (holotype, INB-148038). Figures 26 & 27.

Diagnosis: Anthurium chaconii is provisionally placed in sect. *Decurrentia* and is characterized by its epiphytic habit, short internodes, dense cluster of roots, persistent cataphyll fibers, long-petiolate leaves, moderately long, very slender petioles, narrowly oblong-elliptic to narrowly lanceolate, greenish drying, epunctate, long-acuminate blades with weakly developed primary lateral veins, as well as the long-pedunculate inflorescence with a short greenish yellow spadix and red berries.

Epiphyte; internodes short, 2.5 cm long; cataphylls 2.0–3.8 cm long, stiffly erect, acute, persisting intact at apex, becoming fibrous with fragments of brown epidermis drying reddish brown. Leaves with petioles 2.4–19.7 cm long, 1–2 mm diam, terete, narrowly and acutely sulcate, drying reddish brown; geniculum 4–5 mm long, drying darker than petioles; blades narrowly oblong-elliptic, 6.2–20.8 cm long, 1.4–3.7 cm wide (averaging 14×3), 3.5–6.5 (averaging 5.4) times longer than broad, 0.7–2.7 (averaging 1.5) times longer than petioles, abruptly acuminate at apex, acute at base, drying subcoriaceous, drying yellowish brown and weakly glossy above, grayish brown, and weakly glossy below; midrib drying narrowly rounded and paler above, narrowly raised, glandular-punctate and darker below; primary lateral veins (8)10 per side, departing midrib at 35–45°, drying weakly and narrowly raised, paler above, weakly narrowly raised, glandular-puncate and darker below; collective veins arising from the only pair of basal veins 2–3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface densely granular but not glandular-punctate, sometimes with removable black dots (probably insect eggs); lower surface minutely granular-ridged, lacking glandular punctations, conspicuously pustular on both surfaces. *Inflorescence* with peduncle 10.1–24.7 cm long; spathe green with purple lineations, 1.5–1.7 cm long, 3 mm wide, drying moderately coriaceous, reddish brown; spadix greenish yellow, sessile, cylindrical, 3.6–7.0 cm long, 3–5 mm diam., drying yellowish red-brown; flowers 2 visible per spiral, drying 2.8 mm long and 2.2 mm wide; tepals granular on drying; lateral tepals 1.9 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. *Infructescence* with red berries.

Distribution and ecology — *Anthurium chaconii* is known only from the eastern slopes of the Cordillera de Talamanca in Limón Province at 600–700 m in *Tropical wet forest* and *Lower montane rain forest* life zones.

Etymology — *Anthurium chaconii* is named in honor of Costa Rican biologist, Abelardo Marcial Chacón Gamboa who was trained, beginning in 1980, to collect both plants and insects for the Costa Rican biodiversity program. He collected many plants including the type specimen of this species.

Comments — Anthurium chaconii is unique in Costa Rica in looking like a member of sect. Porphyrochitonium but lacking well-developed glandular punctations. Most species which resemble *A. chaconii* have proven to be members of Anthurium sect. Calomystrium series Rupicola but all of the members of this group (so far as is known) were collected in or along streams and usually were growing on rocks in or near flowing water. The Herrera collection was described as an epiphyte so there is some doubt about its sectional placement.

Anthurium chaconii is unusual in having strange brown rounded to ellipsoid gland-like structures on the lower surface that can easily be removed but they are apparently not real glandular punctations. Anthurium chaconii is very similar to *A. carrasquillanum* Croat & O.Ortiz from western Panama although that species differs by having larger leaf blades with the collective veins further from the margin, lacking antemarginal veins and by having the primarly lateral veins further apart.

Other species which are similar to *Anthurium chachonii* in terms of its blade shape, size and coloration are A. rupicola Croat which differs by having leaf blades glandular-punctate on both surfaces and has the petiole to blade ratio more nearly equal and *A. angustispadix* Croat & R.A.Baker which differs by having broader leaf blades with more primary lateral veins, much longer pale fibrous cataphylls and in having a much more long-tapered spathe and a longer spadix and pale yellow-green berries.

Paratype: COSTA RICA. Limón: Cantón de Talamanca, Fila de exploracion minera; area between Río Sukut and Río Carbri, Muragubishi, 09°22'50"N, 82°56'50"W, 700 m, 14 July 1989, G. Herrera 3287 (CR, MO). Anthurium churchillii Croat, sp. nov. — Type: PANAMA. Chiriqui: Fortuna Dam area. Along Quebrada Bonito to E of road, 08°45'N, 82°13'W, 1100 m, 8 Feb. 1984, *H.W. Churchill, G. de Nevers & H. Stockwell 4827* Holotype, (MO-3670512). Figure 28.

Diagnosis: Anthurium churchillii is a member of section *Porphyrochitonium* and is distinguished by its narrowly oblong, long-attenuated blades which dry reddish brown, the long, acutely tapered, greenish spadix and the berries which are yellowish, orange or red.

Epiphyte; internodes short, to 5 mm diam.; cataphylls to 2.7 cm long, persisting as reddish brown fibers. Leaves with petioles 2.0-8.4 cm long, 10 mm diam., subtriangular, broadly and acutely sulcate, drying medium brown; geniculum 4-5 mm, drying darker than petioles; blades narrowly oblong, 6.6-17.0 cm long, 1.6-4.6 cm wide (averaging 11 × 3), 3.4-4.8 (averaging 4.1) times longer than broad, broadest above middle, 2.3–3.9 (averaging 3.1) times longer than petioles, abruptly acuminate at apex, narrowly acute at base, coriaceous, weakly to moderately bicolorous, drying slightly reddish brown and weakly glossy above, medium brown and semiglossy below; midrib sparsely glandular, narrowly rounded and slightly darker above, sparsely glandular, narrowly acute and concolorous below; primary lateral veins 9 or 10 per side, departing midrib at 40–50°, drying convex and concolorous above, narrowly rounded and slightly darker below; tertiary veins prominulous on upper surface; collective veins arising from basal vein, to 5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface conspicuously glandular-punctate, smoother with very small brownish speckles upon magnification; lower surface with conspicuous, raised, reddish brown glandular punctations, granular. Inflorescence erect with peduncle greenish maroon, drying 10.6-23.6 cm long, medium brown; spathe lanceolate, yellow-green, drying 1–3 cm long, 3–7 mm wide, coriaceous, yellowish to reddish brown; spadix sessile, green, acutely tapered, drying 2.7-6.0 cm long, 2-3 mm diam., slightly reddish brown; flowers 3 visible per spiral, drying 3.6-3.7 mm long, 3.1-3.2 mm wide (2.1-2.3 mm long and wide pre-anthesis); tepals minutely granular on drying; lateral tepals 2.5–2.7 mm wide, the outer margins 2-sided, the inner margins rounded; stamens not seen. Infructescence with berries yellowish orange or red.

Distribution and ecology — *Figure 28. Anthurium churchillii* Croat. is endemic to Panama, known only from the type locality around the Fortuna Dam in Chiriquí and Bocas del Toro Provinces at 970–1150 m in *Premontane rain forest* life zones.



Figure 28. Anthurium churchillii Croat. Holotype: Churchill et al. 4827.



Figure 29. Anthurium comincoense Croat. Holotype: McPherson 20668.

Etymology — Anthurium churchillii is named in honor of the late Hugh W. Churchill (1946–1993) who worked on the Flora of Panama Project for the Missouri Botanical Garden during 1983 and 1984 and who made most of the collections of this species. Churchill made many fine aroid collections and for a non-specialist, his descriptions were more detailed than any other collector we have known. After working in Panama, he taught at the University of Vermont until the time of his death in 1993.

Comments — Anthurium churchillii is closest to A. gracililaminum Croat in appearance but that species has a spadix that is proportionately shorter and is bluntly rounded at apex and has berries which are white to pinkish white. In the Lucid Anthurium Key, Anthurium churchillii tracks to Anthurium brevipes Sodiro from Ecuador, A. kallunkii Croat and A. pageanum Croat (the two latter species from Panama) all of which differ by having the inflorescences shorter than the leaves. Another similar species is A. oxystachyum Croat from central Panama, which differs by having lanceolate, greenish drying leaves which are glandular-punctate only on the lower surface as well as by having a more narrowly long and pointed spadix.

Paratypes: PANAMA. Chiriquí: Fortuna Dam area. Along Quebrada Bonito to E of road, 08°45'N, 82°13'W, 1100 m, 8 Feb 1984, H.W. Churchill, G. de Nevers & H. Stockwell 4826, 4820 and 4924 (all MO); North fork of Quebrada de Arena, near Continental Divide, 08°46'N, 82°12'W, 1100 m, 8 Feb. 1984, H.W. *Churchill et al. 4855* (MO).

Anthurium comincoense Croat, **sp. nov.** — Type: PANAMA: Colón: Teck Cominco Petaquilla mining concession, forested slopes, 08°51'25"N, 80°41'47"W, 100 m, 25 June 2008, G. McPherson 20668 (holotype, MO-6103348; isotypes, COL, K. PMA, US). **Figure 29**.

Diagnosis: Anthurium comincoense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, loose, pale, persisting cataphyll fibers, long, obscurely D-shaped petioles (shorter than blades), narrowly oblong-elliptic, narrowly acuminate leaf blades which dry gray on the upper surface, yellowish green on the lower surface and glandular-punctate on both surfaces as well as by the long-pedunculate inflorescence (much longer than petioles) with a green, lanceolate, spreading spathe and a white spadix as well as white berries.

Epiphyte; internodes short, 4–5 mm diam.; cataphylls 4.2 cm long, acute, persisting as loose pale fibers with fragments of reddish brown epidermis, the fibers pale brown, the uppermost mostly closely parallel. *Leaves* with petioles 7.2-14.7 cm long, 2 mm diam., obscurely D-shaped, drying greenish yellow-brown; geniculum 1.1-1.6 cm long, drying darker than petioles; blades narrowly oblong-elliptic, 11.2-24.1 cm long, 2.4-4.6 cm wide (averaging 16×3), 4.2-5.4 (averaging 4.7) times longer than broad, broadest at middle or slightly below middle, 1.2-1.7 (averaging 1.2) times longer than petioles, gradually and narrowly acuminate at apex, (acumen 1.0-1.5 cm long), acute at base, drying subcoriaceous, gray and weakly glossy above, yellowish green and weakly glossy below; midrib drying narrowly acute and slightly paler above, narrowly rounded, finely ribbed, sparsely glandular-punctate and paler below;

primary lateral veins 14(16) per side, difficult to discern and not markedly more conspicuous than interprimary veins, departing midrib at 35–40°, drying weakly and narrowly rounded, slightly paler above, narrowly raised and slightly darker below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from the basal veins 3–4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface sparsely glandular-punctate, minutely granular-ridged on magnification; lower surface moderately smooth, conspicuously and densely glandular-punctate. *Inflorescence* with peduncle 21.7–29.1 cm long; spathe green, spreading, 3.1–4.2 cm long, 9–12 mm wide, lanceolate, drying coriaceous, greenish yellow-brown; spadix white, stipitate 5 mm, weakly tapered, 3.2–4.1 cm long, 3–4 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 2.3 mm long and 2.3–2.5 mm wide; tepals minutely granular on drying; lateral tepals mostly shield-shaped, 1.2–1.3 mm wide, inner margin rounded, outer margins 3- or 4-sided; stamens at first weakly exserted, then mostly withdrawn beneath tepals; anthers 0.2 mm long, 0.6 mm wide, thecae somewhat divaricate. *Infructescence* with berries white.

Distribution and ecology — *Anthurium comincoense* is endemic to Panamá, known only from the type locality in Colón Province at 100 m in a Tropical wet forest life zone.

Etymology — *Anthurium comincoense* is named for the type locality at the Teck Cominco Petaquilla mining area in Colón Province.

Comments — In the key to *Anthurium* of Central America, *Anthurium comincoense* comes out near *A. lancifolium* Schott, a species that differs by having leaf blades broadest below the middle and with prominent primary lateral veins.

Anthurium cuadrosii Croat, sp. nov. — Type: PANAMA, Parque Nacional del Darién, slopes of Cerro Mali, head waters of S branch of Río Pucuro, ca. 22 km E of Pucuro, 08°04'30"N, 77°14'00"W, 1300–1400 m., 23 Oct. 1987, *H. Cuadros, B. Hammel, G. de Nevers & H. Herrera 3965* (holotype, MO-3581748). Figure 30.

Diagnosis: Anthurium cuadrosii is a member of sect. *Porphyrochitonium* and is characterized by its oblong-elliptic, narrowly acuminate blades which are eglandular on the upper surface, have a narrowly (but not acutely) raised midrib on the upper surface and dry somewhat grayish, by its short inflorescence scarcely longer than the petiole, the sharply 2- or 3-ribbed-winged peduncle shorter than the petiole and by the green, narrowly cylindric, green spadix. The spathe on the type specimen is only 7 mm long and appears to be normal otherwise.

Epiphyte; internodes short, 5 mm diam.; cataphylls 2.8 cm long, persisting semi-intact, reddish brown with fragments of reddish brown epidermis. Leaves erect; petioles 12.0-13.7 cm long, 3 mm diam., sharply 2- or 3-ribbed-winged, drying dark yellowish brown; geniculum winged, to 1 cm long, drying darker than petioles; blades oblong-elliptic, 23-27 cm long, 6.0-7.1 cm wide (averaging 24×7), 3.8-4.0 (averaging 3.9) times longer than broad, broadest at middle, 1.7–2.2 (averaging 2.0) times longer than petioles, narrowly acuminate at apex, acute at base, subcoriaceous, drying grayish brown and matte above, dark yellowish brown and weakly glossy below; midrib eglandular above, drying narrowly raised and darker above, sparsely glandular below, drying narrowly raised to narrowly acute and darker below; primary lateral veins 13 or 14 per side, departing midrib at 45–50°, drying narrowly convex in sunken valleys and concolorous above, narrowly rounded, etched and slightly darker below; collective veins narrowly sunken above, as prominulous as primary lateral veins below, arising from the basal veins, to 5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely and minutely granular with minute ridging parallel to margins upon magnification; lower surface densely glandular-punctate and granular-ridged upon magnification, the glands dark brown and rounded with occasional central depression. *Inflorescence* with peduncle 7.5 cm long, 2 mm diam., sharply 2- or 3-ribbed-winged, drying yellowish medium brown; spathe green, not seen on specimen; spadix green, cylindrical, drying 9.2 cm long, 4 mm wide, medium brown; flowers 3 visible per spiral, drying 3.6 mm long, 1.6 mm wide; tepals minutely granular on drying; lateral tepals 2.1 mm wide, the outer margins 2-sided, the inner margins rounded; stamens not emergent. Infructescence not seen.

Distribution and ecology — *Anthurium cuadrosii* is known only from the type locality in the Parque Nacional del Darién at 1300–1400 m elevation in a *Tropical wet forest* life zone.

Etymology — *Anthurium cuadrosii* is named in honor of Colombian botanist, Hermes Cuadros, Curator at the Universidad de Atlantica in Baranquilla, Colombia. Hermes has spent much of his career collecting in the north of Colombia. For several years he worked at the Cartajena Botanical Gardens.

Comments — Anthurium cuadrosii is closest to A. granditepalum Croat, another species from Cerro Pirre, in having blades of similar shape and size and with a short spathe. That species differs however in having the upper blade surface conspicuously glandular-punctate, a long, slender subterete peduncle that is more than twice as long as the longest petiole, the upper midrib drying narrowly acute and large fruiting tepals (2.8–3.4 mm long).



Figure 30. Anthurium cuadrosii Croat. Holotype: Cuadros et al. 3965.



Figure 31. Anthurium deneversii Croat. Holotype: Denevers et al. 6526.

Croat et al., 2022

Anthurium deneversii Croat, **sp. nov.** — Type: PANAMA. Comarca de San Blas: Cangandí, hills NW of village toward Río Nergala, 09°24' N, 79°24'W, 50 m, 16 Dec. 1985, *G. de Nevers, H. Herrera & S. Charnley* 6526 (holotype, MO-3320670). **Figure 31**.

Diagnosis: Anthurium deneversii is a member of sect. *Porphyrochitonium* and is characterized by its moderately small size, short internodes, persistent cataphyll fibers, triangular petiole, elliptic gray-drying blades with nearly rounded apices and short, abrupt acumens with primary lateral veins that are weakly developed, scarcely visible on the dried upper blade surface as well as by the slender, cylindroid, green spadix with the stamens mostly visible.

Epiphyte; internodes short, 1 cm diam.; cataphylls 1.7 cm long, persisting at upper nodes, the fibers reddish brown, erect; leaves forming rosettes. Leaves with petioles 2.5-8.3 cm long, triangular, drying 2.5–3.0 mm wide, sharply sulcate adaxially, blackened to yellow-brown with 3 or more ridges on the sides, 0.2–0.5 times as long as the blades; geniculum 0.6–1.0 cm long, not markedly different from petiole shaft; blades narrowly elliptic, 12.9–17.5 cm long, 5.3–7.0 cm wide (averaging 16×6), 2.4–2.6 (averaging 2.5) times longer than wide, 2.4–5.4 (averaging 4.8) times longer than petioles, narrowly rounded and weakly and abruptly short-acuminate at apex, acute to narrowly rounded at base, subcoriaceous, drying gray above, brownish gray below; midrib narrowly raised and concolorous above, narrowly rounded and slightly paler below, drying several-ridged and concolorous to darker than surface above, several ridged and darker or paler than surface; primary lateral veins 8 or 9 per side, departing midrib at 50–55°, only weakly visible and weakly undulate on drying and equaling the collective veins on the dried upper blade surface, along with the collective veins weakly raised on drying below; collective veins arising from the base, 3–5 mm from margin; upper surface eglandular, appearing smooth, closely areolate with pale punctations on magnification; lower surface conspicuously glandular-punctate, closely areolate on magnification, the whitish punctations not apparent. Inflorescence much shorter than leaves; peduncle 11 cm long, drying 1 mm wide, several ribbed, semiglossy, dark brown; spathe green, linear-lanceolate, 3.6 cm long, 4 mm wide, abruptly short-acuminate at apex, reflexed-spreading; spadix narrowly oblong, sessile, 5.5 cm long, 3 mm diam., green, rounded at apex; flowers 3 visible per spiral, 2.5–2.8 mm long, 1.6–1.8 mm wide; lateral tepals 1.1–1.3 mm wide, the inner margin broadly rounded, the outer margin 2-sided; stamens remaining exposed or at least with some stamens visible along the entire length of the spadix; anthers 4–5 mm long, only slightly longer than wide, held at the level of the tepals. Infructescence not seen.

Distribution and ecology — *Anthurium deneversii* is known only from the type locality in the Comarca de San Blas near the Caribbean coast at 50 m elevation in a *Premontane rain forest* life zone.

Etymology — Anthurium deneversii is named in honor of American botanist, Gregory Clark de Nevers, who collected the species while working as the Curator of Summit Herbarium in Panama City, Panama. Greg lived in Panama and collected for the Missouri Botanical Garden's Flora of Panama Project for three years. Greg worked closely with Kuna Indians and collected widely throughout Panama. Later he served as the resident biologist at the 1200 hectare Pepperwood Preserve in Sonoma County, CA, as well as at the Bolinas Lagoon Preserve of Audubon Canyon Ranch. Greg served in the Peace Corps in Guinea (West Africa) from 2018 through 2020, and is now a botanist with the U.S. Forest Service in Happy Camp, CA.

Comments — Anthurium deneversii may be closest to A. jefense Croat mostly known from he vicinity of Cerro Jefe and mostly above 900 m elevation but that species differs by having leaf blades oblong-elliptic and less than 5 cm wide, 3.5–4.0 times longer than wide with the lower surface drying usually brownish, upon magnification densely brownish maculate and irregularly short-ridged-granular. In contrast, A. deneversii has leaf blades narrowly elliptic, 2.4–2.6 times longer than wide with the lower surface drying grayish and upon magnification densely areolate, not brownish maculate, not short-ridged nor granular. A. deneversii may also confused with A. lactifructum Croat owing to the size and shape of its blades but that species differs by having glandular punctations on the upper surfaces.

Anthurium diversurense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along Continental Divide from road branching N off main Fortuna-Chiriquí Grande Highway near Continental Divide; 1.1 mi from main highway, 08°44'N, 82°17'W, 1200 m, 11 Mar. 1985, T.B. Croat & M.H. Grayum 60341A (holotype, MO-3237538). **Figure 32**.

Diagnosis: Anthurium diversurense is a member of sect. *Porphyrochitonium* distinguished by ts epiphytic habit, short internodes, persistent reddish brown cataphyll fibers, sharply 3-sided petioles; elliptic, brown-drying blades with etched primary lateral veins and collective veins as well as the long-pedunculate inflorescences with green spathe and spadix.

Epiphyte; stems 6 cm long; internodes short, 4 mm diam.; cataphylls 3.5 cm long, persistent, reddish brown, fibrous with fragments of medium brown epidermis. *Leaves* with petioles 7.7–13.2 cm long, to 4 mm diam., sharply C-shaped, flat adaxially with erect margins, drying grayish brown; geniculum 8 mm long, drying darker than petioles; blades elliptic, 17.5–21.8
The current status of Anthurium sect. Porphyrochitonium ...



Figure 32. Anthurium diversurense Croat. Holotype: Croat 60341A.



Figure 33. Anthurium doroteryense Croat. Holotype: Rodriguez et al. 11247.

cm long, 6.2-7.9 cm wide (averaging 20×7), 2.6-2.8 (averaging 2.7) times longer than broad, broadest midway, 1.7-2.3 (averaging 1.9) times longer than petioles, abruptly acuminate at apex (acumen to 8 mm long), attenuate at base, subcoriaceous, moderately glossy, dark green above, moderately paler below, drying slight reddish brown and semiglossy above, grayish brown and weakly glossy below; midrib sparsely glandular, narrowly raised and darker above, sparsely glandular, narrowly raised to sharply acute, concolorous below; primary lateral veins 14 or 15 per side, departing midrib at 55–60°, etched, narrowly raised and concolorous above, narrowly rounded and paler below; collective veins arising from the basal veins, to 5 mm from margin, etched above, scarcely visible below; basal veins 1 pair; antemarginal vein present; upper surface densely and minutely granular, densely glandular-punctate, the glands larger than on lower surface and appearing flat; lower surface equally glandular-punctate and weakly brown- speckled. Inflorescence with peduncle 15.7-22.5 cm long, green or tinged reddish, V-shaped, flattened adaxially with a medial rib, drying medium brown; spathe narrowly ovate-elliptic, green, tinged reddish, drying 5.2 cm long, 5 mm wide, coriaceous, slightly reddish brown; spadix medium green, cylindrical, weakly tapered, drying 5.7-8.0 cm long, 3 mm diam., medium brown; flowers 3 visible per spiral, drying 3 mm long, 2.2 mm wide; tepals weakly glossy, granular on drying; lateral tepals 2 mm wide, the outer margins 3-sided, the inner margins rounded; stamens not emerged. *Infructescence* not seen.

Distribution and ecology — *Anthurium diversurense* is known only from the type locality in Panama in Bocas del Toro Province near the Continental Divide at 1200 m in a Premo*ntane wet forest* life zone.

Etymology — The epithet comes from the Latin '*diversurus*' (meaning about to divert or separate) and '-ensis' (indicating origin) referring here to the Continental Divide (commonly called La Divisura) where the species was collected.

Comments — *Anthurium diversurense* is similar to *A. paulmaasii* Croat but that species differs by having a peduncle shorter than the petioles and a narrowly ovate-elliptic spathe that is 2.8 times longer than wide.

Anthurium doroteryense Croat, sp. nov. — Type: COSTA RICA. Limón: Talamanca. Parque Nacional La Amistad. Cuenca de Sixaola, Talamanca. Bratsi. Alrededores de Laguna Dorotery. Bosque primario, 09°37'04.7"N, 83°16'05.1"W, 900–910 m, 23 July, 2007, A. Rodríguez, D. Santamaría, D. Solano, S. Bridgewater, A. Solis, M. Moraga & W. Ga 11247 (holotype, CR). Figure 33.

Croat et al., 2022

Diagnosis: Anthurium doroteryense is a member of sect. *Decurrentia* and is characterized by its epiphytic habit, persistent fibrous cataphylls, elongate terete petioles, oblong-linear, greenish brown, narrowly acute, epunctate blades with obscure primary lateral veins, collective veins arising from one of the lowermost primary lateral veins and running close the margin as well as by it long-pedunculate inflorescence with a linear-lanceolate green spathe and long-stipitate, narrowly oblong reddish burgundy spadix.

Epiphytic. stems short; internodes short, ca. 1 cm diam.; cataphylls 12 cm long, rounded at apex, persisting as slender, much shorter fibers. *Leaves* with petioles 15.5–16.5 cm long, drying deeply sulcate adaxially, medium yellow-brown; geniculum 1 cm long, drying darker, weakly sulcate, transversely fissured; blades linear, 33.0-38.5 cm long, 2.8-4.0 cm wide, 9.6-10.7 times longer than wide, 0.5–0.6 times as long as blades, narrowly acute at apex, slightly less acute at base, drying moderately coriaceous, yellowish brown and slightly glossy above, slightly paler and semiglossy below, epunctate on both surfaces; midrib narrowly and acutely raised and concolorous above, narrowly and bluntly raised and slightly paler below; primary lateral veins 40-45 per side, departing midrib at 35-45°, scarcely more conspicuous than interprimary veins, narrowly rounded and concolorous on both surfaces; collective veins arising from one of the lower primary lateral veins near the base, 1-2 mm from margin, scarcely or not at all loop-connected; upper surface eglandular, minutely and densely areolate-granular; lower surface eglandular, minutely granular-ridged. Inflorescence erect, long-pedunculate; peduncle 21 cm long, 1.5 mm diam.; spathe green, linear-lanceolate, 5.5 cm long, 7 mm wide, acute and narrowly rounded at apex, rounded at base, drying densely granular on both surfaces; spadix narrowly oblong, reddish violet, 16.2 cm long, stipitate 2.2 cm (stipe 1.5 mm diam.); flowers 6 visible per spiral, 1.8–2.1 mm long, 1.4–1.5 mm wide; tepals weakly granular, inner margin rounded, outer margins 2-sided; stamens clustered around the style at the level of the tepals; anthers 0.4 mm long and wide; thecae somewhat divaricate, persisting exserted. Infructescence not seen.

Distribution and Ecology — *Anthurium doroteryense* is endemic to Costa Rica, known only from the type locality in Limón Province at 900–910 m in a *Premontane rain forest* life zone.

Etymology — The species is named for the type locality at the Laguna Dorotery in the Parque Nacional La Amistad in Limón Province, Talamanca Cantón.

Comments — *Anthurium doroteryense* has been confused with *A. bakeri* but that species differs by having much broader blades with glandular punctations and deeply sunken collective veins with a stubby whitish spadix. In the key to the species of Central American

Anthurium doroteryense tracks to Anthurium eximium Engl., a member of sect. Pachyneurium with an ovate spathe and a short somewhat clavate spadix.

Anthurium duocostatum Croat, sp. nov. — Type: PANAMA. San Blas (Kunayala): 7 mi. N of Interamerican Highway on El Llano-Cartí Road, ca. 09°15'N, 79°00'W, 550 m, 14 Mar. 1985, *G. McPherson 6854* (holotype, MO-3208939). Figure 34.

Diagnosis: Anthurium duocostatum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, internodes which are sometimes longer than broad, long, sharply C- to D-shaped petioles, more or less elliptic grayish-drying blades which are matte on the lower surface and glandular-punctate on both surfaces as well as by the long-pedunculate inflorescence with a long-tapered, sharply pointed green spadix.

Epiphyte; internodes short, 7 mm diam.; cataphylls 4 cm long, semi-intact, reddish brown becoming fibrous with fragments of reddish brown epidermis, the fibers manilla. Leaves with petioles 8.1-13.7 cm long, drying 3 mm diam., C-shaped (nearly D-shaped), drying grayish brown; geniculum 0.7 cm long, drying slightly darker than petioles; blades oblong-elliptic, 13.1–18.3 cm long, 4.7–6.2 cm wide (averaging 16 × 5), 2.8–3.0 (averaging 2.9) times longer than broad, broadest midway, 1.3-1.6 (averaging 1.4) times longer than petioles, abruptly acuminate, attenuate at base, subcoriaceous, bicolorous, drying gray-brown and weakly glossy above, grayish brown and semiglossy below; midrib drying narrowly rounded, sparsely pustular and slightly darker above, narrowly raised, sparsely pustular and concolorous below; primary lateral veins 9 or 10 per side, departing midrib at 55-60°, drying narrowly rounded and concolorous above, narrowly rounded to narrowly raised and concolorous below; collective veins arising from the basal veins, 2 mm from margin; basal veins 1 pair; antemarginal vein present' upper surface conspicuously granular, glandular-punctuate (glands dark brown, weakly raised with center concave); lower surface moderately smooth, somewhat pustular in places, glandular-punctuate (glands dark brown, weakly raised with concave center) with fine ridging upon magnification below. Inflorescence long-pedunculate, erect-spreading; peduncle 2-ridged, 27 cm long, drying narrowly and obtusely sulcate and brown; spathe perhaps white, 4 cm long, 2 mm wide, drying coriaceous and reddish brown; spadix green, long-tapered, sharply pointed, 7.7 cm long, 3 mm diam., drying dark reddish brown; flowers about 2–3 visible per spiral, drying 2.2–2.4 mm long, 1.8–2.0 mm wide; tepals minutely granular and sparsely pustular on drying; lateral tepals 1.2 mm wide, the outer margins 2-sided, inner margin rounded. Infructescence not seen.

Distribution and Ecology — *Anthurium duocostatum* is endemic to Panama, known only from the type locality in central Panama at ca. 550 m in a *Premontane wet forest* life zone.



Figure 34. Anthurium duocostatum Croat. Holotype: McPherson 6854.



Figure 35. Anthurium edtysonii Croat. Holotype: Nee & Tyson 10897.

Etymology — The species epithet derives from '*duo*' (two) and '*costatus*' (ribbed) and refers to the two-ribbed state of the adaxial surface of the petioles.

Comments — *Anthurium duocostatum* is perhaps closest to *A. zhui* Croat which differs by having shorter internodes, darker reddish brown cataphyll fibers, sharply 3-sided petioles, proportionately longer, brown-drying more narrowly long-acuminate blades.

Anthurium edtysonii Croat, sp. nov. — Type: PANAMA. Colón: Colón to Portobello, vic. of bridge over Río Viejo, 9 m, 4 km NE of Puerto Pilón, 09°23'30"N, 79°46'15"W, 9 m, 27 Mar. 1974, *M. Nee & E. Tyson 10897* (holotype, MO-2251621). Figure 35.

Diagnosis: Anthurium edtysonii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, pale loosely organized cataphyll fibers, short-petiolate leaves, sulcate petioles, narrowly oblong-oblanceolate grayish-green-drying long-acuminate leaves with a single pair of basal veins, upper surface with an acutely raised midrib, short pale-lineate and epunctate, lower surface elineate and densely glandular-punctate as well as by the moderately long-pedunculate inflorescence with a green spathe and spadix.

Epiphyte; stem short, less than 10 cm long; internodes short, 0.5-1.0 cm diam.; cataphylls 4.5-5.2 cm long, persisting as a loose network of pale fibers, becoming fibrous with fragments of yellowish-brown epidermis, the fibers manila. Leaves with petioles 6.2-9.8 cm long, 3 mm diam., drying sharply sulcate, light yellowish brown; geniculum 4-6 mm long, drying darker than petiole; blades narrowly oblong-oblanceolate, 38-46 cm long, 4.2-5.4 cm wide (averaging 42 × 5), 8.5–9.1 (averaging 8.9) times longer than broad, broadest at midpoint, 4.4–4.9 (averaging 4.7) times longer than petioles, gradually acuminate at apex, acute at base, subcoriaceous, drying grayish green and matte above, grayish yellow-brown and weakly glossy below; midrib drying narrowly raised to acute, irregularly several ribbed and paler above, narrowly raised to acute, sparsely glandular-punctate and paler below; primary lateral veins 14-20 per side, departing midrib at 25–30°, drying narrowly raised to acute, concolorous above, narrowly acute, and slightly darker below; secondary veins drying as prominent as primary lateral veins above and below; collective veins arising from basal veins, 3-5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface short pale-lineate and epunctate; lower surface elineate and densely glandular-punctate. Inflorescence erect, much longer than petioles but much shorter than leaves with peduncle 20.3 cm long; spathe green, erect-spreading, 2.5 cm long, 3 mm wide, linear-lanceolate, drying moderately coriaceous, medium reddish brown; spadix greenish, sessile, weakly tapered, measurements unknown, drying medium brown; flowers 3 visible per spiral, drying 2.1 mm long and 1.9 mm wide; tepals papillate-granular on drying; lateral tepals 1.4 mm wide, the outer margins 3-sided, inner margin rounded; stamens not exserted. Infructescence not seen.

Distribution and Ecology — *Anthurium edtysonii* is endemic to Panama, known only from the type locality in Colón Province at or near sea level in a Premontane wet forest life zone.

Etymology — Anthurium edtysonii is named in honor of Dr Edwin Tyson, formerly a Professor of Biology with the University of Florida who spent most of his professional career in Panama teaching students in the U.S. Military. Ed was one of the most active plant collectors in the 1960's and 1970's and worked with the U.S. Army to develop a collection of plants at facilities of the Army Tropic Test Center located at the Miraflores locks on the Panama Canal. Staff of the Missouri Botanical Garden used those facilities when Dr Walter Lewis conducted expeditions to Panama. Later Ed Tyson helped Lewis establish Summit Herbarium at Summit Gardens where the Missouri Botanical Garden operated a field station for more than 10 years. Upon retirement, Tyson returned to his native Georgia where he raised hybrid cattle on his farm.

Comments — Anthurium edtysonii seems closest to A. iguanitense Croat which differs by having proportionately shorter, more deeply sulcate petioles, broader oblanceolate-elliptic blades which are 10 times longer than petioles (versus 4.5 times longer than petioles for A. edtysonii). In the Lucid Anthurium Key, Anthurium edtysonii also tracks to Anthurium acutangulum Engl., which differs by having proportionately much longer petioles and mostly pendent more or less elliptic blades; A. caloveborum Croat which differs by having leaves with proportionately longer petioles and blades that dry generally brownish; A. ramonense Engl. ex K.Krause, which differs by being a much larger proportionately more long-petiolate plant with a more or less elliptic blade; A. oxystachyum Croat, which differs by having smaller, shorter lanceolate blades and spadices that are acutely pointed and A. utleyorum Croat & R.A.Baker, which differs by having proportionately narrower more oblong and more coriaceous blades.

Anthurium flagellum Croat, sp. nov. — Type: PANAMA: Colón: 2–3 km. up the Río Iguanita from the sea, evergreen wet forest, ca. 09°29'N, 79°41'W, 200–300 m, 21 Feb. 1976, *H. Kennedy & R. Dressler 3507* (holotype, F-1780156). Figure 36.

Diagnosis: Anthurium flagellum is a member of sect. *Porphyrochitonium* and is recognized by its epiphytic habit, short internodes, semi-intact persistent cataphylls, the long terete petioles which are narrowly flattened and weakly 3-ribbed adaxially, the narrowly lanceolate, caudate-acuminate blades which dry gray above and yellow-green below with an eglandular upper surface and sunken collective veins and the primary lateral veins only weakly discernable as well as by the long-pedunculate (about as long as petioles) slender green inflorescence with a slender, scarcely tapered spadix and a narrow reflexed spathe.

Epiphyte; internodes short, 5 mm diam.; cataphylls 3.5 cm long, persisting semi-intact, reddish brown with fragments of reddish brown epidermis. Leaves erect with petioles 14.0-16.3 cm long, 2 mm diam., subterete, narrowly flattened and weakly 3-ribbed adaxially, drying gravish green-brown; geniculum to 1.3 cm long, drying darker than petioles; blades narrowly lanceolate, dark green above, green below, 23.9-28.0 cm long, 3.4-4.8 cm wide (averaging 26×4), 6.8–7.9 (averaging 7.4) times longer than broad, broadest below middle, 1.7 times longer than petioles, caudate-acuminate at apex (acumen to 3.5 cm), acute at base, drying papyraceous, grayish brown above and yellow-green below; midrib eglandular above, drying bluntly acute and slightly paler above, sparsely glandular-punctate below, drying narrowly rounded, finely ribbed and paler below; primary lateral veins 20 per side, departing midrib at 55-60°, drying weakly convex and concolorous above, narrowly rounded, weakly etched and slightly darker below; collective veins sunken above, bluntly acute below, arising from the basal veins, to 2-3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely granular-ridged parallel to the margins upon magnification; lower surface minutely and irregularly granular ridged upon magnification, densely glandular-punctate with the glands dark reddish brown, weakly raised and with an occasional central depression. Inflorescence with peduncle green, 17 cm long, 1-2 mm diam., drying weakly 3-ribbed adaxially, grayish green-brown; spathe lanceolate-elliptic, green, reflexed, 3.2 cm long, 4 mm wide, drying subcoriaceous and yellowish brown; spadix yellowish green, slender, cylindrical, scarcely tapered, drying 3.4 cm long, 2 mm wide, medium brown; flowers (in bud) 2-3 visible per spiral, drying 1.1 mm long, 1.3 mm wide; tepals minutely granular on drying; lateral tepals 0.9 mm wide, the outer margins 2-sided, the inner margins rounded. Infructescence not seen.

Distribution and Ecology — *Anthurium flagellum* is known only from the type locality in Colón province at 200–300 m elevation in a *Tropical wet forest* life zone.

Etymology — The epithet '*flagellum*' refers to the long flagellate apex of the blade, from the Latin for whip.

Comments — *Anthurium flagellum* is most easily confused with *A. bakeri* but that species has thicker, oblong-elliptic, less acuminate, conspicuously bicolorous blades and a much thicker, white, cylindroid spadix.



Figure 36. Anthurium flagellum Croat. Holotype: Kennedy & Dressler 3507.



Figure 37. Anthurium floresii Croat & O.Ortiz. Holotype: Ortiz et al. 2452.

Anthurium floresii Croat & O.Ortiz, sp. nov. — Type: PANAMA. Darién: Serrania de Cañasas, Reserva Privada Chucantí, Cima de Cerro Chucantí, 1325 m, 30 Aug. 2014, O.O. Ortiz, R. Flores, A. Sierra, J. Batista, Y. Guadalupe & C. Rodríguez 2452 (holotype, MO-6600594; isotype, PMA). Figure 37.

Diagnosis: Anthurium floresii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, thin, short, persistent cataphyll fibers, subterete, weakly sulcate petioles, narrowly oblong-elliptic to narrowly elliptic, more or less concolorous, gradually acuminate, brownish drying blades which are narrowly acute at the base with a single pair of collective veins moderately close to the margin with glandular punctations only on lower surfaces, moderately obscure primary lateral veins as well as a long-pedunculate inflorescence with a terete peduncle, a slender reflexed purplish-violet to greenish-red spathe and cylindroid-tapered dark violet spadix with berries which are white with just the apex dark violet.

Epiphyte; internodes very short, ca. 1 cm diam.; cataphylls to 2 cm long, persisting as thin, moderately loose red-brown fibers. Leaves with petioles 2.2-4.2 cm long (averaging 3.3 cm), drying gray-brown, 1.5 mm diam., 0.17–0.25 times as long as blades, subterete, weakly sulcate adaxially; geniculum 5–7 mm, drying darker than petioles; blades narrowly oblong-elliptic to narrowly elliptic, 13–17 cm long, 2.1–4.0 cm wide (averaging 15 × 3), 3.6–6.6 (averaging 4.5) times longer than broad, 3.9-5.8 (averaging 4.2) times longer than petioles, gradually acuminate at apex, narrowly acute at base, subcoriaceous, more or less concolorous, drying brownish olive and matte above, slightly paler and grayish yellow-brown and matte below; midrib weakly raised above, round-raised and slightly paler below, drying much thicker than broad and paler above, prominently raised with a medial rib, scarcely paler below; primary lateral veins 9-11 per side, departing midrib at 35-45°, weakly evident on the upper surface, slightly more evident on lower surface; collective veins a single pair arising from the base, 2.0-3.5 mm from margins, scarcely visible above, weakly raised below but scarcely loop-connecting the primary lateral veins; primary lateral veins ca. 10 per side, moderately obscure above, slightly more apparent below; upper surface eglandular, granular and sparsely flattened-pustular, sometimes densely longitudinally ridged; lower surface densely glandular-punctate, densely and minutely pale-speckled. Inflorescence long-pedunculate; peduncle 16.5 cm long, 1.5 mm diam. on drying, terete; spathe oblanceolate, 2.3 cm long, 4 mm wide, reflexed, purplish violet to greenish red; spadix 3.5 cm long, 4 mm diam. in fruit, cylindroid-tapered, dark violet, stipitate 2 mm; flowers 3 visible per spiral, 2.5-2.6 mm long, 1.8-2.0 mm wide; tepals coarsely granular; lateral tepals 1.8–2.0 mm wide; inner margin rounded, outer margin 2-sided; stamens barely emerging above edge of tepals, retracting; anthers 0.4 mm long, 0.6 mm wide; thecae ovoid, scarcely divaricate. Infructescence with berries white with just the apex dark violet.

Distribution and Ecology — *Anthurium floresii* is endemic to Panama, known only from the type locality in Darién Province in the Serrania de Cañasas at 1325 m in a Tropical wet forest life zone.

Etymology — *Anthurium floresii* is named after Panamanian botanist, Rodolfo Flores who helped collect the type specimen. Rodolfo is an excellent plant collector and has participated in many expeditions in Panama, visiting remote and botanically unexplored areas. In 2015 and 2016 he was trained in Classical Taxonomy in two renowned botanical gardens in the United States, the Missouri Botanical Garden and Marie Selby Botanical Garden.

Comments — *Anthurium floresii* is seemingly closest to both *A. alticola* Croat and *A. tutense* Croat but differs from both in having an eglandular upper blade surface.

Anthurium gerardoi Croat, **sp. nov.** — Type: COSTA RICA. Limón: Cantón de Talamanca, Fila de exploracion minera; area between Río Sukut and Río Carbri, Muragubishi, 09°22'50"N, 82°56'50"W, 700 m, 14 July 1989, *G. Herrera* 3287A (holotype, CR-14986). **Figure 38**.

Diagnosis: The sectional placement is in doubt but *Anthurium gerardoi* is here placed in sect. Calomystrium ser. Rupicola. It is distinguished by its epiphytic habit, short internodes, persistent cataphyll fibers, long-petiolate, narrowly lanceolate, greenish drying, epunctate blades with weakly developed primary lateral veins and a long-pedunculate inflorescence with a green, tapered spadix and reddish berries.

Epiphyte; internodes short, 8 mm diam.; cataphylls 3.8 cm long, acute, persisting intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel; petioles 16.3–19.7 cm long, 2 mm diam., subterete, sharply sulcate, drying yellowish brown; geniculum 5 mm long, drying darker than petioles; blades narrowly lanceolate, 14.3–20.8 cm long, 3.1–3.7 cm wide (averaging 18 × 3.3), 4.6–6.1 (averaging 5.2) times longer than broad, broadest at petiole attachment, 0.7–1.3 (averaging 1.0) times as long as petioles, abruptly acuminate at apex, (acumen to 1 cm long), acute at base, drying subcoriaceous, grayish green brown and matte above, greenish brown and weakly glossy below, epunctate both surfaces; midrib drying narrowly raised and darker above, narrowly raised, epunctate and darker below; primary lateral veins 8 (10) per side, departing midrib at 55° near middle, drying weakly and narrowly raised, concolorous above, narrowly raised and darker below; secondary veins drying moderately conspicuous on lower surface, scarcely more visible than surface above; collective veins arising from 1st primary lateral veins 3 mm from margin; basal veins 1 pair; upper surface eglandular, densely granular-pustular with obscure



Figure 38. Anthurium gerardoi Croat. Holotype: G. Herrera 3287A.



Figure 39. Anthurium glandulicostum Croat & O.Ortiz. Isotype: McPherson 20688.



Figure 40. Anthurium glandulicostum Croat & O.Ortiz. Holotype: McPherson 20688.

short pale-lineations; lower surface eglandular, sparsely granular-pustular. *Inflorescence* with peduncle 14.7–24.7 cm long; spathe green, 1.7 cm long, to 3 mm wide, oblong-lanceolate, drying moderately coriaceous, medium reddish brown; spadix green, sessile, cylindroid and weakly tapered, 3.7–4.9 cm long, 3–5 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 2.8 mm long and 1.6 mm wide; tepals minutely granular on drying; lateral tepals 1.7 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. *Infructescence* with berries red (fide G. Herrera, pers. comm.).

Distribution and Ecology — *Anthurium gerardoi* is known only from the type locality in Limón Province in Costa Rica at 700 m elevation in a *Lower montane rain* forest life zone.

Etymology — *Anthurium gerardoi* is named for Costa Rican botanist, Gerardo Herrera who collected the type specimen. Hererra is one of the finest plant collectors in the history of plant exploration in Costa Rica.

Comments — Anthurium gerardoi is unique in Costa Rica in looking like a member of sect. Porphyrochitonium but lacking well-developed glandular-punctations. Most species which resemble A. gerardoi have proven to be members of Anthurium sect. Calomystrium series Rupicola but all of the members of this group (so far as is known) were collected in or along streams and usually were growing on rocks in or near flowing water. The Herrera collection was described as an epiphyte so there is some doubt about its sectional placement. Anthurium gerardoi is most similar to A. rupicola Croat, a member of sect. Porphyrochitonium in terms of blade shape, size and coloration but that species differs by having leaf blades glandular-punctate on both surfaces and has the petiole to blade ratio more nearly equal.

Anthurium glandulicostum Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Colón: Teck Cominco Petaquilla mining concession, forested slopes, 08°51'18"N, 80°40'08"W, 165 m, 26 June 2008, *G. McPherson 20688* (holotype, PMA-73428). Figures 39 & 40.

Diagnosis: Anthurium glandulicostum is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, few persistent cataphyll fibers, deeply sulcate, glandular-punctate petioles which are about one-third as long as blades and dry weakly glossy and minutely granular, elliptic-oblanceolate, long-acuminate, grayish-green-drying blades which glandular-punctate on both surfaces, narrowly acute at the base with a single pair of relatively remote collective veins, 7 or 8 pairs of primary lateral veins as well as a short-pedunculate inflorescence, green reflexed lanceolate spathe and long-tapered, green to yellow spadix. Epiphyte; internodes short, 6–10 mm diam.; cataphylls 3.8–4.0 cm long, acute at apex, persisting semi-intact at apex, becoming pale course fibers and fragments of reddish brown epidermis. Leaves with petioles (4.6)8.3-10.5 cm long, 2-3 mm diam., 0.3-0.4 times as long as blades, drying gray-green to yellow-brown, weakly glossy and minutely granular, deeply sulcate with prominently raised acute margin above, acutely angular abaxially; geniculum 1.3–1.7 cm long, drying slightly darker, same thickness; blades elliptic-oblanceolate, (15)21.3-31.6 cm long, (3.6)5.3-6.7 cm wide, 3.7-4.9 times longer than wide, 2.2-3.3 (averaging 2.8) times longer than petioles, long-acuminate at apex, narrowly acute at base, subcoriaceous, drying weakly glossy and gray-green to grayish olive-green above, weakly glossy and yellowish graygreen below; midrib narrowly rounded, concolorous above, drying acutely raised and slightly darker below, glandular-punctate on both surfaces; primary lateral veins 7–14 per side, departing midrib at 50-60°, weakly and narrowly rounded, concolorous above, narrowly rounded and concolorous to darker below; tertiary veins moderately obscure; basal veins 1 or 2 pairs; collective veins, arising from near the base to the 4th pair of primary lateral veins, 6–8 mm from margin; upper surface smooth to minutely granular, minutely arerolate to faintly pale-speckled with a few short pale-lineations, conspicuously dark glandular-punctate; lower surface more coarsely granular, conspicuously dark glandular-punctate. Inflorescence short-pedunculate; peduncle 8.7–9.8 cm long, 1.5 mm wide, drying minutely granular, sparsely glandular-punctate; spathe narrowly oblong-lanceolate, ca. 7.5 cm long, 8 mm wide, green, reflexed, drying moderately coriaceous; spadix stipitate to 6 mm, 6.3–9.7 cm long, 3–6 mm diam., 16 times longer than broad, long-tapered, green to yellow, drying green-brown; flowers 3-4 visible per spiral, 2.6–3 mm long, 2.2–2.6 mm wide; tepals minutely papillate-granular on drying; lateral tepals 1.4–1.7 mm wide, inner margin broadly round, outer margin 2-sided; stamens not remaining exserted. Infructescence not seen.

Distribution and Ecology — *Anthurium glandulicostum* is endemic to Panama, known only from the type locality in Colón Province at 165 m in a *Tropical wet forest* life zone.

Etymology — The specific epithet is from the Latin '*glandula*' meaning a small gland, '*costa*' meaning midrib, referring to a glandular-punctate midrib.

Comments — In the Lucid Anthurium Key, *Anthurium glandulicostum* tracks to *A. bakeri* which differs by leaf blades drying green on upper surface with the collective veins drying much more conspicuously than the primary lateral veins and by having the spadix more cylindroid and whitish; *A. billdarcyi* Croat, which differs by having blades that more narrowly long-acuminate, drying dark brown above with no glandular punctations; *A. boqueronense* Croat, a species which lacks glandular punctations as well as by having proportionately much shorter petioles and a long-pedunculate inflorescence which is nearly as long as the leaves;

A. comincoense Croat, which differs by having proportionately longer petioles, 14 or more primary lateral veins, collective veins 3–4 mm from margin and a proportionately much longer inflorescence; *A. gentryi* Croat, which differs by having much smaller blades (to 10 cm long and 2.7 cm wide) with a proportionately much longer inflorescence; *A. paludosum* Engl., which differs by having cataphylls drying intact and much more coriaceous blades; *A. rupicola* Croat, which differs by having proportionately more slender leaf blades, much longer peduncles and a stipitate white spadix and *A. vallense* Croat, which differs by having massive reticulated cataphyll fibers.

Anthurium granditepalum Croat, sp. nov. — Type: PANAMA. Darién: Middle slopes on west side of Cerro Pirre, 07°56'N, 77°45'W, 29 June 1988, 800–1050 m, *T.B. Croat 68939* (holotype, MO-3610809). Figure 41.

Diagnosis: Anthurium granditepalum is a member of sect. *Porphyrochitonium* and is characerized by its oblong-elliptic, grayish-drying blades with the upper blade surface conspicuously glandular-punctate, with the upper midrib drying acutely raised, the primary lateral veins sunken but with a medial rib on the upper surface and with the primary lateral veins drying undulate on the upper surface. Also characteristic is the long, slender subterete peduncle that is more than twice as long as the longest petiole and by the slender infructescence with only 2–3 flowers visible per spiral and with depressed-globose berries tinged lavender, surrounded by large fruiting tepals (2.8–3.4 mm long).

Epiphyte; internodes short, 1.2 cm diam.; cataphylls 2 cm long, intact, dark reddish brown, fibrous with fragments of brown epidermis. Leaves with petioles 7.7-16.3 cm long, 3 mm diam., sharply sulcate, drying gravish brown; geniculum 1.1 cm long, drying much darker than petioles; blades oblong-elliptic, 17.4-30.6 cm long, 4.0-6.9 cm wide (averaging 24×6), 3.9-4.6 (averaging 4.2) times longer than broad, broadest midway, 1.6-2.3 (averaging 1.9) times longer than petioles, abruptly acuminate at apex (acumen to 1.2 cm long), acute at base, subcoriaceous, moderately bicolorous, drying grayish brown and matte above, grayish brown and semiglossy below; midrib convex and paler on both surfaces, drying acutely raised, sparsely glandular, concolorous above, narrowly rounded, sparsely glandular and slightly darker below; primary lateral veins 18 per side, departing midrib at 50-55°, sunken above, pleated-raised beneath drying narrowly rounded and concolorous above, narrowly raised and concolorous below; collective veins arising from basal veins, 2-3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface conspicuously glandular-punctate (glands sometimes sunken in center) and minutely areolate; lower surface glandular-punctate (glands equally dense on both surfaces) and moderately smooth, densely and inconspicuously dark-speckled. Inflorescence erect; peduncle long, slender, 36 cm long, drying sharply sulcate, gravish brown;



Figure 41. Anthurium granditepalum Croat. Holotype: Croat 68939.



Figure 42. Anthurium gregneversii Croat. Holotype: Churchill et al. 4619.

spathe green, erect, drying 1.2 cm long, 4 mm wide, reddish brown; spadix green, uniform and weakly tapered, drying 8 cm long, 7 mm diam., reddish brown; flowers 2 visible per spiral, drying 4.5 mm long, 4.3 mm wide; tepals granular on drying; lateral tepals 4.2 mm wide, the outer margins 2-sided, inner margin rounded. *Infructescence* with berries white, tinged lavender, depressed-globose.

Distribution and Ecology — *Anthurium granditepalum* is known from the type locality in Panama in Darien Province at 800–1050 m in a *Tropical wet forest* life zone.

Etymology — The epithet refers to the large size of the tepals which are unusually large for a spadix of the size for this species.

Comments — Anthurium granditepalum is closest to Anthurium cuadrosii Croat, another pecies from Cerro Pirre, in having blades of similar shape and size and with a short spathe. That species differs however in having the upper blade surface eglandular and has a bluntly and narrowly raised (but not acute) midrib on the upper surface and a short, sharply 2- or 3-ribbed-winged peduncle that is shorter than even the shortest petiole, four flowers visible per spiral and the tepals of the flowering spadix only 1.8–2.0 mm long.

Anthurium gregneversii Croat, sp. nov. — Type: PANAMA. Bocas del Toro: Oleoducto Road, near Continental Divide, Fortuna Dam area, 1000 m, 08°48'N, 82°12'W, 5 Feb. 1984, *H.W. Churchill, G. de Nevers & H. Stockwell 4619* (holotype, MO-3210675). Figure 42.

Diagnosis: Anthurum gregneversii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, subterete petioles with a conspicuous geniculum, more or less oblong, narrowly acuminate yellow-brown-drying blades which are rounded at the base with a single pair of collective veins close to the margin and with close obscure primary lateral veins, a short slender peduncle, green lanceolate spathe and green weakly tapered spadix.

Epiphyte; stem and leaves erect; internodes short, 4–5 mm diam.; cataphylls 2.7–5 cm long, persisting as straight, pale brown, slender fibers, deciduous at lower nodes. *Leaves* with petioles 8–17 cm long, 1.6 mm diam., subterete, slightly flattened adaxially, drying sulcate; geniculum conspicuously swollen, 6 mm long (including remainder of petiole plexus), drying dark brown, drying sulcate adaxially; blade oblong, weakly tapered to apex, (14.3) 21–23.5 cm long, 2.5–3.4 cm wide, (5.7) 7.5–8.1 times longer than wide, narrowly and sharply acuminate at apex, narrowly rounded at base, moderately coriaceous, drying yellowish brown on both surfaces; midrib narrowly and acutely raised, concolorous above, weakly raised, finely and irregularly

ridged, concolorous; primary lateral veins 20–25 per side, departing midrib at 25–30°, narrowly and weakly raised, concolorous above, narrowly rounded and concolorous, glandular-punctate below; collective veins one pair, 1.5–2.5 mm from margins; densely dark glandular-punctate (with larger glands) below; upper surface drying densely and conspicuously granular and thick pustular, sparsely glandular-punctate above; lower surface drying closely ridge-granular, sparsely glandular on the lower margins. *Inflorescence* erect; peduncle 11.0–13.7 cm long, 0.8 cm diam., finely ribbed and densely granular; spathe green, 1.5–2.0 cm long, 4–6 mm wide, spreading to reflexed-spreading; spadix green, 3.3–4.0 cm long, 4 mm diam.; flowers 4–5 visible per spiral, 2.5 mm long and wide; lateral tepals 0.6 mm wide; stamens weakly protruding, held near the surface of the tepals, all held persisting exserted; anthers 0.6 mm long, 0.7 mm wide; thecae weakly divaricate. *Infructescence* not seen.

Distribution and Ecology — *Anthurium gregneversii* is endemic to Panama, known only from the type locality in Bocas del Toro Province near the Chiriquí Province limit at 1000 m in at Tropical wet forest life zone.

Etymology — *Anthurium gregneversii* is named for Greg de Nevers who, along with Hugh Churchill and Henry Stockwell, collected the type specimen (see also *A. deneversii* above).

Comments — Seemingly, *Anthurium gregneversii* is closest to *Anthurium crassiradix* ssp. *purpureospadix* Croat but that taxon has a purple, more long-tapered spadix. It differs from the typical variety of that species by having a narrower, proportionately longer blades which are mostly more than 7.5 or more times longer than broad (versus 2.9–3.5 times longer than broad for *A. crassiradix* ssp. *crassiradix*).

Anthurium guaboense Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Oleoducto Road, 2 km NE of Continental Divide, on ridge between Río Guabo and Río Guabito, 1000 m, 08°48'N, 82°12'W, 9 Feb. 1984, *H. W. Churchill, D. de Nevers & H. Stockwell 4938* (holotype, MO-3210642). **Figure 43**.

Diagnosis: Anthurium guaboense is a member of sect. *Porphyrochitonium* distinguished by its epiphytic habit, short internodes, persistent cataphyll fibers, subtriangular petioles which are sharply sulcate adaxially and abaxially, by the dark yellow-brown-drying elliptic blades, long-pedunculate inflorescence with a green spathe and green, long-tapered spadix.

Epiphyte; internodes short, 2 cm diam.; cataphylls to 3.5 cm long, persistent, red-brown, drying reddish brown, fibrous with fragments of pale reddish brown epidermis. *Leaves* with petiole 9.9–10.6 cm long, drying 2–3 mm diam., subtriangular, broadly, sharply sulcate above,

winged above and below, drying sharply sulcate adaxially and abaxially; geniculum 0.7 cm long, drying slightly darker than petioles; blades elliptic, 19.5–23.6 cm long, 7.9–8.0 cm wide (averaging 22×8), 2.5–3.0 (averaging 2.7) times longer than broad, broadest above midway, 2.0–2.2 (averaging 2.1) times as long as petioles, abruptly acuminate at apex, acute at base, subcoriaceous, drying dark yellowish brown and weakly glossy above, yellowish brown, and semiglossy below; midrib drying narrowly rounded, ribbed adaxially and darker above, narrowly raised and concolorous below; primary lateral veins ca. 23 per side, departing midrib at 55–60°, narrowly rounded, pale pustular-granular and slightly paler above, convex, pale pustular-granular and concolorous below; collective veins arising from basal veins, 2-4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate, conspicuously pale-pustular and minutely granular; lower surface more densely glandular-punctate, moderately smooth with minute scattering of tiny pale granules on magnification. Inflorescence erect with peduncle 32 cm long, reddish green, 2-winged proximally, drying yellowish brown; spathe narrowly elliptic, reddish green, 6.6 cm long, 9 mm wide, drying coriaceous and yellowish brown; spadix green, long-cylindric, 13.5 cm long, 3 mm wide, drying grayish yellow-brown; flowers 3 visible per spiral, drying 4.2 mm long, 2.2 mm wide; tepals minutely granular on drying; lateral tepals 2.0 mm wide, the outer margins 2-sided, inner margin rounded. Infructescence not seen.

Distribution and Ecology — *Anthurium guaboense* is known only from the type locality in Panamá in Bocas del Toro Province along the Continental Divide at 1000 m in a *Premontane wet forest* life zone.

Etymology — The epithet derives from the type locality at the Río Guabo in Bocas del Toro Province.

Comments — *Anthurium guaboense* may be confused with *A. pageanum* Croat but that species differs by having typically much longer, typically oblong-elliptic blades ranging from 2.7 to 6.5 times longer than wide and drying grayish with the primary lateral veins markedly undulate on drying as well as in having the minor veins flat, not at all prominulous. In contrast, the blades of *A. guaboense* have leaf blades elliptic, 2.3–2.7 times longer than wide, drying dark brown and have primary lateral veins usually not markedly undulate. In addition, *A. pageanum* has minor veins drying prominulous on both surfaces.

In the Lucid Anthurium Key, *Anthurium guaboense* tracks to *A. alatipedunculum* Croat & .A.Baker from the area of the Osa Peninsula on the western slope in Costa Rica which differs by having blades pale short-lineate and eglandular to weakly glandular-punctate above; *A. durandii* Engl., also known only from the western slopes of SW Costa Rica, which differs by



Figure 43. Anthurium guaboense Croat. Holotype: Churchill 4938.



Figure 44. Anthurium guadalupeae Croat & O.Ortiz. Holotype: Ortiz et al. 2663



Figure 45. Anthurium guadalupeae Croat & O.Ortiz. Ortiz et al. 2663. Inflorescence.



Figure 46 Anthurium guadalupeae Croat & O.Ortiz. Ortiz et al. 2663. Habit in field.

having conspicuously glandular-punctate upper blade surfaces and a terete peduncle and the spadix 3 times longer than the spathe and *A. vallense* Croat which differs by having a very long cataphyll which forms a pale net-like reticulum.

Anthurium guadalupeae Croat & O.Ortiz, sp. nov. — Type: PANAMA. Darién: Serranía de Pirre, Rancho Plastic, 07°58'07"N, 7°42'26"W, 1208 m. 1 Agosto, 2016, O.O. Ortiz, R. Flores, E. Campos, Y. Guadelupe & C. Quirós 2663 (holotype, MO-6724959; isotype, PMA). Figures 44–46.

Diagnosis: Anthurium guadalupeae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, oblong-elliptic, narrowly acuminate blades which are eglandular above and dry dark gray-brown, glandular-punctate below and dry médium yellow-brown with 18–20 markedly wrinked primary lateral veins per side, collective veins arising from the base and straight close to the margins as well as by its long-pedunculate inflorescence with a linear-lanceolate, spreading, reddish spathe and a sessile, scarcely tapered, moderately long, green spadix.

Epiphyte. Stem short; internodes short, 1.0–1.5 cm diam.; cataphylls 2.5–3.0 cm long, persisting as fine dark red-brown fibers, the innermost more or less intact. Leaves with petioles 19-24 cm long, subterete with a longitudinal rib abaxially, drying moderately ribbed, reddish brown, 2 mm diam.; geniculum 1.5–1.7 cm long, drying darker, flattened adaxially; blades narrowly oblong-elliptic to oblong-oblanceolate, 24.5-27.4 cm long, 4.3-5.3 cm wide, 4.7-6.0 times longer than wide, 1.0–1.35 times longer than petioles, gradually acuminate at apex, attenuate at base, subcoriaceous, dark olive-green, pale green beneath, drying moderately gray-brown and matte, moderately paler, yellow-brown and weakly glossy below; midrib drying broadly round-raised, finely ribbed, concolorous above, narrowly rounded and darker, finely ribbed below; primary lateral veins 14-16 per side, departing midrib at 45-50°, weakly raised, narrowly rounded, slightly paler above, narrowly rounded, darker, moderately undulate; collective veins arising from the base, 1.0-1.3 mm from the margin, not at all loop-connected, not sunken adaxially; upper surface eglandular, minutely areolate-ridged; lower surface dark glandular-punctate, moderately smooth, minutely brown-speckled. Inflorescence sub-pendent; peduncle subterete, 26.5 cm long, drying dark brown, 1.5 mm diam.; spathe linear-lanceolate, reflexed, reddish, margin greenish; spadix erect, sessile, narrowly cylindroid, cane-green, 8.5 cm long, 3.3–3.4 mm diam.; flowers 3 visible per spiral, 2.5–3.0 mm long, 2.0–2.2 mm wide; tepals conspicuously granular, lateral tepals 1.4–1.5 mm wide, inner margin broadly rounded, outer margin broadly 2-sided; stamens included, filaments 02.5 mm wide; anthers 0.25 mm long, 0.15 mm wide; thecae weakly divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium guadalupeae* is endemic to Panama, known only from the type locality in Darién Province at 1200 m in a Premontane wet forest life zone.

Etymology — *Anthurium guadalupeae* is named in honor of Panamanian biologist Yessica Guadalupe from the Universidad de Panama who assisted in collecting the type specimen. Yessica is an avid enthusiast with the study of hornworts and liverworts.

Comments — Anthurium guadalupeae is similar to both A. pirrense Croat and A. caloveboranum Croat. The former differs by having proportionately broader greenish-drying leaf blades that are 2.9–3.3 times longer than broad (versus 5.7–7.3 times for A. pirrense), collective veins which are closer to the margins (5–13 mm versus 2–3 mm for A. guadalupeae), petioles that are more nearly the length of the blade (petiole-blade ratio of 1.2 versus 0.8 for A. guadalupeae) and spadix pale orange-brown versus pale green. Anthurium caloveborum differs by having the midrib sharp (like the edge of knife) on the upper surface and by having the lower blade surface much paler and brownish speckled.

In the to key to *Anthurium* for the Flora of Mesoamerica (Croat, in press) *Anthurium guadalupeae* keys to *A. floresii* Croat & O.Ortiz, another species from the Cerro Pirre área but that species from the nearby Serrania de Cañasas differs by having petioles less than 5 cm long, leaf blades less than 20 cm long and less than 4 cm wide with peduncles less than 16.5 cm long and by having a dark violet spadix.

Anthurium heraclioanum Croat, **sp. nov.** — Type: PANAMA. San Blas: Río Playón Chico, Campamento to Neba Dummat, 09°15'N, 78°15'W, 50–60 m, 11 July 1994, *H. Herrera* 1666 (holotype, MO-04642615). **Figures 47–49**.

Diagnosis: Anthurium heraclioanum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent mostly intact and mostly deciduous cataphylls, sharply triangular petiole and peduncle, oblong-elliptic, brown-drying blades which are glandular-punctate only on the lower surface, a single pair of basal veins rather remote from the margins, moderately obscure primary lateral veins as well as by the moderately long-pedunculate inflorescence with a green erect-spreading spathe, green weakly tapered spadix and red berries.

Epiphyte; internodes short, 0.8–3.0 cm diam.; cataphylls mostly deciduous, only the intact basal portion persisting. *Leaves* with petioles 12.7–13.7 cm long, 5 mm diam., 0.4–0.6 times as long as blades, sharply 3-sided and winged on the angles, flattened adaxially with the margins erect, drying acutely triangular, medium brown; geniculum 1.0–1.1 cm long, drying

darker than petioles, the margins sometimes markedly undulate; blades elliptic-obovate, 28.5–33.5 cm long, 8–11 cm wide (averaging 30×10), 2.7–3.3 (averaging 3.1) times longer than broad, broadest above midway, 1.7-2.2 (averaging 2) times longer than petioles, weakly short-acuminate at apex, acute at base, coriaceous, dark green and semiglossy above, much paler and semiglossy below, drying coriaceous, dark brown to gravish brown and matte to semiglossy above, grayish brown and weakly glossy to semiglossy below; midrib narrowly rounded and paler above, sharply angular below, sparsely glandular and conspicuously granular on both surfaces, drying narrowly raised and paler above, bluntly acute and concolorous below; primary lateral veins 17 per side, along with the collective veins etched above, scarcely raised below, departing midrib at 65–70°, conspicuously granular on both surfaces on drying, drying narrowly raised and paler above, bluntly acute and concolorous below; collective veins arising from basal veins, 8-10 mm from margin; tertiary veins not visible on either surface; basal veins 1 pair; antemarginal vein present; upper surface minutely and densely granular, glandular-punctate, the glands button-shaped; lower surface glandular-punctate, less densely granular but sparsely pale-pustular and reddish brown speckled. Inflorescence erect; peduncle 21.6–28.0 cm long, sharply 3-sided, drying reddish brown; spathe green, erect-spreading, drying 2.5 cm long, 1.1-1.7 cm wide, coriaceous and reddish brown; spadix yellowish green, weakly tapered, 6.3–11.5 cm long, 5–6 mm diam., (13.4 cm long, 1.3 cm diam., in fruit), drying reddish brown; flowers 3 visible per spiral, drying 2.5 mm long, 2.9 mm wide; tepals with subglobular cellular inclusion on drying; lateral tepals 1.5 mm wide, inner margin rounded, outer margins 2-sided; stamens not emergent. Infructescence erect; berries red; seeds 1.8 mm long, 1.6 mm wide, ca. 1.2 mm thick.

Distribution and Ecology — *Anthurium heraclioanum* is endemic to Panama, known only from the Atlantic slope type in Bocas del Toro, Colón Province and the Comarca of Kunayala (San Blas) at 50–60 m for certain but the sterile collection from Bocas del Toro is almost certainly this species also. It occurs in *Premontane wet forest* life zones.

Etymology — *Anthurium heraclioanum* is named in honor of Heraclio Herrera from the Comarca de Kunayala who collected the type specimen. Heraclio is a good explorer who has made many excellent collections in Kunayala.

Comments — Anthurium heraclioanum is most easily confused with and no doubt closely related to *A. dwyeri* Croat which differs by having usually much narrower, more gray-drying blades which are moderately smooth (not moderately granular) upper surfaces and lavender-white berries.



Figure 47. Anthurium heraclioanum Croat. Paratype: Croat 60277.



Figure 48. Anthurium heraclioanum Croat. Paratype: Knapp 3602.

The current status of Anthurium sect. Porphyrochitonium ...



Figure 49. Anthurium heraclioanum Croat. Holotype: Herrera 1666.



Figure 50. Anthurium hughchurchilii Croat. Holotype: Churchill 5560.
Paratypes: PANAMA. **Bocas del Toro**: Along road between Fortuna Dam and Chiriquí Grande, 7.3 mi N of bridge over Fortuna Dam, 3.2 mi N of Continental Divide, 08°49'00"N, 82°12'36"W, 700 m, 10 Mar 1985, *T.B. Croat & M.H. Grayum 60277* (MO). Colón: Portobelo, ca. 1–2 km from the Portobelo Highway up the Río Guanche, 09°30'N, 79°40'W –, 09°30'N, 79°41'W, 0–50 m, 17 Feb 1982, *S. Knapp & R. J. Schmalzel 3602* (MO).

Anthurium hughchurchillii Croat, sp. nov. — Type: PANAMA. Colón: Road to Santa Rita Ridge, 09°20'N, 79°47'W, 200 m, 29 June 1984, *H.W. Churchill 5560* (holotype, MO-36705117). Figure 50.

Diagnosis: Anthurium hughchurchillii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short petioles, elliptic to oblanceolate-elliptic, abruptly acuminate blades drying grayish yellow-brown drying with the upper midrib narrowly acute, the primary lateral veins and the collective veins weakly raised, the surfaces both glandular-punctate as well as by the inflorescence much longer than the petioles with a short, reflexed green spathe and a moderately short, stubby spadix.

Epiphyte; internodes short, 8 mm diam.; cataphylls 3 cm long, intact, persisting as coarse red fibers. Leaves with petioles 2.8-3.7 cm long, 2 mm diam., subterete, broadly and shallowly sulcate above, drying yellowish brown; geniculum to 8 mm long, drying darker than petioles; blades elliptic to oblanceolate-elliptic, 12.1-13.8 cm long, 3.9-4.7 cm wide (averaging $13 \times$ 4), 2.9-3.1 (averaging 3.0) times longer than broad, broadest midway, 3.8-4.3 (averaging 4.0) times longer than petioles, abruptly acuminate, narrowly acute at base, subcoriaceous, slightly bicolorous, drying gravish yellow-brown slightly glossy above, gravish brown and semiglossy below; midrib drying narrowly acute and concolorous above, narrowly raised, sparsely glandular-punctate, minutely ribbed and slightly paler below; primary lateral veins 8 per side, departing midrib at $30-40^\circ$, drying narrowly rounded to convex and paler above, narrowly rounded, sparsely glandular-punctate and concolorous below; collective veins arising from basal veins, 3-4 mm from margin, slightly more conspicuous than the primary lateral veins on both surfaces; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate, glands reddish brown, smaller and darker than on lower surface, with a network of fine reticular ridges with areolae present upon magnification; lower surface more densely glandular-punctate, (glands reddish brown), irregularly ridged but smoother than upper surface. Inflorescence with peduncle to 13.2 cm long, drying sharply sulcate, dark yellowish brown; spathe elliptic, green, to 3.8 cm long, 4 mm wide, drying coriaceous and reddish brown; spadix green, uniformly and weakly tapered, drying 3.7 cm long, 3 mm diam., yellow reddish brown; flowers 4 visible per spiral, drying 1.7 mm long, 1.2 mm wide on immature flower, 3.7 mm long 1.7 mm wide on mature flower; tepals pustular on drying; lateral tepals 1.2 mm wide on immature flower, 2.4 mm wide on mature flower, the outer margins 3-sided, the inner margins rounded; stamens probably withdrawn post-anthesis. Infructescence not seen.

Distribution and Ecology — *Anthurium hughchurchillii* is known only from the type locality in Colón Province at 200 m elevation in a *Tropical wet forest* life zone.

Etymology — Anthurium hughchurchillii is named in honor of the late Dr Hugh Churchill (1946–1993), a graduate of the University of Massachusetts and one of the principal collectors for the Missouri Botanical Garden during the Flora of Panama Project. Hugh was a prodigious explorer and made many collections of Araceae including the type of this species.

Comments — *Anthurium hughchurchillii* is similar to *A. tutense* Croat but that species has the blades more narrowly acuminate and downturned at apex, has proportionately longer petioles and reddish to violet-purple spadices.

Anthurium iguanitense Croat, **sp. nov.** — Type: PANAMA: Colón: 2–3 km up Río Iguantita from sea, evergreen wet forest, ca. 09°29'N, 79°41'W, 200–300 m, 21 Feb. 1976, *H. Kennedy* & *R. Dressler 3504* (holotype, PMA). Figure 51.

Diagnosis: Anthurium iguanitense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent cataphyll fibers, short, bluntly V-shaped, deeply and narrowly sulcate petioles, oblanceolate, grayish drying, weakly glossy blades with the collective veins drying sunken above and somewhat more conspicuous than the primary lateral veins as well as by the long-pedunculate inflorescence with a reflexed, linear-lanceolate green spathe and the narrow, slightly light yellow-green, tapered spadix.

Epiphyte; internodes short, 1 cm diam.; cataphylls 5.2 cm long, persisting as medium yellowbrown, erect, semi-organized fibers. Leaves with petioles 3.5–4.3 cm long, 3 mm diam., bluntly triangular, deeply and narrowly sulcate adaxially, narrowly rounded abaxially, drying yellowish brown, the upper margins acute; geniculum 1 cm long, drying darker than petioles; blades oblanceolate, 37.2–37.7 cm long, 8.9–9.0 cm wide, 4.0–4.2 (averaging 4.1) times longer than broad, 8.9–9.9 (averaging 9.4) times longer than petioles, narrowly acuminate and downturned at apex, narrowly acute at base, subcoriaceous, dark olive-green above, semiglossy and paler green below, drying grayish and slightly glossy above, only weakly paler and slightly yellowish gray and slightly more glossy below; midrib narrowly rounded and concolorous above, narrowly raised to bluntly acute and slightly paler below, drying finely several-ribbed on both surfaces, drying slightly darker than surface above, slightly paler than surface below; primary lateral veins 10–12 per side, departing midrib at 45–50°, sunken above, slightly raised below, drying indistinguishable on the upper surface with minor veins prominulous and only a few mm apart on upper surface, narrowly raised and concolorous and scarcely more prominulous than the interprimary veins on lower surface; tertiary veins prominulous on both surfaces; collective veins arising from the base, 5–7 mm from the margins, weakly sunken above, drying moderately sunken and concolorous above, drying narrowly raised below, slightly more conspicuous than the primary lateral veins on both surfaces; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely granular and short-ridged on magnification; lower surface conspicuously glandular-punctate and minutely granular. Inflorescence with peduncle 33 cm long, dark purple, drying grayish yellow-brown, irregularly ridged, 1.5 mm diam.; spathe lanceolate, green, 6.6 cm long, 6 mm wide, tinged purple along margins, reflexed, acuminate at apex, narrowly acute at base, the margins meeting at a 30° angle, drying with the veins close and raised and with both surfaces densely granular; spadix light yellow-green, narrowly tapered, 6 cm long, drying 3 mm diam., medium yellow-brown, matte; flowers 3-4 visible per spiral, 1.8–2.2 mm long, 1.6–1.8 mm wide; lateral tepals 0.9–1.1 mm wide, the outer margins 2-sided, inner margins straight to broadly rounded; pistils drying dark brown, 0.6 mm long, 0.4 mm wide, held well below the tepals; stamens not seen. Infructescence not seen.

Distribution and Ecology — *Anthurium iguanitense* is known only from the type locality in Colón, Province of Panama along the Río Iguanita relatively near the Caribbean at 200–300 m in a *Tropical wet forest* life zone.

Etymology — The epithet refers to the type locality along the Río Iguanita in Colón Province in Panamá.

Comments — Anthurium iguanitense seems closest to A. fragrantissimum Croat which shares leaves of similar size and shape and are also eglandular on the upper blade surface, but that species dries consistently blackened and the lower surface has an obscure whitish speckling and lacks the dense granular texture so prevalent in A. iguanitense. In addition, the spadix of A. fragrantissimum dries blackened not yellow-brown as in A. iguanitense. Anthurium iguanitense is also close to A. terryae Standl. & L. O. Williams, a species with a similarly grayish, oblanceolate blade but that species has smaller blades, less than 28 cm long which are glandular-punctate above. In having a long, slender spadix, it is similar to Anthurium acutifolium Engl., but that species has proportionately longer petioles and more frequently elliptic blades.



Figure 51. Anthurium iguanitense Croat. Holotype: Kennedy & Dressler 3504.



Figure 52. Anthurium insolitum Croat & O.Ortiz. Holotype: Zapata et al. 1563.

Anthurium insolitum Croat & O.Ortiz, sp. nov. — Type: PANAMA. Darién: Parque Nacional Darién, Cerro Pirre, 1400 m, 07°46'00"N, 77°44'06"W. May 1999, A. Zapata, J. Polanco, C. Brandaris & J. Teucama 1583 (holotype, PMA-82007). Figure 52.

Diagnosis: Anthurium insolitum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short slender internodes, dense red-brown cataphyll fibers, long-petiolate leaves, slender, terete, dark brown-drying petioles, oblong-elliptic, narrowly acuminate, brownish drying leaf blades which are narrowly acute to attenuate at base, densely glandular-punctate on the lower surface with a single pair of obscure collective veins arising from near the base and close to the margins as well as by the narrowly long-pedunculate inflorescence with a green, decurrent, reflexed spathe and a narrowly long-cylindroid, brownish spadix.

Epiphyte; stems short, less than 7 cm long; internodes short, ca. 1 cm diam. or less; cataphylls 2.5 cm long, persisting semi-intact with some dark brown fibers. Leaves long- petiolate; petioles 13.7–18.5 cm long, slender, terete, drying dark brown, ca. 1 mm diam.; geniculum sulcate, drying 10-12 mm long; blades 16.8-19.5 cm long, 4.6-4.7 cm wide, 3.5-4.1 times longer than wide, 0.9-1.1 times longer than petiole, narrowly oblong-elliptic, narrowly long-acuminate at apex, narrowly acute to attenuate at base, thinly coriaceous, dark green and semiglossy above, slightly paler and semiglossy below, drying gray-brown to dark brown above, dark reddish brown below; midrib narrowly acute and prominently raised concolorous above, rounded darker and wrinkled below; primary lateral veins 6 or 7 per side, departing midrib at 70–75°, inconspicuous, drying concolorous, wrinkled-undulate above, narrowly rounded and slightly darker below; collective veins arising from the base, 1-2 mm from margin, the margin rolled tightly under; tertiary veins inconspicuous; upper surface smooth and eglandular; lower surface densely dark glandular. Inflorescence long-pedunculate; peduncle slender, slightly longer than petioles, terete, drying 1 mm diam.; spathe green, lanceolate, shorter than spadix, reflexed; spadix weakly short-stipitate (ca. 1 mm), 13.5 cm long, 1.8 mm diam., green, drying dark brown; flowers 2.3–2.4 mm long, 1.0–1.3 mm wide; lateral tepals 1.8 mm long, inner margins very broadly rounded, outer margins 2-sided; stamens withdrawing below the level of tepals. Infructescence not seen.

Distribution and Ecology — *Anthurium insolitum* is endemic to Panama, known only from the type locality in Darién on Cerro Pirre at 1400 m elevation in a *Tropical wet forest* life zone.

Etymology — *Anthurium insolitum* is named from the Latin '*insolitus*' (meaning unusual) referring to the unusual condition of petioles being longer that the blades.

Comments — In the Lucid Anthurium Key, Anthurium insolitum tracks to A. amargalense Croat & M.M.Mora which differs by being much larger and more broadly elliptic, more than 8 cm wide; A. filiforme Engl, which differs by having much larger oblanceolate leaf blades and a sessile yellow spadix and A. umbricola Engl., which differs by having broadly elliptic blades and a sessile, much shorter, cylindroid spadix.

Anthurium jicoteense Croat, **sp. nov.** — Type: COSTA RICA. Cartago: Cantón Turrialba. Distrito Tayutic, Jicotea, Finca La Pradera, subiendo la Fila hacia San Antonio, 09°47'15"N, 83°33'15"W, 1400 m, *G. Herrera 7886* (holotype, MO-05036250; isotype, CR). **Figure 53**.

Diagnosis: Anthurium jicoteense is a member of sect. *Porphyrochitonium* and is characterized by its pendent epiphytic habit with short stems, short internodes, loosely persistent reddish brown cataphyll fibers, moderately long-petiolate leaves but with the petioles only about half as long as the blades, narrowly sulcate, subterete petioles, narrowly oblong-elliptic, grayish drying, narrowly acuminate blades which are acute at the base with a single pair of collective veins, dark green, matte and glandular-punctate above with a prominently raised midrib, paler and glandular-punctate below with the primary lateral veins less conspicuous than the collective veins as well as by the long-pedunculate inflorescence with a reddish brown spathe and a long narrowly-tapered green spadix.

Epiphyte; internodes short, 1 cm diam.; cataphylls 3.5 cm long, persisting semi-intact, fibrous with fragments of reddish brown epidermis, the fibers becoming manila. *Leaves* with petioles 16.0-25.4 cm long, 3 mm wide, terete, obtusely and broadly sulcate, drying olive-brown; geniculum 1.3 cm long, drying darker than petioles; blades oblong-elliptic, 34.5-49.2 cm long, 5.1-6.9 cm wide (averaging 42×6), 6.7-7.1 (averaging 6.9) times longer than broad, broadest midway, 1.9-2.2 (averaging 2.0) times longer than petioles, abruptly acuminate at apex, acute at base, subcoriaceous, drying brownish olive-green and weakly glossy above, olive-green and semiglossy below; midrib sharply acute, sparsely glandular-punctate and paler above, narrowly rounded, sparsely glandular-punctate, multi-ribbed with one prominent rib abaxially and concolorous below; primary lateral veins 12-14 per side, departing midrib at $40-50^{\circ}$, sunken above, drying narrowly convex and concolorous above, narrowly rounded, sparsely granular and paler below; collective veins arising from basal veins, 3-7 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface sparsely glandular-punctate, densely granular and minutely glandular-ridged upon magnification; lower surface glandular-punctate, smoother and pustular. *Inflorescence* with peduncle 25 cm long, rose-lilac, drying sharply sulcate



Figure 53. Anthurium jicoteense Croat. Holotype: Herrera 7886.



Figure 54. Anthurium jimfolsomii Croat. Holotype: Folsom 2973.

and dark reddish brown; spathe reddish brown, drying 7.5 cm long, 1 cm wide, coriaceous; spadix green, uniform and weakly tapered, drying 16.7 cm long, 3 mm diam., reddish brown; flowers 5 visible per spiral, drying 2.8 mm long, 1.7 mm wide; tepals subgranular with imbedded cellular inclusions on drying; lateral tepals 1.4 mm wide, the outer margin 2-sided, the inner margin broadly rounded with both margins at times concave. *Infructescence* not seen.

Distribution and Ecology — *Anthurium jicoteense* is known only from the type locality in Costa Rica, in Turrialba Province, found at 1400 m in a *Premontane rain forest* life zone.

Etymology — The species epithet derives from the type locality at Turrialba in Cartago Province.

Comments — In the Lucid Anthurium Key, *Anthurium jicoteense* tracks to *A. pageanum* Croat which differs by having smaller leaf blades (less than 28 cm long) and a shorter spadix (usually less than 7 cm long) as well as triangular petioles which are often 4–5 winged adaxially; *A. gracilispadix* Croat, which differs by having much smaller, oblong-elliptic leaf blades that are about 3.4 times longer than broad and a much shorter, prominently tapered spadix and *A. caloveborum* Croat, which differs by having more brownish drying blades that are usually less than 5 times longer than broad and petioles which are nearly as long as the blades or only somewhat shorter than the blades.

Anthurium jimfolsomii Croat, **sp. nov.** — Type: PANAMA. Veraguas: 6.4 km outside Santa Fé on road that passes the agriculture school, headed toward the cordillera; 5 May 1977, *J.P. Folsom 2973* (holotype, MO-2603136). **Figure 54**.

Diagnosis: Anthurium jimfolsomii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent cataphyll fibers, petioles about as long as the blades, yellowish green-drying, oblong-elliptic blades which are glandular-punctate and pustular on both surfaces and in having the inflorescence much longer than the leaves. Also characteristic is the short green, reflexed spathe and the long-tapered, acute, green spadix.

Epiphyte; internodes short, 0.4–0.5 cm diam.; cataphylls 2.2 cm long, persisting semi-intact at apex, with reddish brown fibrous persistent below. *Leaves* with petioles 8–11 cm long, drying 1 mm diam., 0.8–1.2 times as long as blades, subterete, slightly flattened, drying yellowish brown, weakly folded longitudinally, weakly glossy; geniculum 0.5 cm long, slightly thicker than petiole shaft and drying blackened; blades oblong-elliptic, 7.9–11.9 cm long, 2.0–3.6 cm wide (averaging 10×3), 3.1–4.0 (averaging 3.4) times longer than wide, 0.9–1.2 (averaging 1.0) times longer than petiole, gradually short-acuminate at apex, broadest at the middle, acute at base, not at all decurrent, subcoriaceous, drying yellowish gray-green, scarcely bicolorous; midrib scarcely raised and drying concolorous above, thicker, irregularly ridged and slightly paler below; primary lateral veins 5 or 6 per side, scarcely more prominent than the interprimary veins, departing midrib at 45°, weakly raised and concolorous on both surfaces, slightly less prominent than collective veins; collective veins 2 pairs, arising from the base, the innermost 4–5 mm from the margin, the outer 1–2 mm from margin, uniting with the margin in lower 1/3 of blade; margins drying somewhat undulate; tertiary veins moderately weak; upper surface and lower surface sparsely pustulate and densely glandular-punctate. *Inflorescence* erect, long-pedunculate; peduncle 21 cm long, 1.5 mm diam., terete, drying darl brown; spathe green, 2.3 cm long, 5 mm wide, reflexed; spadix narrowly long-tapered, acute at apex, green to yellow-green, 7–8 cm long, 3–5 mm diam., drying matte; flowers 3–4 per visible per spiral, more or less quadrangular, 1.8 mm long, 1.5 mm wide (pre-anthesis), to 3.5–4.2 mm long in fruit, the surface smooth, medium yellow-green; lateral tepals 3-sided, the inner margin broadly rounded, drying raised and convex across the surface. *Infructescence* not seen.

Distribution and Ecology — *Anthurium jimfolsomii* is known only from the type locality near Santa Fé in Veraguas Province at 500–700 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium jimfolsomii* is named for Dr James Folsom, Director of the Huntington Botanical Garden, who collected the type specimen when he worked for the Missouri Botanical Garden while serving as Curator of Summit Herbarium and collecting for the Flora of Panama Project.

Comments — Anthurium jimfolsomii resembles to A. gracilispadix Croat which also has oblong elliptic, greenish drying blades and long-tapered greenish spadices but which differs from that species in having smaller, thicker blades and in having the inflorescences shorter than leaves rather than much longer than leaves. In addition, the leaf blades of Anthurium jimfolsomii have the blades merely acute at the base rather than somewhat attenuate at the base. Anthurium jimfolsomii is also similar to A. cuasiacanum Croat from Darién Province of Panama but that species differs by having the blades narrowly ovate and gradually long-acuminate at the apex and in having tepals drying roughened and dark brown. Another species resembling Anthurium jimfolsomii is A. oxystachyum Croat, owing to its blades of similar size and color but that species has its blade broader below the middle and are glandular-punctate only on the lower surface. Moreover, it has the inflorescence shorter than the leaves. *Anthurium kensytsmae* Croat, **sp. nov.** — Type: PANAMA. Colón Prov., Santa Rita Ridge Road, 09°24'N, 79°39'W, 304–365 m, 25 Sep. 1980, *K.J. Sytsma 1322* (holotype, MO-2807213). Figure 55.

Diagnosis: Anthurium kensytsmae is is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit high in trees (to 15 m), by its short, slender internodes, its short, semi-intact cataphylls, the long, slender petioles which are about as long as or longer than the blades (drying narrowly triangular with a deep sulcus and acute margins), by the oblong-elliptic to almost oblong, brownish-drying blades which are epunctate above and brownish speckled and glandular-punctate on the lower surface as well as the purplish brown spadix sharply tapered to the apex.

Epiphytic in trees up to 15 m; internodes short, 5 mm diam.; cataphylls 1.6 cm long, semi-intact, becoming quickly fibrous, mostly deciduous, and not evident, drying medium brown. *Leaves* with petioles 11.0–12.7 cm long, 2 mm diam., drying narrowly triangular with a deep sulcus and acute margins, slightly reddish brown; geniculum 0.7 cm long, drying darker than petioles; blades oblong-elliptic to almost oblong, 9.5-11.6 cm long, 3.1-4.1 cm wide (averaging 11×4), 2.8–3.3 (averaging 3.1) times longer than broad, broadest midway, 0.8–1.0 (averaging 0.9) times as long as petioles, abruptly acuminate at apex, base acute to weakly acuminate, rarely obtuse, drying subcoriaceous, grayish brown and matte above, medium brown and weakly glossy below; midrib eglandular on both surfaces, drying narrowly raised to narrowly acute and slightly darker above, narrowly convex and concolorous below; primary lateral veins 7 or 8 per side, departing midrib at $45-50^\circ$, drying convex and slightly paler above, narrowly rounded and concolorous below; collective veins arising from 1st pair of basal veins, 2-3 mm from margin; basal veins 2 pairs, the outer pair merging with the margins in lower ¹/₃; upper surface eglandular, densely and minutely red-brown speckled; lower surface sparsely glandular-punctate (somewhat irregular), red-brown speckled (irregularly blotched and diffuse), minutely parallel-ridged upon magnification. Inflorescence with peduncle to 21 cm long, drying reddish brown; spathe lanceolate-oblong, 4.5 cm long, 5 mm wide, green, drying coriaceous and slightly reddish brown; spadix sessile, purplish brown, sharply tapered, 3.7 cm long, 3 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 1.4-1.5 mm long, 1.1-1.2 mm wide; tepals pustular on drying; lateral tepals 0.8 mm wide, outer margins 2- or 3-sided, inner margin rounded; pistils whitish; stamens withdrawn to slightly lower than level of the tepals. Infructescence not seen.

Distribution and Ecology — *Anthurium kensytsmae* and is known only from the type locality in Colón Province in Panama at between 300 and 365 m in a *Tropical wet forest* life zone.



Figure 55. Anthurium kensytsmae Croat. Holotype: Sytsma 1322.



Figure 56. Anthurium kittredgeanum Croat. Holotype: Croat 27131.

Etymology — *Anthurium kensytsmae* is named in honor of Dr Ken Sytsma, formerly of the Missouri Botanical Garden and presently in the Department of Botany at the University of Wisconsin in Madison. Ken Sytsma worked for the Garden as a collector in Panama and collected the type specimen.

Comments — Anthurium kensytsmae is similar to A. oxystachum Croat in having a sharply pointed spadix but that species differs by having lanceolate blades broadest well below the middle of the blade, lacks the brownish speckling on the lower blade surface on drying and has stamens which are promptly retracted and do not persist exserted as is the case with A. kensytsmae. Anthurium kensytsmae can also be confused with A. caloveboranum Croat owing to its brownish speckled lower blade surfaces but that species has longer blades, usually 3.5–5.0 times longer than wide whereas those of A. kensytsmae are less than 3.3 times longer than wide.

Anthurium kittredgeanum Croat, **sp. nov.** — Type: PANAMA. Darién: primary forest along headwaters of Río Tuquesa, ca. 2 km air km distance from Continental Divide, in vicinity of upper gold mining camp of Tyler Kittredge, 08°33'30"N, 77°28'30"W, 450–500 m, 25 Aug., 1974, *T.B. Croat 2713* 1(holotype, MO-2253605; isotype, PMA). **Figure 56**.

Diagnosis: Anthurium kittredgeanum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, conspicuous red-brown persistent cataphyll fibers, short-petiolate leaves, narrowly oblong-linear, semi-erect blades which dry dark gray-brown above and yellow-brown beneath with a conspicuously sunken collective veins and obscure primary lateral veins as well as by the long-tapered, moderately stipitate, pale yellow spadix with 13–15 flowers visible per spiral.

Epiphyte; internodes short, 2 cm diam.; cataphylls 9.0–9.5 cm long, drying dark red-brown, persisting as closely parallel, somewhat reticulate, mostly dark red-brown fibers. *Leaves* with petioles 18.3 cm long, narrowly and obscurely sulcate, drying dark brown, semiglossy, sharply and deeply sulcate adaxially, rounded abaxially, several narrowly weak-ribbed on sides, densely short pale-lineate, lacking glandular punctations; geniculum 1 cm long, darker and more shrunken than petiole; blades oblong-elliptic, 86 cm long, 11.8 cm wide, 4.6 times longer than wide, 4.6 times longer than petioles, moderately coriaceous, acuminate at apex, acute at base, dark green above, much paler below, drying dark gray-brown, matte above, moderately paler and yellow-brown, weakly glossy below; midrib drying convex in valley, finely 5–7 acute-ribbed, darker above, much thicker, narrowly round-raised, matte, finely and acutely ribbed, eglandular, slightly darker than surface below; primary lateral veins 20–24 per side, departing midrib at 30–55°, drying narrowly rounded and prominulous above, drying weakly raised

below; collective veins arising from base, 5–7 mm from margins, more deeply sunken than primary lateral veins above, narrowly raised below; tertiary veins scarcely apparent on both surfaces; upper surface eglandular, moderately granular to granular-ridged; lower surface nearly smooth, glandular-punctate. *Inflorescence* erect; peduncle 21.5 cm long, 5 mm diam.; spathe linear-lanceolate, 12.5 cm long, 1.5 cm wide, green, reflexed, weakly acuminate; spadix stipitate 7 mm, moderately tapered, pale yellow, 22 cm long, 8 mm diam., 27.5 times longer than broad; flowers 13–15 visible per spiral, 2.6–2.7 mm long, 1.2–1.3 mm wide; tepals drying medium brown, semiglossy, moderately smooth; lateral tepals 1.6 mm wide, inner margin broadly rounded to straight, outer margin 2-sided, at least one angle broadly rounded; stamens not exserted; anthers 0.3 mm long, 0.8 mm wide; thecae positioned at the tip of the filaments and virtually end to end, positioned 180° apart. *Infructescence* not seen.

Distribution and Ecology — *Anthurium kittredgeanum* is endemic to Panama, known only from the type locality in Darién Province at 40–500 m elevation in *Tropical wet forest* life zone.

Etymology — *Anthurium kittredgeanum* is named in honor of geologist, Tyler Kittredge who provided transportation by helicopter to visit his gold mine on the upper Río Tuquesa where the type was collected.

Comments — Anthurium kittredgeanum is seemingly most closely related to A. botijaense Croat with which it shares many flowers visible per spiral. That species from Colón Province at about 100 m elevation differs by having narrower and longer leaf blades which are more than 12 times longer than wide, less distinct primary lateral veins and a sessile, pale green spadix. A. kittredganum has been confused with A. redolens Croat, a species which differs by having shorter and proportionately broader leaf blades, mostly 45–60 cm long that range from 4.5–8.2 times longer than wide with a typically stipitate, usually lavender spadix with 10–13 flowers per spiral.

Anthurium lellingeri Croat, sp. nov. — Type: PANAMA. Darién: Trail from Cana to Colombian border along Río Setigandí, ca. 07°47'N, 77°43'W, 500–600 m, 19 Apr. 1980, A. Gentry, E. Forero, M. Dillon, E. Rentería, L. Skog, M. Sousa & D. Lellinger 28578 (holotype, MO- 2781702). Figure 57.

Diagnosis: Anthurium lellingeri is a member of sect. *Porphyrochitonium* and is characterized by its short, slender internodes, persistent, pale brown cataphyll fibers, slender, subterete petioles, linear, long-acuminate grayish-brown-drying blades which are glandular-punctate on the lower surface with an acute upper midrib as well as by the slender peduncle which exceeds the length of the petiole, a slender, green reflexed spathe and a short, cylindrical green spadix. Epiphyte; internodes short, 5 mm diam.; cataphylls 1.5 cm long, persistent, drying medium brown, fibrous with fragments of brown epidermis, the fibers manila. Leaves with petioles 6.1–7.2 cm long, 2 mm diam. near base, subterete, drying grayish brown; geniculum 0.6 cm long, drying darker than petioles; blades linear, long-acuminate, 25.5–29.9 cm long, 1.1–1.3 cm wide (averaging 28×1.2), 23.0-23.2 (averaging 23.1) times longer than broad, broadest above midway, 4.2 times as long as petioles, gradually acuminate at apex, acute at base, drying subcoriaceous, grayish brown and matte above, grayish green-brown and weakly glossy below; midrib eglandular above, sparsely glandular below, drying narrowly acute and concolorous above, narrowly rounded and paler below; primary lateral veins 14-16 per side, departing midrib at 35–40°, granular on both surfaces, drying narrowly convex and concolorous above, narrowly rounded and slightly paler below; collective veins arising from basal veins, 1 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, with pale, linear cellular inclusions and irregularly parallel granular ridges upon magnification; lower surface glandular-punctate with some low ridging upon magnification, considerably smoother than above, the glands red-brown, weakly and uniformly raised with sunken centers, granules smaller and less uniform. Inflorescence with peduncle 10.8 cm long, drying grayish brown; spathe green, reflexed, drying 1.5 cm long, 2 mm wide, coriaceous and medium brown; spadix green, cylindroid, 1.5 cm long, 4 mm diam., drying medium brown; flowers 3 visible per spiral, drying 2.3 mm long, 1.8 mm wide; tepals conspicuously granular with white and dark brown areas on drying; lateral tepals 1.2 mm wide, outer margins 3-sided, inner margin rounded; stamens not emerged; pistils drying as sparse dark irregular spots. Infructescence not seen.

Distribution and Ecology — *Anthurium lellingeri* is known only from the type locality but it is to be expected in adjacent Colombia. It occurs at 500–600 m in a Tropical wet forest life zone.

Etymology — *Anthurium lellingeri* is named in honor of botanist, Dr David Lellinger, a fern specialist formerly at the Smithsonian Institution in Washington, D.C. Lellinger worked in the Chocó of Colombia studying ferns and helped to collect the type collection.

Comments — *Anthurium lellingeri* is close to narrow-leaved specimens of *A. bakeri* but differs from that species by its green spadix and the dense array of pale, linear cellular inclusions on the upper blade surface.



Figure 57. Anthurium lellingeri Croat. Holotype: Gentry 28578.



Figure 58. Anthurium loratum Croat. Holotype: Croat 47085.



Figure 59. Anthurium loratum Croat. Isotype: Croat 47085.

Croat et al., 2022

Anthurium loratum Croat, **sp. nov.** — Type: COSTA RICA. Cartago: 1.5 miles E of Cachi, 10.2 miles NE of junction at Paraiso, ca. 09°49'N, 83°48'W, 1300–1350 m, 5 Feb. 1979, *T.B. Croat 47085* (holotype, MO-2769783; isotype, INB). **Figures 58 & 59**.

Diagnosis: Anthurium loratum is a member of sect. *Porphyrochitonium* and is characterized by its pendent epiphyte habit, short internodes, semi-organized, reddish brown cataphyll fibers, terete glandular-punctate heavily sheathed petioles, strap-shaped narrowly and weakly attenuated blades glandular-punctate on both surfaces, more than 25 primary lateral veins per side, 2 pairs of basal veins, a long-pedunculate inflorescence, lanceolate, pink to light green spathe which becomes apricot-orange and twisted in age and a bright reddish brown, cylindroid spadix.

Pendent epiphyte; internodes short, 1.0–1.5 cm diam.; cataphylls 5.5–6.0 cm long, persisting as semi-organized, reddish brown fibers. Leaves pendent; petioles 11.5-16.2 cm long, terete, glandular-punctate, drying 2 mm diam., gravish yellow-brown, matte to weakly glossy, sheathed 0.14-0.23 their length; sheath persisting intact; geniculum 0.6-1.0 cm long, blackened; blades strap-shaped, 52–95 cm long, 2.3–3.8 cm wide (averaging 74×3), 18–40 (averaging 24) times longer than wide, 4.6-5.8 times longer than petioles, narrowly and weakly attenuated at apex, narrowly acute at base, sometimes abruptly ending with base narrowly rounded but no more than 4-5 mm wide near where it ends, subcoriaceous drying gravish to grayish yellow-brown above, concolorous to slightly darker and grayish brown below, matte on both surfaces (the glands above slightly larger than those below); midrib prominently raised and drying darker on both surfaces, narrowly raised and minutely ridged below, somewhat quadrangular to irregularly ridged above, not narrowly flattened and knife-edged; primary lateral veins more than 25 per side, inconspicuous, scarcely more obvious than the interprimary veins, departing midrib at 20-35°, weakly and narrowly raised on both surfaces, about equal to collective veins; collective veins arising from base, 1-3 mm from the margin, weakly raised on both surfaces; basal veins 2 pairs; upper surface velvety, glandular-punctate, drying densely papillate with dense pale-depressions; lower surface dark glandular-punctate, densely papillate often in close rows, with dense pale depressions. Inflorescence with both peduncle and spadix erect at anthesis; peduncle 17.0-39.5 cm long, sometimes reddish, drying 2-3 mm diam., matte, finely ribbed, gray-brown; spathe lanceolate, pink to light green, 6.5-10.0 cm long, 6-12 mm wide, narrowly acuminate at the apex, cordulate and contiguous at the base, reflexed-spreading to spreading, twisted, becoming apricot-orange in age; spadix bright reddish brown, cylindroid, 6.2–11.3 cm long, 4–5 mm diam., rounded at apex; flowers 6–7 visible per spiral, 2.2 mm long; lateral tepals 1.6–1.8 mm long, the outer margin obtusely 2-sided, inner margin broadly rounded. Infructescence not seen.

Distribution and Ecology — *Anthurium loratum* is endemic to Costa Rica, known only from 1300–1350 m in the Talamanca Range in Cartago Province in the region of Tapantí and in Limón Province between the upper Río Xichiari and the upper Río Boyei in a *Premontane wet forest* life zone.

Etymology — The species epithet '*loratum*', meaning 'strap-shaped' in Latin, refers to the strap-shaped leaf blades of this species.

Comments — Anthurium loratum is most easily confused with A. friedrichstahlii Schott, a species that also occurs in Costa Rica at elevations usually below 400 m but occurring up to 800 m. It differs by having petioles sheathed only 0.14–0.23 their length, blades that are 7.2–8.4 times longer than petioles, an inflorescence which is more or less pendent at anthesis and tepals which are 1.0–1.2 mm long. Anthurium loratum is also similar to a Panamanian species, Anthurium pendens Croat, which differs by having the blade narrowly oblanceolate, broader above the middle and with the peduncle shorter than the petioles. In contrast, A. loratum has blades strap-shaped and broadest at the middle with the peduncles longer than the petioles, sometimes up to twice as long. In addition, the petioles of Anthurium pendens are sheathed only near the base and the blades are only 8–18 times longer than wide while the upper epidermis dries irregularly ridged with a tight reticulum with a lack of minute papillae.

A cultivated specimen of unknown origin from the Wilson Tropical Botanical Garden (Las Cruces) near San Vito de Java (Croat 32965) may be this species, but it differs by having proportionately shorter (only 14.5 times longer than wide) and wider blades (to 5.3 cm wide) which dry dark yellow-brown. It does however have the same strange epidermal pattern on the upper surface as is present in *Anthurium loratum*.

Paratypes: COSTA RICA. Cartago: Upper Río Naranjo headwaters, above Quelitales de Cachi, ca. 1350 m, 2 Aug. 1989, *T. B. Croat & C. Horich 69774* (MO). Limón: Almirante, Divide between the headwaters of the upper Río Xichiari and the headwaters of the upper Río Boyei, 09°45'50"N, 83°19'45"W, 1300 m, 12 Aug. 1995, *G. Herrera 8441* (INB, MO).

Anthurium mercadoi Croat & O.Ortiz, sp. nov. — Type: PANAMA. Colón: Distrito de Donoso, Área de concesión de Minera Panamá, Coastal Road, km 16, 08°54'38.7"N, 80°39'32.01"W, 101 m, 30 June 2013, O.O. Ortiz, L. Mercado & M. Ponce 1825 (holotype, PMA-106388; isotype, MO). Figures 60–64.

Diagnosis: Anthurium mercadoi is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, short internodes, intact cataphylls, subterete petioles somewhat flattened

adaxially, weakly quilted, bicolorous, prominently acuminate, ovate, greenish drying blades with the base rounded-weakly cordate, 2 pairs of basal veins the first of which is 6–10 mm from the margins, the upper surface weakly glandular-punctate and lower surface conspicuously glandular-punctate as well as by the moderately long-pedunculate inflorescence with an oblong-oblanceolate, green, spreading-erect spathe and a sessile, cream-colored, weakly tapered spadix.

Terrestrial herb; internodes short, ca. 2 cm diam.; cataphylls dark brown, persisting intact, splitting only at the base. Leaves erect-spreading to spreading from more or less erect petioles, moderately long-petiolate; petioles 25 cm long, 7 mm diam., terete, flattened adaxially toward apex with several weak longitudinal ribs, drying sharply sulcate, grayish green, weakly glossy; geniculum ca. 1 cm long, shrunken and darker than surface; blades ovate-elliptic, 29.7 cm long, 16.9 cm wide, broadest slightly below the middle, 1.7 times longer than wide, 1.2 times longer than petioles, gradually long-acuminate at apex, rounded at base, subcoriaceous, moderately bicolorous, dark olive-green and matte above, moderately paler and matte below, drying dark green and weakly glossy above, grayish green and semiglossy below; midrib narrowly rounded on both surfaces; primary lateral veins 15–17 per side, departing midrib at moderately steep angle then spreading at $50-60^\circ$, except to 70° near the base, weakly quilted-sunken and concolorous above, narrowly raised and darker than surface below; collective veins arising from one of the lower primary lateral veins, 4–9 mm from margins, weakly loop-connecting and slightly more prominent than primary lateral veins on drying; **upper surface** weakly glandular-punctate, moderately smooth with minute flecks and very short pale lineations at high magnification; lower surface smooth, densely dark-glandular-punctate. Inflorescence erect; peduncle 31 cm long, ca. 5 mm diam.; spathe spreading, 6.4 cm long, 1.3 cm wide, green, acute and apiculate at apex, decurrent 1.9 cm at base; **spadix** cream-colored, erect, weakly tapered, 8.7 cm long, 4 mm diam. and dark brown on drying; **flowers** 5–6 visible per spiral, 2.1–2.3 mm long,1.6–1.8 mm wide; tepals minutely granular, lateral tepals 1.2–1.3 mm wide, inner margin rounded, outer margin bluntly 2-sided; stamens exposed but at least partially withdrawing beneath tepals, 0.6 mm long, 0.6 mm diam., thecae parallel. Infructescence not seen.

Distribution and Ecology — *Anthurium mercadoi* is endemic to Panama, known only from the type locality in Colón Province at about 100 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium mercadoi* is named in honor of Panamanian botanist, Luis Mercado who assisted in collecting the type specimen with Orlando Ortiz and Marcos Ponce. Luis worked on the study of the plants in the vicinity of the copper mine in the Donoso region and has contributed to the inventory of that area.



Figure 60. Anthurium mercadoi Croat & O.Ortiz. Holotype: Ortiz et al. 1825.



Figure 61. Anthurium mercadoi Croat & O.Ortiz. Ortiz et al. 1825. Leaves.



Figure 62. Anthurium mercadoi Croat & O.Ortiz. Ortiz et al. 1825. Leaf base.



Figure 63. Anthurium mercadoi Croat & O.Ortiz. Ortiz et al. 1825. Inflorescence.



Figure 64. Anthurium mercadoi Croat & O.Ortiz. Ortiz et al. 1825. Cataphylls.



Figure 65. Anthurium minimum Croat. Holotype: McPherson 9671.

Comments — Anthurium mercadoi is most similar to A. lancifolium Schott which differs by having typically elliptic-lanceolate blades which are broadest in the middle and usually acute to attenuate at the base. In the Lucid Anthurium Key, Anthurium mercadoi tracks also to A. barryi Croat, which differs by having elliptic to narrowly ovate blades less than 10 cm wide which are glandular-punctate only on the lower blade surface and have a yellow-green spadix; A. crassilaminum Croat which differs by having oblong-lanceolate blades which are glandular-punctate only on the lower surface; A. gentryi Croat which differs by having small lanceolate leaf blades which are glandular-punctate on the lower surface and A. paludosum Engl. which differs by having narrowly elliptic to oblanceolate concolorous leaves as well as a green spadix.

Anthurium minimum Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Vicinity of Fortuna Dam, along pipeline road leaving main Gualaca-Chiriquí Grande road 2.8 km from Continental Divide, ca. 08°45'N, 82°15'W, 850–900 m, 25 June 1986, *G. McPherson 9671* (holotype, MO-33999581). **Figure 65**.

Diagnosis: Anthurium minimum is a member of sect. *Porphyrochitonium* and is characterized by its short, slender internodes, persistent pale brown cataphyll fibers, slender, subterete petioles, narrowly oblong-elliptic, long-acuminate, grayish brown-drying blades which are glandular-punctate on the lower surface with an acute upper midrib as well as by the slender peduncle which exceeds the length of the petiole, a slender, green, reflexed spathe, and a short, cylindrical, green spadix.

Epiphyte; internodes short, drying 5 mm diam.; cataphylls 2.5 cm long, intact, dark yellowish brown, fibrous with fragments of brown epidermis. *Leaves* with petioles 3.2–6.5 cm long, flattened adaxially, drying 1.0 mm or less in diam., gray-brown, deeply sulcate adaxially with prominently raised acute margins, glandular-punctate; geniculum to 6 mm long with medial ribs, drying darker than petioles; blades narrowly oblong-elliptic, 4.7–11.2 cm long, 1.3–3.0 cm wide (averaging 8 × 2), 3.6–3.8 (averaging 3.7) times longer than wide, broadest midway, 1.3–2.2 (averaging 1.8) times as long as petioles, abruptly acuminate at apex, narrowly acute at base, subcoriaceous, drying dark gray-brown and matte on both surfaces; midrib flattened, drying convex and paler above, drying narrowly convex, ribbed, glandular and concolorous below; primary lateral veins 8–10 per side, departing midrib at 35–45°, scarcely more prominent than the interprimary veins above, drying weakly convex and concolorous above, narrowly rounded and slightly paler below; collective veins arising from the basal veins, 2 mm from margin; antemarginal vein present; basal veins 1 pair; upper surface sparsely glandular-punctate, glands weakly raised and almost blackened, conspicuously granular with small cellular inclusions; lower surface prominently glandular-punctate, glands weakly raised and dark brown,

weakly granular and irregularly folded. *Inflorescence* erect; peduncle 11.7 cm long, terete, reddish, drying < 1 mm diam.; spathe reddish, narrowly linear-lanceolate, 2.8 cm long, 5 mm wide, spreading-reflexed, narrowly acute at apex, drying reddish brown and coriaceous; spadix green, narrowly tapered but with a narrowly rounded point, 4.7 cm long, 2 mm diam. on drying; flowers 3–4 visible per spiral, 2.8–3.0 mm long, 1.5–1.7 mm wide; lateral tepals 1.8–2.0 mm wide, densely granular, the outer margins 2-sided, inner margins broadly rounded; stamens not emergent. *Infructescence* not seen.

Distribution and Ecology — *Anthurium minimum* is endemic to Panama, known only from the type locality in Bocas de Toro Province along the Continental Divide near the road between Fortuna Dam and Chiriquí Grande at 850–950 m in a *Premontane wet forest* life zone.

Etymology — The species epithet derives from the Latin 'minimus' (meaning the least) referring to the small size of this species.

Comments — Anthurium minimum is closest to A. churchillii Croat which has leaves of similar size and shape which are also glandular-punctate on both surfaces, but that species differs by having leaf blades that dry yellow-brown, bicolorous and with the upper midrib prominently and narrowly raised. In contrast, Anthurium minimum has blades that dry dark gray-brown, concolorous and with the midrib on the upper surface more or less flat on drying.

Anthurium monroi Croat, sp. nov. — Type: PANAMA. Bocas del Toro: Ridge N of Campamiento Lucho, 09°05'03"N, 82°44"33"W, 2000 m, 18 Mar. 2004, A.K. Monro & E. Alfaro 4475 (holotype, MO-5881318; isotypes, BM, INB, MEXU, MO, PMA). Figures 66–68.

Diagnosis: Anthurium monroi is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, pale persistent cataphyll fibers, long subterete petioles, narrowly oblong-lanceolate blades with a single pair of collective veins and by its long-pedunculate inflorescence with a reddish brown spathe and pale green to cream spadix as well as by the orange berries.

Epiphyte; internodes short, 7 mm diam.; cataphylls 5.5 cm long, persisting as reddish brown fibers with fragments of reddish brown epidermis. *Leaves* with petioles 34 cm long, 4 mm diam., subterete, drying obtusely and broadly sulcate, yellowish brown; geniculum 1.2 cm long, drying slightly darker than petioles; blades oblong-lanceolate, 45.2–50 cm long, 7.1–8 cm wide, 6.4 times longer than broad, broadest above midway, 1.3 times longer than petioles, abruptly acuminate at apex, weakly attenuate at base, subcoriaceous, dark green, matte with

blue-gray hue above and a yellow-green hue below, moderately bicolorous, drying medium brown, matte above, yellowish brown, weakly glossy below; midrib acutely raised, sparsely glandular-punctate and concolorous above, narrowly raised, sparsely elongated glandular-punctate, with narrow irregular ridges that upon magnification are minutely lined with transverse ridges and slightly darker below; primary lateral veins 16–18 per side, arising at 40–45°, weakly narrowly rounded and concolorous above, narrowly raised and concolorous below; collective veins arising from basal veins, 4–5 mm from margin; basal veins 1 pair; antemarginal vein present and obscured by the revolute margin; upper surface densely granular, sparsely glandular-punctate with glands which are sunken and reddish brown; lower surface glossier but with irregular ridges upon magnification and paler, more densely glandular-punctate with glands which are raised, dark reddish brown. Inflorescence with peduncle slender, cream suffused with pink, 27.2 cm long, drying dark reddish brown; spathe ovate-narrow elliptic, greenish, 9 cm long, 7 mm wide, drying dark reddish brown; spadix pale green to cream, uniform, drying 8 cm long, 2 mm wide, dark reddish brown; flowers (immature) 6 visible per spiral, drying 1.0-1.2 mm long, 0.9–1.0 mm wide; tepals sparsely pale pustular on drying; lateral tepals 0.8 mm long, the outer margins 3-sided, the inner margin rounded. Infructescence with berries orange.

Distribution and Ecology — *Anthurium monroi* is known only from the type locality in western Panama near the Costa Rican border at 2000 m elevation in a *Lower montane rain forest* or *Montane rain forest* life zone.

Etymology — *Anthurium monroi* is named for Alex Monro, a Senior Botanist at Kew Gardens, and a researcher at the Natural History Museum in London. A specialist on Urticaceae, he devoted a lot of time collecting in Central America, especially in NE Panama near the Costa Rican border where the type specimen originated.

Comments — Anthurium monroi should be compared with A. gracililaminum Croat, A. hammelii Croat and A. lancifolium Schott. These are the only species that occur above 1500 m with petioles more than 25 cm long. Anthurium lancifolium and A. gracililaminum both differ in having blades broadest well below the middle. In contrast, the blades of Anthurium monroi are broadest at the middle and A. lancifolium also differs by having berries purple to white, while A. gracililaminum differs by having greenish berries as well as blades that are eglandular on the upper surface. Anthutium hammelii differs by having an almost rounded spathe that is purple with a cream spadix.



Figure 66. Anthurium monroi Croat. Holotype: Monro 4475.



Figure 67. Anthurium monroi Croat. Monro 4475. Habit in field



Figure 68. Anthurium monroi Croat. Monro 4475. Infructescence with emerging young berries



Figure 69. Anthurium morrisii Croat & O.Ortiz. Holotype: Zapata et al. 3501.


Figure 70. Anthurium morrisii Croat & O.Ortiz. Paratype: Arturo 2069

Anthurium morrisii Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Veraguas: Distrito Sante Fé, Limite norte del Parque Nacional Sante Fé, Quebrada El Cedro, afluente de Río Dos Bra zos, proximo a Río Veraguas, 08°42'29"N, 80°53'19"W, 210 m, 6 Feb. 2014, *A. Zapata, A. Morris, G. Abrego, J. Rodríguez & A. Gálvez 3501* (holotype, MO-6578058; isotype, PMA). Figures 69 & 70.

Diagnosis: Anthurium morrisii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, long cataphylls weathering to a network of closely parallel fibers, petioles which are thicker than broad, broadly and sharply deep-sulcate with a prominently raised acute medial rib as well as being narrowly angled abaxially with a thin-winged angle, blades which dry grayish-green an are oblanceolate and gradually acuminate with glandular punctations on both surfaces, narrowly acute at base with a single pair of collective veins as well as a short-pedunculate inflorescence with a green reflexed spathe and a long-tapered spadix with red berries.

Epiphyte; internodes short, ca. 1 cm diam.; cataphlls 5.5–11.5 cm long, soon weathering into a network of moderately parallel pale fibers, mostly persisting. *Leaves* with petioles 4.0-14.1 cm long, ca. 2.5 mm wide, thicker than broad, broadly and sharply deep-sulcate adaxially with a prominently raised acute medial rib, narrowly ribbed abaxially with a thin-winged angle, densely glandular-punctate-short-lineate throughout; blades elliptic, 29.4–31.5 cm long, 5.7-6.5 cm wide (averaging 30.6×6.2), 4.8-5.2 times longer than wide, 2.3-7.4 (averaging 5.5) times longer than petiole, gradually acuminate at apex, acute to weakly attenuate at base, subcoriaceous, drying dark gray-green and weakly glossy above, moderately paler, gray-green and semiglossy below; midrib narrowly rounded to narrowly round-raised and slightly paler, glandular-punctate above, narrowly rounded, glandular-punctate and darker below; primary lateral veins 13 or 14 per side, arising at 50–60°, scarcely more prominent than the interprimary veins, drying narrowly rounded, minutely granular, narrowly rounded and concolorous below; tertiary veins not prominent; collective veins 1 pair, arising from the base, 3-4 mm from margin; antemarginal veins present; upper surface minutely areolate upon magnification, densely glandular-punctate; lower surface moderately smooth, densely dark glandular-punctate. Inflorescence with peduncle 10 cm long, 2.5 mm diam., drying gray-green, granular; spathe 4.1 cm long, 6 mm wide, sparsely pale short-lineate, acuminate, spreading; spadix yellow, 11.5 cm long, 4 mm diam., 28 times longer than wide; flowers 2.5–3 visible per spiral, 3 mm long, 2 mm wide; tepals minutely granular, matte; lateral tepals 2 mm wide, inner margin nearly straight, outer margin obtusely 2-sided with rounded angle; stamens withdrawn beneath tepals, anthers 0.3 mm long, 0.5 mm wide. Infructescence spreading; berries reddish, soon and broadly raised, tepals reddish.

Distribution and Ecology — *Anthurium morrisii* is endemic to Panama, known only from two collections in the type locality in Veraguas Province at 210 m and 169 m respectively in a *Premontane rain forest* life zone.

Etymology — *Anthurium morrisii* is named in honor of Panamanian botanist, Arturo Morris who helped collect the type specimen. Arturo is recognized as a great collector and has collaborated in many floristic studies for many years, focusing mainly on the Fortuna Forest Reserve in Chiriqui Province and the Donoso region in Colon Province.

Comments — In the Lucid Anthurium Key *Anthurium morrisii* tracks to *A. cuasicanum* Croat, which differs by having yellow-brown, less conspicuously bicolorous blades, proportionately longer petioles in relation to blades and much longer inflorescences (usually longer than leaves); *A. lustriviridum* Croat, which differs by having much broader elliptic blades with 2 pairs of collective veins; *A. rupicola* Croat, which differs by having proportionately longer and narrower leaf blades, a much stubbier white spadix as well as usually growing on rocks in streams; *A. spathifolium* Sodiro, which differs by its much shorter petioles (3–5 cm long) and proportionately broader (8–10 cm wide) oblanceolate blades drying dark brown; *A. verrucos-um* Croat & D. C. Bay, which differs by having blades with verrucose structures on the upper surface and glandular-punctate only on the lower surface and *A. wattii* Croat & D.C.Bay, which differs by having blades with purplish red berries.

Paratype: PANAMA. Veraguas: Parque Nacional Santa Fé, cerca del río dos Brasos, 8°41'53"N, 80°53'12"W., 169 m, 5 Feb. 2014, A. Zapata, J. Rodríguz, A. Galvez & G. Abrego 2069 (PMA).

Anthurium muscidiradix Croat & O.Ortiz, sp. nov. — Type: PANAMA. Colón: Teck Cominco Petaquilla mining concession, streamside forest, 08°50'20"N, 80°41'28"W, 121 m, 14 Sep. 2007, *G. McPherson 19543* (holotype, PMA-59782). Figure 71.

Diagnosis: Anthurium muscidiradix is a member of sect. Porphyrochitonium and is characterized by its epiphytic habit, short internodes with roots few and enveloped in a short-leafed moss, short, weakly fibrous and inconspicuous cataphylls, deeply sulcate petioles with a narrow acute medial ridge and prominently raised acute margins, short blackened geniculum, narrowly elliptic, brownish drying, gradually acuminate blades which are acute to attenuate at base, with a single pair of collective veins arising from base and 1–2 mm from margins, both surfaces dark glandular-punctate as well as by the long-pedunculate inflorescence with a less globose lanceolate, green, spreading spathe and a subsessile, long-tapered spadix with red, more or less globose berries. *Anthurium muscidiradix* is seemingly so closely associated with the moss that tightly envelopes the internodes that presumably the moss does most of the absorption of moisture and nutrients.

Epiphytic; internodes short, ca.1 cm diam.; roots few, slender, enveloped in a strange short-stranded moss; cataphylls 1.5 cm long, persisting as pale fibers with dark brown fragments of epidermis. Leaves with petioles 1.5-3.7 cm long, 0.6-1.6 cm thick, 0.6-1.2 cm wide, deeply sulcate with a narrow acute medial ridge and prominently raised acute margins adaxially, narrowly rounded to acutely1-ribbed abaxially; geniculum, 2–3 mm long, blackened; blades elliptic to oblong-elliptic, 7.7–13.3 cm long, 2.4–4.0 cm wide (averaging 10.9 × 3.2 cm), 3.3– 4.0 (averaging 3.5) times longer than broad, 4.3–5.3 (averaging 4.8) times longer than petioles, prominently and gradually acuminate at apex, narrowly acute to weakly attenuate at base, subcoriaceous, drying gray-brown above, yellow-brown below; weakly glossy on both surfaces; midrib prominently, narrowly round-raised, darker than surface above, broadly anglular, short pale-lineate, lacking a ridge, darker brown below; primary lateral veins 4 or 5 per side, weakly raised and concolourous on both surfaces with distinct interprimary veins, departing midrib at 40-50°; basal veins one pair; collective veins arising from the base, 1-2 mm from the margin; tertiary veins not at all conspicuous; upper surface smooth, minutely areolate with conspicuous, mostly sunken dark glandular-punctations; lower surface smooth, minutely brownish speckled with dark brown glandular punctations. Inflorescence much longer than leaves; peduncle terete, 13.3 cm long, drying 2 mm diam., yellow-brown, densely granular; spathe lanceolate, green, spreading, 2.3 cm long, 5.2 mm wide; spadix subsessile, long-tapered, 7.5 cm long, 2.8 mm diam., drying dark brown; flowers 2 visible per spiral, 3.6 mm long, 3 mm wide; tepals matte with faint cellular inclusions; lateral tepal 2 mm wide, inner margin rounded, outer margin 2-sided. Infructescence with berries red, subglobose, 5-6 mm diam.; seeds 4-6 per berry, 1.4 mm long, 0.9 mm wide, yellow-brown.

Distribution and Ecology — *Anthurium muscidiradix* is endemic to Panama, known only from the type locality in Colón Province at 121 m in a *Tropical wet forest* life zone.

Etymology — The species epithet is derived from the Latin '*muscidus*' (meaning mossy) and '*radix*' (meaning root).

Comments — In the Lucid Anthurium Key, *Anthurium muscidiradix* tracks to *A. kallunkiae* Croat which differs by its more broadly elliptic leaf blades which are more attenuated at base and the inflorescence much shorter than leaf blades and *A. pageanum* Croat, which differs by its more decidedly triangular petioles, thinner, more gray drying blades with the lower surface much paler and densely dark-brown-speckled with more inconspicuous glandular punctations.



Figure 71. Anthurium muscidiradix Croat & O.Ortiz. Holotype: McPherson 19543

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Figure 72. Anthurium neei Croat. Holotype: Nee 7916.

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Anthurium neei Croat, sp. nov. — Type: PANAMA. Panamá: El Llano-Cartí Road, 5 km N of Pan-American Hwy. at El Llano, 09°15'N, 78°55'W, 300 m, 10–11 Nov. 1973, *M. Nee 7916* (holotype, MO-2274217). Figure 72.

Diagnosis: Anthurium neei is a member of sect. *Porphyrochitonium* characterzed by its epiphytic habit, dense coralloid root mass, short, sharply sulcate petioles, narrowly elliptic leaf blades which are glandular-punctate only on the lower surface as well as by its short-pedunculate inflorescence with a reflexed spathe.

Epiphyte; internodes short, 8 mm diam.; cataphylls 2.1 cm long, acute, persisting intact at apex, becoming fibrous with fragments of yellowish-brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 1.5-5.4 cm long, 2-3 mm diam., narrowly and acutely sulcate, drying yellowish brown; geniculum 5-8 mm long, drying darker than petioles; blades narrowly elliptic,14.3-21.5 cm long, 4.9-7.6 cm wide (averaging 18 × 6 cm), 2.7-3.1 (averaging 2.9) times longer than broad, broadest midway, 3.9-10.1 (averaging 6.9) times longer than petioles, gradually short-acuminate at apex, acute to attenuate at base, drying subcoriaceous, medium brown and weakly glossy above, yellowish brown and semiglossy below; midrib drying narrowly raised and darker above, narrowly rounded, finely ribbed and darker below; primary lateral veins 12 per side, departing midrib at 45–50° near middle, drying narrowly rounded, concolorous above, narrowly raised and slightly darker below; tertiary veins drying indistinct above, weakly raised below; basal veins 1 pair; prominent antemarginal vein present; collective veins arising at 1st or 2nd primary lateral vein, 1 mm from margin; upper surface epunctate, densely granular to minutely areolate, sparsely short pale-lineate; lower surface glandular-punctate, brownish speckled. Inflorescence erect, peduncle 2.6 cm long; spathe green, reflexed, 1.7 cm long, 3 mm wide, narrowly elliptic, drying moderately coriaceous, medium reddish brown; spadix weakly tapered, 4.4-6.7 cm long, 5-8 mm diam., yellow-white, drying reddish dark brown; flowers 3 visible per spiral, drying 2.1 mm long and 1.8 mm wide; tepals sparsely lenticellate and minutely granular on drying; lateral tepals 1.4 mm wide, inner margin rounded, outer margins 2-sided; stamens withdrawn below level of tepals; thecae 0.4 mm long, 0.4 mm wide, weakly divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium neei* is endemic to Panama in Panamá Province, known at present only on the El Llano-Cartí Road at 300 m in a *Premontane wet forest* life zone.

Etymology — *Anthurium neei* is named in honor of Dr Mike Nee who graduated at the University of Wisconsin under the supervision of Hugh Iltis and spent his career working at the New York Botanical Garden. Mike was a specialist on Solanaceae but was an excellent collector in all groups. He worked for the senior author as a collector for the Flora of Panama Project for a year and was known for the quality of his collections. Mike is now retired and lives on his family farm in Wisconsin but continues botanizing, including making field trips to Bolivia.

Comments — Anthurium neei is most easily confused with A. kallunkiae Croat which is very similar in superficial characteristics, such as size, leaf blade shape and even coloration of dried leaves. That species differs by having roots spreading and normal in appearance rather than having a coralloid root mass as in A. neei, in having leaf blades glandular-punctate on both surfaces, an erect-spreading spathe and a yellow-white spadix.

Anthurium nutans Croat, **sp. nov.** — Type: COSTA RICA. Heredia: Atlantic slope of Volcán Barva, between Río Peje and Río Sardinalito, 10°17'30"N, 84°04'30"W, 700–800 m, 3 Apr. 1986, *M. H. Grayum 6714* (holotype, MO-3489956; isotype, INB). **Figure 73**.

Diagnosis: Anthurium nutans is a member of sect. Porphyrochitonium and is characterized by its pendent leaves, terete petioles, oblong-linear grayish drying blades which lack glandular punctations on the upper surface, 16–20 primary lateral veins per side, which are scarcely loop-connected with the collective veins, 5–6 mm from the margin in the lower ¹/₃ of the blade, a pendent inflorescence, green spathe and long greenish brown spadix with 5–6 flowers visible per spiral.

Pendent epiphyte in understory; stem less than 20 cm long; internodes short, 1.5 cm diam.; cataphylls to 7.8 cm long, persisting as reddish brown fibers, sometimes with narrow fragments of epidermis. *Leaves* pendent; petioles 34–39 cm long, more or less terete, drying grayish brown, matte, finely ridged; geniculum 1.3 cm long, drying blackened, slightly thicker than petiole; blades oblong, 49.0–56.5 cm long, 8.0–8.5 cm wide (averaging 53×8.2), 6.1–6.6 (averaging 6.4) times longer than wide, 1.6–1.7 times longer than petioles, broadest at about the middle, weakly acuminate at apex, acute at base, coriaceous, semiglossy above, glossy below, drying grayish, nearly matte above, grayish yellow-brown, slightly paler below; midrib convex on both surfaces; primary lateral veins 16–20 per side, departing midrib at 35–45°, scarcely more conspicuous than the interprimary veins, scarcely loop-connected with the collective veins, slightly raised above, obscurely sunken beneath, drying weakly raised and bluntly acute above, weakly raised below; collective veins arising from near the base, extending along the margin 5–6 mm from the margin in the lower $\frac{1}{3}$, increasingly more distant from the margins



Figure 73. Anthurium nutans Croat. Holotype: Grayum 6714.



Figure 74. Anthurium orosiense Croat. Holotype: Croat 36123.

and up to 5–10 mm from the margins toward apex, more or less equaling the primary lateral veins in prominence, much more conspicuous than interprimary veins; tertiary veins obscure below; upper surface eglandular, drying areolate granular-ridged, minutely papillate and somewhat uneven; lower surface conspicuously and densely glandular-punctate, finely granular, sparsely pustular, minutely parallel ridged-reticulate. *Inflorescence* pendent; peduncle 24.5 cm long, drying 2.5 mm diam., terete, dark brown; spathe missing; spadix ca. 27 cm long post-anthesis, sessile, greenish brown; flowers 5–6 visible per spiral, 2.2 mm long; lateral tepals 2.2–2.4 mm wide, the inner margin broadly rounded, outer margins 2–3 mm sided; stigma 0.10–0.15 mm wide, circular, drying blackish without a whitish margin. *Infructescence* not seen.

Distribution and Ecology — *Anthurium nutans* is known only from the type specimen from Volcán Barva in Heredia Province in Costa Rica at 700–800 m in a *Premontane rain forest* life zone.

Etymology — The epithet '*nutans*' means nodding or directed downward, and represents the general aspect of the entire plant in natural conditions.

Comments — Anthurium nutans is closest to A. tarrazuense Croat which also has long-petiolate leaves with blades that dry a similar color and texture but A. tarrazuense has blades that have the collective veins more remote from the margin (5–6 mm) in the lower ¹/₃ of the blade, have fewer primary lateral veins (6–8 per side) which are more conspicuous than the interprimary veins on drying and has flowers with a larger elliptic stigma (0.5–0.6 mm long). In contrast, A. nutans has more elongated blades (6.2–6.7 times longer than wide), collective veins less remote from the margin (1–2 mm from margin), has more primary lateral veins which are scarcely more prominent than the interprimary veins and have flowers with a smaller style. Anthurium nutans is perhaps also related to A. chiriquense Standl. but that species differs by having blades more broadly elliptic and only 4 times longer than wide with the upper midrib acute and a stipitate spadix.

Anthurium orosiense Croat, **sp. nov.** — Type: COSTA RICA. Cartago: Tapantí Hydroelectric Reserve along Río Orosi, 4.5 km beyond small bridge which crosses river inside the reserve, along road to the diversion dam, 09°47'N, 83°49'W 1500–1700 m, 23 June 1976, *T.B. Croat 36123* (holotype, MO-2390064; isotype IMB). **Figure 74**.

Diagnosis: Anthurium orosiense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent cataphyll fibers, long terete petioles more or less equalling the blades, by the narrowly oblong-elliptic blades with weakly developed primary

lateral veins and a more well-developed pair of collective veins, glandular punctations on both surfaces as well as by the green, linear-lanceolate spathe and the long, narrowly tapered, greenish to brownish spadix.

Epiphyte; stems less than 20 cm long; internodes short, 1.2 cm diam.; cataphylls to 6 cm long, persisting as loose, brownish, semi-erect fibers at all upper nodes. Leaves with petioles 31.5–33.0 cm long, terete, erect-spreading, drying dark yellow-brown, minutely granular; geniculum 1.5 cm long, drying darker; blades narrowly oblong-elliptic, 33.0-46.6 cm long, 7.0–7.5 cm wide (averaging 35×7.1), 4.5–7.1 (averaging 5.1) times longer than wide, 1.0–1.4 (averaging 1.1) times longer than the petioles, somewhat pendent from the petioles, weakly acuminate to acute at apex, acute to obtuse at base, subcoriaceous, dark green and semiglossy above, paler and semiglossy below, drying matte and dark grayish brown above, matte and dark yellowish brown below; midrib raised and concolorous above, narrowly raised and slightly paler below, drying 2 or more ridged, bluntly acute above, mostly bluntly acute and slightly darker below; primary lateral veins visible but not prominently raised on either surface, drying weakly and narrowly raised on both surfaces, concolorous and scarcely more prominent than the interprimary veins; collective veins arising from the base, more prominent than the primary lateral veins, 5–8 mm from the margins; the antemarginal pair of veins almost hidden by the revolute margin; tertiary veins moderately few, weakly raised and concolorous on both surfaces; upper surface drying minutely papillate, sparsely glandular-punctate but the glands moderately large; lower surface drying moderately smooth, neither surface drying wrinkled or ridged, more densely and conspicuously glandular-punctate. Inflorescence erect-spreading; peduncle 39 cm long, ca. 2 mm wide on drying; spathe green, 7 cm long, 6 mm wide, reflexed to spreading-reflexed, acuminate at apex, rounded at base, the margins joining on the side of the peduncle opposite the direction it is spreading; spadix 15 cm long, 4 mm diam., about 50 times longer than wide, greenish, turning brownish, weakly tapered to apex; flowers 5 visible per spiral, 1.7–1.9 mm long, 1.5–1.7 mm wide on drying; pistils not emerging; lateral tepals 0.9-1.0 mm wide, the outer margins bluntly 2-sided, the inner margin broadly rounded, concave but not held against the pistil on drying; stamens emerging just above the level of the tepals; anthers 0.3 mm long, 0.5 mm wide, the thecae ovoid, scarcely divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium orosiense* is known only from the type locality in the Tapantí Hydroelectric Reserve in Cartago Province near the Río Grande de Orosi at about 1500 m elevation in a *Premontane rain forest* life zone.

Etymology — The species epithet derives from the type locality near the Río Orosi in Cartago Province.

Comments — *Anthurium orosiense* is probably closest to *A. utleyorum* Croat & R.A.Baker, a more widespread Costa Rican species which differs by having usually smaller and narrower, more coriaceous blades with the collective veins closer to the margin (usually less than 5 mm versus rarely as close as 5 mm in A. orosiense) and by having a shorter, more prominently tapered purplish spadix with protruding pistils.

Anthurium paulmaasii Croat, sp. nov. — Type: PANAMA. Veraguas: Cerro Tute, western slope, 1000 m, ca. 08°31'N, 81°09'W, 23 Oct. 1980, *P.J.M. Maas & R. Dressler 5055* (holotype, U). Figure 75.

Diagnosis: Anthurium paulmaasii is a member of sect. *Porphyrochitonium* distinguished by its epiphytic habit, short internodes, reddish brown cataphyll fibers, moderately long, subterete, sulcate, large elliptic blades which are glandular-punctate on both surfaces and especially by its short-pedunculate inflorescence with a narrowly ovate-elliptic green spathe and a cylindroid green spadix.

Epiphyte; stems short, less than 10 cm long; internodes short, 1 cm diam.; cataphylls 2 cm long, persisting as medium reddish brown, moderately loose fibers. Leaves with petioles 8-12 cm long, deeply and sharply sulcate, yellowish green on drying; geniculum ca. 1 cm long, sulcate, sometimes drying darker than petiole; blades lanceolate, 12.5–20.0 cm long, 6.6–7.8 cm wide (averaging 16×7), 1.8-2.9 (averaging 2.5) times longer than wide, 1.2-2.1 (averaging 1.7) times longer than petioles, briefly acuminate and apiculate at apex, acute to attenuate at base, subcoriaceous, dark green and weakly glossy above, paler and semiglossy below, drying dark olive-green to yellowish green above, moderately paler and grayish green below; midrib obtusely raised, darker and faintly several ribbed on drying, obtusely raised and slightly darker below; primary lateral veins 12-17 per side, weakly and narrowly raised and concolorous on both surfaces, only slightly more prominent than the interprimary veins; collective veins 3.5–5.0 mm from the margins, drying somewhat undulate with depressions, equal to the primary lateral veins; upper surface densely papillate and minutely pale granular upon magnification, sparsely dark glandular-punctate; lower surface smooth, densely brownish speckled and densely dark brown glandular-punctate. Inflorescence with peduncle 4 cm long, much shorter than even the shortest petioles, drying acutely 1-ribbed on one side, acutely 2-ribbed on the other side but not markedly 3-sided; spathe 3.1 cm long, 1.8 cm wide, green, erect, narrowly ovate-elliptic, 2.8 times longer than wide, narrowly acute at apex; spadix narrowly cylindroid, 4.3 cm long, 4 mm diam., dark green, bluntly rounded at apex; flowers 2 mm wide and long, 4 visible per spiral; tepals conspicuously granular, lateral tepals 1.3–1.5 wide, the outer margins 2-sided, inner margins broadly rounded; stamens weakly emergent and withdrawing beneath the tepals; anthers 0.4 mm wide and long. Infructescence not seen.

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The current status of Anthurium sect. Porphyrochitonium ...



Figure 75. Anthurium paulmaasii Croat. Holotype: Maas & Dressler 5055.

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Figure 76. Anthurium perangustum Croat. Holotype: Mori & Kallunki 6392.

Distribution and Ecology — *Anthurium paulmaasii* is endemic to Panama, known only from the type locality in Veraguas Province on Cerro Tute at 1000 m in a *Premontane rain forest* life zone.

Etymology — Anthurium paulmaasii is named in honor of Dr Paul Maas, now affiliated with the Naturalis Biodiversity Center in Leiden, the Netherlands. Paul collected the species, like many others in this family, in the company of Bob Dressler. Maas has been one of the most prodigious botanists owing to his many collections and work with plant families as diverse as Annonaceae and Costaceae. He spent most of his career at the University of Utrecht and did much of his work with his botanist wife, Hiltje Maas-van de Kamer, who regularly went on his many overseas expeditions.

Comments — In the Lucid Anthurium Key, owing to its relatively long petioles and glandular punctations on both blade surfaces, *Anthurium paulmaasii* keys out with *Anthurium crassite-palum* Croat and *A. pageanum* Croat, but both of those species differ in having narrower leaf blades, longer petioles, and proportionately longer spathes.

Anthurium perangustum Croat, **sp. nov.** — Type: PANAMA. Panamá: El Llano-Cartí Road, 9.6 from Interamerican Hwy., ca. 350 m, ca. 09°16'30"N, 78°59'00"W, 26 May 1975, *S. Mori* & *J. Kallunki 6392* (holotype, MO-2274535). **Figure 76**.

Diagnosis: Anthurium perangustum is a member of sect. *Porphyrochitonium* and is characterized by its epiphyte habit, close network of cataphyll fibers, terete, sulcate petioles, linear-oblanceolate, narrowly acuminate to acicular blades which are glandular-punctate on both surfaces, have 6 or 7 primary lateral veins per side, collective veins arising from basal veins and 15–20 mm from margin, a single pair of basal veins, an erect inflorescence, short peduncle, small white spathe and red, scarcely tapered spadix with four flowers visible per spiral.

Epiphyte; stem less than 10 cm long; internodes short, 5 mm diam.; cataphylls 3.0-5.3 cm long, persisting as a close network of reddish brown, mostly erect fibers. *Leaves* with petioles 4.5-10.5 cm long, terete, drying 1 mm diam., adaxially sulcate, medium yellow-brown, matte, irregularly ridged; geniculum 3-4 mm long, drying darker than petioles, slightly shrunken compared to petiole; blades linear-oblanceolate, 24.5-40.7 cm long, 1.1-2.1 cm wide (averaging 30×1.5), 19-25 (averaging 22) times longer than wide, 3.8-6.1 (averaging 5.5) times

than petioles, narrowly acuminate to acicular at apex, narrowly acute at base, widest in upper half, subcoriaceous, moderately bicolorous, drying dark brown above, medium grayish yellow-brown below, drying essentially matte on both surfaces; midrib drying narrowly rounded and concolorous above, narrowly rounded to bluntly acute, sparsely glandular-punctate and paler below; primary lateral veins 6 or 7 per side, departing midrib at 20°, drying very obscure to weakly raised on both surfaces, directed almost straight to the collective veins; collective veins arising from basal veins, 15-20 mm from margin, about equaling the primary lateral veins and weakly raised on both surfaces; margins prominently rolled under; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate and finely irregularly ridged with the ridges more or less acute along their upper margins (more prominently so above); lower surface glandular-punctate and finely irregularly ridged. Inflorescence erect; peduncle 5.3 cm long, drying 1 mm diam., weakly ribbed; spathe 4.3 cm long, 5 mm wide, white, drying dark brown, abruptly acuminate at apex; spadix red, 9.2 cm long, 3 mm diam. on drying, scarcely tapered to apex, rounded at apex; flowers 4 visible per spiral, 2.2-2.5 mm long, 1.9-2.3 mm wide; lateral tepals 1.0–1.2 mm wide, the inner margins broadly rounded, outer margins 2-sided; stamens emerging and remaining at level of tepals; anthers 0.6 mm long, 0.7 m wide; thecae moderately divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium perangustum* is endemic to Panama, known only from the type specimen in Panamá Province at about 350 m elevation in a *Premontane wet forest* life zone.

Etymology — The specific epithet '*perangustum*' (meaning very narrow) refers to the narrow blades that characterize the species.

Comments — Anthurium perangustum is most similar in shape to A. friedrichsthalii Schott which has blades of similar shape and size. That species differs by having longer peduncles, a green spathe, green tinged purplish spadix, the upper midrib narrowly raised and has the blade surface moderately smooth on drying, finely and acutely ridged.

Anthurium polancoi Croat, **sp. nov.** — Type: PANAMA. Darién: Serrania de Sapo, limite del Parque hasta la cima, 07°58'N, 78°23'W, 300–800 m, *H. Herrera & J. Polanco 804* (holotype, MO-3850742). **Figure 77**.

Diagnosis: Anthurium polancoi is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, moderately long, slender, sulcate petioles, elliptic, gray-ish-drying, acuminate blades and the slender, long pedunculate inflorescence with a reddish spathe and the short, weakly tapered green spadix with most of the stamens remaining exposed after anthesis.

Epiphyte; internodes short, 7 mm diam.; cataphylls 2.6 cm long, persisting as dense reticulum of fibers, with small fragments of reddish brown epidermis. Leaves with petioles 9.2-15.7 cm long, 2 mm diam., C-shaped, sulcate, drying deeply and narrowly sulcate, yellowish to olive-brown; geniculum 8 mm long, drying slightly darker than petioles; blades elliptic, 10.7– 14.4 cm long, 3.5 - 5.6 cm wide (averaging 13×5), 2.1 - 3.1 (averaging 2.6) times longer than broad, broadest at middle, 0.9–1.3 (averaging 1.2) times longer than petioles, abruptly acuminate at apex, acute to slightly rounded at base, subcoriaceous, drying grayish to olive-brown and semiglossy above, yellowish brown and weakly glossy below; midrib eglandular on both surfaces, narrowly raised to sharply acute and slightly paler above, narrowly convex, ribbed and slightly darker below; primary lateral veins 9 or 10 per side, departing midrib at 55-60°, convex and slightly paler above, narrowly rounded and concolorous below; collective veins arising from the basal veins, 2 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, conspicuously and minutely granular, uniform and pale upon magnification; lower surface smoother with faint medium brown speckles, glandular-punctate, the glands raised, sunken at center and dark reddish brown. Inflorescence with peduncle slender, 18.5 cm long, drying deeply and narrowly sulcate and yellowish brown; spathe lanceolate, reddish, drying 2 cm long, 4 mm wide and dark yellowish brown; spadix green, weakly tapered, drying 3.7 cm long, 3 mm diam., dark yellowish brown; flowers 4 visible per spiral, drying 2.2–2.4 mm long, 1.8–2.0 mm wide; tepals minutely granular on drying; lateral tepals 1.3 mm wide, outer margin 2-sided, inner margin rounded; stamens held at level of tepals, most remaining exposed after anthesis; anthers 0.4 mm long and wide, the thecae weakly divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium polancoi* is known only from the type specimen in Panama on Cerro Sapo in Darién Province at 300–800 m in a *Premontane wet forest* life zone.

Etymology — *Anthurium polancoi* is named in honor of one of the collectors of the type specimen, Panamanian botanist, José Polanco. Mr. Polanco works for the Asociación Nacional para la Conservación de la Naturaleza (ANCON) in Panama.

Comments — Anthurium polancoi is most easily confused with Anthurium toroense that differs by having conspicuously bicolorous proportionately narrower blades that are glandularpunctate on the upper surface and are often more than 2.8 times longer than broad and more than 15 cm long. In contast, Anthurium polancoi has leaf blades that are scarcely bicolorous, less than 2.6 times longer than broad and less than 14 cm long with the upper surface lacking



Figure 77. Anthurium polancoi Croat. Holotype: Herrera & Polanco 804



Figure 78. Anthurium robertii Croat. Holotype: Kennedy & Dressler 3347.

glandular punctations. In addition, *Anthurium toroense* has the primary lateral veins pleated-raised on the lower surface and has a reddish spathe whereas *A. polancoi* has inconspicuous primary lateral veins, and a green spathe. *Anthurium polancoi* is also similar to *A. terryae* Croat from Cerro Pirre which differs by having blades that are broadest above the middle, drying thin and usually gray-green with a petiole usually less than one-half as long as the blade. In contrast, Anthurium polancoi has blades which are broadest at middle and dry grayish to olive-brown above and yellowish brown below with the petioles usually more than one half as long as blades.

Anthurium polancoi has been confused with *A. alticola* but that species differs by having longer stems, longer internodes, longer cataphylls, terete petioles and ovate-elliptic to oblong-elliptic blades which are more abruptly narrow-acuminate and are glandular-punctate on the upper surface.

Anthurium robertii Croat, sp. nov. — Type: PANAMA. Panamá Province: El Llano-Cartí Road, km 10–12, ca. 09°19'N, 79°06'W, 350–400 m, 31 Aug. 1974, *H. Kennedy & R. Dressler* 3347 (holotype, US-754002). Figure 78.

Diagnosis: Anthurium robertii is a member of sect. *Porphyrochitonium* recognized by its relatively small size, epiphytic habit, short internodes, persistent cataphyll fibers, short, 3-ribbed petioles, narrowly oblanceolate blades which dry grayish on the upper surface, medium yellow-brown below and with dark glands on both surfaces as well as by the long-pedunculate inflorescence with a long, sharply tapered, yellow-green spadix.

Epiphyte; internodes short, 5 mm diam.; cataphylls 3 cm long, persistent, yellowish olive-brown with fragments of olive-brown epidermis. *Leaves* with petioles 9.5–11.7 cm long, 2 mm diam., D-shaped, flat adaxially with 3 ribs, drying medium brown; geniculum 6 mm long, drying slightly darker than petioles; blades narrowly oblanceolate, 11.8–13.0 cm long, 2.8–3.3 cm wide (averaging 12 × 3), 3.9–4.2 (averaging 4.0) times longer than broad, broadest above midway, 3.0–3.9 (averaging 3.6) times longer than petioles, abruptly acuminate at apex, narrowly acute at base, coriaceous, green and glossy above, pale green below, drying subcoriaceous, grayish and matte above, medium yellow-brown and weakly glossy below; midrib drying narrowly raised in sunken valleys above, sparsely glandular and narrowly raised to narrowly acute below; primary lateral veins 8–10 per side, departing midrib at 30–35°, narrowly rounded and concolorous above, etched, narrowly rounded and slightly paler below; collective veins arising from basal veins, 2–3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface conspicuously areolate-ridged, sparsely glandular-punctate; lower surface smoother, finely parallel-ridged adjacent to veins, sparsely glandular-punctate, the glands

weakly raised and reddish brown. *Inflorescence* with peduncle pale green, 9.5–11.7 cm long, drying sharply sulcate and slightly reddish brown; spathe lanceolate, light green tinged pinkish, drying 2.5–3.0 cm long, 4 mm wide, coriaceous and dark yellowish brown; spadix yellow-green, long and weakly tapered, drying 4.1–10.4 cm long, 0.3–0.4 cm diam., dark yellowish brown; flowers 3 visible per spiral, drying 4.0–4.2 mm long, 2.0–2.2 mm wide; tepals minutely granular on drying; lateral tepals 2.2 mm wide, the outer margin 2-sided, the inner margin rounded; stamens not emergent. *Infructescence* not seen.

Distribution and Ecology — *Anthurium robertii* is endemic to Panama, known only from the type locality in Central Panama in Panamá Province at about 300 m elevation in a *Tropical wet forest* life zone.

Etymology — *Anthurium robertii* is named in honor of the late Dr Robert Dressler (1927–2019), who along with Helen Kennedy collected the type specimen. Dressler, a botanist who worked for the Smithsonian Tropical Research Institute in Panama, was for more than four decades the ever-present force for orchid studies in Central America. He was a colleague to many who visited and often provided the only way to get to the field for many visiting botanists. Dressler, after retiring from Smithsonian Tropical Research Institute, lived near Lancaster Gardens in Costa Rica where he died on October 15, 2019.

Comments — Anthurium robertii is similar to A. chaconii Croat, a Costa Rican species from Limón Province at 600 m, in terms of the size and coloration of its dried leaves but that species has leaf blades typically broadest in the middle, a more attenuated acumen, and a shorter, less tapered spadix that is not prominently sharpened to a point. Anthurium robertii is also similar to Anthurium churchillii Croat but that species, though possessing a prominently tapered spadix, has a much shorter spadix. The latter species usually also has proportionately longer petioles and has leaf blades that dry more yellow-brown and are typically broadest in the middle. A. robertii is also similar to A. oxystachyum Croat in having a long tapered spadix but that species differs by having much longer petioles and blades that are broader below the middle. Anthurium minimum Croat is similar in size to A. robertii but differs by having a shorter, proportionately less pointed spadix and leaf blades that are broadest near the middle, drying dark brown with the upper epidermis densely granular with short pale linear cellular inclusions. In contrast, the blades of A. robertii dry with a minutely areolate upper surface and lack the pale linear cellular inclusions. Anthurium wiehleri Croat has similarly short-petiolate leaves, is abruptly acuminate at the apex and has a similarly areolate dried upper surface but it is only about one half the size of A. robertii, has the blades widest in the middle and has shorter, more slender spadices which are not tapered.

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Anthurium sabanitense Croat, **sp. nov.** — Type: PANAMA. Colón: Along route between Sabanitas and Portobello, along drainage of Río Piedras Lumber Road, departing main highway 6.7 mi E. of Sabanitas, 3.9 mi up logging road in direction of Santa Rita Ridge, 250 m, 09°22'30"N, 79°41'30"W, 6 Apr. 1993, *T.B. Croat 75165* (holotype, MO-4342327). **Figures 79 & 80**.

Diagnosis: Anthurium sabanitense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent, reddish brown cataphyll fibers, short, subterete, broadly sulcate petioles, narrowly oblong-oblanceolate blades with very close collective veins which are markedly more prominent than the primary lateral veins as well as by the moderately short-pedunculate inflorescence, cream-colored, reflexed spathe and the cylindroid-tapered, gray-green spadix.

Epiphyte; internodes short, 2 cm diam.; cataphyll fibers persisting, red-brown (none available on specimen). Leaves with petioles 4.5 cm long, 5 mm diam., terete, broadly sulcate, greenish, drying greenish brown; geniculum 1.5 cm long, drying darker than petioles; blades narrowly oblong-oblanceolate, 44.9 cm long, 5.8 cm wide, 7.7 times longer than broad, broadest above midway, 10 times longer than petioles, abruptly acuminate at apex, attenuate at base, moderately coriaceous and bicolorous, matte, drying greenish brown and semiglossy above, greenish yellow-brown and weakly glossy below; midrib eglandular above, sparsely glandular below, drying narrowly raised and paler above, narrowly rounded, finely ribbed and slightly paler below; primary lateral veins 20–25 per side, departing midrib at 40–45°, scarcely more prominent than interprimary veins, drying narrowly rounded and concolorous above, narrowly rounded and darker below; tertiary veins prominulous on both surfaces; collective veins more prominent than primary lateral veins, arising from basal veins, 2-3 mm from margin, sunken above, narrowly raised below; basal veins 1 pair; antemarginal vein present; upper surface eglandular, moderately smooth; lower surface sparsely glandular-punctate, the glands dark brown, relatively flat and weakly raised, slightly depressed in center. *Inflorescence* erect; peduncle 14.1 cm long, 5 mm diam., cylindrical, drying subterete, medium brown; spathe cream, turning green in age, reflexed, 7.7 cm long, 1.2 cm wide, subcoriaceous, drying greenish yellow-brown; spadix oblong-lanceolate, reddish at base, gray-green toward apex, cylindroid-tapered, drying 13.3 cm long, 8 mm wide, medium brown; flowers 10 visible per spiral, drying 2.1–2.2 mm long, 1.9–2.0 mm wide; tepals moderately smooth on drying; lateral tepals 1.4 mm wide, the outer margins 3-sided, the inner margins rounded; stamens not emergent. Infructescence not seen.

Distribution and Ecology — *Anthurium sabanitense* is known only from the type locality in Central Panama in Colón Province at 250 m in a *Tropical moist forest* life zone.



Figure 79. Anthurium sabanitense Croat. Holotype: Croat 75165

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Figure 80. Anthurium sabanitense Croat. Holotype: Croat 75165. Infructescence and leaves

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Figure 81. Anthurium scottmorii Croat. Isotype: Mori et al. 3752.

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Figure 82. Anthurium scottmorii Croat. Holotype: Mori et al. 3752.

Etymology — The species epithet '*sabanitense*' refers to the town of Sabanitas near the type locality.

Comments — Anthurium sabanitense is closest to A. bakeri and A. redolens Croat both of which differ in having leaf blades with the collective veins much further from the margins, having the minor veins less prominently and closely raised but instead being further apart, having a more cylindroid, proportionately shorter spadix. In terms of the spadix shape, Anthurium sabanitense is closer to A. redolens but that species also differs by having the spadix usually stipitate while those of A. sabanitense are sessile.

Anthurium scottmorii Croat, sp. nov. — Type: PANAMA. Panamá: Cerro Jefe, cloud forest dominated by *Clusia* spp. and *Colpothrinax cookii*, along trail on ridge running NE from the summit, 1000 m, 18 Dec. 1974, *S. Mori, J. Kallunki, B.A. Cochrane, T.S. Cochrane, B.F. Hansen, R.R. Kowal & M.H. Nee 3752* (holotype, MO-2276078–79; isotypes, K, PMA, WIS). Figures 81 & 82.

Diagnosis: Anthurium scottmorii is a member of sect. *Porphyrochitonium* and is recognized by its small size, short stems, short internodes, sulcate petioles, more or less elliptic blades which are glandular-punctate on both surfaces with a more or less acute apex, and a long pedunculate inflorescence with a short, cylindric reddish to purplish spadix which is 8.0–12.8 times longer than wide with yellow-orange, globose berries.

Usually epiphytic, sometimes terrestrial; stems usually less than 10 cm long; internodes short, 5-10 mm diam.; cataphylls 1.5-2.5 cm long, persisting as moderately closely appressed, reddish brown fibers. Leaves with petioles sharply sulcate, (1)2.5-8 cm long, drying 2 mm diam., drying yellow-brown, sharply and deeply sulcate; geniculum drying blackened, 8-10 mm long, 2 mm diam.; blades elliptic to oblong-elliptic, rarely ovate, (3.5)6.0–11.9 cm long, (1.7)2.5-5.6 cm wide (averaging 9 × 4), 2.1–2.7 (averaging 2.4) times longer than wide, 1.2– 4.1 (averaging 1.9) times longer than petioles, usually rounded to acute at apex with a short apiculum or a moderately short acumen, acute at base, subcoriaceous, drying gray above, grayish yellow-brown below; midrib drying prominently raised and irregularly wrinkled to narrowly acute and more or less concolorous above, irregularly several ribbed and yellow-brown below; primary lateral veins (3)4-5 per side, departing midrib at 25-30°, drying weakly raised on both surfaces, scarcely more prominent than the interprimary veins; collective veins arising from the base, 2–5 mm from margin; upper surface with a minute areolate pattern upon magnification with mostly sunken dark-glandular punctations; lower surface minutely and irregularly ridged with dark, weakly raised glandular punctations. Inflorescence erect and usually held well above the leaves; peduncle (9)13–24 cm long, drying yellow-brown, 1.5–2.0 mm diam.; spathe green to yellowish green to greenish white, sometimes tinged with purple, 2.0–2.3 cm long, 5–7 mm wide, abruptly acuminate, reflexed; spadix reddish to purple to redbrown or brownish purple, 2.7–4.8(5.5) cm long, 8.0–12.8 times longer than wide, cylindroid and rounded at apex, sometimes curved; flowers ca. 4 visible per spiral, 2.7–3.2 mm long; lateral tepals 1.5–1.6 mm wide, the outer margins 2–sided, the inner margin broadly rounded. *Infructescence* subglobose, with berries ca 6 mm diam, yellow-orange.

Distribution and Ecology — *Anthurium scottmorii* is endemic to the summit of Cerro Jefe in Panama Province at 85–1000 m in a *Primary rain forest* life zone.

Etymology — Anthurium scottmorii is named after the late Dr Scott Mori (1941–1920), Curator Emeritus at the Institute of Systematic Botany at the New York Botanical Garden where he spent most of his career. Mori was a student of Hugh Iltis (1925–2016) at the University of Wisconsin and specialized in neotropical floristics but particularly the Lecythidaceae. In addition to his work on that family he devoted a lot of time to floristic studies especially in Brazil, French Guiana, and Saba, a Caribbean Island in the Lesser Antilles chain. He traveled widely, often accompanied by his photographer wife, Carol Gracie, an author of several books on plants.

Comments — Anthurium scottmorii is related to Anthurium alticola Croat, a species that is similar in both stature and dried coloration but differs by the blades abruptly acuminate to moderately long-acuminate at apex and with the spadix moderately attenuated toward the apex and 20–31 times longer than wide. Anthurium alticola occurs at somewhat higher elevations, to 1850 m elevation, in Chiriquí and Darién Provinces.

Antonio 4740 is unusual in having somewhat longer blades, 3.5 times longer than broad with an acuminate apex and by having a prominently stipitate spadix. Perhaps it represents a hybrid.

Paratypes: PANAMA. Panamá. Cerro Jefe: Vicinity of Cerro Jefé, near tower, 09°12'50"N, 79°23'05"W, 732 cm, 23 May 1980, T.M. *Antonio* 4721 (MO); 4740 (MO); 09°14'22"N, 79°22'30"W, 900–1000 m, 30 Aug. 1977, *PJ.M. Maas, R.L. Dressler, & C.C. Berg* 2703 (MO); 1.5 km. before weather station, 09°12'50"N, 79°23'05"W, 850–900 m, 7 Oct. 1980, *K.J. Sytsma* 1479 (MO); 09°14'02"N, 79°22'30"W, 2500–3000 ft, 29 June 1978, *B. Hammel* 3728 (MO); 800–1000 m, 23 Feb 1977, *J.P. Folsom, R. Lantz & J.* 1859 (MO); 1860 (MO); 23 km N of Panamerican Hwy., 1000 m, 11 Apr. 1977, *J.P. Folsom, L. Skog & W.G. D'Arcy* 2530 (MO); 900–1000 m, 8 Oct. 1974, *S. Mori & J. Kallunki* 2393 (MO); 1.5 km before weather station, 09°12'50"N, 79°23'05"W, 850–900 m, 8 Oct. 1980, *K. J. Sytsma* 1515 (MO); New road leading N from summit, 900–1000 m, 26 Sep. 1975, *J. T. & F. Witherspoon* 8533 (MO); 1000 m, 29 Aug. 1975, *S. Mori* 7983 (MO); La Eneida, A la largo del camino nuevo que empieza al lado de la casa de López, 09°11'20"N, 79°23'05"W, 750 m, 8 Mar. 1968, *M.D. Correa* A., *R.L. Dressler & C.E. Calderón* 820 (MO).

Anthurium sknappiae Croat, **sp. nov.** — Type: PANAMA. Coclé: Ridge NW of village of Río Blanco de Norte, between Caño Sucio and Río Blanco de Norte, property of Dideymo Olivera, 08°44'N, 81°40'W; 350 m, 20 Feb. 1982, *S. Knapp 3679* (holotype, MO-3043619). **Figure 83**.

Diagnosis: Anthurium sknappiae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, pale, persistent cataphyll fibers, relatively short, deeply sulcate petioles, oblong-lanceolate, narrowly long-acuminate blades that are eglandular on the upper surface and glandular-punctate below as well as by the long-pedunculate inflorescence with a green, reflexed-spreading spathe, and narrowly tapered spadix.

Epiphyte; internodes short, 5 mm diam.; cataphylls 1.7 cm long, pale, persistent, the fibers drying manilla. Leaves with petioles 8.5 cm long, 2 mm diam., terete, sometimes deeply channeled near apex above, drying subterete to narrowly and sharply flattened, grayish brown; geniculum 0.8 cm long, drying darker than petioles; blades oblong-lanceolate, 30.8-32.5 cm long, 3.2-3.5 cm wide (averaging 32.0×3.0), 8.8-10.2 (averaging 9.5) times longer than broad, broadest midway, 3.8 times as long as petioles, narrowly long-acuminate, acute at base, drying subcoriaceous, grayish brown and weakly glossy above, grayish green-brown and semiglossy below; midrib drying narrowly acute and concolorous, eglandular with sparse, ellipsoid, gland-like structures above, sparsely glandular, narrowly raised and paler below; primary lateral veins 14 per side, departing midrib at 25-30°, granular on both surfaces, drying narrowly raised and concolorous above, narrowly rounded and slightly paler below; collective veins arising from basal veins, 2-3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely granular to granular-ridged, occasionally sub-areolate upon magnification; lower surface sparsely glandular-punctate (the glands red-brown, flat to weakly raised occasionally with sunken centers), moderately ridged, granular to granular ridged, irregularly folded upon magnification. Inflorescence with peduncle 18.7 cm long, terete, drying yellowish medium brown; spathe green, reflexed, drying 8 mm long, 1 mm wide, coriaceous, medium brown; spadix narrowly tapered, stipitate 2 mm, 4.2 cm long, 3 mm diam. at base, drying dark brown; flowers 3 visible per spiral, drying 2.4 mm long, 1.6 mm wide; tepals pustular on drying; lateral tepals 1.4 mm wide, outer margins 3-sided, inner margin rounded; stamens not emergent. Infructescence not seen.

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Figure 83. Anthurium sknappiae Croat. Holotype: Knapp 3679.



Figure 84. Anthurium stockwellii Croat. Holotype: Churchill et al. 4943.

Distribution and Ecology — *Anthurium sknappiae* is endemic to Panama, known only from the type locality in Coclé Province at 350 m in a Tropical wet forest life zone.

Etymology — *Anthurium sknappiae* is named in honor of Dr Sandra Knapp from the Natural History Museum in London. Sandy collected the type of this plant while working for the Missouri Botanical Garden and collecting for the Flora of Panama Project. Dr Knapp, a specialist on the Solanaceae, worked with Dr William D'Arcy, who at the time was the director of the project and was a fellow Solanaceae expert. She has fortunately not restricted her collecting to that family and has collected a lot of interesting Araceae.

Comments — Anthurium sknappiae most closely resembles A. perangustum Croat which differs by having narrower and longer leaf blades, a shorter peduncle, a white spathe, and a red spadix; A. friedrichsthalii Schott which differs by having narrower and longer leaf blades and collective veins 1 mm from margin.

Anthurium stockwellii Croat, sp. nov. — Type: PANAMA. Bocas del Toro: Oleoducto Road, 2 km NE of Continental Divide, on ridge between Río Quabo and Río Quabito, 08°48'N, 82°12'W, 1000 m, 9 Feb. 1984, *H.W. Churchill, G. de Nevers & H. Stockwell 4943* (holotype, MO-3210638). Figure 84.

Diagnosis: Anthurium stockwellii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent cataphyll fibers, short, obtusely sulcate petioles, dark brown-drying, oblong-elliptic blades glandular-punctate only on the lower surface, and a long inflorescence with the spadix much longer than the peduncles.

Epiphyte; leaves erect; internodes short, 1 cm diam.; cataphylls 3.5 cm long, persisting semiintact, yellowish brown with fragments of medium brown epidermis. *Leaves* with petioles 4.5–5.6 cm long, 4 mm diam., subterete, narrowly and obtusely sulcate, drying dark brown; geniculum 5 mm long, drying darker than petioles; blades oblong-elliptic to oblongoblanceolate, 27.3 cm long, 7.5 cm wide, 3.6 times longer than broad, broadest above midway, 6.1 times longer than petioles, abruptly acuminate at apex, acute at base, coriaceous, drying dark brown and weakly glossy above, medium brown and semiglossy below; midrib eglandular on both surfaces, drying narrowly convex, finely ribbed and darker above, narrowly rounded and darker below; primary lateral veins 16–18 per side, departing midrib at 50–55°, drying narrowly rounded and concolorous above, narrowly raised and darker below; tertiary veins prominulous on both surfaces; collective veins arising from basal veins, 2–4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, moderately smooth, minutely reddish speckled upon magnification; lower surface dark brown-speckled but prominently paler upon magnification, densely glandular-punctate, the glands dark brown and rounded, smooth. *Inflorescence* pendent; peduncle 18.5 cm long, 3 mm diam., drying narrowly and acutely sulcate, medium brown; spathe lanceolate, pale maroon-green, drying 5.8 cm long, 9 mm wide, coriaceous, dark brown; spadix pale maroon-green, uniform and weakly tapered, drying 22.5 cm long, 7 mm wide, dark brown; flowers 5 visible per spiral, drying 4.0–4.2 mm long, 2.4–2.6 mm wide; tepals smooth upon drying; lateral tepals 2.6 mm wide, the outer margins 2- or 3-sided, the inner margins rounded; stamens not emergent. *Infructe-scence* not seen.

Distribution and Ecology — *Anthurium stockwellii* is known only from Panama at the type locality in Chiriquí Province at 1000 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium stockwellii* is named in honor of Dr Henry Stockwell of the Smithsonian Tropical Research Institute and Gorgas Memorial Hospital in Panama. Henry is an authority on weevils and has participated in many field trips with botanists, as was the case on the trip when the type of this species was collected.

Comments — Anthurium stockwellii most closely resembles A. fragrantissimum Croat, but that species has longer and proportionately narrower blades, and a proportionately much longer and slenderer spadix. It also differs by having the flowers withdrawn beneath the level of the tepals so that only a few are visible at any point.

Anthurium sueae Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along Continental Divide from road branching N off main Fortuna-Chiriquí Grande Hwy. near Continental Divide, 1.1 mi from main hwy., 08°44'N, 82°17'W, 1200 m, 11 Mar. 1985, *T.B. Croat & M.H. Grayum 60341* (holotype, MO-3237539). **Figures 85 & 86**.

Diagnosis: Anthurium sueae is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, persistent reddish brown cataphyll fibers, sharply C-shaped to D-shaped short glandular-punctate petioles with erect margins, narrowly lanceolate to narrowly elliptic, brownish drying, acuminate blades which are glandular-punctate on both surfaces with often etched primary lateral veins and collective veins as well by the long-pedunculate inflorescences with the reddish or purplish-tinged spathe and sessile, olive-green, long- tapered spadix usually held above the leaves.

Epiphyte; stems 6 cm long; internodes short, 4–15 mm diam.; cataphylls to 3 cm long, fibers persistent, light reddish brown with fragments of brown epidermis. Leaves with petioles 3.2-22.1 cm long, drying 1–2 mm diam., sharply C-shaped to D-shaped, flat adaxially with erect margins, drying medium brown; geniculum 5–8 mm long, drying darker than petioles, sometimes slightly shrunken; blades narrowly lanceolate to narrowly elliptic, 10.2-28.5 cm long, 2.0-5.4 cm wide (averaging 19×3), 4.3-6.9 times longer than broad, broadest midway, 1.1-3.8 (averaging 2.3) times longer than petioles, narrowly long-acuminate to abruptly acuminate at apex (acumen to 2 cm), acute at base, subcoriaceous, moderately bicolorous, moderately glossy, dark green to gray above, moderately paler below, drying medium to dark brown and weakly glossy above, yellowish to reddish brown and semiglossy below; midrib narrowly raised to triangular, frequently ellipsoid-glandular-punctate above, weakly raised and paler, sparsely ellipsoid-glandular-punctate below, drying concolorous and much thicker than broad on both surfaces, sometimes acute above; primary lateral veins 9-12 per side, departing midrib at 45-50(60)°, etched to obtusely sunken above, scarcely visible below, drying convex and concolorous above, narrowly rounded and concolorous below; collective veins arising from the lowermost primary lateral veins, (1)3–4 mm from margin, etched above, scarcely visible below; basal veins 1 pair; upper surface somewhat irregular, sparsely glandular-punctate, the glands flat to weakly raised, conspicuously densely granular; lower surface densely glandular-punctate (the glands larger than above, dark brown and flat to weakly raised), granular-ridged, smoother than above. Inflorescence with peduncle 15.5–35.9 cm long, green or tinged reddish, narrowly triangular to 4-side, flattened adaxially with a medial rib, sometimes brick red, drying medium brown; spathe lanceolate, green, tinged reddish or purplish violet, spreading twisted-coiled, soon deteriorating, drying 2.2-4.5(9.2) cm long, (1.5)4-7 mm wide, subcoriaceous and yellowish medium brown; spadix long-tapered, medium to dark green, 3.5–13.7 cm long, drying 2-5 mm wide and medium to dark brown; flowers 2-3 visible per spiral, drying 2.3-2.4 mm long, 1.7–1.8 mm wide; tepals weakly glossy, pustular on drying; lateral tepals 1.5 mm wide, the outer margins 2- or 3-sided, the inner margins rounded; stamens not emergent at anthesis, withdrawing beneath tepals after anthesis. Infructescence not seen.

Distribution and Ecology — *Anthurium sueae* is endemic to Panama, known only from the type locality on the Continental Divide along the Bocas del Toro-Chiriquí Province at 1200 m elevation in a *Premontane wet forest* life zone.

Etymology — *Anthurium sueae* is named in honor of botanist Dr Sue A. Thompson, formerly of the Carnegie Museum and currently Director of 3 Rivers Ecological Research Center, Pennsylvania Fish and Boat Commission. Dr Thompson has collected many new and interesting species of Araceae in several parts of South America. Her work with *Xanthosoma* made great strides toward a better understanding of that complex genus.



Figure 85. Anthurium sueae Croat. Holotype: Croat & Grayum 60341.


Figure 86. Anthurium sueae Croat. Isotype: Croat & Grayum 60341.

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Figure 87. Anthurium sukutense Croat. Holotype: Herrera 3277.

Comments — *Anthurium sueae* is seemingly closest to *A. gracilispadix*, which differs by petioles 10–20 cm long, concolorous leaves and a terete peduncle and *A. pageanum* Croat which differs by having triangular petioles and terete peduncles.

Paratypes: PANAMA. Chiriquí: Distrito Gualaca; Fortuna Dam area ca. 5 km N of Fortuna Dam, trail along Continental Divide, 08°45'N, 82°15'W, 1200–1300 m, 25 Apr. 1988, *S. A. Thompson 4964* (MO); Bocas del Toro-Chiriquí border above Fortuna Dam, forest along Divide, ca. 08°45'N, 82°15'W, 1200 m, 4 Dec. 1985, *G. McPherson 7743* (MO); Reserva Forestal Fortuna, Sendero Honda A, 08°45'08"N, 82°14'32"W, 1190 m, 8 Dec. 2013, *O. O. Ortiz* 1828 (PMA).

Anthurium sukutense Croat, **sp. nov.** — Type: COSTA RICA. Limón: Cantón de Talamanca; Fila de exploración minera entre Río Sukut y Río Carbri, Muraubishi, 09°22'50"N, 82°56'50"W, 700 m, 14 July 1989, *G. Herrera 3277* (holotype, INB). **Figure 87**.

Diagnosis: Anthurium sukutense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent red-brown cataphyll fibers, petioles 3-ribbed adaxially, the margin narrow, prominently 3-ribbed winged abaxially, the wings more prominent, drying moderately sharply sulcate and often longer than the blades, oblong-elliptic grayish drying acuminate scarcely bicolorous blades on drying with glandular punctations on both surfaces, a single pair of collective veins which are rather close to the margins as well as by the moderately long and slender peduncle, brownish red spathe and green spadix with reddish-orange berries.

Epiphyte; internodes short, 1.2 - 1.5 cm diam., drying coarsely ribbed, dark brown; cataphylls to 5.5 cm long, persisting as loose, reddish brown fibers, mostly erect. *Leaves* with petioles 17–28 cm long, 4–6 mm diam., about 0.8 times as long as blades, drying dark brown, 3-ribbed adaxially with lateral margins narrow, prominently 3-ribbed winged abaxially, the side wings more prominent; geniculum 8 mm long, drying darker than petioles; blades ovate-elliptic, 19.3–26.4 cm long, 8.1–9.3 cm wide (averaging 23×9), 2.3–2.8 (averaging 2.6) times longer than broad, broadest below midway, 1.1-1.5 (averaging 1.3) times as long as petioles, acute to rounded at apex, acute to weakly attenuate at base, subcoriaceous, drying grayish brown, weakly glossy above, grayish brown and semiglossy below; midrib drying narrowly raised, sparsely glandular-punctate, short linear-granulate and darker below with a fine weak medial rib; primary lateral veins 12-14 per side, departing midrib at 60–65° at middle, drying weakly and narrowly rounded, concolorous above, narrowly rounded and slightly darker below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 3-4 mm from margin;

basal veins 1 pair; upper surface conspicuously glandular-punctate, minutely pale-granular and minutely dark-speckled; lower surface conspicuously glandular-punctate, minutely and irregularly dark-speckled. *Inflorescence* with peduncle 56–58 cm long; spathe green, 7.2–13.6 cm long, 1.0–1.5 cm wide, lanceolate, reflexed-spreading, subcoriaceous, drying reddish or yellowish brown; spadix sessile, cylindrical, green, 16.8 cm long, 8 mm diam., drying yellowish brown; flowers 3–4 visible per spiral, drying 4.0–4.2 mm long, 2.6–3.8 mm wide; tepals drying minutely granular; lateral tepals 2.8 mm wide, inner margin rounded to straight, outer margins 2-sided; stamens not emergent; anthers 0.3 mm long, 0.8 mm wide; thecae moderately divaricate. *Infructescence* with berries red-orange.

Distribution and Ecology — *Anthurium sukutense* is endemic to Costa Rica, known only from the type locality in Limón Province in the Cantón of Talamanca at 700 m elevation in a *Premontane wet forest* life zone.

Etymology — *Anthurium sukutense* is named for the type locality along the Río Sukut on the western slopes of the Talamancas in Limón Province.

Comments — Anthurium sukutense is seemingly close to A. rupicolum Croat, which differs by having the blades conspicuously glandular-punctate on the upper surface and by having a more nearly equal petiole to blade ratio as well as by being a rupicolous herb rather than an epiphyte. Anthurium sukutense is also resembles A. gracililaminum Croat with that differing by the blades being glandular-punctate on the upper surface. In the Lucid Anthurium Key, Anthurium sukutense also tracks to Anthurium cuasicanum Croat and A. dichrophyllum Croat, which both differ by having blades decidedly broader below the middle and by having the upper blade surface glandular-punctate. In addition, Anthurium cuasicanum has thicker blades that dry brown while A. dichophyllum has much more markedly bicolorous blades.

Anthurium tarrazuense Croat, sp. nov. — Type: COSTA RICA. San José: Tarrazu, Nápoles, Ladera Oeste de Cerro Pito, 09°34'50"N, 84°04'10"W, 1500 m, 1 Dec. 1995, *G. Herrera, A. Cascante & J. Sónchez 8799* (holotype, CR-196066). Figure 88.

Diagnosis: Anthurium tarrazuense is a member of sect. *Porphyrochitonium* and is recognized by its narrow, long-petiolate leaves that are glandular-punctate only on the lower surface, by the long-pedunculate inflorescence, reddish brown slender spathe and the long brownish spadix.

Epiphyte; internodes short, 1.5 cm diam.; cataphylls to 6.5 cm long, persisting as more or less parallel brownish fibers. *Leaves* with petioles 25.0–35.5 cm long, drying 2–3 mm diam., dark yellow-brown, irregularly ridged; blades narrowly ovate-oblong to narrowly oblong-

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Figure 88. Anthurium tarrazuense Croat. Holotype: Herrera et al. 8799



Figure 89. Anthurium tayuticense Croat. Holotype: Herrera & Cascante 8157

elliptic, 28.5-39.5 cm long, 4.8-6.3 cm wide (averaging 33×6), 5.9-6.2 (averaging 6) times longer than wide, equalling petioles, narrowly long-acuminate at apex, obtuse at base, subcoriaceous, drying matte to weakly glossy on both surfaces, greenish gray above, yellowish green below; midrib narrowly convex, drying nearly concolorous, with a few irregular fine ridges on upper surface above, slightly thicker, nearly concolorous, with a few irregular fine ridges below; primary lateral veins 6-8 per side, departing midrib at 25-30°, drying bluntly acute and concolorous, scarcely more prominent than the interprimary veins below; collective veins arising from the base, 6-9 mm from the margins, slightly more prominent than the primary lateral veins, weakly loop-connecting the primary lateral veins; upper surface eglandular, irregularly covered with blunt bumps; lower surface irregularly short-ridged at higher magnifications, sparsely glandular-punctate. Inflorescence with peduncle 39 cm long; spathe 8.7 cm long, 8 mm wide, reddish brown, drying dark brown, narrowly acuminate at apex, rounded at base; spadix weakly stipitate (ca. 1 mm), 16 cm long, drying 4.5 mm diam., turning brownish; flowers 6 visible per spiral, 2.6 mm long, 1.8 mm wide; lateral lobes 1.4–1.6 mm wide, the inner margin broadly rounded, the outer margins 2-sided; anthers 0.3 mm long, 0.5–0.6 mm wide, promptly retracted beneath the margin of the tepals. Infructescence not seen.

Distribution and Ecology — *Anthurium tarrazuense* is endemic to Costa Rica, known only from the type locality near Tarrazú, Nápoles on the slopes of Cerro Pito at 1500 m in a *Premontane wet forest* life zone.

Etymology — The species epithet refers to the town of Tarrazú near the type locality.

Comments — Anthurium tarrazuense is closest to A. nutans Croat but that species has more elongated blades (6.2–6.7 times longer than wide), collective veins closer to the margin (1-2 mm from margin in lower 1/3 of the margin), more primary lateral veins (15-20 per side) which are scarcely more prominent than the interprimary veins (from the descriptions these are not different) and flowers with a smaller style (0.1-0.15 mm).

Anthurium tayuticense Croat, sp. nov. — Type: COSTA RICA. Cartago: Cantón Turriaba. Distrito Tayutic. Vereda Grana de Oro, 2 km E., trail to Llanos del Quetzal, 09°48'50"N, 83°22'40"W, 1200 m, 28 July 1995, *G. Herrera & A. Cascante 8157* (holotype, MO-5036242; isotypes CR). Figure 89.

Diagnosis: Anthurium tayuticense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, petioles which are sharply sulcate adaxially, yellowish brown on drying, sheathed to 9 cm at base, a geniculum 1.8 cm long, drying darker and 5 mm diam., blades that are oblong-elliptic, eglandular on the upper surface as well as by the purple-violet spadix with only 5 flowers visible per spiral.

Epiphyte; internodes short; cataphylls not seen. Leaves with petioles 27 cm long, 4 mm diam., sharply sulcate adaxially, yellowish brown on drying, sheathed to 9 cm at base; geniculum 1.8 cm long, 5 mm diam, drying darker; blades oblong-elliptic, 52 cm long, 10.8 cm wide, 4.8 times longer than wide, acuminate at apex, acute and weakly attenuate at base, subcoriaceous, drying yellowish gray and weakly glossy above, medium grayish yellow and slightly more glossy below, margin sometimes drying markedly undulate, revolute at the margin; midrib convex, slightly paler and drying yellow-brown and finely ridged on drying above, becoming narrow and bluntly acute toward the apex, narrowly raised, drying gray-brown and finely ribbed on bottom; primary lateral veins 15-27 per side, scarcely distinguishable except for a weak indentation at the collective veins, not otherwise distinguishable from the interprimary veins, concolorous and prominulous on both surfaces, 3-5 mm apart, even closer and departing midrib at 30° near the base, at 35–40° at middle; collective veins essentially a single pair with a weak development of small marginal veins near the base, the main vein arising from the base, 1-2mm from the margin in the lower 1/4 of the blade, 5–7 mm from the margin from the middle to apex of the blade, scarcely sunken above, weakly raised and scarcely or not at all more prominent than the lateral veins on upper surface, somewhat more prominent than the primary lateral veins below; upper surface eglandular, drying conspicuously pustular, otherwise smooth; lower surface dark glandular-punctate, drying conspicuously pustular. Inflorescence erect; peduncle 20 cm long, drying dark brown, 2 mm diam.; spathe linear, 8 mm wide, promptly drying inrolled, affixed at nearly at a 90° angle; spadix 12.3 cm long, 4 mm diam. near base, stipitate 1-2 mm, narrowly cylindroid, scarcely tapered except very near apex, purple-violet; flowers 9–10 per spiral, 1.6–2.3 mm long, 1.2–1.4 mm wide; lateral tepals 1.0–1.2 mm wide, 2-sided on outer margin, nearly straight on the inner margin, the surface conspicuously pale pustular on magnification; stamens weakly protruded above the tepals; anther 0.10 long, 0.15 mm wide, the thecae slightly divaricate. Infructescence not seen.

Distribution and Ecology — *Anthurium tayuticense* is endemic to Costa Rica, known only from the type locality in Cartago Province of Costa Rica at 1200 m elevation in a *Premontane wet forest* life zone.

Etymology — The species epithet refers to the town of Tayutic near the type locality.

Comments — *Anthurium tayuticense* most closely resembles *A. jicoteense* a species from a similar elevation in Costa Rica Cartago Province, Cantón Turialba but that species has terete, obtusely and broadly sulcate petioles, blades that are less than 7 cm wide and 5–7 times longer than broad which are glandular-punctate on the upper surface with a green spadix with only 5 flowers visible per spiral.

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Anthurium toroense Croat, sp. nov. — Type: PANAMA. Bocas del Toro: Cerro Colorado, 9.2 m W of Chamé, along trail E of road which leads down to stream, 08°35'N, 81°50'W, 1450–1480 m, 6 July 1988, *T.B. Croat, 69016* (holotype, MO-3640327; isotypes, B, CAS, CM, DUKE, F, K, M, MBM, MEXU, NY, PMA, TEX, US). Figures 90 & 91.

Diagnosis: Anthurium toroense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, small stature, short internodes, slender petioles 2/3 as long as or slightly longer than the blades, the grayish to grayish yellow-brown, more or less narrowly elliptic blades with glandular punctations on both surfaces as well as by the narrowly long-tapered greenish spadix and lavender berries.

Epiphyte; internodes 1 cm or less in diam.; cataphylls 5 cm long, the uppermost moderately intact, drying light brown, soon persisting as thin, pale fibers. Leaves with petiole (4)9-20 cm long, 1.5–3.0 mm diam. (dried), sharply C-shaped, grayish green on drying, flat-sulcate or with a medial rib, the margins sharply erect; blades elliptic to weakly ovate-elliptic, 10-21 cm long, 2.8-6.6 cm wide, 3.1-3.6 times longer than wide, narrowly long-acuminate at apex, narrowly acute to weakly attenuate at base, subcoriaceous, conspicuously bicolorous, drying medium gray and matte above, paler, grayish yellow-brown and weakly glossy below; midrib convex and slightly paler above, acute below, drying bluntly acute and concolorous above, acute and finely ribbed, slightly paler below; primary lateral veins etched-quilted above, pleated-raised below, drying narrowly rounded and concolorous above and below; upper surface densely and minutely granular to granular-ridged, conspicuously dark brown glandular-punctate; lower surface moderately smooth, conspicuously dark brown glandular-punctate, the glands smaller than above. Inflorescence erect; peduncle 16–27 cm long, 1–2 mm diam.; spathe green, 2.2-5.5 cm long, 3-6 mm wide, reflexed to spreading; spadix 8-10 cm long, 2-3 mm diam., green at anthesis, yellowish brown in fruit; flowers 2-3 visible per spiral, 3.4-4.0 mm long, 1.5–1.6 mm wide, drying dark yellow-brown; lateral tepals drying minutely granular with outer margins 2-sided, inner margins broadly rounded, almost straight. Infructescence with berries pale lavender.

Distribution and Ecology — *Anthurium toroense* is endemic to Panama, known only from the type locality on Cerro Colorado in Bocas del Toro and unquestionably also in Chiriquí Province at nearly 1500 m elevation in *Premontane rain forest* life zones.

Etymology — The species epithet refers to the type locality in Bocas del Toro Province.

Comments — Anthurium toroense has been confused with A. ochrostachyum Sodiro which has blades of similar color, shape and texture and has narrowly long-tapered spadices which are acute at the apex, but A. ochrostachyum differs by having glandular punctations only on the lower surface.



Figure 90. Anthurium toroense Croat. Isotype: Croat 69016

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Figure 91. Anthurium toroense Croat. Holotype: Croat 69016



Figure 92. Anthurium tsaiae Croat. Holotype: McPherson 8588.

Anthurium tsaiae Croat, **sp. nov.** — Type: PANAMA. Bocas del Toro: Along road from Fortuna Dam towards Chiriquí Grande, 10 miles from Continental Divide, 1 mile along side road, ca. 08°55'N, 82°10'W, ca. 120 m, 5 Mar. 1986, *G. McPherson 8588* (holotype, MO-3486414). **Figure 92**.

Diagnosis: Anthurium tsaiae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, somewhat intact red-brown, C-shaped cataphylls, C-shaped petiole, narrowly oblong-elliptic, somewhat inequilateral, narrowly acuminate, brownish-drying blades which are eglandular on the upper surface and about twice as long as the petioles and acute at base as well as by the long-pedunculate inflorescence which equals or exceeds the length of the leaves, a linear, spreading, greenish red spathe and a green to dark purple, slightly tapered spadix.

Epiphytic; internodes short, less than 1 cm diam.; cataphylls 1.5-2.5 cm long, somewhat intact, red-brown, becoming fibrous toward base. Leaves with petioles C-shaped, 6.5-10.0 cm long, drying reddish brown, narrowly and deeply sulcate adaxially, 1.3 mm wide, 1.8 mm thick, narrowly and weakly ribbed adaxially; geniculum 3–5 mm long, slightly swollen, sulcate adaxially, narrowly rounded abaxially; blades narrowly oblong-elliptic, 15.7-18.5 cm long, 2.2–2.9 cm wide, 6.9–7.4 times longer than wide, 0.5–0.6 times as long as blade, somewhat inequilateral (one side 2-3 mm wider), narrowly acuminate at apex, narrowly acute at base, subcoriaceous, drying medium greenish brown and matte above, weakly paler, grayish brown and weakly glossy below; midrib drying narrowly rounded, irregularly ribbed, densely granular, densely short pale-lineate above, broadly rounded with a thick paler medial rib, finely intermittent ribbed below; primary lateral veins 9-11per side, departing midrib at 40-50°, 3-5 mm from margin, scarcely loop-connected, not sunken above, about as prominent as primary lateral veins; upper surface eglandular, coarsely granular, faintly and sparsely short pale-lineate, densely and minutely dark-speckled; lower surface sparsely glandular-punctate, sparsely pustular, densely reddish-speckled. Inflorescence long-pedunculate, equaling or exceeding the length of the leaves; spathe linear, 3.6–5.6 cm long, 5–6 mm wide, narrowly acute at apex, spreading, greenish red; spadix 8.0–14.7 cm long, drying 2.8–3.0 mm diam., green to dark purple, slightly tapered; flowers mostly 2 visible per spiral, 4.4–5.0 mm long, 3 mm wide; tepals granular; lateral tepals 2.0–2.8 mm wide, inner margin broadly rounded, outer margin broadly 2-sided; stamens only weakly exserted above tepals, seemingly not withdrawn; anthers 0.4 mm long, 0.5 mm wide; thecae ovoid, somewhat divaricate; *Infructescence* not seen.

Distribution and Ecology — *Anthurium tsaiae* is endemic to Panama, known only from the type locality in Bocas del Toro Province at ca. 120 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium tsaiae* is named for Joceyln Tsai, one of the authors of this paper. While she was a student at Washington University Jocelyn devoted a summer to sorting and characterizing many unpublished species of sect. Porphyrochitonium, thus helping to lay the groundwork for this paper. Jocelyn is currently at the University of North Carolina.

Comments — Anthurium tsaiae was confused with A. crassiradix Croat var. purpureospadix Croat but that taxon has leaf blades that are rounded at the base and have a proportionately shorter, more bluntly pointed spadix. The former may also be confused with Anthurium tuquesense but that species has proportionately shorter petioles, leaf blades that are 2–3 times longer than petioles and an inflorescence that is much longer than the leaves.

Anthurium tscuiense Croat & O.Ortiz, sp. nov. — Type: PANAMA. Bocas del Toro: Chaguinola District: Cerro Frío, headwaters of Río Tskui, Point 22, 09°15'37.6"N, 82°30'14.6"W, 1200 m, 27 Oct. 2008, *L. Martínez, A.K. Monro & D. Santamaría 382* (holotype, PMA-802208). Figures 93–95.

Diagnosis: Anthurium tscuiense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short, moderately thick internodes, densely arranged, more or less erect, reddish brown cataphyll fibers, moderately short-petiolate, 5 ribbed petioles which are 0.2–0.4 times as long as blades, deeply sulcate adaxially and 3-ribbed abaxially, narrowly elliptic, narrowly acuminate blades which are acute to attenuate at base, grayish above, grayish brown below with moderately weak primary lateral veins and a single pair of collective veins moderately remote from the margins, glandular punctations on both surfaces as well as by the long-pedunculate inflorescence which is about 3 times longer than the petioles with a several low-winged-ribbed peduncle, a pale green, linear-lanceolate, erect-spreading spathe and a green, long-tapered spadix.

Epiphytic at 50 cm above soil; internodes short, 1.5–2.0 cm diam., densely rooted; cataphylls ca. 5 cm long, the lower portion persistent as closely parallel thin reddish brown fibers with a few fragments of epidermis. *Leaves* with petioles 8.7–12 cm long, ca. 3.5 mm diam., 0.2–0.4



Figure 93. Anthurium tscuiense Croat & O.Ortiz. Martinez et al. 382. Inflorescence.



Figure 94. Anthurium tscuiense Croat & O.Ortiz. Martinez et al. 382. Habit of living plant

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Figure 95. Anthurium tscuiense Croat & O.Ortiz. Holotype: Martinez et al. 382.



Figure 96. Anthurium tuquesense Croat. Holotype: Croat 27276

times as long as blades, deeply and sharply sulcate adaxially, acutely 3-ribbed abaxially; geniculum 7–8 mm long, slightly thicker and darker than shaft, ribbed like petiole; blades narrowly elliptic, 30.5–31.0 cm long, 9.7–10.5 cm wide, 2.9–3.0 times longer than wide, 2.5–3.5 times longer than petioles, gradually acuminate, acute to weakly attenuate at base, subcoriaceous, drying dark gray and weakly glossy above, much paler and gray-brown, almost matte below; midrib narrowly and prominently raised, concolorous, often acute above, narrowly rounded to bluntly acute, drying darker below; primary lateral veins 12 or 13 per side, departing midrib at 45–50°, weakly sunken and concolorous above, drying scarcely raised and concolorous above, weakly and narrowly raised, darker, sometimes undulate below, sometimes scarcely more prominent than interprimary veins; collective veins arising near the base, 7-10 mm from margins; upper surface minutely granular, weakly dark glandular-punctate; lower surface weakly and minutely darkish speckled, conspicuously dark glandular-punctate. Inflorescence erect; peduncle 42 cm long, narrowly several-winged; spathe pale green, linear-lanceolate, 7 cm long, 8 mm wide, erect-spreading; spadix long-tapered, bluntly pointed, 14 cm long, 7 mm diam., 20 times longer than wide, green; flowers 4 visible per spiral, 2.6–3.1 mm long, 1.6–2.4 mm wide; tepals densely granular, 1.0-1.2 mm wide, inner margins broadly rounded, outer margins 2-sided. Infructescence not seen.

Distribution and Ecology — *Anthurium tscuiense* is known only from Panama at the type locality in Bocas del Toro Province at 1200 m in a Tropical wet forest life zone.

Etymology — The species is named for the type locality along the Río Tskui in Bocas del Toro Province, Chaguinola District.

Comments — Anthurium tscuiense is most similar to A. pageanum Croat owing to its blades of similar shape and color but that species differs by having smaller leaves and sharply triangular petioles. In the Lucid Anthurium Key, Anthurium tscuiense tracks to A. crassitepalum Croat, A. cuasicanum Croat, A. gracilispadix Croat, A. lancifolium Schott, A. melastomatis Croat, A. oxystachyum Croat, A. terryae Standl. & L. O. Williams, A. utleyorum Croat & Baker and A. vallense Croat but differs from all in having only a single pair of collective veins and by having winged-ribbed peduncles.

Anthurium tuquesense Croat, *sp. nov.* — Type: PANAMA. Darién: Vicinity of gold mining camp of Tyler Kittredge on headquarters of Río Tuquesa, ca. 2 km from Continental Divide, 08°33'30"N, 77°28'30"W, 450–500 m, 26 Aug. 1974, *T.B. Croat 27276* (holotype, MO-2253343). Figure 96.

Diagnosis: Anthurium tuquesense is a member of sect. *Porphyrochitonium* and is characterized by its small size, epiphytic habit, narrowly oblong-linear blades which are eglandular on the upper surface and by its long-pedunculate, long-tapered, purplish spadix. Especially characteristic is the closeness of the collective veins to the margin and the fact that there is yet an additional pair of veins, the antemarginal veins which run immediately adjacent to the margins and extend to the apex.

Epiphyte; internodes short, 9 mm diam.; cataphylls 3.2–3.7 cm long, acute persisting intact at apex, becoming fibrous with fragments of yellowish brown epidermis, the fibers manila, mostly closely parallel. Leaves with petioles 3.3-5.0 cm long, 2 mm diam., narrowly and acutely sulcate, drying yellowish brown; geniculum 5 mm long, drying darker than petioles; blades narrowly oblong-linear, 10.9-13.3 cm long, 1.6-2.1 cm wide (averaging 12 × 2), 6.3-6.8 (averaging 6.6) times longer than broad, broadest midway, 2.7-3.3 (averaging 3.0) times as long as petioles, abruptly acuminate at apex, (acumen to 8 mm long), attenuate at base, drying subcoriaceous, brown and weakly glossy above, yellowish brown and semiglossy below; midrib drying bluntly acute and concolorous above, narrowly raised, finely ribbed and slightly paler below; primary lateral veins 14 per side, departing midrib at 40–45° near middle, drying narrowly rounded, concolorous above, narrowly rounded and concolorous below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from1st pair primary lateral veins, 1 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely granular, sparsely dark-punctate (but with punctations removable); lower surface glandular-punctate with weak longitudinal ribs and dark brown-speckling. Inflorescence with peduncle 14.9 cm long, drying 1.5 mm diam.; spathe not seen; spadix purplish, very long and weakly tapered, 10.1 cm long, 3 mm diam., more than 30 times longer than wide, drying reddish brown; flowers 3 visible per spiral, drying 3 mm long and 2.3 mm wide; tepals minutely granular on drying; lateral tepals 1.8 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. Infructescence not seen.

Distribution and Ecology — *Anthurium tuquesense* is known only from the type locality in Panama's Darién Province near the Continental Divide at 450–500 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium tuquesense* is named for the type locality along the Río Tuquesa in near the Continental Divide in Darién Province.

Comments — *Anthurium tuquesense* is perhaps closest to A. jefense Croat but that species has proportionately broader leaf blades that range from about 3 to 5 times longer than wide and have the collective veins farther from the margins (mostly 4–8 mm) and lack a distinct antemarginal vein.

Anthurium vanninii Croat, **sp. nov.** — Type: Cult. J. Vannini ex PANAMA. Panamá Province: Cerro Jefe, SW slope, 09°13'25"N, 79°20'59"W, 900 m, originally collected by J. Vannini, 28 Oct. 2007, vouchered 17 Dec 2012, *T.B. Croat & J. Vannini* 100583 (holotype, MO-6458634; isotype, K, PMA). **Figures 97–100**.

Diagnosis: Anthurium vanninii is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, persistent, reddish brown cataphyll fibers, sharply C-shaped to D-shaped petioles with erect margins, narrowly lanceolate to narrowly elliptic, brownish drying, gradually acuminate blades with etched primary lateral and collective veins as well by the long-pedunculate inflorescences with the green spathe and bright yellow spadix usually held above the leaves.

Epiphyte; stems to ca. 6.0 cm long, 1.8 cm diam.; internodes short, ca. 1 cm diam., leaf scars hidden by cataphylls; cataphylls to 3.5 cm, rounded at apex, initially with several cataphylls intact at upper nodes, drying reddish brown, weathering to network of persistent fibers. Leaves with petioles erect and blades more or less spreading; petioles obtusely C-shaped, 5.3-6 cm long, 3.0–3.5 mm diam., 0.4 times as long at blades, medium green, pale-short-lineate, glandular punctate, obtusely and moderately deeply sulcate with narrow medial rib moderately conspicuous in apical half, the margins bluntly acute, sheathed and swollen in lower 1 cm; geniculum ca. 1.5 cm long, moderately paler than shaft; blades narrowly ovate-elliptic, 9.2–19.1 cm long, 2.2-9.2 cm wide (averaging 13×5), 1.8-4.4 (averaging 2.8) times longer than wide, 0.7-5.4 (averaging 2.6) times longer than petioles, somewhat rounded at apex, obtuse at base, moderately coriaceous, semiglossy, moderately bicolorous, drying matte, dark greenish brown to grayish brown above, moderately paler, weakly glossy, greenish to greenish brown below; midrib glandular punctate, narrowly rounded in a deep valley, narrow and bluntly acute toward the apex, moderately paler than surface in the lower half of the blade, narrowly rounded and paler in lower half, narrowly rounded toward apex below, drying acute and concolorous above, narrowly rounded and irregularly ridged, darker below; primary lateral veins 5 or 6 per side, with interprimary veins sometimes almost as prominent as primaries, departing midrib at (25)30–40°, weakly sunken and concolorous above, weakly raised and slightly paler below, drying weakly raised and concolorous above, scarcely distinguishable from interprimary veins above, drying narrowly rounded and darker below: interprimary veins etched above; collective veins arising from base, about equally sunken as primary lateral veins in the upper half of the blade, more prominent than primary lateral veins; a pair of secondary basal veins much weaker and merging with the margins in the distil ²/₃ of the blade; upper surface moderately smooth, sparsely glandular-punctate, the glands moderately sunken when fresh; lower surface weakly granular, densely dark glandular-punctate. *Inflorescence* prominently pedunculate, held well above the leaves; peduncles medium green, 22.7 cm long, 3 mm diam., 3.7 times longer than petioles, subterete, weakly sulcate on one side; spathe greenish, reflexed-spreading to reflexed, narrowly ovate, prominently reflexed, matte inside, semiglossy outside, the margins meeting at an 80° angle; spadix 3.5 cm long, 1.5 cm wide, subsessile, cylindroid, weakly tapered, usually bright yellow at anthesis, semiglossy; flowers 3.8–4.0 mm long, 3.0–3.2 mm wide, margins parallel to spirals straight, margins perpendicular to spiral broadly sigmoid; tepals orange-brown, matte, smooth when fresh, lateral tepals 1.9–2.1 mm wide, inner margin broadly rounded, outer margins 2-sided; pistils rather prominently protruding, pale green, semiglossy, 1.0–1.2 mm wide, quadrangular with rounded corners; stigma slit-like, 0.5 mm long; stamens apparently withdrawing below tepals, 1 mm wide, 0.1 mm long. *Infructescence* with berries orange, subquadrangular and truncate-depressed at apex.

Distribution and ecology — *Anthurium vanninii* species is known only from Cerro Jefe, at about 900 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium vanninii* is named for Jay Vannini who collected the plant from which the type specimen was made. Jay is a naturalist equally versed in the biology of animals, especially amphibians, as he is with plants. His many years of roaming the forests of Central America, especially Guatemala where he lived for many years, have led to numerous important discoveries. Jay was co-author on a treatment of the Araceae of Guatemala (Croat & Vannini, 2005).

Comments — Anthurium vanninii most closely resembles A. bicollectivum Croat owing to its general blade shape and the yellow-orange berries, but that species differs by having typically more narrowly elliptic blades with 2 well-developed collective veins which extend along the margins nearly to the apex and by having a green to yellow-green, long-tapered spadix. In contrast, Anthurium vanninii has only a weak pair of secondary collective veins which merges with the margins near the middle of the blade and an inflorescence with a cylindroid bright yellow spadix. In the Lucid Anthurium Key, Anthurium vanninii tracks to Anthurium crassiradix Croat which differs by having roots arranged in a coralloid mass, narrowly ovate-oblong blades and A. paludosum Engl. which differs by having narrowly oblong-elliptic to oblanceolate blades which are 3.1–3.8 times longer than broad, primary lateral veins 12–14 per side; spadix green, becoming violet-purple or reddish (versus with blades narrowly ovate-elliptic, 2.0–2.1 times longer than wide, primary lateral veins 5 or 6 per side and the spadix pale yellow-orange).



Figure 97. Anthurium vanninii Croat. Holotype: Croat & Vannini 100583. Photos by J. Vannini



Figure 98. Anthurium vanninii Croat. Croat & Vannini 100583. Cataphylls.



Figure 99. Anthurium vanninii Croat. Croat & Vannini 100583. Habit of greenhouse plant.



Figure 100. Anthurium vanninii Croat. Croat & Vannini 100583. Habit with berries

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Figure 101. Anthurium veraguense Croat & O.Ortiz. Holotype: Ibanez 5694AI

A collection from the El Llano-Carti Road (*Mori & Kallunki 5567*) may also be *Anthurium vanninii* but is described as having a purplish spathe, has proportionately narrower blades, and lacks a pair of secondary collective veins.

Paratypes: PANAMA. Panamá: Cerro Jefe, 900–1000 m, P.*J.M. Maas, R.L. Dressler & C.C. Berg 2703* (MO); Near radio towers, 1000 m, 30 Nov. 1983, *W.H. Churchill 3935* (MO); Forrest near summit, 850 m, 24 Aug. 1986, *G. McPherson 9974* (MO); July 1973, *H. Kamemoto & Sagawa 152* (MO); 09°14'02"N, 79°22'30"W, 700–1000 m, 11 Dec. 1978, *T.B. Croat 45064* (MO); Chepo, El Llano-Cartí Road, 23.4 km from Inter-American Hwy., 09°18'24"N, 78°57'01"W, 350 m, 13 Apr. 1975, *S.A. Mori & J.A. Kallunki 5567* (MO); Vicinity of summit, 09°14'N, 79°22'W, 850 m, 8 July 1987, *T.B. Croat 67055* (MO).

Anthurium veraguense Croat & O.Ortiz, sp. nov. — Type: PANAMA. Veraguas: Parque Nacional Sante Fe, La Sabaneta, bosque cerrado ca. 6–8 m con alto palmas, 08°40'32N, 80°59'28"W, 1000–1224 m, 15 July 2009, A. Ibáñez, F. Hernández, J. Guerra & V. Concepción 5694AI (holotype, PMA-106304). Figure 101.

Diagnosis: Anthurium veraguense is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, elongated internodes, pale, persistent cataphyll fibers, narrowly elliptic, narrowly acuminate, grayish to yellowish brown drying blades with a weakly attenuated base, a single pair of collective veins, glandular punctations only on the lower surface, an inflorescence shorter than the leaves an erect-spreading to reflexed, lanceolate-elliptic, green tinged lavender spathe and a pale yellow-green spadix with early-emergent broad pale green berries which are whitish in basal half.

Small terrestrial herb with slender erect stem; internodes 9–15 mm long, 5 mm diam., leaf scars often at an oblique angle, drying dark brown, matte, minutely and densely granular; cataphylls 3.0–3.3 cm long, drying dark brown, soon decomposing with a sparse network of pale fibers and fragments of dark brown epidermis, soon deciduous. *Leaves* with petioles 12.7–17.5 cm long, drying 2 mm diam., subterete, drying narrowly sulcate adaxially, medium brown; geniculum 5 mm long and darker; blades narrowly elliptic, 13.3–17.7 cm long, 5.2–7.7 cm wide (averaging 16×7), 2.2–2.5 (averaging 2.4) times longer than wide, about equaling petioles, narrowly and gradually acuminate, weakly attenuated at base, subcoriaceous, dark green and matte above, somewhat paler and semiglossy below, drying dark gray-brown and matte above, grayish yellow-brown and semiglossy below; midrib drying narrowly raised, sometimes acute, concolorous above, narrowly rounded and paler below, drying in part with an acute medial rib toward the base; primary lateral veins (6) 9–12 per side, departing midrib at 45–50°, moderately obscure and concolorous, drying undulated above, weakly and narrowly raised in part, slightly darker and wrinkled on drying below; tertiary veins obscure below; collective veins arising from the only basal veins, 5–6 mm from margin; upper surface eglandular, drying minutely and closely granular; lower surface moderately smooth, conspicuously and densely dark glandular-punctate (the glands usually depressed in center). *Inflorescence* erect, much shorter than the leaves; peduncle 8 cm long, drying 1 mm diam., terete; spathe lanceolate-elliptic, erect-spreading to reflexed, 2.6 cm long, 7 mm wide, tinged lavender; spadix green in early fruit, 5.3 cm long, 4 mm diam.; flowers 4 visible per spiral, 3.0–3.2 mm long, 2.0–2.2 mm wide; tepals minutely granular-ridged; lateral tepals 1.6–1.8 mm wide, inner margin broadly rounded, outer margin 2-sided. *Infructescence* with berries whitish in basal half, greenish in apical half, ca. 3 mm long, 2.6 mm diam., sparsely imbedded with short pale cellular inclusions throughout.

Distribution and ecology — *Anthurium veraguense* is endemic to Panama, known only from the type locality in Veraguas Province in the Parque Nacional Santa Fé at 1000 m in a *Premontane rain forest* life zone.

Etymology — The species is named for the type locality in the Province of Veraguas.

Comments — In the Lucid Anthurium Key, *Anthurium veraguense* tracks to *A. brevipes* Sodiro which differs by having proportionately narrower blades (to more than 3 times longer than broad) with a much longer acumen and a more narrowly tapered spadix and *A. margaricarpum* Sodiro which has blades more than twice as large and has conspicuously persistent cataphylls. In the Central American Key to Anthurium, *Anthurium veraguense* tracks to *A. subrotundum* Croat, a species with blades nearly as broad as long.

Anthurium wendlingeri G.M.Barroso var. *borichii* Croat, var. nov. — Type: cult. Missouri Botanical Garden ex COSTA RICA. Limón: Llanuras de Santa Clara, Atlantic rain forest, rare, pendulous epiphyte on tall old trees of shore-jungle along lower Río Costa Rica near Hacienda "El Zorro Cruel", 10°12'36"N, 83°51'00"W, 250 m, originally collected by Clarence Horich; vouchered Mar. 1990, *T.B. Croat 71837* (holotype, MO-5451888; isotypes, CR, K, US). Figures 102 & 103.

Diagnosis: Anthurium wendlingeri var. horichii is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, pendent leaves, proportionately short, subterete, weakly sulcate petioles, very long, oblong-lanceolate, pendent, more or less concolorous, gradually acuminate blades which are rounded at the base, dark green, glandular-punctate on both surfaces, matte-subvelvety above with a single pair of collective veins relatively remote from

the margin as well as by the weakly stipitate, long and weakly tapered spadix which is pinkish at anthesis then turning purplish.

Epiphyte; internodes short 1.0-1.7 cm diam.; cataphyll fibers persisting, pale. Leaves with petioles terete, weakly and narrowly sulcate, dark green, almost matte, weakly short purple-lineate on drying, 17.7-27.6 cm long, 3-4 mm diam., greenish brown; geniculum moderately paler than petioles, drying 7-9 mm long, darker than petioles; blade strap-shaped, 63.8-84.6 cm long, 6.3-8.3 cm wide (averaging 74×7), about ten times longer than broad, 3.6 times as long as petioles, gradually acuminate at apex, (acumen to 2 cm long), obtuse at base, subcoriaceous, dark green and matte-subvelvety above, equally as dark and weakly glossy below, drying essentially concolorous, matte and yellowish green above, weakly glossy and yellowish green below; midrib sparsely glandular-punctate above and below, bluntly acute and slightly paler above, weakly convex and paler below; primary lateral veins ca. 20 per side, departing midrib at 40°, weakly and obscurely raised and concolorous above, flat and obscurely visible below, but scarcely more conspicuous than interprimary veins; collective veins arising from basal veins, 6 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface sparsely and slightly raised glandular-punctate, cells prominently raised; lower surface conspicuously glandular-punctate, minutely areolate-ridged. Inflorescence pendent; peduncle 20-44 cm long; spathe and peduncle purplish, linear-lanceolate, drying 4.5-14.4 cm long, 9-12 mm wide, moderately coriaceous, medium reddish brown; spadix stipitate 6 mm, very long and weakly tapered, greenish when young, pinkish at anthesis, turning purplish, drying 15.8–32.9 cm long, 4-5 mm diam., yellowish brown; flowers 5 visible per spiral, drying 2.1 mm long and 1.3 mm wide; tepals minutely granular on drying; lateral tepals 1.5 mm wide, inner margin rounded, outer margins 2-sided; pistils weakly emergent; stamens held at level of tepals, anthers 0.4 mm long and wide, thecae ellipsoid, scarcely divaricate. *Infructescence* not seen.

Distribution and ecology — *Anthurium wendlingeri* var. *horichii* is known only from the type locality in Costa Rica in Limón Province at 250 m elevation in a *Tropical wet forest* life zone.

Etymology — Anthurium wendlingeri var. horichii is named for the German plant collector, Clarence Horich (né Klaus Hörick) who spent much of his career botanizing in Costa Rica where he collected the living type specimen. Horich was born in Lüdenschied, Germany on 11 May 1930 and died on 1 March 1994 in Costa Rica. Horich had training as a gardener and immigrated to Canada in 1951 when he was 21 years old. Working in a large orchid nursery beginning in 1953, he went on collecting expeditions to Colombia, Ecuador and Bolivia primarily looking for orchids (but also cacti, aroids, and ferns). In 1957, Horich moved to San José, Costa Rica where he married a local woman and took up residence, working in his own private business, collecting plants for export. During his many years of wandering in Costa Rican forests he found and cultivated many interesting plants including this one that bears his name.



Figure 102. *Anthurium wendlingeri* G.M.Barroso var. *horichii* Croat. Paratype: *Munich 92–3413*.



Figure 103. Anthurium wendlingeri G.M.Barroso var. horichii Croat



Figure 104. Anthurium wiehleri Croat. Holotype: Croat & Zhu 76546. Infructescence

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Figure 105. Anthurium wiehleri Croat. Holotype: Croat 71837



Figure 106. Anthurium wiehleri Croat. Paratype: Kennedy et al. 1122

Comments — *Anthurium wendlingeri* var. *horichii* is most easily confused with the typical variety A. wendlingeri but that taxon has a white spadix which is white to gray-white and forms a tight spiral before anthesis.

Paratype: COSTA RICA. Llanuras de Santa Clara, Hacienda El Zorro Cruel, (1995), Botanische Garten München 92/3437 (MO).

Anthurium wiehleri Croat, sp. nov. — Type: PANAMA. Kunayala: El Llano-Cartí Road, Nusigandí, 10.1 mi N of main Pan-American Highway near El Llano, vicinity of base camp, 09°20'N, 79°00'W, 300 m, 1 July 1994, *T.B. Croat & G. Zhu 76546* (holotype, MO-04612799). Figures 104–106.

Diagnosis: Anthurium wiehleri is a member of sect. *Porphyrochitonium* and is characterized by its minute size, epiphytic habit, dense cluster of roots, short internodes, short, subterete, weakly sulcate petioles, small, narrowly oblanceolate leaves which are glandular-punctate on both surfaces and by the slender greenish inflorescences which overtop the leaves.

Epiphytic herb; internodes short, ca. 1 cm diam.; cataphylls 2.7 cm long, acute persisting intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 1.7-3.2 cm long, 1 mm diam., subterete, weakly sulcate, drying yellowish brown; geniculum 3-4 mm long, drying darker than petioles; blades narrowly oblanceolate, 4.7-11.3 cm long, 1.4-2.4 cm wide (averaging 8×2), 3.4-4.9(averaging 4.2) times longer than broad, 2.0-5.8 (averaging 3.8) times as long as petioles, abruptly acuminate at apex, (acumen to 6 mm long), acute at base, subcoriaceous, green above, yellow green below, drying yellowish brown and weakly glossy above and below; midrib drying narrowly rounded and darker above, narrowly raised, paler below; primary lateral veins 9(10) per side, departing midrib at 25–30°, drying narrowly raised, darker above, narrowly raised, paler below; collective veins arising from basal veins 3 mm from margin; basal veins 1 pair; upper surface weakly granular, glandular-punctate; lower surface moderately smooth, dark glandular-punctate, equally dense as upper surface. Inflorescence with peduncle rose, 6.4-6.7 cm long; spathe green to rose, lanceolate, reflexed, 1.4-1.9 cm long, 2-4 mm wide, drying moderately coriaceous, medium reddish brown; spadix green, stipitate 6 mm, slender and weakly tapered, 3.9-4.3 cm long, 2 mm diam., drying reddish brown; flowers 2 visible per spiral, drying 3.2-3.3 mm long and 1.7-1.8 wide; tepals drying with subglobular cellular inclusion; lateral tepals 2.1 mm wide, the outer margins 2-sided, inner margin rounded; stamens not exserted. Infructescence not seen.
Distribution and ecology — *Anthurium wiehleri* is known only from the type locality in Panama in Colón Province on Santa Rita Ridge at 300 m elevation in a *Tropical wet forest* life zone.

Etymology — *Anthurium wiehleri* is named in honor of the late Hans Joachim Wiehler (1930–2003) who collected the type specimen. Wiehler was a noted specialist of Gesneriaceae and formerly a staff member of the Marie Selby Botanical Gardens. Hans was born in the small village of Klettendorf in East Prussia, about 60 miles from the Baltic Sea. His father died during World War II serving in the German army. At age 14, Hans and his mother and two younger brothers fled in horse carts in advance of the invading Russian army, suffered a near drowning when their vessel was hit with a torpedo in the Baltic, then endured years of displacement as refugees. Eventually immigrating to the United States in 1953, Hans later obtained his Master's Degree from Cornell University where he worked on Gesneriaceae and his Ph.D. at Miami University under the direction of Calaway Dodson. Dodson brought Wiehler to Sarasota shortly after the founding of the Marie Selby Botanical Garden. Later Hans Wiehler founded the Gesneriaceae Research Foundation which he ran until near the time of his death. Wiehler became the world's authority on Gesneriaceae and built up one of the most impressive collections of living material in the world. He gave the collection to Selby Gardens before his death.

Comments — Because of its minute size, *Anthurium wiehleri* is not likely to be confused with any other known species though it is most similar to small individuals of *A. scottmorii* Croat, a species common at Cerro Jefe in adjacent Panamá Province. *Anthurium scottmorii* shares glands on the upper blade surface and an overtopping inflorescence. However, that species has a stubby, purple to reddish spadix rather than a slender, elongated greenish spadix.

Paratype: PANAMA. Colón: Santa Rita Ridge, below rain gauge, 300–350 m, 13 Aug. 1971, H. Kennedy, R. Dresser & H. Wiehler 1122 (PMA).

Anthurium zachdufranianum Croat & O.Ortiz, **sp. nov.** — Type: PANAMA. Chiriquí: Distrito de Gualaca, Reserva Forestal Fortuna, Sendero Honda B, 08°45'08"N, 82°14'34"W, 1160 m, 9 Dec. 2013, *O.O. Ortiz 1837* (holotype, MO-6568069; isotype, PMA). Figures **107–109**.

Diagnosis: Anthurium zachdufranianum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent, reddish brown cataphyll fibers, moderately long-petiolate leaves, triangular-wing-ribbed petioles, oblong-elliptic, acuminate, brownish drying blades with a narrowly raised upper midrib, dried undulate margins, both surfaces glandular-punctate as well as by the erect inflorescence with a several-winged-ribbed peduncle, green, reflexed spathe and green spadix with pale orange berries.

Epiphyte; internodes short, 6 mm diam.; cataphylls 2.3 cm long, acute, persisting and becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 9.1-10.2 cm long, 2 mm diam., triangular-wing-ribbed with up to 8 ribs, drying dark yellowish brown; geniculum 8–9 mm long, drying darker than petioles; blades oblong-elliptic, 11.2-19.3 cm long, 3.3-4.6 cm wide, 3.4-4.2 times longer than broad, broadest at middle or slightly above middle, about twice as long as petioles, gradually acuminate at apex, (acumen to 1 cm long), acute at base, bicolorous, olive-green and glossy above, light green and paler below, drying subcoriaceous, gravish brown and matte above, yellowish brown and weakly glossy below; midrib glandular-punctate, acute on both sides, drying narrowly acute and concolorous above, narrowly raised, finely ribbed and darker below; primary lateral veins 10 per side, departing midrib at 55-60° near middle, drying weakly convex, concolorous above, narrowly raised, finely ribbed and darker below; secondary veins drying indistinct above, moderately conspicuous on lower surface; collective veins arising from basal veins, 5 mm from margin; basal veins 1 pair; lacking antemarginal veins; upper surface glandular-punctate, densely granular, sparsely pustular; lower surface glandular-punctate, densely and weakly brown-speckled, sparsely granular. Inflorescence with peduncle 9.8 cm long, ribbed, green; spathe green, ca. 3.3 cm long, 6 mm wide, oblong-lanceolate, drying coriaceous, medium reddish brown; spadix green, very long and weakly tapered, 8.3 cm long, 7 mm diam, drying reddish brown; flowers 3 visible per spiral, drying 2.8 mm long and 2.3 mm wide; tepals minutely granular on drying; lateral tepals 2 mm wide, inner margin rounded, outer margins 2-sided; stamens not usually seen, 0.8 mm long, 0.4 mm wide. Infructescence with berries maturing orange.

Distribution and ecology — *Anthurium zachdufranianum* is endemic to Panama, known only from the type locality in Chiriquí Province at 1150–1200 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium zachdufranianum* is named in honor of Zach Du Fran, former President of the International Aroid Society, who has played a strong role in that organization and in furthering the study of Araceae. Du Fran was instrumental in the founding of the Midwestern Chapter of the International Aroid Society and helped to organize an initial meeting at the Oklahoma City Botanical Garden.



Figure 107. *Anthurium zachdufranianum* Croat & O.Ortiz. Holotype: *Ortiz 1837*. Photos by O.O. Ortiz.



Figure 108. Anthurium zachdufranianum Croat & O.Ortiz. Ortiz 1837. Berries



Figure 109. *Anthurium zachdufranianum* Croat & O.Ortiz. *Ortiz 1837*. Infructescence.



Figure 110. Anthurium zapatae Croat. Holotype: Zapata 1037

Comments — Anthurium zachdufranianum is most closely related to A. zhui Croat which shares similar dried blades and proportionately long petioles, but that species differs by having petioles merely 3-sided but not otherwise ribbed as well as by a much longer peduncle which is 3-sided but not otherwise ribbed.

Anthurium zapatae Croat, sp. nov. — Type: PANAMA. Colón: Distrito de Donoso, Río Caimito, 08°58'28"N, 80°40'21", 40 m, 5 July 1996, A. Zapata, D. Mosquera & W. Martínez 1037 (holotype, PMA-50164). Figure 110.

Diagnosis: Anthurium zapatae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, pale cataphyll fibers, long-petiolate leaves, a subterete petiole drying somewhat flattened with a narrow wing on each side, narrowly elliptic, acuminate, somewhat grayish-drying blades with rather obscure primary lateral veins, a single pair of collective veins and both surfaces glandular-punctate as well as by the moderately short-pedunculate inflorescence, the green spreading spathe, and the narrowly oblong, yellowish green spadix with 3 flowers visible per spiral.

Epiphyte; internodes short, 1 cm diam.; cataphylls 3.5 cm long, persisting semi-intact, fibrous with fragments of reddish brown epidermis. Leaves with petioles 19.6 cm long, 4 mm diam., glandular-punctate, drying narrowly and obtusely sulcate, prominently flattened with a narrow thin wing on each side, medium gray-brown, matte and minutely granular; geniculum 1 cm long, drying paler than petioles; blades narrowly elliptic, 36.6 cm long, 8.4 cm wide, 4.4 times longer than broad, broadest midway, about twice as long as petioles, abruptly acuminate at apex, acute at base, subcoriaceous, drying grayish olive-green and semiglossy above, yellowish olive-brown and weakly glossy below; midrib sparsely glandular on both surfaces, drying narrowly rounded and paler above, bluntly acute and darker below; primary lateral veins 20 per side, departing midrib at 55-60°, drying convex and paler above, narrowly convex and slightly darker below; collective veins arising from basal veins, 4–5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate, the glands dark brown and weakly raised, minutely and regularly areolate, more granular along veins, glossy upon magnification; lower surface conspicuously black-speckled and weakly ridged, equally smooth at upper surface, glandular-punctate, the glands dark brown and markedly raised. Inflorescence with peduncle 13.6 cm long, drying yellowish brown; spathe green, drying 3 cm long, 5 mm wide, thinly coriaceous, reddish brown; spadix yellowish green, cylindrical, 7.2 cm long, 3 mm diam., drying dark yellowish brown; flowers 3 visible per spiral, drying 2.5-2.6 mm long, 2.0–2.1 mm wide; tepals granular on drying; lateral tepals 1.7 mm wide, outer margins 2-sided, inner margin rounded; stamens not emergent. Infructescence not seen.

Distribution and ecology — *Anthurium zapatae* is known only from the type locality in Panama, Colón at 40 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium zapatae* is named in honor of Panamanian botanist, Alvin Zapata who with D. Mosquera and W. Martínez collected the type specimen. Alvin has contributed to the knowledge of the medicinal use of plants of Chiriqui Province. He worked for many years at the University of Panama and ANCON (Asociación Nacional para la Conservación de la Naturaleza), participating in many floristic studies in Panama. Currently, Alvin Zapata works in a forest inventory in the copper mine of Donoso region, Colón Province.

Anthurium zhui Croat, **sp. nov.** — Type: PANAMA. Coclé: Alto Calvario, ca. 6 mi. N of El Copé, 08°38'N, 80°35'W, 770 m, 12 July 1994, *T.B. Croat & G. Zhu 76765* (holotype, MO-04612786). Figure 111.

Diagnosis: Anthurium zhui is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, moderately elongated, sharply C- to D-shaped or triangular petioles, its narrowly oblong-elliptic, brown-drying blades which are acute to attenuate at the base and have a single pair of close collective veins as well as by an inflorescence with a green spathe and spadix that overtops the leaves.

Usually epiphytic, low on tree trunks; internodes short, 1 cm diam.; cataphylls not seen. Leaves with petioles dark purplish, 3.7–16.7 cm long, 3 mm diam., sharply triangular, sparsely glandular-punctate, drying reddish brown; geniculum 4–10 mm long, drying darker than petioles; blades narrowly oblong-elliptic, 11.9-20.5 cm long, 2.7-5.1 cm wide (averaging 16×4), 3.5-5.1 (averaging 4.4) times longer than broad, broadest midway, 1.2-3.9 (averaging 2.3) times as long as petioles, abruptly acuminate at apex (acumen to 1.2 cm long), attenuate at base, subcoriaceous, semiglossy, moderately bicolorous, drying brown and semiglossy above, yellowish brown and weakly glossy below; midrib narrow-raised and paler above, acute and paler below; primary lateral veins (12)13 per side, departing midrib at 55° near middle, drying narrowly rounded, concolorous above and below; secondary veins and tertiary veins drying prominently raised above and below; tertiary veins drying indistinct above, weakly raised; collective veins arising from basal veins 3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate, densely granular-pustular-ridged; lower surface glandular-punctate, brownish and white speckled. Inflorescence with peduncle sharply flattened on one side, 17.6-31.5 cm long; spathe green tinged purplish, 2.2-4.1 cm long, 3-5 mm wide, oblong-elliptic, drying moderately coriaceous, medium reddish brown; spadix dark

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Figure 111. Anthurium zhui Croat. Holotype: Croat & Zhu 76765

green, very long and tapered, 3.8–6.8 cm long, 3–4 mm diam., drying reddish dark brown. Flowers 2 visible per spiral, drying 3.2 mm long and 2.7 mm wide; tepals minutely granular on drying; lateral tepals 1.9 mm wide, the outer margins 2-sided, inner margin rounded; pistils pale green; stamens not exserted. *Infructescence* not seen.

Distribution and ecology — *Anthurium zhui* is known only from Panama in Chiriqui and Bocas del Toro Provinces in western Panama and in Coclé Province in central Panama. It occurs at 730–1200 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium zhui* is named in honor or the late Dr Guanghua Zhu (1964–2005), the first author's former student and fellow aroid specialist who did an excellent revision of the very difficult genus, *Dracontium* (Croat & Zhu, 2004), before his untimely death. Guanghua was with Croat when the type was collected.

Comments — Anthurium zhui is closest to Anthurium gracilispadix Croat because it shares blades of similar shape and size and acutely pointed spadices. The latter species differs by having thinner blades which dry grayish-green rather than yellow-brown and have the inflorescence much shorter than the leaves. A. zhui is also similar to A. pageanum Croat which differs by having gray drying blades, collective veins arising from base and a violet-red tinged spathe. One collection of A. pageanum from Veraguas Province (Hammel 5171) is especially noteworthy because it highly resembles A. zhui in petiole length, blade shape and by its long-pedunculate inflorescence but it differs by growing only at 200 m elevation and in lacking glandular punctations on the upper blade surface except scantily along the midrib.

Paratypes: PANAMA. Coclé: La Pintada, Alto Calvario above El Copé, ca. 6 km N of El Copé, Atlantic slope, along trail through forest W off old lumber trail which leads down to Las Ricas, Limón and San Juan, 08°40'41"N, 80°35'47"W–08°41'04"N, 80°35'50"W, 710–800 m, 23 June 1988, T.B. *Croat 68775* (MO); Bocas del Toro, Fortuna Dam region, along trails leaving pipeline road, ca. 08°45'N, 82°15'W, 1000 m, 8 Dec. 1985, *G. McPherson 7851* (MO).

2. Species from South America

Anthurium acaimense Croat & W.Vargas, **sp. nov.** — Type: COLOMBIA. Quindío: Municipio Salento, Reserva Acaime, 2800 m, Oct. 1992, *W.G. Vargas 739* (holotype, MO-5302394; isotype, ICESI). **Figure 112**.

Diagnosis: Anthurium acaimense is a member of sect. *Porphyrochitonium* and is charactezed by its oblong-elliptic, glandular-punctate blades with a single pair of collective veins. It is unusual in having rather elongated internodes for a species in this section. It is further characterized by semi-intact cataphylls, moderately long-petiolate leaves with subterete, sulcate petioles and a long-pedunculate inflorescence with a slender, weakly tapered spadix.

Terrestrial to hemiepiphytic and climbing; internodes to 2.7 cm long (much shorter near apex) 6 mm diam. (dried), drying finely ribbed and blackened; cataphylls persisting with fibers in dark brown reticulum, 5.5-7.0 cm long, narrowly attenuated at apex. Leaves 56.8 cm long, clustered near apex; petioles subterete, sulcate, 31 cm long, 0.3-0.4 cm diam., drying medium brown, weakly glossy, finely ribbed; geniculum 0.6 cm long, drying darker than petiole and laterally winged; blades elliptic, 21.5-29.0 cm long, 5.5-7.8 cm wide, 3.7-4.0 times longer than broad (averaging 4.0), acuminate, acute at base, subcoriaceous, moderately dark green, tinged with red and semiglossy above, moderately paler and semiglossy below, drying weakly glossy and grayish olive-green to medium brown above, paler and grayish yellow-brown to grayish yellow-green below; midrib drying narrowly raised to acute in valley above, narrowly raised, finely ribbed, yellow-brown below; primary lateral veins 17–20 per side, departing midrib at 45–55°, drying narrowly raised in shallow valleys above, acutely raised on lower surface; collective veins arising from the basal vein, more prominent than primary lateral veins, 5–7 mm from margin, drying etched above, narrowly raised to bluntly acute below; tertiary veins prominulous below, slightly less so above upon drying; upper surface eglandular, drying matte, with a few scattered pale pustules; lower surface smoother, finely dark glandular-punctate. Inflorescence 44.2 cm long, erect; peduncle 39 cm long, 11.1 times longer than spathe, drying dark brown; spathe lanceolate, green, dark brown, 3.5 cm long; spadix cylindroid-tapered, 5.2 cm long, 0.2-0.3 cm diam.; flowers 5-6 visible per spiral, 1.2 mm long, 1.2 mm wide; lateral tepals oval, 3-sided, 0.4 mm wide, 0.8 mm long. Infructescence with berries maturing orange.

Distribution and ecology — *Anthurium acaimense* is endemic to Colombia, known only from the type locality along the upper Río Quindío in Quindío Department between 2000–2800 m elevation in a Montane wet forest life zone.



Figure 112. Anthurium acaimense Croat. Holotype: Vargas 739

Croat et al., 2022

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Figure 113. Anthurium alejandroi Croat. Holotype: Zuluaga et al. 763.



Figure 114. *Anthurium alejandroi* Croat. *Zuluaga et al. 763*. Leaf blade, adaxial surface.



Figure 115. Anthurium alejandroi Croat. Zuluaga et al. 763. Habit of flowering plant



Figure 116. Anthurium alejandroi Croat. Zuluaga et al. 763. Inflorescence.

Etymology — The species is named for the type locality in the Reserva Acaime in Quindío Department, Municipio de Salento.

Comments — In the Lucid Anthurium Key, *Anthurium acaimense* tracks to *A. aureum* Engl. which may be distinguished by its shorter petiole (20 cm), broader blade (length-width ratio 3) and long apiculum (2 cm); *A. smithii* Croat which has a long geniculum (2.4 cm), only 4–9 per side of primary lateral veins and the blades have obtuse to rounded bases and *A. trianae* Engl. which has shorter petioles (20 cm), only 8 or 9 primary lateral veins per side and the blades oblong rather than elliptic.

Anthurium alejandroi Croat, sp. nov. — Type: COLOMBIA. Antioquia: Municipio Urrao, Corregimiento La Encarnación, Vereda Calles Abajo, Parque Nacional Natural Las Orchídeas, camino entre cabañas de Calles y La Raya, limite entre Urrao y Frontino, 06°31"N, 76°16'W - 06°31"N, 76°18'W, 1000–1280 m, 22 July 2011, A. Zuluaga, P. Pedraza, J. Betancur, M.F. González, R. Arevalo, D. Sanin, J. Serna & A. Duque 763 (holotype, MO-6353148; isotype, COL). Figures 113–116.

Diagnosis: Anthurium alejandroi is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, short internodes, cataphylls persisting as fibers, terete petioles which are longer than the blades, the oblong-lanceolate, narrowly long-acuminate, semiglossy blades which dry dark gray-green above and yellowish olive-brown below with an acute base and the collective veins arising from the base as well as by the long pedunculate inflorescence with a slender peduncle, a slender reflexed spadix and a stipitate, weakly tapered, slender, white spadix.

Terrestrial; internodes short, 1.1 cm diam.; cataphylls 4.9 cm long, acute and persisting intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel; *Leaves* with petioles 33.3-36.5 cm long, 3 mm diam., terete, drying narrowly and obtusely sulcate, gray-brown; geniculum 8–11mm long, drying slightly darker than petioles; blades oblong-lanceolate, 32.7-32.9 cm long, 6.4-6.6 cm wide (averaging 33×6), 5.0-5.1 (averaging 5.05) times longer than broad, 0.9 times as long as petioles, abruptly and narrowly acuminate at apex (acumen to 2.8 cm long), acute at base, subcoriaceous, bicolorous, semiglossy glossy on both surfaces, drying dark gray-green, semiglossy above, yellowish gray-brown semiglossy below; midrib drying narrowly raised, sparsely glandular-punctate and concolorous above, narrowly rounded, sparsely glandular-punctate, finely ribbed and paler below; primary lateral veins 12-14 per side, departing midrib at 45° near middle, drying weakly and narrowly raised, concolorous above, narrowly rounded and concolorous below; interprimary veins sometimes present; tertiary veins moderately distinct above and below; collective veins arising from basal veins 4–5 mm from margin; basal veins 1 pair; antemarginal veins present; upper surface smooth, sparsely and weakly glandular-punctate; lower surface conspicuously glandular-punctate, finely granular in the areoles. *Inflorescence* with peduncle 31.9 cm long; spathe green, reflexed, 3.8 cm long, 1 cm wide, oblong-lanceolate, drying moderately coriaceous, dark brown; spadix white, stipitate 3 mm, slender and weakly tapered, 6.6 cm long, 3 mm diam., drying yellowish brown; flowers 3–4 visible per spiral, drying 2 mm long and 1.7 mm wide; tepals papillate-granular on drying; lateral tepals 1.1 mm wide, inner margin rounded, outer margins 3-sided; stamens not exserted. *Infructescence* not seen.

Distribution and ecology — *Anthurium alejandroi* is endemic to Colombia, known only from the type locality in Antioquia Department, at 1000–1280 m in a *Premontane rain forest* life zone.

Comments — In the Lucid Anthurium Key, *Anthurium alejandroi* tracks to *A. amargalense* Croat & M.M.Mora which differs by having a much thicker ovate-elliptic blade; *A. purdieanum* Schott, which differs by having longer internodes, persistent intact cataphylls, short petiolate narrowly ovate leaves and a short peduncle; *A. trianae* Engl., which differs by having more coriaceous blades which are reflexed on the erect petioles with the inflorescence held prominently higher than the leaves.

Etymology — *Anthurium alejandroi* is named for Colombian botanist, Alejandro Zuluaga who collected the type specimen. Alejandro is a specialist on Monstera, received his Ph.D. at the University of Wisconsin in Madison, and is now a professor at the Universidad del Valle in Cali, Colombia. Alejandro helped organize the XII International Aroid Conference, in Cali, Colombia in July 2017, the first international conference on aroids to be held in Latin America.

Anthurium barfodii Croat, **sp. nov.** — Type: ECUADOR. Esmeraldas: Zapallo Grande, mixed black and Cayapas Amerindian community along Río Cayapas, second growth vegetation and disturbed rain forests close to village, 00°48'N, 78°54'W, 200 m, 11 Oct. 1983, *A. Barfod, L.P. Kvist and D. Nissen 48095* (holotype, AAU). Figure 117.

Diagnosis: Anthurium barfodii is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, short, persistent, dark brown cataphyll fibers, moderately short, sharply sulcate drying petioles, oblong-oblanceolate yellow-brown drying blades which are glandular-punctate on both surfaces with two pairs of collective veins, the innermost ca.

1 cm from the margins, numerous primary lateral veins that are scarcely distinguishable from the interprimary veins, the long-pedunculate inflorescence with the spathe persisting only as basal fibers, the spadix cylindroid and short with pink berries.

Epiphytic; internodes short, 0.8–1.2 cm diam., cataphylls persisting as scant reddish brown fibers 3-5 cm long. Leaves 35 cm long with petioles 6.0-9.3 cm long, 0.3-0.5 cm diam., drying dark brown, C-shaped, markedly sulcate adaxially; geniculum 1 cm long, drying darker than petiole and with lateral margins acute, winged; blades lanceolate-elliptic, 25.5-29.0 cm long, 6.8-7.4 cm wide (averaging 27.3×7.1), 3.7-4.0 times longer than broad, 0.8-1.2times longer than petiole, shortly acuminate at apex, cuneate at base, subcoriaceous, drying greenish gray on both surfaces; midrib upper surface convex, drying dark brown, irregularly ribbed and granular, more acute toward the apex, lower surface more narrowly ribbed; primary lateral veins fine, concolorous, 36-40 per side, departing midrib at 30-40°; basal veins 2 pairs, lower pair margining out in lower 1/4 blade, upper pair becoming collective veins which are more prominent than the primary lateral veins, arising from the base and running 1 cm from the margin near the base to 0.5 cm from the margin near the apex, drying concolorous with the blade surfaces; upper surface drying obtusely and irregularly granular, densely glandular-punctate, sparsely pustular; lower surface with minute, dark, glandular punctations and larger pustules which are more distinctly rounded and raised on the lower surface. Inflorescence not seen; peduncle 38.4 cm long, 0.3 cm diam., terete, drying coarsely ribbed; spathe not seen. Infructescence 4.9 cm long, 0.8 cm diam., cylindroid, berries pink protruding, 5 mm diam., drying dark brown.

Distribution and ecology — *Anthurium barfodii* is known only from the type locality in Ecuador, Esmeraldas Province at 200 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium barfodii* is named for the collector, Anders Barfod, Associate Professor of Bioscience at Aarhus University in Denmark.

Comments — Anthurium barfodii is similar to A. calimense Croat & D.C.Bay, found in Colombia, which differs by having the blade more broadly elliptic (2.6–3.3 times longer than broad), more attenuate at base, more long-attenuated at apex with the spadix more longtapered; A. quinquesulcatum Sodiro which has prominently 5-ribbed petioles, sharply sulcate adaxially with 2-ribs on the sides and an acute rib abaxially, obovate to oblanceolate blades and peduncle 8–30 cm long; A. tsamajainii Croat which has smaller blades (8–20 cm long), more prominent primary lateral veins and peduncles 15–30 cm long; A. sulcatum Engl. which has petioles 10–12 cm long, oblanceolate blades and collective veins that run 5–7 mm from the margin.



Figure 117. Anthurium barfodii Croat. Holotype: Barfod et al. 48095

Croat et al., 2022

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Figure 118. Anthurium bueyense Croat. Holotype: Gentry 17435.

In the Lucid Anthurium Key, *Anthurium barfodii* tracks with: *A. cachabianum* Sodiro which has petioles 20–25 cm long, broader blades (2.1–2.3 length/width ratio) and only 8–12 primary lateral veins per side; *A. navasii* Sodiro which has smaller blades (20–25 × 8–12 cm) with the base rounded to obtuse; *A. rhizophorum* Sodiro which has oblong blades, 8–10 primary lateral veins per side, and a collective vein only 3–4 mm from the margin.

Anthurium bueyense Croat, **sp. nov.** — Type: COLOMBIA. Chocó: North ridge of Alto de Buey, above Dos Bocas del Río Mutata, tributary of Río El Valle, ESE of El Valle, 06°05'30"N, 77°26'00"W, 200–500 m, 8 Aug. 1976, *A. Gentry & M. Fallen 17435* (holotype, COL-205421; isotypes, MO-161952, MO-2464044). **Figure 118**.

Diagnosis: Anthurium bueyense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, subterete, sulcate petioles, oblong-oblanceolate blades that are glandular-punctate on the lower surface and with the collective veins arising from near the base as well as by long-pedunculate inflorescences with a very long-stipitate grayish spadix and a reddish infructescence with red berries.

Epiphytic; internodes short, 1.2-1.5 cm diam.; cataphylls persisting as brown fibers (length uncertain, probably 3-5 cm long) Leaves 71 cm long, with petioles 19.5-22.0 cm long, 0.4-0.6 cm diam., broader than thick with 1 medial rib, drying yellow-brown; blades oblong-elliptic, 34-65 cm long (averaging 51), 9.2-11.2 cm wide (averaging 10.3), 3.7-5.8 times longer than broad (averaging 4.9), blade 2.5-3.0 times longer than petiole, long tapered acuminate at apex, long tapered cuneate at base, moderately coriaceous, drying matte, dark yellowish green above, matte lighter greenish yellow below; midrib narrowly convex and finely ribbed above, broadly convex and coarsely ribbed below, drying light yellowish brown on both surfaces; primary lateral veins inconspicuous, 35-40 per side, departing midrib at 30-40°, along with numerous interprimary veins; collective veins arising from the base and running 3-6 mm from margin; upper surface eglandular with scattered minute whitish inclusions; lower surface densely thick low-pustular with sparse folds, conspicuously dark black glandular-punctations, the glands raised with medial depression. Inflorescence with stipe 4.1-5.3 cm long; 2 cm diam., peduncle 31-33.2 cm long, broader than thick with 1 medial rib, drying medium brown; spathe not collected, described by collector as yellow; spadix stipitate 4-5 cm, 17.8 cm long, 1.3 cm diam., cylindroid, reddish; flowers 7-8 visible per spiral, 2.5-2.6 mm long and wide. Infructesence reddish 7.5-12 cm long, 0.8-1.5 cm diam., drying dark brown; berries reddish, drying bottle-shaped, 8 mm long, 3 mm wide, drying dark brown.

Distribution and ecology — *Anthurium bueyense* is endemic to Colombia, known only from Chocó Department in the Alto de Buey at 500–1200 m in *Tropical wet forest* and Premontane wet forest life zones.

Etymology — The species is named for the type locality at Altos de Buey in Chocó Department.

Comments — *Anthurium bueyense* is most similar to *A. redolens* Croat but that species differs by having larger cataphylls (5–7 cm long), shorter petioles (3–10 cm), which are narrowly and obtusely sulcate adaxially (versus broader than thick with a medial rib and blades with fewer primary lateral veins (7–20(25) per side).

A collection from Alto de Buey at 1200 to 1800 m elevation (Gentry & Forero 7349) is perhaps also this species, but differs by drying much paler yellow-brown.

Anthurium certeguense Croat, **sp. nov.** — Type: COLOMBIA. Chocó: Along road (under construction in 1979) from Yuto to Lloró (N of Certequí), pluvial forest, along creek ca. 2 km E of Yuto, 50 m, 18. Jan 1979, *A. Gentry & E. Renteria 24435* (holotype, MO-2716751; isotypes, COL, HUA). **Figure 119**.

Diagnosis: Anthurium certeguense is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, short, persistent, red-brown cataphyll fibers, its more or less triangular petioles which are broadly flattened adaxially with sharply erect margins and acute ridges abaxially, by the gray drying blades with glandular punctations on the lower surface, with only a single pair of collective veins arising from near the base as well as by the long pedunculate inflorescence with a green, spreading, frequently incurled (sometimes tinged with white or pink) spathe and the green spadix that turns pinkish or orange post-anthesis. The white berries are also distinctive.

Epiphytic or sometimes terrestrial; internodes 0.4 cm long, 1 cm diam.; cataphylls 4–6 cm long, persisting as shredded reddish brown fibers. *Leaves* 45 cm long with petioles 7.6–36.3 cm long (averaging 18.5), 0.4 cm diam., broadly flattened adaxially with sharply erect margins, acutely ridged abaxially, drying medium brown; geniculum 1.4 cm long, darker than petiole; blades ovate-elliptic, 18.5–30.8 cm long (averaging 26.3), 5.9–11.2 cm wide, 2.1–4.1 times longer than broad (averaging 2.9), 0.8–3.2 times longer than petiole (averaging 1.9), apex cuspidate with down-turning acumen 1.0–1.5 cm long, attenuate at base, moderately coriaceous, drying grayish and weakly glossy above, slightly and grayish and slightly more glossy below; midrib narrowly rounded, inconspicuous above, broadly rounded to flattened, concolorous

below; primary lateral veins 9–14 per side, (average 12), concolorous, departing midrib at 50°–60°, inconspicuous above, finely acute, concolorous below; basal veins 1 pair, forming the only pair of collective veins, these loop-connecting to primary lateral veins 0.5 cm from margin, more conspicuous than primary lateral veins; upper surface eglandular, drying minutely wrinkled; lower surface densely and minutely glandular-punctate, minutely granular. *Inflorescence* 26 cm long with peduncle 8.5–23.7 cm long, 0.2 cm diam.; spathe spreading, green or green tinged with tinges of pink or red, 3.5–5.7 cm long, 0.3 cm wide; spadix green turning red, pink or orange post-anthesis, 5.7–16.8 cm long, 0.3–0.7 diam., with pronounced tapering; flowers 4 visible per spiral, 3.2 mm long, 2.5 mm wide, lateral tepals 2.0 mm long, inner margins slightly convex to nearly straight, no stamens visible. *Infructescence* with distinctive white berries.

Distribution and ecology — *Anthurium certeguense* is endemic to Colombia, known only from central Chocó Department in the region of Yuto, Lloró and Certeguí to as far south as the Río San Juan at 5–50 m elevation in a *Tropical pluvial forest* life zone.

Etymology — The species is named for the village of Certegui near where the species was first collected in September 1976 by Enrique Forero and R. Jaramillo.

Comments — Anthurium certeguense is similar to A. acutangulum Engl., A. calimense Croat & D.C.Bay and A. punctatum N.E.Br. Anthurium acutangulum, which ranges from Honduras to Panama, differs by having subterete petioles, a frequently pendent inflorescence with a less prominently tapered and somewhat stipitate spadix. Anthurium calimense may be distunguished by its longer internodes and cataphylls and blades that dry olive-green. Anthurium punctatum differs by having long, slender blades, primary lateral veins that are obscure on both sides and has only been found in Ecuador at higher altitudes (300–600 m). In the Lucid Anthurium Key, Anthurium certeguense also tracks with A. ventanasense Croat which has a longer blade, purple spathe and spadix, green berries and is found in Ecuador at 300 m.

Paratypes: COLOMBIA. Chocó: Carretera en construcción Yuto–Lloró, 1 km de Yuto, 70 m, Sep. 8 1976, *E. Forero and R. Jaramillo 2693 and 2673* (both COL); Quebrada Taparal, alfuente del Río San Juan, alrededores de la comunidad indígena Wuananá de Taparalito, 04°12'N, 77°10'W, 5–10 m, Mar. 27 1979, *E. Forero, R. Jaramillo, L.E. Forero P and N. Hernández 4232 and 4296* (both COL); Municipio de Quibdó, carretera Quibdó-Yuto, Km 8–9. ramal hacia el Real de Tanado, 80 m, June 29 1983, *E. Forero, R. Jaramillo, J. Espina, L. M Quiñones 9622 and 9615* (both COL).

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Figure 119. Anthurium certeguense Croat. Holotype: Gentry 24435



Figure 120. Anthurium chiriacoense Croat. Holotype: van der Werff et al. 24619.

Anthurium chiriacoense Croat, sp. nov. — Type: PERU. Amazonas Department, Bagua Provincas: Chiriaco Mountain, lower slope of Cerro Tayu, Campau vegetation, soil thick with humus layer, 05°15'56"S, 78°22'07"W, 500–625 m, 27 Oct. 2012, *H. van der Werff, R. Rojas, L. Valenzuela, G. Shareva, R. Apanu, A. Roca & A.R. Barrantes 24619* (holotype, MO-6472305; isotype, HOXA). Figure 120.

Diagnosis: Anthurium chiriacoense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, conspicuous, reddish brown, sub-parallel cataphyll fibers, moderately short-petiolate leaves with subterete petioles with a swollen blackened geniculum, moderately coriaceous elliptic blades which are rounded and apiculate at the apex and acute at the base with a single pair of collective veins arising from the base and relatively remote from the margins, midrib acutely raised above, primary lateral veins 6–8 per side, which dry etched in surface, glandular punctations on the lower surface only as well as by the long-pedunculate inflorescence as long as or longer than the leaves, a green, spreading spathe and a green spadix.

Epiphytic; internodes short, 1.1 cm diam.; cataphylls 5.1-8.3 cm long, acute and persisting intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 6.8-11.7 cm long, 3-4 mm diam., subterete, drying deeply narrowly and acutely sulcate adaxially, finely and acutely ribbed abaxially and on sides, greenish brown; geniculum 1.0-1.3 cm long, drying conspicuously swollen and darker than petioles; blades elliptic, 15.3-26.7 cm long, 6.5-14.2 cm wide (averaging 19×9), 1.9–2.5 (averaging 2.2) times longer than broad, 1.7–2.3 (averaging 2.1) times as long as petioles, rounded and apiculate at apex, acute at base, subcoriaceous, drying gray-yellow-brown, matte above, yellowish gray-brown, matte below; midrib drying narrowly raised to narrowly acute and slightly darker above, narrowly raised and slightly paler below; primary lateral veins 6-8 per side, departing midrib at 40-45° near middle, drying deeply sunken with narrowly and prominently raised margins, concolorous above, narrowly and irregularly rounded and concolorous below; secondary and tertiary veins moderately obscure on both surfaces; collective veins arising from basal vein, 5–7 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface conspicuously and irregularly folded, sparsely black-dotted (probably insect eggs); lower surface densely and minutely glandular-punctate. Inflorescence with peduncle 36.2 cm long; spathe green, spreading, 5.9 cm long, 8 mm wide, linear-lanceolate, drying subcoriaceous and reddish brown; spadix green, weakly stipitate (1 mm), weakly tapered, 8.5 cm long, 6 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 3.2 mm long, 2.8 mm wide; tepals drying minutely granular; lateral tepals 1.8 mm wide, inner margin rounded, outer margins 2-sided; stamens held at the level of the tepals, 0.5 mm long, 0.9 mm wide; anthers ovate, thecae weakly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium chiriacoense* is endemic to Peru, known only from the type locality on Chiriaco Mountain, Bagua Province in Amazonas Department at 500–625 m in a *Lower montane rain forest* life zone.

Etymology — The species is named for the type locality on Chiriaco Mountain, Bagua Province in Amazonas Department.

Comments — Anthurium chiriacoense has no obvious relatives and does not closely resemble other species. In the Lucid Anthurium Key, Anthurium chiriacoense tracks to A. cachabianum Sodiro from the western slopes of the Andes in Esmeraldas Province, Ecuador, which differs by having proportionately longer petioles, thinner blades, less rounded and more gradually acuminate apex and a more long-tapered sessile spadix; A. tenuispica Sodiro (from same area) which differs by having the leaf blades narrowly elliptic, proportionately longer petioles and a proportionately longer spadix and A. yamaykatense Croat, which differs by having oblong-elliptic leaf blades 3.7 times longer than wide and proportionately longer petioles; and A. mostaceroi Croat but that species differs by having cataphylls to 13 cm long, petioles proportionately longer and blades proportionately longer (2.5 times longer than wide) which are gradually long-acuminate.

Anthurium claudiae Croat, sp. nov. — Type: ECUADOR. Carchi: Along road from El Chical to El Limonal (Imbabura), 16 km S of junction with main El Chical-Peñas Blancas Road, 2 km S of Río Gualpi Bridge, vicinity of Km 15.5–15.8 markers, 00°52'N, 78°13'W, 2200 m, 13 Oct. 2012, *T.B. Croat, G. Ferry, D. Scherberich, C.L. Henriquez R., & E. Levy 104224* (holotype, MO-6429270; isotypes, B, COL, F, K, M, NY, QCNE, S, SEL, US). Figure 121.

Diagnosis: Anthurium claudiae is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, short internodes, dense, persistent, reddish brown cataphyll fibers, petioles weakly to sharply flattened adaxially, elliptic to ovate-elliptic, brownish drying, gradually acuminate blades which are glandular-punctate on both surfaces with a single pair of collective veins, close primary lateral veins as well as by the purplish tinged spreading slender spathe, medium green weakly tapered spadix and white berries.

Terrestrial; internodes short, 1.5–2.0 cm diam., the sap turning dark purple; cataphylls (5.5)7.0–8.5 cm long, drying dark red-brown, fibers reddish brown, mostly straight, closely parallel, sometimes persisting in a reticulum, sometimes with large fragments of reddish brown epidermis. *Leaves* with petioles weakly to sharply flattened adaxially, 14.3–41.9 cm long, drying 2–5 mm diam., yellowish brown to dark brown; geniculum 1.0–1.5 cm long, drying darker than petioles; blades elliptic to ovate-elliptic, 13.6–32.3 cm long, 6.3–15.9 cm wide (averaging 21×10), 1.9–2.7 (averaging 2.2) times longer than broad, broadest at midpoint, 0.7-1.2 (averaging 0.9) times as long as petioles, gradually acuminate at apex, (acumen to 1.3 cm long), acute at base, drying subcoriaceous, dark brown and semiglossy above, slightly yellowish brown and semiglossy below; midrib narrowly rounded, glandular-punctate and paler above, bluntly acute, sparsely glandular-punctate and paler below; primary lateral veins 10-14 per side, scarcely more prominent than interprimary veins, departing midrib at 55-60°, quilted-sunken and concolorous above, narrowly raised and concolorous below; secondary veins drying indistinct above, weakly raised below; collective veins arising from basal veins 2-5 mm from margin, equally sunken arising from base; basal veins 1 pair; antemarginal vein present; upper surface conspicuously glandular-punctate, densely and minutely granular and weakly pustular; lower surface smooth, conspicuously glandular-punctate, minutely and irregularly dark-speckled. Inflorescence erect; peduncle 31.6-65.1 cm long; spathe tinged purplish, spreading, matte inside, glossy outside, 3.5-5.0 cm long, 1.3-1.4 cm wide, narrowly oblong-elliptic, drying moderately coriaceous, medium reddish brown; spadix stipitate 5 mm, long and weakly tapered, medium green, glossy, 6–14 cm long, 5 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 2.2 mm long, 1.7 mm wide; tepals minutely granular on drying; lateral tepals 1.2 mm wide, the inner margin rounded, outer margins 2-sided; pistils and young berries white; fruiting spadix to 18 cm long with spathe to 9 cm long; stamens not exserted. Infructescence with berries white.

Distribution and ecology — *Anthurium claudiae* is endemic to Ecuador, known only from the type locality on and near the divide between the valley of the Río San Juan and the valley of the Río Mira at 2000–2200 m elevation in a *Premontane wet forest* life zone.

Etymology — *Anthurium claudiae* is named for Claudia Henríquez, one of Thomas Croat's graduate students from Washington University in St. Louis. Claudia was one of the collectors of the type specimen and is a specialist on *Anthurium* sect. *Porphyrochitonium* from the Lita-San Lorenzo Region. While working on a class project, she modified the Lucid Anthurium Key to make it more compatible for determining sect. *Porphyrochitonium*.

Comments — Anthurium claudiae is seemingly closest to another species based on *Croat et al.* 104182 from the same region which differs by being more conspicuously glandular-punctate on the lower surface and in lacking glandular punctations on the upper surface.

In the Lucid Anthurium Key, *Anthurium claudiae* tracks to *A. amargalense* Croat & M.M.Mora, which differs by having broader, more deeply sulcate petioles and pale magenta berries; A. cachabianum Sodiro, which occurs at less than 1000 m elevation in Esmeraldas Province



Figure 121. Anthurium claudiae Croat. Holotype: Croat et al. 104224



Figure 122. Anthurium cojimiesense Croat. Holotype: Neill et al. 11438.

differs by having the leaf blades rounded at apex with an abrupt short acumen (versus gradually acuminate), two pairs of collective veins (versus 1 pair), closer primary lateral veins and proportionately somewhat longer petioles 1.3 times longer than blades (versus 1.3–2 times longer than blades); *A. lancifolium*, which differs by having proportionately narrower, more lanceolate more brownish blades with a more cylindroid usually whitish spadix: *A. myosurus* Sodiro, which differs by having 2 pairs of basal veins and a sessile spadix and *A. victoriense* Croat, which differs by having the leaf blades with the primary lateral veins close and indistinct, hardly distinguishable from the interprimary vein as well as by having conspicuous cross-veins and a much larger inflorescence.

Anthurium cojimiesense Croat, **sp. nov.** — Type: ECUADOR. Manabí: Cantón Pedernales, 45 km N of Pedernales, just above the tidal estuary of Río Cojimíes, 00°18'N, 79°53'W, 5 m, 28 Aug.× 1998, *D. Neill 11438* (holotype, MO-04959165; isotype, QCNE). **Figure 122**.

Diagnosis: Anthurium cojimiesense is a member of sect. *Porphyrochitonium* and is recognized by its epiphytic habit, short internodes, dark reddish brown, persistent fibers, long-petiolate leaves, strap-shaped gray-green blades glandular-punctate on the lower surface as well as its long-pedunculate inflorescence with a slender, pale green, spreading spathe, and purplish brown, long-tapered spadix.

Epiphytic; internodes short, 0.8 cm long, 1 cm diam.; cataphylls persisting as reddish brown fibers to 5.5 cm long. Leaves 75.8 cm long with petioles 17.5-21.2 cm long, 0.4-0.5 cm diam. subterete, sulcate adaxially, drying brownish green; blades long-lanceolate, 50.5-62.4 cm long, 2.9-3.6 cm wide (averaging 56.4 xx 3.2), 13.6-21.5 times longer than broad (averaging 17.7), long tapered acuminate at apex, long tapered-cuneate at base, subcoriacous, drying matte greyish green, concolorous on both surfaces; midrib convex, finely ribbed above, more acute below, drying medium brown above and below; primary lateral veins 24-26 per side, inconspicuous, departing midrib at 20-40°; collective veins arising from the base and running 0.2-0.3 cm from margin; collective veins more prominent than primary lateral veins; upper surface eglandular, moderately smooth with some reticulate venation; lower surface granular, faintly ridged, brownish speckled, sparsely black glandular-punctate. Inflorescence to 61.3 cm long, erect; peduncle subterete, 41.3-42.6 cm long, 0.4-0.5 cm diam, 2.3 times longer than spathe, drying medium brown; spathe18.3 cm long, 0.5 cm wide, pale green, drying dark brown; spadix 17.0-21.5 cm long, 0.5 cm diam., greenish-white, drying dark brown; flowers 4 visible per spiral, 5 mm long and wide; lateral tepals 3–3.5 mm wide, inner margins almost straight to broadly rounded, outer margins 2-sided; stamens not persisting exserted. Infructescence not seen.

Distribution and ecology — *Anthurium cojimiesense* is endemic to Ecuador, known only from the region along the Pacific coast 45 km N of Pedernales in Manabí Province at 5 m elevation in a *Premontane moist forest* life zone.

Etymology — The species name named for the type locality along the Río Cojimíes in Manabí Province.

Comments — Anthurium cojimiesense is easily confused with an unpublished species represented by Ceron 17856, another species from the Pacific coastal area with strap-shaped leaves. That species is from the Province of Guayas in the Cantón Naranjal at the Reserva Ecológica Manglares Churute on Cumbre del Cerro Pancho Diablo at 700 m elevation. It is a member of sect. *Multinervium* and differs by lacking glandular punctations. Another species, a member of sect. *Porphyrochitonium* from Pichincha, Ecuador, with a long, narrow, linear blade is Anthurium jimwestii Croat but its blades are 75–95 cm long, and 4.8–6.0 cm wide and has 56–64 primary lateral veins per side. In the Lucid Anthurium Key, Anthurium cojimiesense tracks with A. julospadix Sodiro which may be distinguished by its shorter petioles (5–20 cm long), shorter blades (25–50 cm long), and shorter spadix (4–15 cm long); and A. ruprestre Sodiro which has longer blades (60–90 cm long), primary lateral veins which arise from the midrib at wider angles (50–70°) and collective veins that run 3–5 mm from the margin.

Anthurium coquiense Croat, sp. nov. — Type: COLOMBIA. Chocó: Municipio de Nuquí, Corregimiento de Coquí, Quebrada Trapiche al Sureste de Coquí, ca. 05°32'N, 77°15'W, 100–160 m, Feb.–Mar. 1994, *G. Galeano, A. Moreno, G. Moreno & J. Perea 5523* (holotype, COL). Figure 123.

Diagnosis: Anthurium coquiense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, short, persistent, light brown cataphyll fibers, dark brownish drying, deeply sulcate petioles, broadly oblanceolate, markedly abruptly long-acuminate, brownish drying blades with a single pair of collective veins arising from the base and are glandular-punctate only on the lower surface as well as by the long-pedunculate inflorescence, terete peduncle, linear-lanceolate green spreading-reflexed spathe and bright red infructescence.

Epiphytic; internodes short, 1.6 cm diam.; cataphylls 4.7–6.6 cm long, acute, persisting intact at apex, semi-intact, becoming fibrous with fragments of light brown epidermis, the fibers manilla, mostly closely parallel. *Leaves* with petioles 9.8–15.1 cm long, 4–5 mm diam., subterete, drying acutely sulcate, yellowish dark brown; geniculum 1.0–1.1 cm long, drying darker than petioles; blades broadly oblanceolate, 41.8–68.4 cm long, 9.7–11.5 cm wide



Figure 123. Anthurium coquiense Croat. Holotype: Galeano 5523.

The current status of Anthurium sect. Porphyrochitonium ...



Figure 124. Anthurium davidneillii Croat. Holotype: Croat 72340 (sheet 1).



Figure 125. Anthurium davidneillii Croat. Holotype: Croat 72340 (sheet 2).


Figure 126. Anthurium davidneillii Croat. Croat 72340. Flowering plant



Figure 127. Anthurium davidneillii Croat. Croat 72340. Inflorescence

(averaging 53×10), 4.3–6. (averaging 5.1) times longer than broad, broadest in distil $\frac{2}{3}$, 3.2-3.3 (6.9) times longer than petioles, abruptly acuminate at apex (acumen to 2.6 cm), narrowly acute to weakly attenuate at base, drying grayish brown to yellowish brown-green, weakly glossy above, yellowish brown and semiglossy below; midrib drying narrowly acute, and slightly darker above, narrowly rounded, finely ribbed, sparsely glandular-punctate and darker below; primary lateral veins 18–20 per side, departing midrib at 45° near middle, drying weakly and narrowly raised, slightly darker above, narrowly rounded and paler below; tertiary veins weakly visible above, moderately raised below; collective veins arising from basal veins, 4–5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely granular; lower surface moderately smooth, conspicuously glandular-punctate. Inflorescence erect-spreading; peduncle 34.8 cm long; spathe green, spreading-reflexed, linear-lanceolate, drying reddish brown; sessile, long, and weakly tapered, 17.1 cm long, 7 mm diam., drying reddish brown; flowers 3-4 visible per spiral, drying 2.5 mm long, 2.0 mm wide; tepals drying minutely granular; lateral tepals 1.2 mm wide, inner margins broadly rounded, outer margins 2-sided; stamens not seen. Infructescence with spadix bright red, berries red, 2-seeded, ovoid-ellipsoid, drying ca. 5 mm long; seeds 1.6 mm long, 1.2 mm wide, ca. 1 mm thick.

Distribution and ecology — *Anthurium coquiense* is endemic to Colombia, known only from the type locality in Chocó Department at 100–160 m in a Tropical rain forest life zone.

Etymology — The species is named for the type locality in area of Coquí in the Municipio of Nuquí.

Comments — In the Lucid Anthurium Key, *Anthurium coquiense* tracks to *A. joaquinense* Croat & D.C.Bay, which differs by having blades broadest in the lower half with 17–27 primary lateral veins per side, and a proportionately much shorter spadix; *A. punctatum* Engl., which differs by having white berries which are purplish at apex; *A. verrucosum* Croat & D.C.Bay which differs by having longer cataphylls to 15 cm long and forming a reticulum and blades that are broader below the middle and *A. wattii* Croat & D. C. Bay, which differs by having a rounded leaf base and more remote collective veins along the margins.

Galeano et al. 5404 from the same region as the type locality is perhaps also this species but differs by having the upper surface drying dark brown and the lower surface yellow-brown.

Anthurium davidneillii Croat, **sp. nov.** — Type: ECUADOR. Esmeraldas: Cantón, Lita, San Lorenzo, along unfinished road between Lita and San Lorenzo, 37.8 km W of Lita. 00°56'N, 78°39'W, 390 m, 21 Feb. 1992, T.B. *Croat 72340* (holotype, MO-4076067–8; isotypes, AAU, B, F, K, SEL, US). **Figures 124–127**.

Diagnosis: Anthurium davidneillii is a member of sect. *Porphychitonium* characterized its short internodes, persistent cataphylls, sharply 5-sided petioles, ovate, abruptly acuminate blades which are usually rounded to weakly subcordate at base and glandular-punctate on both surfaces with collective veins arising from the first pair of basal veins near the base as well as by the pale greenish whitish to cream colored spathe, purplish spadix and pale violet-purple to lilac berries.

Terrestrial to 80 cm tall or epiphytic; internodes short, 4-6 cm diameter; cataphylls 6-20 cm long, persisting with fibers in red-brown reticulum. Leaves 88.3 cm long, with petioles 23.5-79.0 cm long (averaging 49.4), 0.5-1.1 mm diam., sharply 5-sided, the sides parallel, broadly V-shaped adaxially with moderately acute lateral margins and an obtuse medial rib, often sharply 3-ribbed abaxially, semiglossy, drying often narrowly and deeply sulcate adaxially, medium-dark yellow-brown; geniculum 3 cm long, drying dark brown; blades ovate to broadly ovate, 28.8–55.0 cm long, 14.2–35.0 cm wide, (averaging 38.9 x 26.2), 1.1–2.9 times longer than broad (averaging 1.5), 0.5-1.8 times longer than petiole (averaging 0.8), abruptly acuminate, rounded to weakly subcordate at base, rarely truncate, semiglossy, moderately coriaceous and moderately bicolorous, drying dark olive to dark gray-green above and medium yellowish gray-green below; midrib convex and paler above, thicker than broad and paler below, drying more or less concolorous and often acute above, usually darker than surface and several-ribbed below; primary lateral veins 13-22 per side, (averaging 17), etched-quilted above, pleated-raised below, drying narrowly rounded and more or less concolorous on both surfaces; collective vein arising from the first pair of basal veins near the base; basal veins 2-3 pairs, the outer pairs margining out in the lower ¼ of blade; antemarginal vein present, sometime obscured by the inrolled margin; upper surface densely glandular-punctate, minutely areolate-granular and faintly pale lineolate-speckled; lower surface smoother for the most part but with many small colorless pustules, more conspicuously glandular-punctate than on upper surface. Inflorescence 34.3 cm long. erect; peduncle 9.4-41.5 cm long (averaging 25 cm), 1.2-9.6 times longer than spathe (averaging 1.3), drying 2-4 mm diam., somewhat darker than petiole; spathe 1.8-10.8 cm long (averaging 6.8 cm), 0.5-2.4 cm wide (averaging 1.4 cm), pale greenish white, greenish cream or cream to white, drying medium brown; spadix 3.0–15.8 cm long, drying 4–5 mm diam., dark purple to violet-purple, weakly glossy, becoming paler in fruit; flowers 1.8–2.4 mm long, 2–2.4 mm wide; tepals coarsely granular; lateral tepals 1.4-1.6 mm wide, inner margin broadly rounded to almost straight; outer margins 2-3-sided; stamens (still included), anthers 0.5 mm long, 0.2-0.25 mm long, 0.3-0.4 mm wide; thecae not divaricate to moderately divaricate. Infructescence with berries subglobose, pale violet-purple to lilac, drying 5–6 mm long, coarsely short-pale-lineate; seeds 2.6 mm long, 1.8 mm wide, longitudinally striate.

Distribution and ecology — *Anthurium davidneillii* is known only from northwestern Ecuador at 50–430 m elevation in *Premontane wet forest* and *Tropical wet forest* life zones, less frequently in *Premontane rain forest* life zones.

Etymology — Anthurium davidneillii is named for American botanist, Dr David Neill, an intrepid explorer in Ecuador. David is a phenomenal force there, being involved with most aspects of Ecuadorian biology. His training of Ecuadorian students including many indigenous plant collectors, with the assistance of his wife, Mercedes, has been immensely valuable to Ecuadorian science. David Neill collected the new species in one of the areas where it is most common. He has been responsible for collecting many new species during the more than 36 years he has spent in Ecuador. He was employed by the Missouri Botanical Garden for 25 years, 1985 to 2010 and during much of that time he was the driving force behind the country's largest collection, the QCNE herbarium. After his employment with Missouri ended, he became a faculty member at the Universidad Estatal Amazónica, and a curator of the university's herbarium, ECUAMZ, the 'Herbario Amazónico del Ecuador' for which he was largely responsible for building. Currently David and Mercedes are working at new branch of the university in El Pangui where he will devote his attention to the studies in the Cordillera del Cóndor and on building up yet another herbarium in Ecuador.

Comments — Anthurium davidneillii is closest to another new species, Anthurium ortizii Croat, but that species differs by occurring at much higher elevations (900 to 1900 m and averaging 1210 m), in drying dark brown to dark gray-brown above and dark yellow-brown below and in having typically more primary lateral veins and reticulate venation that is more prominent. In contrast, Anthurium davidneilliii ranges from 50 to 450 m (averages 229 m), has blades that dry dark grayish to gray-green on the upper surface and to medium yellowish green on the lower surface with an average of 4 primary lateral veins per side in the lowermost 6 cm of the blade and with the interprimary veins less prominent and with the reticulate veins markedly less prominent.

Anthurium davidneillii keys out in the Lucid Anthurium Key to *A. cachabianaum* Sodiro and *A. lustriviridum* Croat. Both species have narrower blades with length/width ratios 2.0–2.8 compared to the broadly ovate blade of *Anthurium davidneillii*. The blades of *Anthurium lustriviridum* dries light olive-green above and lighter grey-green below. *Anthurium lustriviridum* has a prominent double collective vein and the blade has a cuneate base; *A. cachabianum* has shorter petioles (20–25 cm), smaller blades (18–25 cm long, 8–12 cm wide) and has a cuneate base. A single collection (Hoover 1240) said to have been collected between 800 and 1300 m appears to be closer to *Anthurium davidneillii*.

Paratypes: ECUADOR. Carchi: Tobar Donoso, Parroqui Tobar Donoso, sendero a Lita, 778800 UTM 10129537, 0-1200 m, E. Freire & R. Qullupangui 8960 (QCNE); trail along plain above Tobar Donoso and Río Guape: 800-1300 feet (243-396 m), 19 Feb. 1984, W. S. Hoover 1240 (MO, QCA). Esmeraldas: San Miguel, Sector Río Grande, Comunidad Corriente Grande, 00°45'N 78°47'W, 22 Nov. 1992, Carlos Tipaz, P. Méndez, H. Vargas & M. Chapiro 2317 (MO, QCNE); Reserva Etnica y Forestal AWA-Mataje., 01°17'N, 78°43'W, 15 Mar. 1988, J. Rodríguez et al. 727 (QCA); Reserva Etnica y Forestal AWA, Mataje, 01°17'N, 78°43'W, 15 Mar. 1988, J. Rodríguez 727B (HUA, QCA); Reserva Cotacachi-Cayapas, Charco Vicente, 00°39'N, 78°55'W, 8 May 1998, X. Cornejo & C. Bonifaz 6310 (GUAY, MO); Eloy Alfaro Reserva Ecológica Cotacachi-Cayapas, Charco Vicente, Río San Miguel, 00°43'N 78°53'W; 06-09 Sept. 1993, W. Palacios & M. Tirado 11265 (K, MO, QCNE); 20 -31 Sept. 1993, M. Tirado, E. Albuja & M. Chapiro 291 (MO, QCNE); San Lorenzo, Parroquia Mataje, Reserva Etnica Awá, Centro Mataje, 01°08'N, 78°33'W, 21 Sep. 1992, C. Aulestia, G. Tipaz, M. Burbano & B. Canticuz 338 (MO, QCNE; 382 (MO, QCNE); Comunidad Awa Guadualito, 01°16'N, 78°45'W, 5 June 1996, C. E. Cerón, C. Montalvo & G. Toasa 31325 (QAP); 31314 (QAP); Territorio Indígena Awá. Mataje village, 01°13'00"N, 78°34'01"W, 14 Feb. 2000, D. Neill, QCNE interns & Awá foresters 12480 (F, MO, QCNE); 12487 (GH, MO, QCNE); Reserva Etnica Awá. Centro Ricaurte, 01°10'N, 78°32'W, 26 Oct. 1992, G. Tipaz, C. Aulestia & A. Taicuz 2204 (MO, QCNE); Vicinity of Río Palaví, eastern bank, along creek flowing into Río Palaví, 200 m downstream from Awa encampment, 01°07'N, 78°37'W, 200 m, 12 Feb. 1988, W.S. Hoover, P. Gelpi, R.A. Lorentzen & A. Arguello 3165 (QCA).

Anthurium friedrichii Croat, **sp. nov.** — Type: COLOMBIA. Cauca: Coteje on the Río Timbiquí, below 500 m, Feb. 1899, *F.C. Lehmann 866* (holotype, K; isotype, NY). **Figure 128**.

Diagnosis: Anthurium friedrichii is provisionally a member of sect. *Porphyrochitonium* characterized by its short slender stem, short internodes, persistent, reddish brown cataphyll fibers, moderately long petiolate leaves, sulcate petioles, oblong-elliptic, abruptly-acuminate, grayish brown drying leaves with a single pair of collective veins and with both surfaces obscurely glandular-punctate, moderately long-pedunculate inflorescence with a green spreading to spreading-reflexed, long-tapered spathe and slender, long-tapered spadix. *Anthurium friedrichii* is rather unique in having the apparent glands only on the upper surface with the lower surface so densely dark-speckled that the glandular punctations are difficult or impossible to discern. Most of what appear to be glands on both surfaces are easily removed but this may be due to the age of the specimens and their state of preservation. *Anthurium friedrichii* may prove to be a member of sect. *Decurrentia* or some other yet undefined section. Habit unknown; internodes short, 1.1–1.8 cm diam.; cataphylls 5.6–6.7 cm long, acute persisting as red-brown fibers, somewhat intact at apex, bearing fragments of reddish brown epidermis, the fibers mostly closely parallel. *Leaves* with petioles 7.9–19.1 cm long, 2–3 mm diam., subterete, drying sharply sulcate adaxially with the margins acute, often inturned, broadly convex to narrowly ribbed medially, dark grayish brown; geniculum 6-8 mm long, drying darker than petioles; blades oblong-elliptic, 15.7-24.6 cm long, 5.3-6.8 cm wide (averaging 21×6), 2.8-3.8 (averaging 3.4) times longer than broad, broadest midway, abruptly long-acuminate at apex (acumen to 1.5 cm), acute at base, subcoriaceous, drying grayish brown, weakly glossy above, grayish brown, semiglossy below; midrib drying narrowly rounded to acute and concolorous above, narrowly acute, granular-punctate and concolorous above below; primary lateral veins (12) 18 per side, departing midrib at $65-70^\circ$ at middle, drying weakly and narrowly convex, concolorous above, narrowly rounded and concolorous below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 2-3 mm from margin; basal veins 1 pair; upper surface obscurely and sparsely glandular-punctate, areolate upon magnification, the glandular punctations with a blackened center surrounded by a sunken depression; lower surface obscurely glandular-punctate, densely dark-speckled. Inflorescence with peduncle 19.5–27.3 cm long; spathe green, spreading, 5.5–6.5 cm long, 7–9 mm wide, lanceolate, drying coriaceous and grayish brown; spadix sessile, long and tapered, 10.0-11.1 cm long, 3 mm diam. at base, 1.5 mm diam. at apex, drying grayish brown; flowers 3 visible per spiral, drying 3.5 mm long, 2.6 mm wide; tepals drying minutely granular; lateral tepals 1.8-2.2 mm wide, inner margin rounded to straight, outer margins 2-sided; stamens withdrawn under tepal, anther 0.4 mm long, 0.8 mm wide; thecae broadly spreading; pistil quadrangular, drying grayish with a medial depression and a slit-like stigma. Infructescence not seen.

Distribution and ecology — *Anthurium friedrichii* is believed to be endemic to Colombia, known only from the type locality in SE Cauca Department along the Río Timbiquí, at an elevation of less than 100 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium friedrichii* is named for the famed plant collector, Friedrich C. Lehmann (1850–1903) who, while German Consul in Colombia, was one of the earlier and most prodigious plant collectors in Colombia and Ecuador.

Comments — Anthurium friedrichii is perhaps most closely related to Anthurium brevipes Sodiro, which differs by having broader leaf blades (6–8 cm wide), a much shorter peduncle



Figure 128. Anthurium friedrichii Croat. Holotype: Lehmann 866. Infructescence

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Figure 129. Anthurium gladysmartineziae Croat. Holotype: Brant & Martinez 1322

(5–25 cm long), as well as by having more distinct glandular punctations on both surfaces. In the Lucid Anthurium Key, *Anthurium friedrichii* tracks to *Anthurium cachabianum* Sodiro which differs by having the collective veins further from the margins (up to 1 cm) and by having distinct glandular punctions only on the lower surface and *A. fuscopunctatum* Sodiro.

While Lehmann reported the elevation of the type locality as less than 500 m, the area must have been at near 40 m, where the town of Cotoje still exists; it would be necessary to travel for more than a day by river to reach elevations of 100 m and several days to reach elevations of 500 m. The coordinates of Cotoje were added with the aid of Google Earth.

Anthurium gladysmartineziae Croat, **sp. nov.** — Type: COLOMBIA. Antioquia: Municipio Frontino, road to Murrí, 15 km W of Nutibara (Altos de Cuevas), margin of primary forest, ca. 0.5 km N of road, 06°45'N, 76°23'W, 1880 m, *A. Brant & G.E. Martínez A. 1322* (holotype, HUA-49980). **Figure 129**.

Diagnosis: Anthurium gladysmartineziae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habitat, short internodes, persistent, moderately short, reddish brown cataphyll fibers, terete petioles (drying weakly sulcate), lanceolate, dark brown-drying, narrowly acuminate blades rounded to obtuse at the base, sparsely and obscurely glandular- punctate on both surfaces, as well as by the slender, weak, green, spreading spathe, a rather long weakly tapered violet-purple spadix and berries which are white toward apex and reddish toward the base.

Epiphytic; internodes short, 8–12 mm diam.; cataphylls 5.2–8.4 cm long, acute, persisting semi-intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. *Leaves* with petioles 17.4–27.2 cm long, 2–3 mm diam., terete, drying weakly sulcate, reddish brown; geniculum 8–10 mm long, drying darker than petioles; blades lanceolate to lanceolate-elliptic, 18.6–25.8 cm long, 4.6–6.9 cm wide (averaging 22×6), 2.9–4.3 (averaging 3.7) times longer than broad, broadest midway or in lower 1/3, 0.9–1.2 (averaging 1.0) times as long as petioles, gradually long-acuminate at apex, narrowly rounded to obtuse or acute at base, subcoriaceous, drying dark brown, weakly glossy above, dark brown, semiglossy below; midrib drying narrowly rounded and slightly paler above, narrowly raised and concolorous below; primary lateral veins 5–8 per side, departing midrib at 50–55° at middle, scarcely more prominent than the interprimary veins, drying weakly and narrowly rounded, paler above, narrowly rounded and concolorous below; collective veins arising from basal veins, 4–5 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface densely areolate-ridged and pitted and sparsely pale-speckled, sparsely and obscurely glandular-punctate

the glands sunken with depressed center; lower surface drying sub-bullate-ridged, inconspicuously and sparsely glandular-punctate. *Inflorescence* with peduncle 42.7–52.1 cm long; spathe green, spreading, 6.4 cm long, 7 mm wide, linear-lanceolate, drying coriaceous and reddish brown; spadix violet-purple, sessile, weakly tapered, 7.7–10.2 cm long, 4–5 mm diam., drying yellowish brown; flowers 4(5) visible per spiral, drying 2.2 mm long, 1.8 mm wide; tepals drying minutely granular; lateral tepals 1.1 mm wide, inner margin rounded; outer margins 2-sided; stamens held at the level of the tepals; anthers 0.5 mm long, 0.6 mm wide; thecae slightly divaricate; berries obovoid, ca. 6 mm long, white basally and dark green apically; seeds 2 per berry, 2 mm long, 1.6 mm diam., drying dark brown. *Infructescence* not seen.

Distribution and ecology — *Anthurium gladysmartineziae* is endemic to Colombia, known only from the type locality in Antioquia Department at 1850–2080 m, in a *Premontane rain forest* life zone.

Etymology — *Anthurium gladysmartineziae* named for Colombian botanist, Gladys E. Martínez A., who participated in collecting the type specimen. Gladys was a student at the Universidad Nacional de Colombia in Medellín when she participated with Alan Brant in the expedition to the type locality.

Comments — Anthurium gladysmartineziae has been confused with Anthurium deflexum Engl. which differs by having blades prominently reflexed on the petioles, blades with the midrib more narrowly acute on the upper surface and the lower surface more densely glandular-punctate. In the Lucid Anthurium Key, Anthurium gladysmartineziae tracks to A. plantagineum Sodiro from western Ecuador and is characterized by having shorter petioles (6–10 cm long) which are only 0.4 times as long as blades (versus about at long as or longer than the blades), shorter blades (less than 16 cm long), and a shorter spathe (2–3 cm long).

Paratypes: COLOMBIA. **Antioquía**: Frontino, Corregimiento Nutibara, cuenca alta del Río Cuevas, 06°48'16"N, 76°14'51"W, 2000 m, 18 Apr. 1987, *D. Sánchez S. et al. 1286* (MO); Sitio Murrí, vía Nutibara-La Blanquita, Alto de Cuevas, finca El Palmar, 06°45'N, 76°23'W, 1970–2080 m, 13 Feb. 1991, *R. Callejas 9886* (HUA, MO); Zona de Murrí, vía Nutibara-La Blanquita, 5–8 km S de Alto de Cuevas,1000–1850 m, 14 Feb. 1991, *R. Callejas 9929* (HUA, MO).

Anthurium gruesoi Croat, sp. nov. — Type: COLOMBIA. Chocó: Municipio de Nuquí, Quebreda Chaquí, ca. 05°40'N, 77°16'W, ca. 200 m, Feb.–Mar. 1994, *G. Galeano, J. Grueso, O. Hurtado & L. Perea 4754a* (holotype, COL-403332). Figure 130.

Diagnosis: *Anthurium gruesoi* is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent cataphyll fibers, long-petiolate leaves, petioles drying narrowly and sharply sulcate and about 2/3 as long as the blades, elliptic, abrupt-ly acuminate blades which are acute at the base, gray brownish green and eglandular but warty-pustular above, yellowish green and glandular-punctate below with a singular collective vein rather remote from the margin as well as by the long-pedunculate inflorescence with the green, promptly deciduous spathe and the very long tapered, sessile, yellow spadix.

Epiphytic; internodes short; cataphylls not seen. Leaves with petioles 20.5–24.1 cm long, 5–7 mm diam., subterete, drying narrowly and sharply sulcate, greenish brown; geniculum 1.0–1.4 cm long, drying darker than petioles; blades elliptic, 21.8-35.2 cm long, 7.8-14.1 cm wide (averaging 30×12), 2.5–2.8 (averaging 2.6) times longer than broad, broadest midway, 1.1– 1.5 (averaging 1.3) times as long as petioles, rounded to narrowly rounded and abruptly acuminate at apex (acumen to 7 mm), acute at base, subcoriaceous, drying gray brownish green, matte above, yellowish green, semiglossy below; midrib drying narrowly raised, finely ribbed and paler above, narrowly rounded, finely ribbed and paler below; primary lateral veins 10-16 per side, departing midrib at 55° at middle, scarcely more prominent than the interprimary veins, drying narrowly rounded to pleated and concolorous above, narrowly rounded and paler below; secondary veins and tertiary veins drying prominently raised above and below; collective veins arising from basal veins, 6–10 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, smooth except for many prominent pustules; lower surface conspicuously glandular-punctate, smooth except for sparse pustules. Inflorescence with peduncle 30.8 cm long; spathe green, deciduous; spadix yellow, sessile, long, and weakly tapered, 15.8-25.9 cm long, 4-6 mm diam., drying dark gravish brown; flowers 3 visible per spiral, drying 3.0-4.2 mm long, 2.0-2.5 mm wide; tepals drying minutely granular; lateral tepals 1.6–2.0 mm wide, inner margin broadly rounded; outer margins broadly 2-sided; stamens not emergent; anthers 0.4 mm long, 0.6 mm wide; thecae broadly ovate, weakly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium gruesoi* is endemic to Colombia, known only from the type locality in Chocó Department at 200 m elevation in a *Tropical wet forest* life zone.

Etymology — *Anthurium gruesoi* is named for Colombian botanist, Juan de Dios Grueso, a native of Nuquí near where the type plant was collected. Juan worked for several years with the Fundación Inguedé, assisting in all its activities including as a field assistant on collecting trips to the Gulf of Tribugá between 1993 and 1999, especially with Colombian researchers Rodrigo Bernal and Gloria Galeano. He now lives in Bogotá.



Figure 130. Anthurium gruesoi Croat. Holotype: Galiano 4754a.



Figure 131. Anthurium habitense Croat. Holotype: Forero et al. 7358.

Comments — In the Lucid Anthurium Key *Anthurium gruesoi* tracks to *A. brevipes* Sodiro, which differs by having much smaller, proportionately more narrowly elliptic, more prominently acuminate blades, a proportionately shorter peduncle and a much shorter, short-tapered spadix; *A. lustriviridum* Sodiro, which differs by having two pairs of collective veins extending to the apex and a long-tapered blade apex; *A. perviride* Croat & D. C. Bay, which differs by having leaf blades attenuate at the base and more narrowly long-acuminate at the base with 2 pairs of collective veins and with glandular punctations on both surfaces; *A. verrucosum* Croat & D. C. Bay which differs by having more narrowly elliptical leaf blades with less conspicuous glandular punctations, a more long acuminate apex, primary lateral veins more numerous and more closely spaced and a less tapered spadix and *A. wattii* Croat & D. C. Bay which differs by having the blade apex narrowly long-acuminate.

Anthurium habitense Croat, sp. nov. — Type: COLOMBIA. Chocó: Municipio de San José del Palmar, hoya del Río Torito (affuente del Río Hábito), declive occidentale, ca. 04°55'N, 76°15'W, 630–730 m, 16 Mar. 1980, *E. Forero, R. Jaramillo, J. Espina Z & P. Palacios H. 7397* (holotype, COL-220715). Figure 131.

Diagnosis: Anthurium habitense is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, short internodes, short, persistent, reddish brown cataphyll fibers, subterete, narrowly sulcate petioles (drying deeply and sharply sulcate), the long-petiolate, more or less elliptic blades which dry grayish adaxially and grayish yellow-brown abaxially, glandular punctate on both surfaces, shortly acuminate at apex and acute to weakly attenuate at base with a single pair of collective veins arising from the base as well as by the slender-pedunculate inflorescence, narrow, tightly inrolled green spreading spathe and the sessile, scarcely tapered, green spadix with no more than 3 flowers visible per spiral and with the squarish pistil clearly visible. Also characteristic are the small white berries.

Epiphytic herb; internodes short, 7 mm diam.; cataphylls 3.4 cm long, acute, persisting as fibers with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 12.4–20.9 cm long, 2 mm diam., subterete, drying deeply and sharply sulcate, yellowish brown; geniculum 1.1–1.3 cm long, drying darker than petioles; blades elliptic, 18.1–22.8 cm long, 7.5–8.9 cm wide (averaging 20×8), 2.4–2.6 (averaging 2.5) times longer than broad, broadest midway, inequilateral (one side 4–7 mm wider), 1.1–1.5 (averaging 1.3) times longer than petioles, abruptly acuminate at apex, acute at base, subcoriaceous, drying gray, weakly glossy above, grayish yellow-brown, weakly glossy below; midrib drying narrowly rounded, glandular-punctate, and paler above, narrowly rounded to bluntly acute, glandular-punctate and concolorous below; primary lateral veins 8–12 per side, departing midrib at 70°, drying weakly and narrowly raised, paler above, narrowly rounded

and slightly darker below; tertiary veins scarcely more visible than surface above and below; collective veins arising from the basal veins, 5 mm from margin; basal veins 1 pair; upper surface conspicuously glandular-punctate, minutely and conspicuously areolate at higher magnification; lower surface glandular-punctate, densely granular and pustular. *Inflorescence* with peduncle 23.3–31.1 cm long; spathe green, spreading, 3.2–3.9 cm long, 3 mm wide, lanceolate, drying coriaceous and yellowish brown; spadix green-white, sessile, weakly tapered, 10.3–13.1 cm long, 4 mm diam., drying yellowish brown; flowers 3 visible per spiral, drying 3.3 mm long, 1.9 mm wide; tepals drying minutely granular; lateral tepals 2 mm wide, inner margin rounded, outer margins 2-sided; stamens not yet emergent, 0.3 mm long, 0.8 mm wide; *Infructescence* with berries white, subglobose, 5 mm diam., the epidermis underlain in lower half with subglobose crystals, 4-seeded; seeds 2–2.4 mm long, 1.2–1.4 cm wide, 1 mm thick, tan.

Distribution and ecology — *Anthurium habitense* is endemic to Colombia, known only from the type locality in Chocó Department at 630–950 m in a *Premontane wet forest* life zone.

Etymology — The epithet refers to the type locality along the Río Habita.

Comments — In the Lucid Anthurium Key, *Anthurium habitense* keys to *A. victoriense* Croat which differs by having typically much larger leaf blades (to 58 × 20 cm) with the veins on the upper blade surface very close and numerous, frequently with a pair of secondary collective veins and with up to 18 primary lateral veins per side, and a greenish white spadix.

Paratype: COLOMBIA. Chocó: Municipio de San José del Palmar, hoya del Río Torito (afluente del Río Hábita), declive occidentale, Finca "Los Guaduales", Quebrada Santa Fé, 630–730 m, 14 Mar 1980, *E. Forero, R. Jaramillo, J. Espina Z. & P. Palacios H. 7308* (COL-220583).

Anthurium jimgribianum Croat, **sp. nov.** — Type: ECUADOR. Esmeraldas: Lita-San Lorenzo Region, along road from Lita to San Lorenzo, along Río Bogotá near Awa community, 00°55'N, 78°33'W, 0.5 km NW of Alto Tambo, 737 m, 20 Feb. 1992, *T.B. Croat 72285A* (holotype, MO-6736175; isotypes, B, COL, F, K, NY, PMA, QCNE, S, US, USM). **Figures 132 & 133**.

Diagnosis: Anthurium jimgribianum is a member of sect. *Porphyrochitonium* and is characterized by its bluntly C-shaped, weakly sulcate petioles which are about half as long as the blades, blades which are arched, oblong-elliptic, short-acuminate with weakly quilted primary lateral veins, a single pair of primary lateral veins arising from the base or one of the lower primary lateral veins, weakly loop-connecting and 3–8 mm from the margin, glands on lower surface only as well as by its moderately short-pedunculate, spreading inflorescence with lanceolate, green, spreading, bluntly pointed spathe and weakly tapered, dark green, weakly stipitate spadix with 5–6 flowers visible per spiral and broadly divaricate anthers.

Epiphytic; stems short, 10-15 cm long; internodes 1.5-2 cm diam.; cataphylls 20-2.5 cm long, intact at apex, fibrous lower down, drying dark brown, persistent. Leaves numerous, spreading; petioles 6.5–24.5 cm long, 3–5 mm diam., obtusely flattened adaxially, narrowly rounded abaxially, dark green, semiglossy; geniculum 1.5 cm long, more sharply D-shaped with a weak obtuse medial rib, slightly paler; blades oblong-oblanceolate, (14)28-43.5 cm long, (3.7)6.5–11.3 cm long, (3.5)3.8–4.5 times longer than wide, about half as long as petioles, shortly and gradually acuminate at apex, acute to subobtuse at base, subcoriaceous, dark green and moderately glossy above, moderately paler and moderately glossy below; midrib narrowly rounded and slightly paler above, narrowly rounded to weakly raised and slightly paler below; primary lateral veins (12)16–17 per side, arising at a 60–65° angle, quilted-sunken and concolorous above, weakly pleated-raised, narrowly rounded and concolorous below; collective veins 1 pair, arising from the only pair of basal veins or sometimes from one of the lower primary lateral veins, equally sunken as the primary lateral veins, (3)4-6(8) mm from margins; upper surface densely and minutely areolate and pale-granular; lower surface moderately smooth, weakly and minutely areolate, glandular punctate, the glands dark brown, slightly raised, distinct, sometimes donut-shaped. Inflorescence spreading-reflexed; peduncle 18-31 cm long, 2.5 mm diam.; spathe ovate-lanceolate, 3.7-6.8 cm long, 1.2-1.8 mm wide, oblong-lanceolate, green, tinged with violet-purple on both surfaces, glossy outside, weakly glossy inside, abruptly short-thick-apiculate with the apiculum turned downward; peduncle 21-30 cm long, terete, green, tinged slightly with violet-purple, semiglossy; spadix green with the pistils faintly purplish red, turning brownish yellow after anthesis, sessile or stipitate 1 mm, 9.5–11.6 cm long, 5–6 mm diam. at base, 4 mm diam. midway, 3 mm diam. at 1 cm from tip (tip narrowly rounded); flowers 5-6 visible per spiral, 2.9-3.6 mm long, 2.1-2.8 mm wide; sides parallel to spiral gradually to jaggedly sigmoid; sides perpendicular to spiral gradually sigmoid; pistils 0.8 mm wide in both directions, weakly raised, green, tinged purplish, concave at apex; stamens held at level of tepals, one on each side of pistil, widely spaced, anthers 0.5-6 mm long, 0.6-0.7 mm wide, thecae moderately divaricate, at least when fully open often at 180° apart; pollen white. Infructescence not seen.

Distribution and ecology — *Anthurium jimgribianum* is endemic to Ecuador, known only from the Lita-San Lorenzo Region at 737 m elevation in a *Premontane rain forest* life zone.

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Figure 132. Anthurium jimgribianum Croat. Holotype: Croat 72285A.



Figure 133. Anthurium jimgribianum Croat. Croat 72285A. Habit of greenhouse plant

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Figure 134. Anthurium jimwestii Croat. Holotype: Croat 95351

Etymology — Anthurium jimgribianum is named in honor of Jim Grib, Tom Croat's former Volunteer Research Associate in the Aroid Research Group at the Missouri Botanical Garden. Jim, coauthor of this paper, specialized in describing Anthurium sect. Belolonchium and Porphyrochitonium as well as Philodendron and was responsible for preparing the detailed descriptions of most of the new species in this paper. Professionally he was a chemist and spent his career at the Anheuser-Busch Brewery in St. Louis. After he retired Jim joined the Aroid Research Group at the Missouri Botanical Garden and spent several years helping us study Araceae. He was noted for his attention to detail and the accuracy of his observations. This is one of several species named in his honor.

Comments — In the Lucid Anthurium Key *Anthurium jimgribianum* tracks to *Anthurium quinquesulcatum* Sodiro which differs by having the petioles 3-ribbed adaxially, by having proportionately shorter leaves which are broadest above the middle and a proportionately much more short-pedunculate spadix.

Anthurium jimwestii Croat, **sp. nov.** — Type: ECUADOR: Pichincha, near border with Imbabura, Reserva Guaycuyacu, along Río Guaycuyacu on road from Cielo Verde to Santa Rosa at junction of Río Guaycuyacu and Río Guayabamba on border with Province of Imbabura, 00°13'N, 78°55' W, 500 m, 1 Mar. 2005, *T.B. Croat 95351 (holotype, MO-4841842*; isotypes, COL, K, QCNE, US). **Figure 134**.

Diagnosis: Anthurum jimwestii is a member of sect. *Porphyrochitonium* and is characterized by its long, linear-oblanceolate leaves with glandular punctations restricted to the lower surface and with the upper surface drying minutely and deeply areolate as well as by the pendent inflorescence with a green spathe and a long-tapered spadix.

Pendent epiphyte; stems less than 15 cm long; internodes 0.5–1.3 cm diam.; cataphylls redbrown, persisting semi-intact, to at least 10 cm long. *Leaves* 111 cm long, pendant; petioles sharply C-shaped adaxially with erect margins and a narrow medial rib, medium green, weakly glossy, 18.7–29 cm long (averaging 25.3), 4 mm diam.; geniculum 1 cm long, darker than petiole; blades narrowly linear-oblanceolate, 75–95 cm long, 4.8–6.0 cm wide (averaging 85.7 × 5.5 cm), blade 12.5–18.2 times longer than wide (averaging 15.7), blade 3.0–4.5 times longer than petiole (averaging 3.6), long-tapered acuminate at apex, very long, narrow attenuate at base, subcoriaceous, dark green and matte-subvelvety above, slightly paler and matte below, drying matte and medium gray-green on both surfaces; midrib narrowly raised and concolorous above, bluntly acute and slightly paler below; primary lateral veins 56–64 per side, departing midrib at 30–40°, weakly raised and concolorous above and below; collective veins more prominent than primary lateral veins, arising from the base and running 0.4–0.8 cm from margins; upper surface epunctate, densely areolate-granular; lower surface densely areolate, conspicuously dark glandular-punctate, the glands to 0.2 mm diam., raised with sunken middle. *Inflorescence* 58.2 cm long, pendent; peduncle 34–36 cm long, 0.3 cm diam., ribbed; spathe medium green, lanceolate; spadix 24 cm long, 7 mm diam. post-anthesis; flowers 5–6 visible per spiral; tepals brownish; pistils weakly exserted and faintly purplish. *Infructescence* not seen.

Distribution and ecology — *Anthurium jimwestii* is endemic to Ecuador, known only from the type locality in western Pichincha Province at 500 m in a *Premontane wet forest* life zone.

Etymology — *Anthurium jimwestii* is named for Mr. Jim West, owner and operator of the Reserva Guaycuyacu. Jim and his wife, Meredith (Mimi), operate a tropical fruits farm and a small hostel which allows visitors to experience real tropics in a rather pristine environment. He has been a pioneer, entering into remote territories accessible only by foot paths and then, with his own ingenuity, building up the property. He has spent the past 30 years living in the tropics of Colombia and Ecuador and has a great interest in conserving tropical plants, especially edible fruits.

Comments — In the Lucid Anthurium Key, Anthurium jimwestii tracks with A. julospadix Sodiro which may be distinguished by its shorter petioles (10–15 cm long), smaller (37.0 \times 6.5 cm), more oblong blades and the presence of a small stipe supporting the inflorescence; A. rupestre Sodiro which differs by also having shorter petioles (10–20 cm long), primary lateral veins that arise at a broad angle and collective veins that run only 3-5 mm from the margin and A. nangaritense Croat which differs by having shorter, broader blades (35.0 × 7.5 cm), only 7 or 8 primary lateral veins per side, and a shorter spadix (7–14 cm long). Anthurium jimwestii can also be compared with smaller plants of Anthurium magnifolium Croat & J. Rodr., another species from the Pacific slope of Ecuador in the vicinity of Volcán Pichincha which has rather remote collective veins, proportionately less elongated blades, being 4.2-4.9 times longer than wide versus 16 times longer than wide in A. jimwestii. Superficially Anthurium jimwestii looks more closely related to Anthurium pallidiflorum Sodiro but that species is not a member of sect. Porphyrochitonium, and lacks glandular punctations on either surface. In addition, Anthurium pallidiflorum has a short peduncle and a short, erect, white spadix. Another Porphyrochitonium from Manabí, Ecuador with a long narrow, linear blade is Anthurium cojimiesense Croat but its blades are only 50-62 cm long and 6-11 cm wide.

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Anthurium juanguillermoi Croat, **sp. nov.** — Type: COLOMBIA. Antioquia: Parque Nacional Natural Las Orchídeas, Sector Calles, margin derecha del Río Calles, 1420 m, 06°31'N, 76°19'W, 25 Mar., 1988, *A. Cogollo, J.G. Ramírez & O. Alvarez 2571* (holotype, MO-4241470; isotype, HUA). **Figure 135**.

Diagnosis: Anthurium juanguillermoi is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, persistent, reddish brown cataphylls with frequent fragments of epidermis, long-petiolate, dark-drying leaves with subterete petioles, elongated, oblong-lanceolate, gradually acuminate blades with the base usually acute to narrowly rounded with a single pair of collective veins arising from the base and 3–7 mm from the margin with the upper surface eglandular and the lower surface dark glandular-punctate as well as by the long-pedunculate inflorescence with a narrow, green, spreading spathe and a reddish or yellow spadix with purple to red berries.

Epiphytic, sometimes terrestrial, known to range from 1.7 and 2.3 m high in trees; internodes short, drying 0.8–1.7 cm diam.; cataphylls 4.7–8.3 cm long (averaging 6.5 cm), persisting as reddish brown fibers. Leaves 19.0-73.5 cm long; petioles terete, 4.9-23.4 cm long (averaging 16.5 cm), drying 3 mm diam. midway, 6 mm at base and on geniculum, matte, red-brown, finely ribbed, sometimes with 1 or 2 deep grooves; geniculum 0.9-1.8 cm long, drying 2-6 mm diam., darker and thicker than petiole; blades oblong-lanceolate, 14.1-50.1 cm long, 2.4-7.5 cm wide, (averaging 31.6×5.0 cm), 4.7-7.8 times longer than broad (averaging 6.3), 1.3–2.9 times longer than petiole (averaging 2.0), broadest below middle, gradually acuminate at apex (acumen ca. 1–2 cm, sometimes downturned), acute to narrowly-rounded and sometimes weakly inequilateral at base, thinly coriaceous, drying drying dark brown, weakly-glossy to matte above, more yellowish brown, semiglossy below; midrib prominent and concolorous above, rounded to narrowly-rounded, finely ribbed, darker than surface below; primary lateral veins appearing to be too numerous to count above and scarcely more prominent than interprimary veins above, 16–20(25) per side, visible below, departing midrib at 40–55°, drying concolorous on each surface, narrowly raised below; collective veins arising near base, 3-7 mm from margin, drying weakly rounded above, acutely raised below; antemarginal veins present 0.4 mm from margin, slightly more conspicuous below; upper surface eglandular, minutely granular-areolate, weakly granular; lower surface finely dark-speckled to finely granular, minutely ridged, occasionally pustular, densely glandular-punctate, the glands medially sunken. Inflorescence erect; peduncle 18.8-46.1 cm long (averaging 34.2), drying 1-5 mm diam., green, drying matte, medium red-brown, granular; spathe narrowly linear-lanceolate, erect-spreading, 4.2-13.6 cm long, 0.6-1.2 cm wide (averaging 7.2 x 0.8 cm), green with a red center, drying dark brown, glossy and short-pale-lineate adaxially, matte abaxially; spadix weakly stipitate (stipe 1 mm long, 3 mm wide), 4.2–16.6 cm long, 3–7 mm diam. (averaging 10.6 cm ×x 5 mm), cylindroid, drying dark brown; flowers 5–7 visible per spiral, 1.9–2.3 mm long by 0.9–1.4 mm wide; lateral tepals to 0.8–1.3 mm wide; inner margins broadly rounded; outer margin 2-sided; stamens held at level of tepals, anthers 0.3 mm long, 0.5 mm wide, thecae broadly ovate, weakly divaricate. *Infructescence* with berries purple to red at maturity.

Distribution and ecology — *Anthurium juanguillermoi* is endemic to Colombia, known only from the type locality in Antioquia at 1420 m in a *Premontane rain forest* life zone.

Etymology — *Anthurium juanguillermoi* is named for Colombian botanist, Juan Guillermo Ramírez from the Jardin Botanico de Medellín, Colombia. Juan is an excellent collector and assisted in the collection of the type specimen.

Comments — In the Lucid Anthurium Key, *Anthurium juanguillermoi* tracks to *A. deflexum* Engl. which differs by having the leaves pendent from more or less erect petioles and a long-pedunculate inflorescence which much overtops the leaves. *Anthurium juanguillermoi* also resembles *A. punctatum* N.E.Br., which differs by having 13–16 primary lateral veins per side, and blades oblong-elliptic, drying matte to weakly glossy, tan-gray. *Anthurium juanguillermoi* is similar to *A. gladymartineziae*, also known from the region of the Parque Nacional Natural Las Orchídeas, and which also dries somewhat blackened but differs by having proportionately shorter and narrower blades which are more rounded at the base, less conspicuous glands and white berries which are red at the tip.

One of the specimens, *Cogollo et al. 2568*, differs by having sparsely scattered short-pale-lineations on its upper surface and in that all of the veins are less elevated/raised, yet darker than the type specimen.

Paratypes: COLOMBIA. Antioquia: Amalfi, vereda Arenas blancas, 06°55'00"N, 74°55'00"W, 1100–1250 m, Apr. 1994, *R. Fonnegra G. et al.* 4776 (HUA); Urrao. Parque Nacional Natural "Las Orquídeas", Sector Calles, margen derecha del río Calles, 06°32'N, 76°19'W, 1420 m, 25 Mar. 1988, *Á. Cogollo P. et al.* 2568 (JAUM, MO); *Á. Cogollo P. et al.* 2571 (JAUM, MO); Camino de Venados arriba hacia Calles, 06°34'N, 76°19'W, 1440 m, 25 July 1988, *Á. Cogollo P. et al.* 3491 (JAUM, MO); Vereda Calles; Bosque Nacional Natural Las Orquídeas; Quebrada Honda; Inventario Permanante de bosque húmedo premontano, en el filo al NW de la Cabaña Calles, 06°29'N 76°14'W, 1330 m, 10 Dec. 1992, *J. Pipoly, 16939* (MO); Vereda Calles, Inventario Permanente Bosque Pluvial Premontano, margen derecha del Río Calles, *A. Duque, F. Giraldo, W. Rodríguez, E. Alvarez,* 06°32'N, 76°19'W, 1450 m, 26 Nov. 1993, J. Pipoly et al. 17152 (JAUM, MO); Río Calles, 1400–1500 m, 2 May 1995, *R. Fonnegra G. et al.* 5481 (HUA); *5483* (HUA).



Figure 135. Anthurium juanguillermoi Croat. Holotype: Cogollo et al. 2571.

The current status of Anthurium sect. Porphyrochitonium ...



Figure 136. Anthurium koesteri Croat. Holotype: Koester & Schnell 2007



Figure 137. Anthurium koesteri Croat. Köster & Schnell 2007. Leaf adaxial surface and Infructescence



Figure 138. Anthurium koesteri Croat. Köster & Schnell 2007. Close-up of infructescence.

Anthurium koesteri Croat, sp. nov. — Type: ECUADOR. Esmeraldas: Bilsa Biological Station, Quinindé Cantón, 00°35'N, 79°07'W, 450–650 m, *N. Köster & A.-M. Schnell 2007* (holotype, MO-6201335; isotypes, BONN, QCA, QCNE). Figures 136–138.

Diagnosis: Anthurium koesteri is a member of sect. *Porphyrochitonium* and is characterized by its short stem, short slender internodes, finely fibrous, reddish brown cataphyll fibers, moderately elongate, sharply and deeply sulcate, winged, brown-drying, glandular-punctate petioles, the winged-margined geniculum and elliptic, short-acuminate leaf blades which are glandular-punctate on both surfaces, dark green and matte above, paler reddish and glossy below (drying gray-brown and matte above, yellowish red-brown and weakly glossy below), a single pair of collective veins that dry more sunken than the primary lateral veins as well as the slender, long-pedunculate inflorescence with a slender, thick purple spathe folded in on margins, a slender, green, non-tapering spadix and greenish blue berries.

Epiphyte; internodes short, 0.6–1.0 cm diam.; cataphylls 3.5 cm long, persisting as reddish brown fine, mostly parallel fibers. *Leaves* with petioles 6.5–12.6 cm long, 2–3 mm thick, moderately elongate (0.5–1.1 times longer than blades), sharply and deeply sulcate-winged, brown-drying, glandular-punctate; geniculum undulate-winged-margined on 3 sides; blades elliptic, 10.8–17.5 cm long, 4.1–8.3 cm wide, 2.1–3.0 (average 2.6) times longer than wide, short-acuminate at apex, acute at base, subcoriaceous, dark green and matte above, paler reddish and glossy below (drying gray-brown and matte above, yellowish red-brown and weakly glossy below); primary lateral veins arising at a 65–70° angle; collective veins 1 pair, arising from the base, 6–8(10) mm from margins, drying more sunken than the primary lateral veins adaxially; basal veins 2 pairs, the outer pair weak or margining out in lower ¼ of the blade; upper surface drying moderately smooth, dark glandular-punctate; lower surface drying moderately smooth, dark glandular-punctate; lower surface drying moderately smooth, dark glandular-punctate. *Inflorescence* slender, long-pedunculate, erect; peduncle 25.5–27.0 cm long, tinged faintly reddish; spathe 2.6–3.5 long, 4 mm wide, slender, thick, erect to spreading, purple with margins inward; spadix 8.8 cm long, 3 mm diam., slender, green, non-tapering. *Infructescence* with berries greenish blue.

Distribution and ecology — *Anthurium koesteri* is known only from Ecuador in the type locality in the Montañas de Mache in NW Ecuador in Esmeraldas Province at 450–650 m in a *Tropical wet forest* life zone.

Etymology — *Anthurium koesteri* is named for Dr Nils Köster of the Berlin Botanical Garden who, along with Anna Marie Schnell, collected the type specimen. They were making collections of epiphytes at the Bilsa Reserve, paying particular attention to the aroids. Köster and the senior author of this paper are also preparing an aroid florula of the Mache-Chindul

Mountains where the Bilsa Field Station is. Nils also works with the taxonomy and phylogeny of *Philodendron*.

Comments — Anthurium koesteri is most similar to A. brevipes Sodiro, which shares leaf blades with a narrowly raised glandular-punctate upper midrib and perhaps also greenish-blue berries. While Sodioro's type description did not mention berry color, other plants in the Lita area fitting Anthurium brevipes do possess blue berries. Sodiro also mentions that both blade surfaces of Anthurium brevipes are glandular-punctate but a study of the type from the Berlin Herbarium shows that all of the black dots on the upper blade surface are small structures that are easily flicked off with a scapel, not the typical glands that are imbedded into the leaf surface. Anthurium kessleri, on the other hand, has distinct and real glandular punctations. In addition, Anthurium kessleri differs from A. brevipes in having more bicolorous leaf blades which dry gray above, yellow-brown below and are bluntly short-acuminate (versus narrowly and sharply acuminate for A. brevipes). In addition, Anthurium kessleri has the geniculum with undulate winged-margins which is not true for A. brevipes.

Anthurium lamanense Croat, **sp. nov.** — Type: ECUADOR. Cotopaxi: Along road between Quevedo and Latacunga, 55.5 km from Quevedo, and 23.5 km E of La Maná, on forested slopes above river, 00°53'S, 79°04'W, 930–950 m, 10 Oct. 1983, *T.B. Croat 57030* (holotype, MO-2531461; isotype, QCA). **Figures 139–145**.

Diagnosis: Anthurium lamanense is a member of sect. *Porphyrochitonium* and is characterized by its somewhat intact cataphylls, sharply C-shaped to subtriangular petioles with an adaxial medial rib, narrowly ovate-elliptic, acuminate, coriaceous blades, dark glandular punctations sunken on the upper surface, prominently etched-sunken primary lateral veins, 2 pairs of collective veins, the outermost margining out in lower ¼ of the blades, subtriangular and somewhat sharply flattened peduncle, green, spreading spathe and the slightly tapered, green spadix.

Low trunk epiphyte to about 1 m above ground; stems short, stout, typically less than 15 cm long; internodes short, 0.5–2 cm diam.; cataphylls 4–7 cm long, sometimes pinkish and intact when young, persisting as reddish brown fibers (upper portion intact). *Leaves* 19–54 cm long with petioles (6)13–20 cm long, 0.5 cm wide, 0.6 cm thick, sharply and deeply C-shaped, broadly and sharply sulcate adaxially with a weak to prominent medial rib, medium green and weakly glossy; geniculum 1.5–2 cm long, sharply and deeply sulcate, sometimes with a low medial rib; blades narrowly lanceolate, (14)27–32 cm long, (4.5)7–9 cm wide, 3.4–4.5 times longer than broad, 2.5–3.7 times longer than petiole, gradually short-acuminate at the apex, cuneate at the base, coriaceous, moderately bicolorous, dark green and semiglossy

above, moderately paler and glossy below, drying greenish and matte above, moderately paler, yellowish green and semiglossy below; midrib narrowly rounded to bluntly acute and paler above, sharply to bluntly acute and paler below; primary lateral veins 8–12 per side (average 10), arising from the midrib at a 40–50° angle, etched and sunken above, drying inconspicuous and slightly raised above, narrowly rounded and concolorous below below, drying more prominent and acutely raised below; collective veins 2 pairs, the outmost when present arising at the base and margining out in lower ¼ of the blades; the innermost arising near the base and running to the apex, 0.7–1.0 cm from the margin, deeply sunken and equaling primary lateral veins above, drying acutely raised and more prominent than primary lateral veins on lower surface; upper surface densely pale granular, dark glandular-punctate, often deeply pitted; lower surface densely pale-speckled, glandular-punctate, the glands weakly sunken. Inflorescence erect; peduncle subtriangular and somewhat sharply flattened on one side 25-45.9 cm long, 0.5 cm diam.; spathe 6.4–9.0 cm long, 0.7–1.2 cm wide, medium green becoming yellowish with age, drying dark brown; spadix (6)14.9-19.7 cm long, 3-4 mm diam., slightly tapered, olive-green becoming yellowish with age, drying dark brown; flowers 8–10 per spiral, 1–1.8 mm long, 1.2-2 mm wide, lateral tepals, 0.6-0.8 mm wide; inner margin rounded, outer margin 2-sided. Infructescence not seen.

Distribution and ecology — *Anthurium lamanense* is endemic to the Pacific slopes of Ecuador in Cotopaxi Province at 800–930 m elevation in a Premontane moist forest life zone.

Etymology — The species is named for the type locality near La Mana in Cotopaxi Province.

Comments — In the Lucid Anthurium Key, *Anthurium lamanense* keys to *A. sulcatum* Engl. which differs by having proportionately longer petioles (blades 1.6–2.0 times longer than petioles versus 2.5–3.7 times longer than petiole for *A. lamanense*), petioles which lack a medial rib, more broadly elliptic, less coriaceous blades which lack conspicuously sunken glandular punctations on the upper surface. In addition, *Anthurium sulcatum* has a purplish spadix 10–12 cm long while *A. lamanense* has a green spadix. Other species that are similar to *Anthurium lamanense* are *A. myosurus* Sodiro, which differs by having much longer petioles (15–40 cm long), elliptic blades that are only 2.5 times longer than broad, a peduncle that is about twice as long as petioles and a reddish spadix; *A. punctatum* Engl. which differs by proportionately longer blades to about 5.0 to 5.5 times longer than broad with blade apex more bluntly pointed; *A. verrucosum* Croat & D. C. Bay which differs by having blade upper surface profusely verrucose (10 x magnification) and 13–18 primary lateral veins per side.



Figure 139. Anthurium lamanense Croat. Holotype: Croat 57030



Figure 140. Anthurium lamanense Croat. Croat 57030. Leaf blade, adaxial surface.



Figure 141. Anthurium lamanense Croat. Croat 57030. Stem and petioles, showing petiole cross-section



Figure 142. Anthurium lamanense Croat. Croat 57030. Flowering potted plant



Figure 143. Anthurium lamanense Croat. Croat 57030. Stem with cataphylls and inflorescence


Figure 144. Anthurium lamanense Croat. Croat 57030. Potted plant with leaves (adaxial) and inflorescence.



Figure 145. Anthurium lamanense Croat. Croat 57030. Inflorescence.

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Figure 146. Anthurium lobinii Croat. Holotype: Croat 103529.

Paratypes: ECUADOR. Cotopaxi: Along road between Guayacán (13.1 km NE of La Maná) and Montenuevo (N of Pucayacu), 23.8 km N of Guayacán, 3.5 km N of Pucayacu, 800 m, 00°41'S, 79°06'W, 20 Mar. 1992, T.B. *Croat 73254* (MO, QCNE).

Anthurium lobinii Croat, **sp. nov.** — Type: cult. Bonn Botanical Garden ex ECUADOR. Pastaza: Vicinity of Puyo, without exact locality, ca. 01°14'S, 78°59'W, ca. 960 m, Ec-0-BONN-8260, originally collected by Prinsler, vouchered 20 Feb. 2012, *T.B. Croat 103529* (holotype, MO-6352499; isotypes, B, BONN, K, QCNE, US). Figure 146.

Diagnosis: Anthurium lobinii is a member of sect. *Porphyrochitonium* and is characterized by its rosulate epiphytic habit, short internodes, semi-intact cataphylls, terete, narrowly and deeply sulcate petioles, oblong-weakly oblanceolate blades with the quilted sunken primary lateral veins which are eglandular above and glandular-punctate below as well as by the erect inflorescence with the green spreading-recurled spathe and long-tapered yellow-green spadix.

Epiphyte, somewhat rosulate; stems short; internodes short, 2 cm diam.; cataphylls lanceolate, 4-5 cm long, persisting more or less intact. Leaves with petioles erect-spreading, 10 cm long, 8 mm diam., subterete, narrowly and deeply sulcate adaxially, dark green, semiglossy, sheathed 3 cm, drying grayish brown; geniculum 1.1 cm long, drying slightly darker than petioles; blades oblong to weakly oblanceolate, 36.6 cm long, 11-13.5 cm wide, 2.6 times longer than wide, broadest slightly above the middle, 3.6 times longer than petiole, obtuse and abruptly short-acuminate at apex (acumen 6 mm long, short-apiculate), acute at base, subcoriaceous, slightly bicolorous, dark green and semiglossy above, moderately paler and semiglossy below, drying brownish gray and matte above, grayish brown and weakly glossy below; midrib obtusely raised with a medial sulcus in the lower 1/4, becoming flattened toward the apex, narrowly rounded toward the apex above, narrowly rounded and darker below, drying slightly darker above, darker below; primary lateral veins 20–21 per side, departing midrib at 50-65°, quilted-sunken and concolorous above, narrowly rounded and pleated-raised below, drying slightly darker above, darker below; interprimary veins considerably weaker than the primary veins; collective veins arising from the base, loop-connecting the primary lateral veins, 3-4 mm from the margin; basal vein 1 pair, same as collective vein; upper surface smooth, eglandular, minutely areolate-granular on magnification; lower surface densely and weakly glandular-punctate, minutely and irregularly granular on magnification. Inflorescence erect with peduncle 28 cm long, 5 mm diam., slightly or to 3 times longer than petioles, sharply 1-ribbed on side beneath the side opposite the spathe; spathe 11.3 cm long, 1.2 cm wide, linear-lanceolate, narrowly acuminate at apex, yellow-green tinged purplish on the lower surface, especially on margins, spreading-recurled with the apex directed upwards, drying dark brown; padix yellow-green, sessile, 13 cm long, 6 mm diam. at base, 5 mm diam. midway, 3 mm diam. at 1 cm from tip; flowers ca. 12 per spiral; 1.9–2.1 mm long, 1.6–1.8 mm wide; tepals minutely papillate, the margins obtusely rounded; lateral tepals 1.7–1.9 mm wide, inner margins rounded, outer margins obtusely 3-sided; stamens not yet emergent, ca. 0.6 mm long and wide. Infructescence not seen.

Distribution and ecology — *Anthurium lobinii* is known only from the type locality in Pastaza Province of Ecuador at 960 m in a *Premontane moist forest* life zone.

Etymology — Anthurium lobinii is named for Dr Wolfram Lobin, Curator at the Bonn Botanical Garden in Germany who provided me the material for the type specimen. The collection was made by Hermann Prinsler and left with the Bonn Botanical Garden, but it was Wolfram's kindness which made this material available to me. Lobin is also an aroid specialist, having worked with the genus Amorphophallus in Africa, and Eminium and Arum in Europe and the Middle East.

Comments — In the Lucid Anthurium Key, *Anthurium lobinii* keys to *A. cachabianum* Sodiro, *A. fusco-punctatum* Sodiro and *A. pellucido-punctatum* Sodiro, all of which are from the Lita-San Lorenzo region on the western slope of the Andes in NW Ecuador. The first differs by having proportionately much longer petioles (to more than 70 % the length of the blade), and by having blades glandular-punctate on both surfaces. The second, *Anthurium fuscopunctatum*, differs by having an orange spadix which turns purple and by having glandular punctations on both surfaces and the 3rd differs by having the upper blade surface lacking glandular punctations. Finally, *Anthurium sulcatum* Engl. differs by having much longer internodes, to 3–5 cm long.

Anthurium luzmariae Croat, **sp. nov.** — Type: COLOMBIA. Antioquia: Carmen de Viboral, Vereda El Porvenir, trocha hacia El Silencio, subiendo al occidente de la escuela por el filo de la montaña, Bosque subandino, 05°53'31.2"N, 73°11'40.6"W; 1390 m, 31 Nov. 2016, *J. Aguirre, H. Mendoza, L.M. Gómez & R. Orozco 2103* (holotype, MO-6924641; isotype, FMB). **Figure 147**.

Diagnosis: Anthurium luzmariae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short stem, short internodes, dense aggregation of red-brown cataphyll fibers, spreading-pendent leaves, subterete petioles which dry shallowly and sharply sulcate with a medial grove adaxially, moderately coriaceous, greyish brown-drying, narrowly lance-olate, narrowly long-acuminate blades with a single pair of weakly loop-connected collective veins, glandular punctations on only the lower surface as well as by the spreading-pendent

inflorescence with a thick green linear-lanceolate spreading-reflexed spathe and a sessile green weakly tapered spadix with early-emergent pistils.

Epiphyte; internodes very short, 1 cm diam.; cataphylls 4.5 cm long, dark reddish brown, persisting as fragments and gnarled pale fibers; petioles 43 cm long, 2.5–3.0 mm diam., drying brownish, matte, deeply and sharply sulcate adaxially with a shallow narrow medial groove, lateral margins thin and erect; geniculum 1.3 cm long, blackened, about as thick as petiole, sharply sulcate adaxially, several warty-ribbed abaxially; blades narrowly lanceolate, 35.5 cm long, 5.8 cm wide, 6.1 times longer than wide, 0.8 times as long at petioles, narrowly long-acuminate at apex, acute at base, moderately coriaceous, medium gray-brown and matte above, slightly paler and semiglossy below; midrib drying convex and finely several-ribbed, concolorous above, narrowly rounded to triangular, concolorous with an acute medial rib and usually 3 close adjacent ribs on each side of middle below; primary lateral veins 9-11 per side, departing midrib at 35-40°, drying narrowly rounded and concolorous with scarcely more conspicuous than interprimary veins; collective veins arising from the base and weakly loop-connecting primary veins, 2-3 mm from margin, not markedly sunken above, weakly raised below; tertiary veins moderately obscure; upper surface moderately smooth, eglandular; lower surface minutely granular and sometimes thick-ridged, dark glandular-punctate, the glands usually raised, sometimes with a medial depression. Inflorescence erect, long-pedunculate; peduncle 44.5 cm long, 2 mm diam., moderately densely brownish, small glandular-punctate below; spathe green, 7.1 cm long, 9 mm wide, narrowly oblong- lanceolate, spreading-reflexed, drying blackened, moderately coriaceous, sparsely short-pale-lineate on both surfaces; spadix green, 6 cm long, 6–7 mm diam.; flowers 3–4 visible per spiral, 2.5 mm long and wide; tepals drying orange-brown, moderately granular; lateral tepals,1.2–1.4 mm wide, inner margin rounded, outer margin 2, sometimes 3-sided; pistils early emergent; stigma 0.6-0.8 mm diam. Infructescence not seen.

Distribution and ecology — *Anthurium luzmariae* is endemic to Colombia, known only from the type locality in Antioquia at 1390 m in a *Lower montane rain* forest life zone.

Etymology — *Anthurium luzmariae* is named for Colombian botanist, Luz Mary Gómez who collected the type specimen with Julian Aguirre-Santoro, the principal collector of the type specimen.

Comments — Anthurium luzmariae is most easily confused with A. friedrichstahlii Schott that differs by having proportionately narrower and more nearly oblong leaf blades that are not narrowly long-acuminate at the apex and proportionately much shorter petioles (usually less than 10 cm long). In Antioquia, Anthurium luzmariae might be confused with Anthurium



Figure 147. Anthurium luzmariae Croat. Holotype: Aguirre et al. 2103.

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Figure 148. Anthurium mercedesense Croat. Holotype: Barbosa 7886.

juanguillermoi Croat, a species which has similarly shaped leaf blades but that species has blades that dry blackened and less acuminate with the upper surface matte-subvelvety and drying minutely areolate-granular in contrast to drying medium gray-brown and nearly smooth except for its small anastomosing ridged veins. In addition, *Anthurium juanguillermoi* has a dark violet-purple spadix.

Anthurium mercedesense Croat, sp. nov. — Type. COLOMBIA. Caldas: Municipio Florencia; Dirección Este, Quebrada Las Mercedes, 05°31'36"N, 75°02'26"W, 1573–1633 m 13 Oct. 1992, *C. Barbosa 7886* (holotype, FMB-34568). Figure 148.

Diagnosis: Anthurium mercedesense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, short, loose, reddish yellow-brown cataphyll fibers, moderately short, sulcate, yellowish green-drying petioles, narrowly oblong-elliptic, grayish brown-drying, long-acuminate blades with the base acute, a single pair of collective veins arising from the base and running regularly 4–5 mm from the margin and slightly more prominent than the primary lateral veins, surfaces glandular-punctate only below as well as by the moderately long-pedunculate inflorescence with a spreading, green, linear-lanceolate spathe, and a weakly tapered, yellowish ochre spadix with weakly emergent green pistils.

Epiphytic; internodes short, to 1.5 cm diam.; cataphylls 3.5 cm long, intact, acute persisting semi-intact at apex, becoming fibrous with minute fragments of reddish yellow-brown epidermis, the fibers yellowish brown, mostly closely parallel. Leaves with petioles 8.5–13.4 cm long, 3 mm diam., terete, drying narrowly and acutely sulcate, yellowish green; geniculum 8-10 mm long, drying darker than petioles; blades narrowly oblong-lanceolate to oblong-elliptic, 32.7-49.1 cm long, 4.2-6.4 cm wide (averaging 39 × 5), 6.0-9.7 (averaging 7.8) times longer than broad, broadest midway, 2.5-5.3 (averaging 3.9) times as long as petioles, prominently and gradually acuminate at apex (acumen to 1.5 cm), base narrowly acute, drying gravish brown, semiglossy above, yellowish gray-brown, semiglossy below; midrib drying narrowly rounded, prominently and irregularly ridged and concolorous in shallow valley above, narrowly raised, irregularly and prominently ridged, sparsely glandular-punctate and concolorous below; primary lateral veins 10–13 per side, departing midrib at 45–50°, drying narrowly rounded, concolorous above, narrowly rounded and concolorous below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal vein, 4-5 mm from margin; basal veins 1 pair, slightly more prominent then primary lateral veins; antemarginal vein present; upper surface epunctate, drying minutely and irregularly ridged; lower surface glandular-punctate, drying irregularly ridged and minutely granular. Inflorescence erect; peduncle 25.2 cm long; spathe green, spreading, 4.8 cm long, 6 mm wide, linear-lanceolate, drying thinly coriaceous and yellowish brown; spadix yellowish ochre, sessile, weakly tapered, 7.7 cm long, 6 mm diam., drying yellowish brown; flowers 4 visible per spiral, drying 2.3 mm long and wide; tepals drying minutely granular; lateral tepals 1.5 mm wide, outer margins 2-sided, inner margin rounded; stamens not emergent; anther 0.3 mm long, 0.4 mm wide; thecae well-separated; pistils green, weakly emergent. *Infructescence* not seen.

Distribution and ecology — *Anthurium mercedesense* is endemic to Colombia, known only from the type locality in Caldas Department in the Municipio of Florencia at around 1500 m in a *Premontane rain forest* life zone.

Etymology — The species is named for the type locality at the Quebrada Las Mercedes in the Municipio of Florencia in Caldas Department.

Comments —In the Lucid Anthurium Key, *Anthurium mercedesense* tracks to *A. acutangulum* Engl., which differs by its elliptic dark brown-drying leaf blades and typically longer, pendent peduncle; *A. margaricarpum* Sodiro, which differs by having proportionately longer petioles in comparison to its blades, broader more elliptic, more greenish drying blades and by its reddish to purplish spadix; *A. lancifolium* Schott, which differs by its larger leaves (8–16 cm wide) and by the white to light green or lavender spadix; *A. lustriviridum* Croat, which differs by its elliptic blades 6–20 cm wide, by its cream to yellow spadix and *A. verrucosum* Croat & D. C. Bay, which differs by its more coriaceous, elliptic, typically broader blades (5–19 cm wide) and by the typically second pair of collective veins near the base. *Anthurium mercedesense* is seemingly closest to A. bakeri but that species does not reach such high elevations and differs by having leaf blades that have the collective veins deeply sunken while the primary lateral veins are not sunken and also has a creamy white spadix.

Anthurium micosense Croat, **sp. nov.** — Type: COLOMBIA. Cauca: Isla de Gorgona, camino a el Alto de los Micos, playas, 02°58'W, 78°11'W, 0–120 m, 7–11 Sep 1987, *J.L. Fernández Alonso, O. Rangel, G. Lozano et al. 7409* (holotype, COL-331242; isotype, NY). **Figure 149**.

Diagnosis: Anthurium micosense is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, persistent, reddish brown cataphyll fibers, short-petiolate, narrowly oblanceolate, gradually acuminate, brownish gray-drying leaf blades with the upper surface glandular-punctate and pustular and the lower surface glandular-punctate and dark-speckled with a single pair of collective veins as well as by a long-pedunculate inflorescence with a pink-ish, linear-lanceolate, spreading spathe and a green, scarcely tapered spadix.

Epiphyte; internodes short, 1.0-1.5 cm diam.; cataphylls 4.8-6.6 cm long, narrowly acute persisting mostly as dense mostly parallel reddish brown fibers with fragments of reddish brown epidermis. Leaves with petioles 5.2-14.6 cm long, 3 mm diam., 0.3-0.6 times as long as blades, terete, drying narrowly and acutely sulcate, yellowish red-brown; geniculum 1.1–1.3 cm long, drying darker than petioles; blades narrowly oblanceolate, 29.6–46.1 cm long, 5.2–8.3 cm wide (averaging 35×6), 5.0–5.8 (averaging 5.5) times longer than broad, broadest above midway, 3–5.9 (averaging 4.2) times as long as petioles, gradually acuminate at apex (acumen to 1 cm), narrowly acute at base, subcoriaceous, drying grayish brown, weakly glossy above, yellowish gray-brown, semiglossy below midrib drying narrowly rounded, sparsely glandular-punctate and slightly paler above, convex, sparsely glandular-punctate and darker below; primary lateral veins 15–20 per side, departing mirib at 40° at middle, drying narrowly rounded, concolorous above, narrowly raised and slightly darker below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 3–4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface glandular-punctate and pustular; lower surface glandular-punctate and dark-speckled. Inflorescence erect; peduncle slender, 22.3–27.4 cm long, drying ca. 2 mm diam.; spathe pinkish, spreading, 3.5–5.8 cm long, 3-6 mm wide, linear-lanceolate, drying thinly coriaceous and yellowish brown to dark brown; spadix green, sessile, scarcely tapered, 3.5–13.2 cm long, 3–5 mm diam., drying dark yellowish brown; flowers 4 visible per spiral, drying 1.8 mm long, 1.3-1.6 mm wide; tepals drying minutely granular; lateral tepals 1.2 mm wide, outer margins 2–3-sided, inner margin rounded; stamens held at edge of tepals; anthers 0.6 mm long, 0.8-1 mm wide; thecae ovoid, slightly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium micosense* is endemic to Colombia, known only from the type locality in the Department of Valle de Cauca on the Isla de Gorgona from sea level to 120 m in a *Lower montane wet* forest life zone.

Etymology — The species is named for the type locality at the Alto de Mico on the Isla de Gorgona, an island off the western coast of Colombia in Cauca Department.

Comments — In the Lucid Anthurium Key, *Anthurium micosense* tracks to *A. cordobense* Croat & D.C.Bay but that species differs by its larger leaf blades more broadly ending base and the golden yellow spadix and *A. lustriviridum* Croat which differs by having blades more obovate and in drying more yellowish. *Anthurium micosense* seems closest to *A. spathulifolium* Sodiro which differs by having proportionately shorter petioles, blades drying darker brown and with a scarcely acuminate apex, upper surface irregularly short-ridged (not minutely granular or pustular).



Figure 149. Anthurium micosense Croat. Holotype: Fernandez et al. 7409.



Figure 150. Anthurium minutiareolum Croat. Holotype: Croat 82351A.

Anthurium minutiareolum Croat, sp. nov. — Type: ECUADOR. Esmeraldas: Lita-San Lorenzo Road, 14.2 km W of Río Lita Bridge (below Lita, 00°52'11"N 78°27'16"W, 4 July 1998, *T.B. Croat, R. Mansell, L.P. Hannon & J. Whitehill 82351A* (holotype, MO-6927332; isotypes, B, COL, K, QCNE, S, NY, US). Figure 150.

Diagnosis: Anthurium minutiareolum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, elongated stems, short, narrow internodes, short, semi-intact cataphylls, sharply C-shaped petioles which are weakly glossy, flattened adaxially with acute, erect margins, elliptic short-acuminate greenish gray to gray-brown blades which are acute at the base, subvelvety-matte and eglandular above and glandular-punctate below as well as by a long-pedunculate inflorescence with a green usually spreading spathe and dark green, narrowly long-tapered spadix with 3 flowers visible per spiral.

Epiphyte; stems short, less than 10 cm long; internodes short, 6-8 mm diam.; cataphylls 3.0–3.3 cm long, drying dark brown, semi-intact with a few thin pale fibers, mostly persistent. Leaves erect; petioles 11.0–24.3 cm long, dark green, sharply C-shaped, weakly glossy, flattened adaxially with acute, erect margins and weak medial rib; blades elliptic to narrowly ovate-elliptic, 12.5–18.6 cm long, 4.5–7.7 cm wide, 2.3–2.7 times longer than wide, 0.6–1.1 times longer than petioles, short-acuminate at apex, acute at base, subcoriaceous, dark green and subvelvety-matte above, weakly glossy and somewhat paler below, drying greenish to greenish brown, matte above, slightly paler, yellowish brown and semiglossy below; midrib narrowly raised above, much thicker, sharply acute and paler below, drying narrowly raised, granular and glandular-punctate above, sub-acute, finely ribbed with a medial rib, light brown below; primary lateral veins 6-8 per side, weakly sunken, concolorous above, narrowly raised and concolorous below, drying weakly raised above, narrowly raised, often undulating below; basal veins 1 pair (sometimes with an obscure marginal vein near the base; collective veins arising from the base, moderately straight, 4–6 mm from margins; upper surface eglandular, densely and minutely areolate and granular; lower surface moderately smooth, weakly granular, conspicuously brownish glandular-punctate. Inflorescence erect; peduncle 25.5-38.0 cm long; spathe 2.5–5.3 cm long, 3.5–5.0 mm wide, green, spreading or sometimes reflexed; spadix 6.3-10.8 cm long, 2.5-3.5 mm diam., narrowly long-tapered, dark green, glossy; flowers 3 visible per spiral, 3 mm long, 1.8 mm wide; tepals finely granular, lateral tepals 1.7–2 mm wide, inner margins broadly rounded, outer margins 2-sided; stamens included, anthers 0.3 mm long, 0.5 mm wide, thecae ovoid-ellipsoid, weakly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium minutiareolum* is endemic to Ecuador, known only from the type locality in the vicinity of Alto Tambo in the Lita-San Lorenzo Region at 400 m in a *Premontane rain forest* life zone.

Etymology — The species epithet is from the Latin '*minutus*' (very small, minute) and '*areolatus*' (areolate, with areoles) referring to the finely areolate upper dried blade surfaces.

Comments — Anthurium minutiareolum is most easily confused with A. burbanoi Croat from the Awá Centro Mataje at 200 m elevation. That species differs by having its leaf blades subrounded and apiculate at apex with the upper surface minutely ridged-granular as well as by having a violet-purple, sub-cylindroid spadix. In contrast Anthurium minutiareolum has its leaf blades gradually acuminate at the apex with its upper blade surface minutely areolate and it has a green long-tapered spadix.

Anthurium minutiglandulum Croat, **sp. nov.** — Type: ECUADOR: Los Ríos: Centinella, 0.2 km past Escuela Mixta La Centinella, along trail to left of road, exactly 13 km from main Santo Domingo-Quevedo Hwy. in Patricia Pilar, 00°32'S, 79°11'W, 1000 m, 14 Mar. 1992, *T.B. Croat 73281* (holotype, MO-1083188). **Figures 151–154**.

Diagnosis: Anthurium minutiglandulum is a member of sect. *Porphyrochitonium* and is characterized by its short internodes, short, somewhat intact cataphylls, sharply sulcate petioles, oblong-elliptic blades with the apex down-turned and apiculate and the base broadly acute with a single pair of collective veins and moderately quilted-sunken primary lateral veins with the lower surface weakly and minutely glandular as well as by the short-peduncular inflorescence with an ovate-elliptic, pale green, spreading spathe and a cylindroid, greenish spadix.

Epiphyte; internodes short, ca. 1 cm diam.; cataphylls 1.2–2.0 cm long, medium brown, persisting moderately intact, eventually fibrous *Leaves* with petioles 4–8 cm long, 3 mm diam., sharply and shallowly sulcate in apical half, obtusely so in lower half, medium green, matte; geniculum 0.7–1.3 mm long, 4 mm diam., darker; blades oblong-elliptic, 10.5–20.0 cm long, 2.0–4.1 cm wide, 4.8 times longer than wide, 3.1 times longer than petioles, acute and apiculate, down-turned at apex, broadly acute at base, subcoriaceous, dark green and semiglossy above, moderately paler and semiglossy below; midrib narrowly rounded and paler above, narrowly rounded and weakly paler below; primary lateral veins 6–8 per side, departing midrib at 45–50°, etched and concolorous above, weakly raised and slightly darker below, about as prominent as the collective veins; collective veins moderately straight, arising from one of the lowermost primary lateral veins or from the only pair of basal veins; upper Croat et al., 2022



Figure 151. *Anthurium minutiglandulum* Croat. Holotype: *Croat 73281*. Base of leaf blade showing detail of venation.



Figure 152. Anthurium minutiglandulum Croat. Croat 73281. Habit of potted plant.



Figure 153. Anthurium minutiglandulum Croat. Croat 73281. Inflorescence.



Figure 154. Anthurium minutiglandulum Croat. Croat 73281. Leaf blade, adaxial surface.



Figure 155. Anthurium miriamiae Croat. Holotype: Croat 61381.



Figure 156. Anthurium miriamiae Croat. Croat 61381. Habit with inflorescence.

surface eglandular, minutely papillate on magnification, drying conspicuously granular; lower surface minutely, densely and inconspicuously dark glandular-punctate, drying moderately smooth, sparsely pustular. *Inflorescence* spreading; peduncle 6.0–24.5 cm long, 2 mm diam.; spathe pale green, spreading, ovate-elliptic, 1.7–2.3 cm long, 8–9 mm wide at base, 8 mm wide in distil ²/₃, rounded and apiculate at apex, twisted and often strongly recurled at tip; spadix cylindroid, medium dark green, semiglossy, 1.7–6.7 cm long, 4.0–5.5 mm diam.; flowers 4–6 visible per spiral, 2.0–2.5 mm long and wide; lateral tepals 0.9–1.2 mm wide, inner margins rounded, outer margin obtusely rounded, sub-3-sided; stamens held at level of tepals in a tight cluster around the style at anthesis, persisting exposed throughout the length of spadix; anthers 0.3–0.4 mm long, 0.6 mm wide; thecae subrounded, moderately divaricate; pollen white. *Infructescence* not seen.

Distribution and ecology — *Anthurium minutiglandulum* is endemic to Ecuador, known only from the type locality in Los Rios Province at Centinela in a *Premontane wet forest* life zone.

Etymology — The species epithet is from the Latin '*minutus*' (meaning minute, very small) and '*glandula*' (a small gland) referring to very minute glandular punctations on the lower leaf blade surface.

Comments — In the Lucid Anthurium Key, *Anthurium minutiglandulum* tracks to *A. andinum* Engl. which differs by having much larger leaves and a spadix to 10 cm long and 4 mm diam.; *A. cachabianum* Sodiro, which differs by its elliptic blades and slender spadix 6–15 cm long and 2–8 mm diam.; *A. centinellense* Croat, which differs by its oblanceolate blades more than 30 cm long and 9 cm wide with dark glandular punctations on both surfaces; *A. jimwestii* Croat, which differs by its narrowly linear-oblanceolate leaf blades more than 75 cm long; *A. margaricarpum* Sodiro, which differs by having proportionately more long-petiolate, narrowly elliptic, long-acuminate blades; *A. myosurus* Sodiro, which differs by elliptic, long-petiolate leaves and long, slender spadix and *A. tenuispica* Sodiro, which differs by its much larger, narrowly elliptic blades and the very long slender spadix.

Anthurium miriamiae Croat, **sp. nov.** — Type: COLOMBIA. Valle del Cauca: Bajo Calima Region, within forestry concession of Cartón de Colombia, between Buenaventura & Río Calima, 6.5 km beyond Porton Tomar (at km 27), 22.3 km beyond Camp Portada Pulpapel, 33.3 km beyond main Calí–Buenaventura Highway, 04°02'N, 77°07'W, 50 m, 8 July 1986, *T.B. Croat 61381* (holotype, MO-3610751; isotype, CUVC). **Figures 155 & 156**.

Diagnosis: Anthurium miriamiae is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short, thick, highly branched internodes, reddish brown, persistent, semi-

intact cataphyll fibers, sharply C-shaped petioles with a concave sulcus, ca. 0.4 times as long as the blade, oblong-oblanceolate, gray-green-drying, moderately coriaceous blades with the apex nearly rounded to obtuse, the abruptly acute apex and acute base with 2 pairs of collective veins both relatively remote from the margin with both surfaces glandular punctate as well as by the long-pedunculate inflorescence with the green spreading spathe and the narrowly tapered violet-purple spadix.

Appressed epiphyte; internodes short, 2 cm diam.; roots highly branched, thin; cataphylls 7.5–15.0 cm long, semi-intact, acute, persisting intact at apex, becoming fibrous with fragments of yellowish-brown epidermis, the fibers reddish brown, mostly fine, closely parallel. Leaves with petioles sharply C-shaped, concave-sulcate, drying 13.7-20.1 cm long, 3-7 mm diam., acutely sulcate, yellowish gray-brown; geniculum 1.1–1.9 cm long, drying darker than petioles; blades oblong-oblanceolate, 24.2-46.7 cm long, 7.0-14.8 cm wide (averaging 35 × 11), 2.8–3.6 (averaging 3.2) times longer than broad, broadest above midway, 1.6–3.0 (averaging 2.3) times longer than petioles, abruptly short-acuminate at apex (acumen to 1.5 cm), base acute, coriaceous, semiglossy, moderately bicolorous, drying gray-green, matte above, graygreen, semiglossy below; midrib convex on both sides, whitish below drying narrowly raised, sparsely glandular-punctate and slightly paler above, narrowly rounded glandular-punctate, finely ribbed and darker below; primary lateral veins 15-16(18) per side, departing midrib at 40-45° at middle, etched-sunken above, weakly raised below, drying narrowly rounded and concolorous above and below; tertiary veins drying prominently raised above and below; collective veins more prominently sunken than primary lateral veins, 2 pairs arising from 1st and 2nd basal vein, inner pair up to 1.5–2.0 cm from margin, outer pair (3)5(8) mm from margin; basal veins 2 pairs; antemarginal vein present; upper surface sparsely and inconspicuously glandular-punctate, minutely areolate; lower surface glandular-punctate, minutely areolate-granular. Inflorescence with peduncle 36.4 cm long; spathe greenish, spreading, 10 cm long, 1.2 cm wide, lanceolate, drying coriaceous and yellowish brown; spadix violet-purple, sessile, narrowly tapered, 11 cm long, 7 mm diam., drying yellowish brown; flowers 6 visible per spiral, drying 1.6–1.9 mm long, 1.5–1.7 mm wide; tepals drying minutely granular; lateral tepals 1.3–1.6 mm wide, inner margin slightly rounded, outer margins 2-sided; stamens held at level of tepals, 0.3 mm long and wide; thecae weakly divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium miriamiae* is endemic to Colombia, known only from Valle del Cauca Department at 50 m elevation in a transition area between Tropical rain forest and *Tropical wet forest* life zones.

Etymology — *Anthurium miriamiae* is named for Colombian botanist, Miriam Monsalvae who worked extensively in the Bajo Calima Region, preparing collections, and illustrations for the Flora of Bajo Calima. Miriam, a dear friend, is now a teacher and lives with her daughter in Cali.

Comments — Anthurium miramiae is most similar to A. vallense Croat which differs by having a single pair of collective veins which are much closer to the margins and a green to yellow spadix. In the Lucid Anthurium Key, Anthurium miramiae also tracks to A. quinquesulcatum Sodiro which differs by having shorter cataphylls (to 6 cm long) and a green glaucescent spadix; A. spathulifolium Sodiro, which differs by having only a single pair of collective veins; A. colonchense Croat & Cornejo, which differs by having proportionately longer blades with a single pair of collective veins as well as a bright yellow spadix and A. cabuyulense Croat & Rodr., which differs by its much longer, more oblanceolate leaf blades with a single pair of collective veins.

An unpublished but apparently related Ecuadorian species is similar to *Anthurium miriamiae*. The collection (Hoover 1234) was made in Ecuador near Tobar Donoso in western Carchi Province, somewhere between 800 and 1200 m. It differs by having longer cataphylls, oblong-elliptic, narrowly acuminate blades with the primary lateral veins more numerous and much closer and the collective veins much closer to the margins.

Anthurium miriamiae was treated as Species #1 in Dorothy Bay's Ph.D. thesis dealing with the Araceae of Bajo Calima (*Croat 61381*).

Anthurium nonoense Croat, sp. nov. — Type: ECUADOR. Pichincha: Along road from Nono to Nanegal, south of Nanegalito, 13 km SE of Nanegal, 00°02'12"N, 78°40'43"W, 1440 m, 4 Sep. 1976, *T.B. Croat 38900* (holotype, MO-3828932; isotypes, COL, K, NY, SEL, S, US). Figure 157.

Diagnosis: Anthurium nonoense is a member of sect. *Porphyrochitonium* and is characterized by it epiphytic habit, short internodes, persistent cataphyll fibers, moderately long-petiolate leaves, sharply sulcate petioles, elliptic-oblanceolate, acuminate, moderately bicolorous blades drying grayish green above and grayish yellow-brown below, a single pair of collective veins arising from the base and close to the margins, moderately close, moderately obscure primary lateral veins as well as by the long-pedunculate inflorescences, green, lanceolate, spreading spathes, and sessile, green, weakly tapered spadix.

Epiphytic; internodes short; cataphylls persistent as fibers. Leaves with petioles broadly and sharply canaliculated, drying 13.6–26.9 cm long, 3 mm diam., drying narrowly and acutely sulcate, greenish brown; geniculum 9–18 mm long, drying darker than petioles; blades elliptic-oblanceolate, 20.1-34.6 cm long, 7.2-12.6 cm wide (averaging 27×11), 2.1-3.1 (averaging 2.6) times longer than broad, broadest midway, 1.1–1.8 (averaging 1.4) times as long as petioles, abruptly acuminate at apex (acumen to 1.5 cm), base acute, subcoriaceous, moderately bicolorous, semiglossy, drying grayish green, semiglossy above, grayish yellow-brown, semiglossy below; midrib round-raised above, raised below, drying narrowly raised, finely ribbed and slightly paler above, narrowly rounded, conspicuously glandular-punctate and slightly paler below; primary lateral veins 16–18 per side, departing midrib at 55° at middle, sunken above, weakly raised below, drying weakly and narrowly raised, concolorous above, narrowly rounded and slightly paler below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 2-6(12) mm from margin; basal veins 1 pair; antemarginal vein present; upper surface epunctate, minutely areolate-granular with many irregular bumps (caused by a weak puckering of surface); lower surface conspicuously glandular-punctate, minutely dark-speckled, the glandular punctations with a depressed center. Inflorescence erect; peduncle 24.6-39.8 cm long, drying 3-4 mm diam.; spathe spreading at 90° and recurved, 3.6–6.6 cm long, 6–7 mm wide, lanceolate, drying coriaceous and yellowish brown; spadix green, turned forward from peduncle at ca. 90°, sessile or sometimes stipitate 2–7 mm, weakly tapered, 6.2–11.8 cm long, 3–5 mm diam., drying yellowish brown; flowers 3–4 visible per spiral, drying 3 mm long, 2.7 mm wide; tepals drying minutely granular; lateral tepals 1.2–1.7 mm wide, outer margins 2- or 3-sided, inner margin rounded; stamens held at level of tepals; anthers 0.4 mm long, 0.6 mm wide; thecae ovoid, moderately divaricate; pollen white. Infructescence not seen.

Distribution and ecology — *Anthurium nonoense* is endemic to Ecuador, known only from the type locality in Pichincha Province at 1440 m in a *Premontane wet forest* life zone.

Etymology — The species is named for the type locality at Nono in Pichincha Province.

Comments — In the Lucid Anthurium Key, *Anthurium nonoense* tracks to *A. cachabianum* Sodiro, which differs by having proportionately longer petioles and both surfaces glandularpunctate; *A. margaricarpum* Sodiro, which differs by its more prominent collective veins which arise from one of the lower primary lateral veins and which are more distant from the margins; *A. marginellum* Sodiro, which differs by having more narrowly oblong-elliptic blades which are more narrowly acuminate at apex and more narrowly acuminate at base as well as by having blades glandular-punctate on both surfaces; *A. myosurus* Sodiro, which differs by its proportionately much more long-petiolate leaves with glandular punctations on upper The current status of Anthurium sect. Porphyrochitonium ...



Figure 157. Anthurium nonoense Croat. Holotype: Croat 38900.



Figure 158. Anthurium oblitum Croat. Holotype: Croat 59633A.



Figure 159. Anthurium oblitum Croat. Croat 59633A. Stem with cataphylls.



Figure 160. Anthurium oblitum Croat. Croat 59633A. Habit of potted plant.



Figure 161. Anthurium oblitum Croat. Croat 59633A. Leaf and inflorescence.



Figure 162. Anthurium oblitum Croat. Croat 59633A. Leaf blade, abaxial surface.

surface as well as by its reddish spadix; A. rupestre Sodiro, which differs by having linear-lanceolate pendent blades with proportionately much shorter petioles; *A. sulcatum* Engl. which differs by more narrowly lanceolate-elliptic, more narrowly acuminate blades that are more than 3.5 times longer than broad and dry blackened; *A. tenuispica* Sodiro, which differs by having more narrowly elliptic blades and a much longer non-tapering spadix and *A. verrucosum* Croat & D.C.Bay, which differs by its more coriaceous, larger blades with a second pair of basal veins.

Anthurium oblitum Croat, **sp. nov.** — Type: PERU. San Martín: Along road between Tarapoto and Yurimaguas, just beyond the tunnel, collected in Jan. 2002 by B. Feuerstein, cultivated at Missouri Botanical Garden; plant vouchered 16 July 2012, *T.B. Croat 59633A* (holotype, MO-6940797; isotypes, B, CAS, COL, F, HOXA, K, L, NY, QCNE, USM, S, US. **Figures 158–162**.

Diagnosis: Anthurium oblitum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, pale-fibrous cataphylls, terete petioles, narrowly oblong-elliptic blades which are glandular-punctate only on the lower surface, 6–8 primary lateral veins per side, a single pair of collective veins from the lowermost pair of primary lateral veins and equally sunken as primary lateral veins, a pale green, lanceolate spathe and sessile, dark violet-purple, tapered spadix.

Epiphyte; stems 10–15 cm long; internodes short, 1.5–2.5 cm diam.; cataphylls 4–7 cm long, becoming pale-fibrous with some small fragments of epidermis. Leaves semi-erect to spreading; petiole 5–24 cm (averaging 18 cm) long, terete and not sulcate when young, moderately flattened adaxially in age and moderately sulcate adaxially in age, sheathed 2 cm at base, pale green, weakly glossy, smooth; geniculum 2.0–2.5 cm long, 4 mm wide, 5 mm thick, sulcate, drying slightly darker than petiole; blade narrowly oblong-elliptic, spreading to sub-pendent from semierect to spreading petioles, pendent from spreading petioles, 17.3-36.3 cm long, 3.3-7.7 cm wide, (averaging 31.2), (1.3-4 times longer than wide) 1.3-4 times longer than petioles, narrowly acuminate to narrowly long-acuminate at apex, acute to attenuate at base, moderately coriaceous, dark green, matte above, moderately paler and weakly glossy below, the margins curled under; midrib slightly paler than surface, convex at base, narrowly rounded at middle, becoming bluntly acute toward apex above, thicker, narrowly rounded and moderately paler, glossier below; primary lateral veins (5)6-8 per side, departing midrib at 20-25°, weakly quilted-sunken and concolorous above, weakly raised and narrowly rounded and slightly darker below; collective veins arising from the lowermost pair of primary lateral veins, equally sunken as primary lateral veins above, and equally raised below (abaxially); upper surface eglandular, irregularly ridged and granular, sparsely short pale-lineate; lower surface dark

glandular-punctate, the glands raised, often with radiating ridges weakly granular-ridged. *In-florescence* 26 cm long, peduncle 33 cm; spathe narrowly oblong-lanceolate, 5.6–8.0 cm long, 1.3–1.6 cm wide, pale green, becoming heavily tinged purple, subcoriaceous, matte above, glossy outside in bud, becoming weakly glossy outside; spadix sessile to stipitate to 2.2 mm (stipe 5.5 mm diam., green), 8.0–9.5 cm long, 5–6 mm diam., dark violet-purple, moderately glossy; flowers 5–7 visible per spiral, 2.5–3.0 mm long, 2.5–2.7 mm wide; tepals markedly curved upward, more or less clam-shell-shaped, broadly rounded on inside, narrowly rounded outside; lateral tepals 0.8 mm wide; inner margin broadly rounded, outer margin 2-sided; pistils broadly rounded, tinged purple; stamens held at the level of the tepals, remaining exserted throughout length of spadix; anthers 0.3 mm long, 0.4 mm wide; thecae broadly ovoid, moderately divaricate; lateral tepals emerging up to 20 spirals ahead of the anterior lobes; pollen white. *Infructescence* not seen.

Distribution and ecology — *Anthurium oblitum* is endemic to Peru, known only from the type specimen in Loreto Department on the road between Tarapoto to Yurimaguas, at less than 500 m in a *Premontane wet forest* life zone.

Etymology — The epithet is from the Latin '*oblitus*' (forgotten), referring to the fact that the species was forgotten or overlooked by being confused with another species, *Anthurium betsyae*.

Comments — In the Lucid Anthurium Key, *Anthurium oblitum* tracks to *A. atamanii* Croat and *A. tumbesense* Croat, both of which differ by lacking a purple spadix and *A. yamayakatense* which differs by having cataphylls 7.5–16.0 cm long, proportionately shorter, narrowly elliptic and equilateral leaf blades, 9–11 primary lateral veins per side, a spadix to 17 cm long with 7–8 flowers per spiral. In constrast, *Anthurium oblitum* has cataphylls less than 7 cm long, leaf blades narrowly oblong-elliptic and 4.5–6.1 times longer than wide, 7 or 8 primary lateral veins per side, and 4–5 flowers visible per spiral.

Anthurium omarescobarii Croat, sp. nov. — Type: COLOMBIA. Antioquia: Municipio Frontino, Corregimiento Nutibara, region of Murrí, Nutibara-La Blanquita Road, 20–32 km, ca. 06°45'N, 75°20'W, 950–1380 m, 20 Apr. 1988, *J.L. Luteyn, R. Callejas & O. Escobar 12122* (holotype, HUA-52861). Figure 163.

Diagnosis: Anthurium omarescobarii is a member of sect. *Porphyrochitonium* and is characterized by its terrestrial habit, long persistent cataphylls with a prominent, pale brown reticulum of fibers, moderately short, shallowly sulcate petioles, narrowly oblong-elliptic, grayish greendrying with an acuminate downturned apex, acute base, a single pair of basal veins giving rise to a collective vein and prominent glandular punctations on both surfaces as well as by long-pedunculate inflorescence with a narrowly oblong, erect, maroon-suffused spathe and a long-tapered, green to maroon spadix.

Terrestrial; internodes short, 1.1 cm diam.; cataphylls 10.2 cm long, acute, persisting intact at apex, becoming fibrous with fragments of yellowish-brown epidermis, the fibers yellowish brown, mostly closely parallel. Leaves with petioles 4.8-9.4 cm long, 3 mm diam., 0.2-0.4 times as long as blades, subterete, shallowly sulcate, drying narrowly and acutely sulcate, dark brown; geniculum 9–16 mm long, drying darker than petioles; blades narrowly oblong-elliptic to weakly oblong-oblanceolate, 14.3–27.1 cm long, 4.2–6.8 cm wide (averaging 19×5), 3.4-4.0 (averaging 3.8) times longer than broad, broadest above midway, 2.0-3.8 (averaging 2.6) times as long as petioles, gradually acuminate and downturned at apex (acumen to 1 cm), acute at base, subcoriaceous, drying grayish green, matte to weakly glossy above, yellowish gray-brown, semiglossy below; midrib drying narrowly acute, conspicuously glandular-punctate, finely ribbed and darker above, narrowly rounded, conspicuously glandular-punctate, finely ribbed and concolorous below; primary lateral veins 13-18 per side, departing midrib at 40° at middle, narrowly rounded, concolorous above, narrowly rounded and concolorous below; tertiary veins drying moderately distinct above and below; collective veins arising from basal veins, 5–7 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface faintly ribbed, densely granular, conspicuously and densely glandular-punctate, the glands sunken, medially pitted; lower surface smooth to faintly granular, dark glandular-punctate, the glands sunken, medially sunken. Inflorescence with peduncle 19.7 cm long; spathe erect, maroon-suffused green, 5.6 cm long, 1 cm wide, narrowly oblong, drying subcoriaceous and reddish brown; spadix green to maroon, sessile, moderately tapered, 16.2 cm long, 5 mm diam., drying reddish brown; flowers 3 visible per spiral, drying 2.6–2.9 mm long, 1.7–1.8 mm wide; tepals drying minutely granular; lateral tepals 1.6–1.8 mm wide, outer margins 2-sided, inner margin broadly rounded; stamens not emergent, filament 0.6 mm long, 1 mm wide, anthers affixed to the distil margin. Infructescence not seen.

Distribution and ecology — *Anthurium omarescobarii* is endemic to Colombia, known only from the type locality in Antioquia Department at 950–1380 m in a Lower montane wet forest life zone.

Etymology — *Anthurium omarescobarii* is named for Colombian botanist Omar Escobar from the National University of Colombia (UNAL), who helped collect the type specimen.



Figure 163. Anthurium omarescobarii Croat. Holotype: Luteyn et al. 12122.



Figure 164. Anthurium orellanense Croat. Holotype: Jaramillo et al. 21532.
Comments — In the Lucid Anthurium Key, *Anthurium omarescobarii* tracks to *Anthurium andinum* Engl. from the western slopes of Ecuadorian Andes at 2400 m which differs by having cataphylls only 4–5 cm long and not conspicuously net-like, larger blades 35–45 cm long and up to 10 cm wide, larger petioles 20–30 cm long; *A. lustriviridum* Croat, which differs by its thick green-drying narrowly elliptic blades with two pairs of collective veins extending to the apex with many close veins near the petiolar plexus and *A. spathulifolium* Sodiro which differs by its much more oblanceolate leaf blades. *Anthurium acutangulum* Engl., A. arusiense Croat & M.M.Mora, *A. amargalense* M.M.Mora and *A. ramosense* Engl. are all similar in the key but all differ by having glandular punctations only on the lower surface.

Anthurium orellanense Croat, **sp. nov.** — Type: ECUADOR. Orellana: Transecta de vegetación de 150 × 5 m en area pantanosa, 230 m al sur de la plataforma del pozo OBE, Bloque 31, 76°02'W, 01°08'S, 25 Nov. 2000, *J. Jaramillo 21532* (holotype, QCA). **Figure 164**.

Diagnosis: Anthurium orellanense is a member of sect. *Porphyrochitonium* and is character ized by its epiphytic habit, subterete petioles, oblong-elliptic, narrowly acuminate bicolorous blades with 9 primary lateral veins, a single pair of collective veins which are 8–10 mm from margin, darkly speckled, conspicuously glandular-punctate on the lower surface as well as by the long-pedunculate erect inflorescence with a spathe green, linear-lanceolate spathe and narrow-ly cylindroid, weakly tapered green spadix with 4–5 flowers visible per spiral.

Epiphyte; internodes short, 1 cm diam.; cataphylls 2.5-3.7 cm long, persisting as red-brown, linear fibers. Leaves 50.1 cm long; petioles 16 cm long, subterete, drying 2.5 mm wide, medium yellow-green, weakly glossy, sulcate adaxially, finely ribbed; geniculum 1 cm long, drying dark brown; blade oblong-elliptic, 33.5 cm long, 8.4 cm wide, 3.9 times longer than wide, 2.1 times longer than petiole, narrowly acuminate at apex, narrowly acute at base, subcoriaceous, drying matte and brown above, semiglossy and yellow-green below; midrib convex above, drying darker than surface, narrowly rounded below, drying bluntly acute and paler below; primary lateral veins 9 per side, departing midrib at 45–50°, drying weakly and narrowly raised and concolorous above, narrowly rounded and concolorous below, not markedly stronger than the interprimary veins; collective veins 1 pair, arising from the base, running 8-10 mm from margin in the middle of the blade; upper surface epunctate, drying smooth, light gray-green and weakly glossy, lower surface sparsely granular to ridged, darkly speckled, conspicuously glandular-punctate. Inflorescence 25.6 cm long, erect; peduncle 17 cm long, 2.5 mm diam., drying gray-green with stipe 0.8 mm long; spathe green, linear-lanceolate, 4.2 cm long (1 cm decurrent on peduncle), 7 mm wide, abruptly acuminate at apex, reflexed; spadix 7 cm long, 5.5 mm diam, green, stipitate 4 mm in back, 1.9 mm in front, narrowly cylindroid, only weakly tapered to apex; flowers 4–5 visible per spiral, 2.5–3.0 cm long; lateral tepals 1.3 mm wide, outer margin 3-sided, the inner margin almost straight; pistils weakly protruding; ovules 2 per locule. *Infructescence* not seen.

Distribution and ecology — *Anthurium orellanense* is known only from the type locality in far western Ecuador in Orellana Province in the Yasuní National Park at 230 m elevation in a Tropical moist forest life zone north of the Río Nariño above its mouth at the Río Yasuní.

Etymology — The species is named for its location in Orellana Province.

Comments — Sect. *Porphyrochitonium* is a group relatively rare in the Amazon Basin at low elevations. Two other species in the region which must be compared are *Anthurium bakeri*, which differs by having the primary lateral veins much less conspicuous than the collective veins versus being roughly equal in *A. orellanense*. This new species has primary lateral veins more conspicuous than interprimary lateral veins whereas in *Anthurium apaporanum* R.E. Schult., there are many more primary lateral veins and these are scarcely more conspicuous than the interprimary veins and the collective veins are closer to the margin (1-2 mm) while in A. orellanense the collective veins are 8–10 mm from the margin. In the Lucid Anthurium Key, *Anthurium orellanense* also tracks with: *A. cachabianum* Sodiro which has longer petioles (20-25 cm), smaller blades $18-25 \times 8-12 \text{ cm}$) and a sessile spadix; *A. julospadix* Sodiro which has narrower blades (length/width ratio 4.5–8.0), a peduncle twice the length of the petiole rather than about the same and bright purple spadix; *A. pellucidopunctatum* Sodiro which has somewhat narrower oblong-lanceolate blades $(3.6 \text{ length/width ratio)$, and a yellowish green, sessile spadix; and *A. sulcatum* Engl. which has asymmetrical, oblong, lanceolate blades that are somewhat narrower (length/width ratio 3.5) and a dark purple, sessile spadix.

Anthurium ortizii Croat, sp. nov. — Type: ECUADOR. Carchi: Tulcán Canton, Parroquia Tobar Donoso, Reserva Indigena Awá, Centro El Baboso, 78° 25'W, 00°53'N, 1800 m, 17–27 Aug. 1992, *G. Tipaz, M. Tirado, C. Aulestia, N. Gale & P. Ortiz 1728* (holotype MO-4374762; isotype, QCNE). Figure 165.

Diagnosis: Anthurium ortizii, a member of sect. *Porphyrochitonium*, is distinguished by persistent brown cataphylls, its atypical, large and broad elliptic-ovate leaves that dry brown and have a rounded to weakly subcordate base, as well as by the prominently raised primary lateral veins on lower leaf surface, cream-colored spathe and a dark purplish spadix.

Terrestrial to 80 cm tall or epiphytic; stems moderately long; internodes short, 1–2 cm long, (2) 4–6 cm diam.; cataphylls persisting with fibers in red-brown, net-like reticulum and partly

semi-intact with moderately coarse fibers 6-29 cm long. Leaves erect with petioles 30.3-98.0 cm long (averaging 61.8 cm), 0.7-1.8 mm diam., sharply triangular to 5-sided, the sides parallel, broadly flattened adaxially with moderately blunt lateral margins and a weak medial rib, drying dark brown, more concave adaxially with narrowly raised, acute lateral margins, sharply 3-ribbed adaxially; geniculum (1)3-4 cm long, slightly wider, drying dark brown to dark tan; blades ovate to broadly ovate to elliptic-ovate, 28-42 cm long, 17-35 cm wide, (averaging 37.5×29.2), 1.2–1.8 times longer than broad (averaging 1.3), 0.5–1.0 times as long as petiole (averaging 0.7), abruptly and sharply long-acuminate, rounded to weakly subcordate at base, rarely truncate, moderately coriaceous and moderately bicolorous, semiglossy, drying dark brown to dark gray-brown above, slightly paler dark yellow-brown, glossier than upper surface below; midrib convex and paler above, thicker than broad and paler below, drying more or less concolorous and often acute above, usually darker than surface and several-ribbed below; primary lateral veins 18-33 per side, (averaging 22), departing midrib at 50-60° near middle, departing midrib at steeper angle near base, etched-quilted above, pleated-raised below, drying narrowly rounded and more or less concolorous on both surfaces; tertiary veins very few, distinct; basal veins 6 or more pairs, arising from or near base; collective veins arising from first pairs of primary lateral vein, 2-4 mm from margin, as prominent as primary lateral veins; antemarginal vein present, arising from base; upper surface densely glandular-punctate; lower surface more conspicuously glandular-punctate with prominent reticulate venation. Inflorescence 37.5-55.6 cm long, erect; peduncle 9-40 cm long (averaging 27.5 cm), 2.6-4.9 times longer than spathe (averaging 3.8), drying 2-4 mm diam., somewhat darker than petiole; spathe 4.5–8.2 cm long (averaging 6.8 cm), 1.1-1.5 cm wide (averaging 6.8 × 1.3 cm), pale greenish white, greenish cream or cream to white, drying medium brown; spadix 5.8–15.6 cm long (averaging 10 cm), drying 4–5 mm diam., dark purple to violet-purple, weakly glossy, drying blackish brown, becoming paler in fruit; flowers (3)4–6 visible per spiral, 1.8–2.1 mm long and wide, lateral tepals 08.-0.9 mm wide; inner margin nearly straight, outer margins 2-sided. Infructescence with berries pale violet-purple to lilac.

Distribution and ecology — *Anthurium ortizii* is known from and northwestern Ecuador in Tulcán Canton in Carchi, and southwestern Colombia near Barbacoas in Nariño Department, at 900–1900 m elevation in Premontane wet forest, Tropical wet forest, and *Premontane rain forest* life zones.

Etymology — Anthurium ortizii named for Ecuadorian botanist Patricio Ortiz who assisted in collecting the type specimens along with Galo Tipaz, Milton Tirado, Carlos Aulestia and Nathan Gale in Tulcán Canton in Carchi and Barbacoas in Nariño Department.



Figure 165. Anthurium ortizii Croat. Paratype: Tipaz 255.



Figure 166. Anthurium pacevedoi Croat. Holotype: Acevedo 1335.

Comments — Anthurium ortizii is closest to another new species, A. davidneillii Croat, which differs by occurring at much lower elevations (50–400 m and averaging 240 m), in blades drying grayish to gray-green above and light yellowish gray-green below and in having typically fewer primary lateral veins and reticulate venation that is not very prominent. In contrast, Anthurium ortizii ranges from 900–1800 m (average: 1210 m), has blades that dry dark brown to dark gray-brown on the upper surface and dark yellow-brown below often with 6 or more pairs of basal veins and with the interprimary veins also rather prominent and with the reticulate veins markedly prominulous. In the Lucid Anthurium Key, Anthurium ortizii tracks to Anthurium cachabianaum Sodiro and A. lustriviridum Croat, both of which differ in having narrower blades with length/width ratios 2.0–2.8 compared to the broadly ovate blade of Anthurium ortizii. The blades of Anthurium lustriviridum dry light olive-green above and lighter grey-green below. Anthurium lustriviridum has a prominent double collective vein and the blade has a cuneate base; A. cachabianum has shorter petioles (20–25 cm), smaller blades (18–25 cm long, 8–12 cm wide) and also has a cuneate base.

Paratypes. COLOMBIA. Nariño: El Espino-Tumaco, 30 km W of Ricaurte, 10 km W of Ataquer, El Mirador, Finca Santa Lucia, 01°17'N, 78°07'W, 950 m, 9 Dec. 1988, *B. Hammel & A. Navaraez 17188* (MO); Barbacoas, Vertiente Occidental, corregimiento Junín El Paramo, 01°20'N, 78°08'W, 1260 m, 21 Feb. 1993, *J. Betancur et al.* 3950 (COL, MO). EC-UADOR. Carchi: Tulcán Canton, Reserva Indígena Áwa, 1600 m, *Tipaz et al.* 255 (QCNE, MO); Centro El Baboso, 1800 m, *Tipaz et al.* 1728 (QCNE, MO); Parroquia El Chical, 1150 m, Armando et al. 489 (QCNE, MO); Parroquia Tobar Donoso, Reserva Etnica Awá, Sabalera, 00°55'N, 78°32'W, 900 m, 22 Nov. 1992, *C. Aulestia et al.* 779 (MO, QCNE); Tulcán, around encampment in Gualpi Chico area of Awá Reservation, NW and SE, 1330 m, 00°58'N, 78°16'W, 22 Jan. 1988, *W.S. Hoover et al.* 3667 (MO, QCA); Reserva Etnica Awá, 1150 m, Parroquia El Chical, Sector Gualpí Medio, Río Canumbí, topografía muy irregular, suelo negro franco-arcilloso, 01°02'N, 78°15'W, 19–28 Feb. 1993, *A. Grijalva et al.* 489 (MO, QCNE); Reserva Indigena Awá, 1800 m, Parroquia Tobar Donoso, Centro El Baboso, 00°53'N, 78°25'W, 1800 m, 17–27 Aug. 1992, *Tipaz et al.* 1728 and 1908 (both MO, QCNE).

Anthurium pacevedoi Croat, sp. nov. — Type: COLOMBIA. Antioquia: Municipio Frontino; Corregimiento Nutibara, Región Murí, carretera hacia La Blanquita, 06°45'00"N, 76°18'W, 1700 m, 13 July 1986, P. Acevedo, G. Martínez, C.E. Orrego, D. Restrepo, D. Sánchez & E. Silva 1335 (holotype, MO-3582733; isotypes, HUA, US). Figure 166.

Diagnosis: Anthurium pacevedoi is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, short persistent cataphylls with pale fibers, petioles ¹/₂

to ²/₃ as long as the blades which are obtusely flattened adaxially and drying prominently sulcate, oblong-elliptic, narrowly long-acuminate, grayish brown blades with both surfaces glandular-punctate and with a single pair of basal veins as well as by the slender, green, spreading spathe and the stipitate, yellowish spadix and red berries.

Epiphytic; internodes short, to 6-8 mm diam.; cataphylls 2-3 cm long, densely fibrous, with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. Leaves with petioles 4.9–19.4 cm long, 2 mm diam., obtusely flattened adaxially, drying narrowly and acutely sulcate, grayish brown; geniculum 4-11 cm long, drying darker than petioles; blades nearly oblong to oblong-elliptic, 8.8-24.8 cm long, 1.7-5.3 cm wide (averaging 17×4), 3.3-6.2 (averaging 5.0) times longer than broad, broadest midway, 0.9–2.3 (averaging 1.6) times longer than petioles, gradually acuminate at apex (acumen to 2.3 cm), obtuse at base, subcoriaceous, drying grayish brown, weakly glossy to matte above and below; midrib drying narrowly raised, finely and acutely ribbed and slightly paler, glandular-punctate above, narrowly raised, densely glandular-punctate, mostly 3-ribbed and moderately paler below; primary lateral veins 14-18 per side, departing midrib at 60° at middle, drying weakly and narrowly rounded, concolorous above and below; tertiary veins drying indistinct above and below; collective veins arising from basal veins, 2 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface conspicuously glandular-punctate, weakly granular-ridged; lower surface conspicuously and densely glandular-punctate, conspicuously granular. Inflorescence with peduncle 24.6-34.8 cm long; spathe green, spreading, 2.2-3.8 cm long, 4-5 mm wide, linear-lanceolate, drying coriaceous and yellowish brown; spadix yellowish, stipitate (to 4 mm), cylindroid, 1.8–6.6 cm long, 3–5 mm diam., drying yellowish brown; flowers 2–3 visible per spiral, drying 2.8 mm long, 2.5 mm wide; tepals drying minutely granular; lateral tepals 1.8 mm wide, inner margin rounded, outer margins 2-sided; stamens held at level of tepals, 0.6 mm long, 0.6 mm wide, at least sometimes with all four stamens present at a time. Infructescence with berries red.

Distribution and ecology — *Anthurium pacevedoi* is endemic to Colombia, known only from the Municipio Frontino and Municipio Urrao in the region of the Parque Nacional Natural Las Orquídeas at 1500–1860 m in a *Lower montane wet* forest life zone.

Etymology — *Anthurium pacevedoi* is named for Puerto Rican botanist, Pedro Acevedo Rodríguez from the Smithsonian Institute. Pedro is a specialist in the systematics and floristics of Sapindaceae and the floristics of the West Indies, especially of Puerto Rico and the Virgin Islands and works also with the diversity and evolution of Neotropical lianas and climbing plants. **Comments** — In the Lucid Anthurium Key, *Anthurium pacevedoi* tracks to *A. deflexum* Engl. and resembles that species. That species differs by having more coriaceous, darker brown-drying blades with the upper blade surface having distinctly mound-shaped epidermal cells and with its glandular punctations few and diffuse as well as by having berries which are usually white or white tinged reddish at apex, not fully red as in *Anthurium pacevedoi*.

Sanchez et al. 987 is perhaps also *Anthurium pacevedoi* but differs by having blades somewhat more elliptic (3.2–3.8 times longer than broad) and flowers with all the stamens persisting, in contrast to other known collections of *A. pacevedoi* which have only a few stamens persisting (stamens presumably being withdrawn after anthesis).

Paratypes: COLOMBIA Antioquia: Municipio Frontino, 06°52'03"N, 75°44'46"W, 1630 m 15 Jan. 1987, *D. Sánchez S. 987* (MEDEL); Frontino, Corregimiento Nutibara, Cuenca Ala del Río Cuevas, 1750 m, 06°47'00"N, 76°15'00"W, 8 July 1986, *D. Sánchez S, C. Orrego, S. Sylva, G. Martínez & D. Restrepo et al.* 178 (MEDEL); Municipio Frontino, Corregimiento La Blanquita, Región Murrí, road from Nutibara to La Blanquita, 14.6 km west of Nutibara, 4–7 km from Alto de Cuevas-La Blanquita, 1350–1450 m, 06°45'00"N, 76°25'00"W, 10 July 1988, R. Callejas et al. 6524 (HUA, MO); Municipio Frontino; km 17 on Nutibara to La Banquita Road, Region of Murrí, 1860 m, 06°45'00"N, 76°24'00"W, 3 Nov. 1988, *J. L. Zarucchi, G. McPherson, F.J. Roldán, & O. Escobar 7058* (COL, MO); Municipio Urrao, Sector de Calles, Quebrada "La Siberia", 1380–1530 m, 06°31'00"N,76°19'00"W 25 Mar. 1991, *J.G. Ramírez et al. 4018* (JAUM, MO).

Anthurium pallidifibrum Croat, sp. nov. — Type: COLOMBIA. Antioquia: Parque Nacional Natural Las Orquídeas, Sector Venados, margen derecha del Río Venados, 850 m, 06°33'N, 76°19'W, 850 m, 4 June 1988, *A. Cogollo & J.G. Ramírez 3208* (holotype, JAUM-018253). Figure 167.

Diagnosis: Anthurium pallidifibrum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short slender internodes, dense, semi-erect, pale brownish cataphyll fibers, moderately short-petiolate leaves with subterete petioles and a short geniculum, more or less oblong, gradually long-acuminate blades which dry grayish brown and eglandular above, yellowish brown and conspicuously glandular-punctate below, a narrowly raised upper midrib and primary lateral veins somewhat less conspicuous than the collective vein which arises from the base as well as by the long-pedunculate inflorescence with a pale yellow, inrolled spathe, a yellowish green, narrowly long-cylindroid spadix and violet-purple berries.

The current status of Anthurium sect. Porphyrochitonium ...



Figure 167. Anthurium pallidifibrum Croat. Holotype: Cogollo & Ramirez 3208.



Figure 168. Anthurium palmitasense Croat. Holotype: Pipoly et al. 17507.

Epiphytic; internodes short, 8 mm diam., drying 5-6 mm diam.; cataphylls 6.3-6.5 cm long, densely moderately pale brown-fibrous, the fibers mostly closely parallel; petioles 6.2-12.5 cm long, 2 mm diam., subterete, drying acutely sulcate, yellowish brown; geniculum 5-6 mm long, drying darker than petioles; blades narrowly oblong-lanceolate to oblong oblanceolate, 25.8–31.0 cm long, 2.6–3.6 cm wide (averaging 28 × 3), 8.6–10.3 (averaging 9.5) times longer than broad, broadest midway, 2.5-4.3 (averaging 3.3) times longer than petioles, gradually and prominently acuminate at apex (acumen to 1.4 cm), obtuse at base, subcoriaceous, drying grayish brown and weakly glossy above, yellowish brown and weakly glossy below; midrib drying narrowly acute and darker above, narrowly raised and concolorous below; primary lateral veins 12-14 per side, departing midrib at 55-60° at middle, narrowly rounded, concolorous above and below; tertiary veins drying moderately distinct above and below: collective veins arising from basal veins, 2-3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface eglandular, densely dark-speckled, minutely areolate on magnification, sparsely pustular; lower surface conspicuously and densely glandular-punctate, faintly dark-speckled, sparsely pustular. Inflorescence with peduncle 12.5-25.2 cm long; spathe pale yellow, inrolled, 3.3-5.4 cm long, 2-4 mm wide, linear, drying thin and pale brown, easily deciduous; spadix yellowish green, subsessile, narrow and scarcely apered, 6.6–10.9 cm long, 3–7 mm diam., ca. 22 times longer than broad, drying pale brown; flowers 2–3 visible per spiral, drying 2.4–3.3 mm long, 2.8 mm wide; tepals drying minutely granular; lateral tepals 1.4-1.7 mm wide, inner margin broadly rounded, outer margins 2-sided; stamens not yet emergent; anther 0.6 mm wide, 0.15 mm long, thecae broadly divaricate. Infructescence with berries violet-purple (as per label, not seen).

Distribution and ecology — *Anthurium pallidifibrum* is endemic to Colombia, known only from the Department of Antioquia in the Parque Nacional Natural Las Orquídeas, Sector Venados at 850 m in a Tropical wet forest life zone

Etymology — The species epithet comes from the Latin '*pallidus*' (meaning pale) and '*fibra*' (meaning fiber) referring to the pale cataphyll fibers so prominently displayed on the stems.

Comments — *Anthurium pallidifibrum* is most similar to *A. friedrichsthalii* Schott based on the size and shape of its blade but that species differs by having proportionately more slender, more elongated leaf blades and bright yellow-orange rather than violet-purple berries.

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Anthurium palmitasense Croat, sp. nov. — Type: COLOMBIA. Antioquia. Municipio Urrao, Zona limítrofe del Parque Nacional Natural Las Orquídeas, Vereda Calles, Alto de Palmitas, ca. 1 km de Cabaña de Calles del INDERNA, 06°32'N, 76°19'W, 1300–1400 m, 1 Dec. 1993, J. Pipoly, W. Rodríguez, J. Velez & O. Alvarez 17507 (holotype, MO-04603594; isotype, JAUM, not seen). Figure 168.

Diagnosis: Anthurium palmitasense is a member of sect. *Porphyrochitonium* and is characterized by it epiphytic habit, short internodes, persistent, brownish cataphyll fibers, subterete, slender petioles drying narrowly and sharply sulcate, narrowly ovate-elliptic, gray-green-drying blades which are narrowly long-acuminate at apex and weakly attenuate at the base, glandular-punctate on both surfaces as well as by the long-pedunculate inflorescence, slender peduncle, narrowly inrolled, green, spreading spathe and moderately long-stipitate, narrowly cylindroid, green spadix.

Epiphytic; internodes short, 1.1 cm diam.; cataphylls 2.0-2.5 cm long, persisting as loose, pale, more or less spreading fibers; petioles 5.2–11.3 cm long, 2 mm diam., subterete, narrowly and sharply sulcate, grayish brown; geniculum 4–8 mm long, drying darker than petioles; blades narrowly ovate-elliptic, 8.8-13.2 cm long, 1.5-4.2 cm wide (averaging 10×3), 3.1-5.9(averaging 4.0) times longer than broad, broadest below midway, 0.9–1.8 (averaging 1.4) times longer than petioles, gradually acuminate at apex (acumen to 1.5 cm), acute to weakly attenuate at base, subcoriaceous, drying gray-green, weakly glossy above, yellowish gray-green, slightly glossier below; midrib drying narrowly raised, sparsely glandular-punctate and slightly paler above, narrowly raised to narrowly acute, sparsely glandular-punctate and slightly paler below; primary lateral veins 5 or 6 per side, departing midrib at 55°, drying narrowly rounded and concolorous above, narrowly raised and concolorous below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 3 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface moderately densely glandular-punctate, densely granular, weakly black-speckled, sparsely pustular; lower surface conspicuously and more densely glandular-punctate, densely granular, moderately pustular. Inflorescence erect, as long as or longer than the leaves; peduncle 18.8–21.2 cm long, drying 1.5 mm diam., greenish brown; spathe mostly missing, green, spreading; spadix green, stipitate (2-5 mm), cylindroid, 2.5–3.7 cm long, 4 mm diam., drying brown; flowers 3 visible per spiral, drying 2.2–2.4 mm long, 1.8–2.0 mm wide; tepals drying papillate-granular; lateral tepals 1.3 mm wide, outer margins 2-sided, inner margin rounded; stamens held at level of tepals; anthers 0.4 mm long and wide; thecae ellipsoid, scarcely divaricate. Infructescence not seen.

Distribution and ecology — *Anthurium palmitasense* is endemic to Colombia, known only from the type locality in Antioquia Department in the Parque Nacional Natural Las Orquídeas at 1300–1400 m in a *Tropical wet forest* life zone.

Etymology — The species in named for the type locality on the Alto de Palmitas in the Parque Nacional Natural Las Orquídeas in Antioquia Department.

Comments — In the Lucid Anthurium Key, *Anthurium palmitasense* tracks to *A. brevipes* Sodiro, which differs by having larger blades which are more acute at the base and shorter peduncles; *A. chucunesense* Croat which differs by having blades which dry dark brown with a prominent collective veins; *A. friedrichstahlii* Schott, which differs by having longer, proportionately more slender, typically pendent leaf blades and *A. purdieanum* Schott, which differs by having longer internodes, intact cataphylls and more broadly ovate blades.

Anthurium palmitasense comes to Anthurium gracililaminatum Croat in the key to Panamanian species but that species differs by having much larger blades, much more prominent primary lateral veins, less prominent glandular-punctations on the upper surface and peduncles only about as long as or slightly longer than the petioles.

Anthurium pedernalense Croat, **sp. nov.** — Type: ECUADOR. Manabí: Pedernales Cantón, Reserva Ecológica Mache-Chindul, Cerro Pata de Pájaro, Cabaceras de Río Vite, estero Nuquepe, bosque al norte de La Loma de Pájaro y carretera víal Carmen, 00°01'N, 79°45'W, 300–700 m, 7 Apr. 1977, *J.L. Clark, T. Nuñez and C. Robles 4327* (holotype, QCNE; isotype, MO-5161042). **Figure 169**.

Diagnosis: Anthurium pedernalense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, cataphylls persisting as fibers, petioles acutely triangular with 2 marginal ribs, the oblong-elliptic blades glandular-punctate on both surfaces and with inconspicuous primary lateral veins and prominent collective veins as well as by its long, gradually tapered spadix with purple, cone-shaped berries.

Epiphytic; internodes short 0.3–0.5 cm, 0.6 cm diam.; cataphylls persisting as dark brown fibers, 2–6 cm long. *Leaves* 70 cm long; petioles 23–25 cm long, acutely triangular with 2 marginal ribs, drying gray-green; blades oblong-elliptic, 43–46 cm long, 11–13 cm wide, 3.7 times longer than broad, 1.8 times longer than petiole, long-tapered acuminate at apex, cuneate at base, subcoriaceous, drying semiglossy, dark grey-green above, matte, light gray-green below; midrib narrowly acute adaxially, broadly convex abaxially drying coarsely ribbed; primary lateral veins inconspicuous, about 60 per side, departing midrib at 40–50°; collective veins more prominent than primary lateral veins, arising from the base, running 1.3 cm from the margin near the base to 0.3 cm from the margin near the apex; upper surface minutely granular textured with dark glandular punctations; lower surface dark glandular punctate with larger, light pustules. *Inflorescence* with peduncle 32.4 cm long, 0.3 cm diam.; spathe green 9.5 cm long,

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Figure 169. Anthurium pedernalense Croat. Holotype: Clark et al. 4327



Figure 170. Anthurium prominor Croat. Holotype: Croat & D. C. Bay 75676 (sheet 2).

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Figure 171. Anthurium prominor Croat. Isotype: Croat & D. C. Bay 75676 (sheet 3).



Figure 172. Anthurium prominor Croat. Croat & D. C. Bay 75676. Inflorescence.



Figure 173. Anthurium prominor Croat. Croat & D. C. Bay 75676. Habit of potted plant.

1.5 cm wide; spadix narrowly long-tapered, 17 cm in early fruit, 5.5 mm diam.; flowers 0.9– 1.1 mm long, 1.3–1.4 mm wide, tepals moderately granular, 1.2–1.4 mm wide, broadly 2-sided, stamens held at level of tepal, closely aggregated 0.4 mm long, 0.4 mm wide; *Infructescence* 48.9 cm long, erect; with purple, cone-shaped berries 3 mm long, 1.5 mm diam. drying dark brown; berries purplish violet with pale cellular inclusions; seeds 2.5 mm long, 1.8 mm diam.

Distribution and ecology — *Anthurium pedernalense* is endemic to NW Ecuador in the Mache-Chindul Ecologial Reserve at 300–700 m in a *Premontane wet forest* life zone.

Etymology — *Anthurium pedernalense* is named for the type locality in Pedernales Cantón in Manabí Province.

Comments — In the Lucid Anthurium Key, *Anthurium pedernalense* tracks with *A. centinellense* Croat which has cataphyll fibers which persist as longer fibers (4–12 cm) and oblanceolate blades with 8–12 distinct primary lateral veins per side; *A. pellucidopunctatum* that has shorter petioles (15–20 cm), smaller blades (30–35 × 8–10 cm), a shorter peduncle (15–18 cm) and a shorter spadix (9 × 5 cm).

Anthurium prominor Croat, **sp. nov.** — Type: COLOMBIA. Valle del Cauca: Bajo Calima Region, along road between Buenaventura and Málaga, vicinity of km 50.7, right (N side) of road in deep ravine along stream, 04°02'N, 77°05'W, 43 m, 12 July 1993, *T.B. Croat & D.C. Bay 75676* (holotype, MO-4572432). *Figures 170–173*.

Diagnosis: Anthurium prominor is a member of sect. *Porphyrochitonium* and is distinguished by its long, dark brown roots, narrow, ovate-elliptic blades which are dark punctate on both surfaces, the sharply sulcate petioles and particularly by the rather stout spadix which is blunt at the apex, usually golden-yellow in flower and lavender in fruit with white berries. Another feature is the peduncle which is very smooth and reddish both fresh and dried.

Epiphytic; stem short, to 20 cm long; internodes 1.0-2.5 cm wide; roots few per node, to 30 cm long, often branching, drying dark brown; cataphylls 6–16 cm long, persisting as weathered fibers, light tan to light red. Leaves 18.4-66.1 cm long (averaging 42.1), erect to erect spreading with petioles 3.0-24.8 cm long (averaging 14.8 cm), 3-7 mm diam., sharply C-or U-shaped adaxially, medium green, drying olive-green; geniculum 1.0-1.8 cm long, drying darker than petiole; blades ovate to narrowly elliptic, 15.4-41.3 cm long, 4.4-14.8 cm wide (averaging 27.3×8.7), 2.2-5.6 times longer than wide (averaging 3.3), 0.9-5.1 times longer than petiole (averaging 2.0), broadest near the middle or slightly below, subcoriaceous,

acuminate to abruptly acuminate at apex, cuneate to obtuse at base, drying semiglossy to glossy, rarely matte, dark green to yellow-green above, semiglossy to glossy, drying matte, light olive-brown, paler than upper surface below; midrib convex, somewhat acute toward apex, drying reddish above, paler below; primary lateral veins 17–29 per side, departing midrib at 35-60°, straight to innermost collective vein, concolorous, obscure to weakly raised above and below; collective veins arising from the base, running 1.0-1.5 cm from the margin near the base, to 0.5 cm near the middle and 3-4 mm near the apex, narrow, acute but distinct yet less prominent than the collective veins of many sect. Porphryochitonium species, 2nd pair of collective veins forming in lower 1/6 of blade; tertiary veins inconspicuous and reticulate; upper surface minutely dark brown glandular-punctate; lower surface abundantly dark brown glandular-punctate, often somewhat verrucose. Inflorescence erect, 16–72 cm long (averaging 35.5 cm) with peduncle 7.5–32.0 cm long (averaging 18.7 cm), often longer than petiole and reddish or purplish, drying smooth and medium reddish brown; spathe spreading to reflexed, 5-14 cm long, 0.7-1.5 cm wide, green tinged with purple, acuminate at apex, drying dark brown; spadix sessile, cylindrical but slightly tapered near apex, 7.3–40.3 cm long (averaging 17.5 cm), 0.5–1.2 cm diam. near the base, 3–4 mm near the apex, greenish becoming yellow or golden-yellow, lavender in fruit; flowers 5-8 visible in spiral, 3-5 mm long, 1.5-3.0 mm wide; tepals granular on the surface, the outer margins 3-sided, inner margins slightly rounded, lateral tepals 2.7-3.5 mm wide, stigma 0.2-0.3 mm long, linear, stamens scarcely emerging beyond tepals, thecae divaricate, 0.8 mm wide, 0.4 mm long. Infructescence with berries lavender to white, globose, depressed in the center, seeds ellipsoid, 2 mm long, 1.1 mm diam., 2 per berry.

Distribution and ecology — *Anthurium prominor* ranges along the Pacific Andean slopes of Colombia and in Esmeraldas Province, Ecuador and occurs in Tropical wet forest transition to Premontane rain forest life zones from sea-level to 550 m. In the Bajo Calima region, it was collected in primary and regrowth forest. *Anthurium prominor* was collected in the Bajo Calima region when in flower in February, July, August, September and November and when in fruit in July and December.

Etymology — The species epithet comes from the Latin '*prominens*' (meaning prominent) and '*minor*' (meaning smaller or lesser), referring to the prominence of the minor veins which are so outstanding on this species in comparison to the normal minor lateral veins in the section.

Comments — In the Lucid Anthurium Key, *Anthurium prominor* tracks to: *A. joaquinense* Croat & D.C.Bay which may be distinguished by its dried blades being dark green rather than dark brown, primary lateral veins departing midrib at 55–60° (rather than 45–55°), a spadix

which is usually smaller at 6-12 cm and berries that are maroon to purple; *A. paludosum* Engl. which differs by having shorter cataphylls (3–4 cm), shorter geniculum 4–5 mm long, smaller blades (usually $12-15 \times 4-5$ cm), a smaller spathe (3.5–4.0 cm long) and stipitate spadix; *A. wattii* Croat & D.C.Bay which has longer petioles (18–36 cm), longer blades (30–55 cm), glandular punctations present only on the lower surface and dark red berries.

Anthurium prominor has been confused with the Anthurium barbacoasense Engl. from 500 m in the area of Barbacoas in Nariño Department. That species differs by having cataphylls less than 4 cm long that persist intact, petioles sheathed 0.35–0.40 its length (versus 0.1–0.2(0.3) its length for Anthurium prominor), leaf blades which are proportionately broader toward the base and narrowly rounded at the apex with a weak apiculum (versus shortly and abruptly acuminate in A. prominor) and has primary lateral veins and the minor veins prominently raised on both surfaces with the punctations both more sparse and less conspicuous.

Material described here was included in the original version of the Araceae of Bajo Calima (D. C. Bay, 1996) as *Anthurium barbacoense* Engl. but recent comparisons with the type specimen of that species has proven it to be distinct.

Paratypes: COLOMBIA. **Chocó**: Along road between Medellín and Quibdó, 73 km W of Bolivar, 533 m, 11 Dec. 1979, *T.B. Croat* 49281 (MO). Valle del Cauca: Bajo Calima, along road between Buenaventura and Málaga, 04° 02'N, 77°05'W, 43 m, 12 July 1993, *T.B. Croat* & *D.C. Bay 75676*; 75676A (MO); Km 51.7 from main Cali-Buenaventura Hwy, 04°03'N, 77°05'W, 50 m, 16 July 1993, *T.B. Croat* & *D.C. Bay 75794* (MO); at 40 km, 04°04'N, 77°09'W, 100 m, 5 Feb. 1990, *T.B. Croat* & *D.C. Bay 75794* (MO); at 40 km, 04°04'N, 77°09'W, 100 m, 5 Feb. 1990, *T.B. Croat* 70166 (MO); Between Río Calima, Carretera Hans at km 22 on main road to Canalete, 04°02'N, 77° 51'W, 50–60 m, 21 July 1988, *T.B. Croat* 69504 (MO); 40 km N of Buenaventura, W of San Isidro, 03°58'N, 77°00'W, 50 m, 19 Dec. 1987, *A. Gentry, M. Monsalve, M.D. Heredia* & *R. Keating 59608* (MO); Along road from Buenaventura to Río Calima at 12.5 km, 03°56'N, 77°01'W, 160 m, 4 Feb. 1990, *T.B. Croat* 70140 (MO); Concesión Pulpapel/Buenaventura, 03°55'N, 77°01'W, 100 m, 7 Sep. 1984, *M. Monsalve B. 371* (MO); Concensión Cartón de Colombia, 03°56'N, 77°10' W, 230 m, *D. C. Bay 261* (MO); 50–100 m, 11 Feb. 1984, *A. Juncosa 2124* (MO); 100 m, *M. Monsalve 190* (MO).

Anthurium purpuribacca Croat, **sp. nov.** — Type: ECUADOR. Pastaza: Cantón Pastaza, 5.3 km NW of center of Shell, along gravel rd. 1.1 km N of hwy., 01°27'S, 78°04'W, 1180 m, 4 Apr 1992, *T.B. Croat 73502* (holotype, MO-5197448; isotypes, B, CAS, F, K, MO, NY, US). **Figures 174–177**.

Diagnosis: Anthurium purpuribacca is a member of sect. *Porphyrochitonium* and is distinguished by sharply and deeply sulcate petioles, subcoriaceous, dark green and somewhat glossy blades with glandular punctations on only the lower surface as well as by the square pistils and purple fruits.

Terrestrial; internodes short, 1.8-2.5 cm diam.; cataphylls 4-6 cm long. Leaves with petioles 20-38 cm long, 1/6-1/7 as long as blades, terete when young, becoming thicker than broad, 7 mm thick, less than 5 mm wide, sharply and deeply sulcate, dark green, weakly glossy, drying dark yellow-brown; geniculum 3 cm long, broader than petioles, sharply sulcate; blades oblong-elliptic, 35-57 cm long, 10-19 cm wide, 3.0-3.5 times longer than wide, weakly short-acuminate at apex, acute at base, subcoriaceous, weakly glossy above, yellow-green, moderately paler and glossy below, drying gray-brown and matte above, yellowish gray-brown and semiglossy below; midrib raised on both surfaces, more acutely so on upper surface, drying pale yellow, darker on the lower surface; primary lateral veins 15 or 16 per side, departing midrib at 60° (to 80° near base); basal veins 2 pairs, both arising near base, the inner pair extending to the apex, 1.0–1.2 cm from margin; collective veins 2 pairs, both arising from near the base, inner pair extending to apex, outer pair of collective veins 1–2 mm from margin, merging with margin near apex; upper surface eglandular, densely granular to ridged-granular; lower surface smoother, somewhat pale speckled, conspicuously dark glandular-punctate. Inflorescence erect; peduncle 52.5 cm long; spathe green, reflexed-spreading, oblong, 7.5 cm long, 8 mm wide, acuminate at apex with pointed tip, drying dark brown; spadix 9–11 cm long, weakly tapered toward apex, dark green, soon tinged purple; flowers 7–8 per spiral, 3.8–4.3 mm long, 3.2–3.5 mm wide; lateral tepals 2.5–2.7 mm wide, outer margin 3-sided to weakly shield-shaped, inner margin straight to concave; pistil square in visible area, 1.3 mm x 1.0 mm wide. Infructescence with berries purple.

Distribution and ecology — *Anthurium purpuribacca* is endemic to Ecuador, known from the region of Pastaza, growing at 1180 m in a Premontane wet forest life zone.

Etymology — The species epithet is from the Latin 'purpureus' (purple) and 'bacca' (berry).

Comments — In the Lucid Anthurium Key, *Anthurium purpuribacca* tracks to a number of species, all of which occur only on the Pacific slope of the Andes, *A. fuscopunctatum* Sodiro which differs by having petioles about ¹/₃ as long as the blades rather than 1/6 to 1/7th as long at the blades, leaf blades which are 4 or more times longer than broad versus less than 3.5 times longer as well as a much longer spadix (15–20 cm long); *A. julospadix* Sodiro, from the Lita-San Lorenzo region, which differs by having long slender blades 5.7–5.8 times longer than wide; *A. myosuroides* Sodiro, from Imbabura Province, which differs by having a



Figure 174. Anthurium purpuribacca Croat. Holotype: Croat 73502.



Figure 175. Anthurium purpuribacca Croat. Croat 73502. Habit of potted plant.



Figure 176. Anthurium purpuribacca Croat. Croat 73502. Leaf blade, adaxial surface.



Figure 177. Anthurium purpuribacca Croat. Croat 73502. Cataphylls.



Figure 178. Anthurium sursumtepalum Croat. Holotype: Cajellas et al. 6704.

spadix about 3 or more times longer than spathe (compared to only slightly longer than spadix for *A. purpuribacca*) and with white rather than purple berries; *A. punctatum* N.E.Br., which differs by having proportionately longer, more slender leaf blades more than 5 times longer than wide as well as by its white berries; *A. quinquesulcatum* Sodiro, which differs by having both surfaces of the blades glandular-punctate and by having a many-ribbed peduncle and *A. tenuispiccum* Sodiro which differs by having proportionately longer petioles which are nearly as long as the blades, more grayish drying blades and a more slender, proportionately longer spadix, 25–30 cm long.

Paratypes: ECUADOR. Napo: Cantón Aguarico, Parque Nacional Yasuní, Lagunas de Graza Cocha, 01°01'S, 75°47'W, 200 m, *C.E. Cerón & N. Gallo 5003* (MO); Res. Faunistica Cuyabeno near Pto. Bolívar at confluence of Río Tarapui and Río Cuyabeno, 00°05'S 76°10'W, 300 m, *H. Balslev 4780* (NY).

Anthurium sursumtepalum Croat, sp. nov. — Type: COLOMBIA. Antioquia: Municipio Frontino, Corregimiento La Blanquita, Región de Murrí, vía Nutibara-La Blanquita, 14.5 km O. de Nutibara, 15–16 km del Alto de Cuevas-La Blanquita, 06°45'N, 76°25'W, 890–900 m, 13 July 1988, *R. Callejas, J. Betancur, A.L. Arbeláez & I.D. Castaño 6709* (holotype, MO-3686691; isotype, HUA). Figure 178.

Diagnosis: Anthurium sursumtepalum is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, persistent, reddish brown cataphyll fibers, longpetiolate leaves, petioles which dry sharply sulcate adaxially and have a very short geniculum, narrowly oblanceolate, brown-drying, acuminate blades which are eglandular on the upper surface with an acute midrib and obscure primary lateral veins and glandular-punctate with faint primary lateral veins on the lower surface as well as by the long-pedunculate inflorescence with a green, linear spathe and very long, scarcely tapered, green spadix with very long flowers and with the dried tepal margins turning outward.

Epiphytic; internodes short, 1.4–1.7 cm diam.; cataphylls 5.8–6.2 cm long, persisting intact at apex, becoming fibrous with fragments of brown epidermis, the fibers brown, loosely parallel. *Leaves* with petioles 7.2–18.8 cm long, 3 mm diam., subterete, drying acutely sulcate, dark yellowish brown; geniculum 6–13 mm long, drying darker than petioles, about as thick; blades narrowly oblong-oblanceolate, 27.5–35.3 cm long, 4.9–7.3 cm wide (averaging 32×6), 4.8–5.6 (averaging 5.3) times longer than broad, broadest above the middle, 1.9–3.9 (averaging 3.0) times as long as petioles, gradually acuminate at apex, acute at base, subcoriaceous, drying dark brown, matte above, yellowish red-brown, weakly glossy below; midrib drying narrowly acute, and slightly darker above, narrowly raised, sparsely glandular-punctate, finely ribbed

and slightly darker below; primary lateral veins 16–18 per side, departing at 55–60° at middle, drying weakly and narrowly raised, paler above, narrowly rounded and concolorous below; tertiary veins drying indistinct above, weakly raised below; collective veins arising from basal veins, 3–4 mm from margin; basal veins 1 pair; antemarginal vein present; upper surface epunctate, moderately smooth, sparsely pustular; lower surface sparsely and weakly glandular-punctate, densely pustular. *Inflorescence* erect-spreading; peduncle 22.5–28.3 cm long; spathe green, 6.2 cm long, 5 mm wide, linear, drying subcoriaceous and reddish brown; spadix green, sessile, long and weakly tapered, 24.7–25.9 cm long, 3–4 mm diam., drying brown; flowers 3 visible per spiral, drying 4.0–4.7 mm long, 1.6–2.0 mm wide; tepals drying minutely granular; lateral tepals 3.1 mm wide, outer margins 2-sided, inner margin broadly rounded; stamens not visible. *Infructescence* not seen.

Distribution and ecology — *Anthurium sursumtepalum* is endemic to Colombia, known only from the type locality in Antioquia Department, Municipio Frontino at 890–900 m in a *Premontane rain forest* life zone.

Etymology — The epithet comes from the Latin '*sursum*' (meaning upwards, from below) referring to the upturned margins of the dried tepals on the spadix.

Comments — Anthurium sursumtepalum appears to be closest to A. margaricarpum which differs by having proportionately thinner, greenish drying, longer acuminate leaf blades and a shorter spadix. In the Lucid Anthurium Key, Anthurium sursumtepalum also keys to A. acutangulum Engl., which differs by having proportionately broader, more elliptic blades with more prominent primary lateral veins and a pendent inflorescence; A. arusiense Croat & M.M.Mora which differs by having proportionately shorter petioles, blades with more prominent primary lateral veins and the upper blade surface short-pale-lineate as well as by having a proportionately shorter spadix which is light grayish brown; A. brevipes Sodiro which differs by its proportionately shorter sharply pointed spadix and A. punctatum N.E. Br. from western Ecuador which differs by having blades more acute at the apex, collective veins that are more remote from the margins and by its stipitate spadix.

Paratype: COLOMBIA. Antioquia: Parque Nacional Natural "Las Orquídeas", Sector Venados, margen derecha de Río Venados, 850 m, 4 June 1988. *A. Cogollo & J.G. Ramírez 3217* (JAUM).

Anthurium tarapuiense Croat, **sp. nov.** — Type: ECUADOR. Napo: Cantón Aquarico, Reserva Faunistica Cuyabeno near Pto. Bolívar at confluence of Río Tarapui and Río Cuyabeno, 00°05'S, 76°10'W, 300 m, 19 Jan. 1984, *H. Balslev 4780* (holotype NY; isotype, MO-3683284). **Figures 179 & 180**.

Croat et al., 2022

Diagnosis: Anthurium tarapuiense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, subterete petioles with a medial rib, ovate to narrowly elliptic blades which are 1.6–2.6 times longer than petioles, prominent collective veins which arise at the base and run 5–8 mm from the margins as well as a green, lanceolate spathe and a green spadix.

Epiphytic; internodes short, 2–4 mm long, 0.8 cm diam.; cataphylls persisting as short reddish brown fibers 3-5 cm long. Leaves 56 cm long with petioles subterete, 13.5-23.8 cm long, 3-4 mm diam., adaxially sulcate with acute margins and a medial rib, drying medium brown; blades ovate to narrowly elliptic, 35.0-37.5 cm long, 6.4-12.0 cm wide (averaging 9 cm), 3.2-5.5 times longer than wide (averaging 4.4), 1.6-2.6 times longer than petiole (averaging 2.2), acuminate at the apex, narrowly cuneate at the base, subcoriaceous, drying dark brownish green above, lighter yellowish green below; midrib narrowly convex, finely ribbed, concolorous upper and lower surfaces; primary lateral veins 16-18 per side, departing midrib at 50-60°, concolorous on upper and lower surfaces, irregularly curved or angled, inconspicuous and with many interprimary veins not markedly weaker than the primary lateral veins; collective veins more prominent than primary lateral veins, running 5-8 mm from margin; upper surface eglandular, somewhat pustular; lower surface minutely dark glandular-punctate with paler and larger pustules. Inflorescence ca. 21 cm long, erect; peduncle 14-16 cm long, 2 mm diam., ribbed; stipe 3 mm long, 2 mm diam.; spathe sub-pendent, green, 3.5-5.0 cm long, 0.6-1.0 cm wide, oblong-elliptic, drying dark brown; spadix 5.5–8.4 cm long 0.5–0.8 cm wide, green, drying dark brown; flowers 4–5 per spiral, 3-sided, tepals 0.8×0.5 m. Infructescence not seen.

Distribution and ecology — *Anthurium tarapuiense* is endemic to Ecuador, known only from the type locality in Napo Province at 300 m elevation in a Tropical moist forest life zone.

Etymology — The species epithet refers to the Río Tarapui in the type locality.

Comments — Anthurium tarapuiense is most easily confused with A. apaporanum R.E.Schult. that differs by having the collective veins 1–2 mm from the margins and in having the primary lateral veins slightly more prominent than the interprimary veins and with many more interprimary lateral veins present. Anthurium apapuranum also has a longer, wider spadix; A. collettianum may be distinguished from A. tarapuiense in having purplish violet spadices and spathes that are longer and more slender. In the Lucid Anthurium Key, Anthurium tarapuiense



Figure 179. Anthurium tarapuiense Croat. Holotype: Balslev 4780.



Figure 180. Anthurium tarapuiense Croat. Paratype: Ceron & Gallo 5003.



Figure 181. Anthurium unguiense Croat. Holotype: Gentry 17039.

tracks with *A. julospadix* Sodiro which may be distinguished by having longer, narrower blades (length-width ratio 5–7) and a spadix that is magenta to purple in color; *A. pedunculare* Sodiro which differs by having smaller blades (15–20 cm \times 3.5–5 cm), collective veins only 2–4 mm from the blade margin and peduncles twice the length of the petioles and *A. verrucosum* Croat & D.C.Bay in which the upper surface of the blades is conspicuously and profusely verrucose, the primary lateral veins are prominently raised and darker than the blade on the lower surface and the spadix is sessile.

Paratypes: ECUADOR. Napo: Cantón Aguarico; Parque Nacional Yasuní, Lagunas de Garza Cocha, 22 Sep. 1988, *C.E. Cerón & N. Gallo 4863* and *5003* (both MO).

Anthurium unguiense Croat, **sp. nov.** — Type: COLOMBIA. Chocó: Serranía del Darien west of Unguía on Panamanian border, ca. 08°02'51"N, 77°13'25"W, 1150 m, 26 July 1976, *A. Gentry, H. Leon & L.E. Forero 17039* (holotype, MO-2400439). **Figure 181**.

Diagnosis: Anthurium unguiense is a member of sect. *Porphyrochitonium* and is characterized by its epiphytic habit, short internodes, fine, reddish brown, persistent cataphyll fibers, subtriangular-winged petioles, oblong-elliptic, brownish drying blades with a single pair of basal veins, glandular punctations on lower surface only, as well as by the short-pedunculate inflorescence with a slender, reddish, erect-spreading spathe and a green, weakly tapered spadix. The upper dried blade surface is unusual in being densely dark-speckled (not glandular-punctate) and prominently pale short-lineate-pustular to punctiform-pustular.

Epiphytic; internodes short, 9 mm diam.; cataphylls 3.4-3.7 cm long, acute persisting intact at apex, becoming fibrous with fragments of reddish brown epidermis, the fibers reddish brown, mostly closely parallel. *Leaves* with petioles 5.8-13.7 cm long, 3-4 mm diam., about half as long as blades, subtriangular, somewhat flattened adaxially with thin erect margins and several faint ribs medially, acutely angular-winged abaxially, drying reddish dark brown; geniculum 6-7 mm long, drying darker than petioles, shaped like the petiole; blades oblong-elliptic, 14.6-30.6 cm long, 2.6-6.1 cm wide (averaging 24×5), 5.0-5.6 (averaging 5.2) times longer than broad, (1.7) 2.2-2.5 (averaging 2.3) times longer than petioles, gradually acuminate at apex, narrowly acute at base, drying subcoriaceous, dark olive-brown and matte above, yellowish medium brown and matte below; midrib drying round-raised and slightly darker above, narrowly raised and darker below; primary lateral veins 9-12 per side, but difficult to discern from interprimary veins, departing midrib at 65° , drying weakly and narrowly raised, concolorous above, narrowly raised and concolorous below; collective veins drying scarcely more visible than surface above, prominulous below; collective veins arising from basal veins 3-4 mm from margin; basal veins 1 pair; upper surface eglandular, densely

dark- speckled and prominently pale short-lineate-pustular to punctiform-pustular; lower surface glandular-punctate, sparsely dark speckled and irregularly short-ridged. *Inflorescence* with peduncle 6.3 cm long, triangular-winged; spathe erect-spreading, reddish, moderately coriaceous, drying dark reddish brown; spadix green, sessile, long weakly tapered, 7.4 cm long, 4 mm diam., 16.5 times longer than broad, drying dark reddish brown; flowers 4 visible per spiral, drying 2.7 mm long and 2 mm wide; tepals minutely granular on drying; lateral tepals 1.9 mm wide, inner margin rounded, outer margins 2-sided; stamens not exserted. *Infructescence* not seen.

Distribution and ecology — *Anthurium unguiense* is known only from a single collection made in Colombia in Chocó Province on the border with Panama in the Serranía del Darien west of Unguía on Panamanian border at 1150 m in a Premontane rain forest life zone. While the type collection was purportedly made in Colombia, *Anthurium unguiense* is assumed here to also be present in adjacent Panama from which Gentry approached the locality.

Etymology — The species named for the town of Unguía, Colombia in Chocó Department which is near the type locality on the Panamanian border.

Comments — In the Lucid Anthurium Key, *Anthurium unguiense* tracks to *A. brevipes* Sodiro which differs by having the inflorescence about as long as or longer than leaves; *A. cachabianum* Sodiro, which differs by having proportionately broader blades, petioles about as long as the blades and blades which are glandular-punctate on both surfaces; *A. pedunculare* Sodiro, which differs by having more oblong leaf blades which are rounded at the base and with peduncles twice as long at the petioles and *A. margaricarpum* Sodiro, which differs by having proportionately longer petioles, more elliptic blades and an inflorescence which typically exceeds the blades. *Anthurium unguiense* has been confused with *Anthurium dwyeri* Croat which has more conspicuously triangular petioles, typically much broader blades which lack the conspicuously granular and pustular surface.

In the Central American Anthurium revision (Croat, 1986), *Anthurium unguiense* keys out to *A. cartiense* Croat which lacks the leaf blade upper surface conspicuously granular when dried.

Anthurium victoriense Croat, sp. nov. — Type: COLOMBIA. Valle del Cauca: Vicinity of Queremal, Vereda La Victoria, just S of Queremal, on moderately steep slopes, 03°31'06"N, 76°42'57"W, 1450–1480 m, 27 July 1997, *T.B. Croat & J. Gaskin 80411* (holotype, MO-04939346; isotype, CUVC). Figure 182.

Diagnosis: Anthurium victoriense is a member of sect. Porphyrochitonium and is characterized by its semi-intact, persistent cataphylls, terete petioles, the large oblong-elliptic blades which are dark green and velvety above and much paler and semiglossy below, with numerous primary lateral veins as well as by its green, reflexed spathe and the greenish white, narrowly cylindroid spadix.

Terrestrial or hemi-epiphytic, to 2 m; internodes short or to 3 cm long, 1.0–2.7 cm diam.; cataphyll persisting semi-intact. Leaves with petioles terete, 26.5–78.4 cm long (averaging 53.9), 0.2-0.7 cm diam., drying coarsely ribbed, medium brown; blades ovate-elliptic, 17.7-56.0 cm long, 7.3-20.8 wide, 2.0-3.3 times longer than broad, 0.5-0.8 times as long as petiole (averaging 0.7), broadly acuminate at apex, broadly cuneate at base, moderately coriaceous, moderately glossy, olive-green, velvety, much paler and semiglossy below, drying dark brownish green above, semiglossy, light grayish green below; midrib narrowly rounded and paler above and below, drying acute and more or less concolorous above, narrowly rounded and more or less concolorous below; primary lateral veins 14-23 per side, quilted-sunken above, pleated-raised below, departing midrib at 40–60°; collective veins more prominent than primary lateral veins, arising 0.7 cm from the margin at the base and running to 0.2 cm near the apex; upper surface with scattered, minute, dark, gland-like punctations; lower surface drying textured and finely granular with abundant, reddish brown, glandular punctations. Inflorescence erect; peduncle 53.7 cm long, 0.4 cm diam., drying coarsely ribbed and dark brown; spathe green, reflexed spreading, 11 cm long, 1.3 cm wide; spadix greenish white, semiglossy, 14.2 cm long, 8 mm diam.; flowers 6-7 per spiral, tepals 4 sided. Infructescence not seen.

Distribution and ecology — *Anthurium victoriense* is endemic to Colombia, known only from Valle del Cauca Department on the western slope of the Cordillera Occidentale in a Montane rain forest life zone.

Etymology — The species epithet refers to the type locality at Vereda La Victoria in Valle del Cauca Department.

Comments — *Anthurium victoriense* perhaps most closely resembles *A. claudiae* Croat but that species has longer petioles, peduncles, spathes and spadices, dries dark brown on the upper surface and is more attenuated at the base with a more prominent and narrower acumen at the apex and has fewer primary lateral veins (up to 14 pairs). In addition, *Anthurium victoriense* is found at 1450–1480 m in a Montane rain forest life zone whereas *A. claudiae* is found at 2200 m in Premontane wet forest. Owing to the large size and shape of its leaves, *Anthurium victoriense* may be confused with *A. joaquinense* Croat & D.C.Bay and *A. amargalense* Croat & M.M.Mora.


Figure 182. Anthurium victoriense Croat. Holotype: Croat & Gaskin 80411.



Figure 183. Anthurium vlastimilii Croat. Holotype: Zak & Espinoza 4727.

Both *Anthurium amargalense* and *A. joaquinense* are found below 150 m in a Tropical wet forest life zone. The blades of Anthurium amargalense are more ovate and those of A. joaquinense are narrower than the blades of A. victoriense.

In the Lucid Anthurium Key, *Anthurium victoriense* also tracks with *A. acaimense* Croat, which differs by having an average of 26 primary lateral veins (versus and average of 19 per side), narrower blades with length/width ratio averaging 4 (versus 2.6) and a smaller spathe, 3.5×0.5 cm (versus 11 ×x 1.3); *A. apaporanum* R.E.Schult. may be distinguished by it shorter petioles, averaging 28 cm long (versus averaging 54 cm for *A. victoriense*), having primary lateral veins that arise at wider angles (55–70°) and by lacking glandular punctations on the upper surface of the blade and *A. margaricarpum*, which differs by having proportionately shorter petioles, 15–25 cm (versus 27–78), proportionately narrow blade which are broader above the middle.

Paratype: COLOMBIA. Valle del Cauca, along the road between Queremal and Anchicayá on old Cali-Buenaventura Road, 03°32'23"N, 76°45'26", 1250 m, 26 July 1997, *T.B. Croat & J. F. Gaskin 80345* (MO).

Anthurium vlastimilii Croat, sp. nov. — Type: Ecuador. Morona-Santiago: Teneco "Garza" oil well, ca. 35 km NW of Montalvo, hills with short trees and red dystrandept soil, 01°49'S, 76°42'W, 260 m, 2–12 July 1989, *V. Zak & S. Espinoza 4727* (holotype, MO-3789018; isotype, QCNE (not seen). Figure 183.

Diagnosis: Anthurium vlastimilii, a member of sect. *Decurrentia*, is distinguished by its minute size, deciduous caudate-acuminate cataphylls, numerous slender roots, narrowly oblanceolate, grayish drying blades with close collective veins, upper leaf surfaces with granules and warts (colorless to white), a very slender peduncle, green spathe and spadix, and coarse and rhomboidal lateral tepals. Although this species appears superficially to be a *Porphyrochitonium*, with features such as the collective vein, typical blade shape and short internode length, it does not have any noticeable glandular punctations.

Epiphytic; stems short; cataphylls 3–4 cm long, drying pale reddish brown, caudate-acuminate at apex, fibers persisting intact, eventually deciduous; roots slender, fine, numerous, branched, less than 1 mm diam. *Leaves* with petioles 2–3 cm long, ¹/₃–¹/₄ as long as blades, drying 1 mm diam., drying sulcate, with narrow ridges, drying grayish green; geniculum not obvious; blades elliptic to oblanceolate, 9–11 cm long, 2–3 cm wide, 3.9–4.5 times longer than wide, short-acuminate at apex (acumen ca. 1.2 cm long), attenuate at base, subcoriaceous, drying gray-green, weakly glossy above, paler and glossier, gray-green below; midrib drying raised

on both surfaces, more prominently so on lower surface, drying yellowish green on lower surface and gray-green on upper surface; primary lateral veins 7–9 per side, departing midrib at 40–50°, drying concolorous on both surfaces; tertiary veins drying prominulous on lower surface; collective vein arising from near the base, from the first primary lateral vein, 0.8–1.4 mm from margin, drying sharply raised on lower surface; antemarginal vein present, arising from base; upper surface eglandular, drying minutely granular (granules concolorous to white), and with warty raised areas,; lower surface smoother, eglandular. *Inflorescence* with peduncle 5 cm long, drying 0.3 mm diam.; spathe green, reflexed, lanceolate, 1.7 cm long, 3 mm wide; spadix green, 2.5 cm long, tapering, 2 mm diam. at base, 1 mm diam. at apex, sessile; flowers drying black, 1–2 visible per spiral, 1.8–2.1 mm long, 2.0–2.5 mm wide; lateral tepals coarse and rhomboidal, 1.0–1.2 mm wide, inner margin slightly 2-sided, outer margin 2-sided. *Infurtescence* not seen.

Distribution and ecology — *Anthurium vlastimilii* is endemic to Ecuador, known from the region of Morona-Santiago, growing in a *Tropical moist forest* life zone.

Etymology — *Anthurium vlastimilii* is named for Vlastimil Zak who helped to collect the type specimen.

Comments — In the Lucid Anthurium Key, *Anthurium vlastimilii* tracks to *A. caulorhhizum* Sodiro from the Pacific slope of northwest Ecuador, which differs by having much larger, reddish brown-drying leaf blades and a long peduncle, more than 15 cm long; *A. decurrens* Poepp. which differs by its long internodes, larger leaf blades (16–36 cm long) and long-stipitate spadix; *A. sarmentosa* Engl., which differs by its larger (18–20 cm long), more ovate, reddish brown-drying blades and reddish spadix; *A. sydneyi* Croat & Lingan, which differs by the much longer petioles (mostly more than 5 cm long), longer spadix (3.6–7.2 cm long) and *A. whitmomei* Croat & Lingan which differs by its larger, more blackish drying, prominently acuminate blade and its 4-sided, 4-winged peduncle.

Anthurium yatuense Croat, sp. nov. — Type: VENEZUELA. Amazonas: Río Yatuá, 01°16'35"N, 66°06'50"W, 84 m, Rubiaceae and Palms dominant, black water, sand-clay mix, many epiphytes, 2 Feb 2005, *K.M. Redden, R. Williams, W. Diaz, O. Leon, O. Santaella, D. Garcia and A. Garcia 3483* (holotype, US). Figure 184.

Diagnosis: Anthurium yatuense is a member of sect. *Porphyrochitonium* and is characterized by intact, persistent cataphylls, large oblanceolate blades which are more than twice as long as petioles, primary lateral veins which are scarcely distinguishable from the numerous interprimary veins, more prominent collective veins and the presence of dark glandular punctations

and white pustules on the under surfaces of the blades as well as a long-pedunculate inflorescence with a green, lanceolate spathe, and white sessile spadix with 5–6 flowers visible per spiral.

Epiphyte; internodes short, 1-2 cm long, 1 cm diam.; cataphylls persisting as reddish brown fibers 5-8 cm long, Leaves 61-68 cm long; petioles 21.8-23.6 cm long, 4 mm diam., C-shaped adaxially with acute lateral margins and a medial rib; geniculum 1.6 cm long drying medium gray-green; blades oblanceolate, 40-43 cm long, 8.6-11 cm wide, 3.9-4.4 times longer than wide, 1.7–2.2 times longer than petiole, abruptly acuminate and downturned at the apex with a 1 mm apiculum, acute at base, subcoriaceous, drying semiglossy, dark gray-green above, semiglossy, light gray-green, moderately dark brown-pustular below; midrib broadly rounded and finely ribbed on upper and lower surfaces; primary lateral veins 20-25 per side, scarcely more prominent than interprimary veins, departing midrib at 40° - 50° ; collective veins arising from the base, running 1 cm from the margin, more prominent on the lower surface; upper surface eglandular, drying smooth, weakly granular at higher magnifications; lower surface dark glandular-punctate, drying with scattered colorless pustules. Inflorescence erect, 40.3 cm long; peduncle 31.5 cm long, 2.5 mm diam., sulcate adaxially, drying finely ribbed and medium brown; spathe green, lanceolate, 4.8 cm long, 1 cm wide, drying light gray-green; spadix white, sessile, 8.8 cm long, 6 mm diam., tapering slightly, drying dark brown; flowers 5-6 visible per spiral, 2.1 mm long, 2.0 mm wide, lateral tepals 1.3 mm wide, outer margins straight, three-sided, inner margins broadly rounded with slight concave dip at margins, surface smooth with globular pale cellular inclusions. Infructescence not seen.

Distribution and ecology — *Anthurium yatuense* is known only from the type location in Amazonas State near the Yatuá River in Venezuela in a Tropical wet forest life zone.

Etymology — *Anthurium yatuense* is named for the Río Yatuá in Amazonas State where it was found.

Comments — Anthurium apaporanum, A. bakeri, and A. collettianum Croat are similar in appearance and may be confused with A. yatuense, but A. apaporanum has inconspicuous collective veins which run 1–2 mm from the margin of the blade; A. bakeri has blades which are conspicuously with the collective vein markedly sunken and the spadix is longer and thicker than in A. yatuense whereas A. collettianum has fewer primary lateral veins that are loop-connected to the collective veins. In addition, Anthurium collettianum lacks white pustules on the lower surface of the blade. In the Lucid Anthurium Key, Anthurium yatuense tracks with A. huanucense Engl. which has very short petioles (4–7 cm), smaller, narrower blades



Figure 184. Anthurium yatuense Croat. Holotype: Redden 3483.





Figure 185. Anthurium zakii Croat. Holotype: Zak 1302.



Figure 186. Anthurium zakii Croat. Paratype: Rodriguez 580.

 $(23-27 \times 4-5 \text{ cm})$ and only 15 primary lateral veins per side; *A. quinquesulcatum* Sodiro which has shorter petioles (5–15 cm), shorter blades (20–30 cm long) and only 12–15 primary lateral veins per side; *A. wattii* Croat & D.C.Bay which is from Baja Colima, Colombia, and differs by having blades widest near the middle, a longer spathe (8–15 cm) and a spadix which is colored green, yellowish or orangish.

Anthurium zakii Croat, **sp. nov.** — Type: ECUADOR. Pichincha: Carretera Quito-San Juan-Chiriboga-Empalme, Km 59, 16 km NW of the main Quito–Santo Domingo Hwy at El Empalme, vic. of Reserva Ecológica "Río Guajalito", ca. 00°38'S, 78°49'W, 1700–2000 m, 23 Sep. 1986, *V. Zak 1302* (holotype, MO-3583441; isotype QCA, US-3583440). **Figures 185 & 186**.

Diagnosis: Anthurium zakii is a member of sect. *Porphyrochitonium* and is characterized by its elongate stem, internodes typically much longer than broad (unusual for sect. *Porphyrochitonium*), persistent, pale brown cataphyll fibers scattered along the stem, its subterete, sulcate petioles which are about as long as the blades, abruptly acuminate blades which are elliptic, glandular-punctate on both surfaces, drying yellow-brown on the lower surface and have a single pair of collective veins arising at or very near the base, as well as by its long-pedunculate, linear-lanceolate, green spathe and narrowly long-tapered, green to yellowish spadix and red berries.

Terrestrial and climbing or epiphytic; internodes 2–4 cm long, 0.8 cm diam.; cataphylls persisting with red-brown fibers, 4–6 cm long, 0.5 cm wide. *Leaves* 47.3 cm long with petioles subterete, 16.2–30.5 cm long (averaging 22.7 cm) 0.3–0.4 cm diam., drying 5-ribbed with sulcus adaxially and convex abaxially, medium brown; blades lanceolate, 17.8–30.5 cm long and 4.8–11.2 cm wide, 2.4–3.7 times longer than wide, blade 0.9–1.4 (averaging 1.1) times longer than petiole, tapered acuminate at apex, obtuse at base, subcoriaceous, drying drying semiglossy, dark greenish gray above, semiglossy, medium yellow-brown below; midrib convex, finely ribbed, adaxially and abaxially, drying medium brown; primary lateral veins less conspicuous, 10–26 per side, departing midrib at 40°–50°; collective veins more conspicuous, arising from the base, running 1.0–1.7 cm from the margin, forming prominent arches where they join the primary lateral veins; upper surface reticulate, with scattered dark glandular-punctations; lower surface densely dark glandular-punctate. *Inflorescence* 63 cm long, erect; peduncle drying terete, medium brown; spathe green, lanceolate, 7–12 cm long, 0.3–1.2 cm wide, drying dark brown; spadix green to yellow, 9.5–13.2 (averaging 10.7), 0.3–0.4 cm wide, drying dark brown. *Infructescence* with red berries. **Distribution and ecology** — *Anthurium zakii* is endemic to Ecuador, known only from the type locality from the slopes of Volcán Pichincha in Pichincha Province at 1700–2000 m in a Montane wet forest life zone.

Etymology — *Anthurium zakii* is named for Ecuadorian collector Vlastimil Zak who collected the type specimen.

Comments — Anthurium zakii keys out in the Lucid Anthurium Key to A. cachabianum Sodiro, a species from the Lita-San Lorenzo region in Esmeraldas Province that has shorter, much thicker internodes, much larger leaves up to 20 cm wide and white berries. Another species suggested by the Lucid Anthurium Key was A. septuplinervium Sodiro but that species has larger leaves, more than 40 cm long and up to 20 cm wide, and has 2 pairs of collective veins instead of a single pair.

Paratypes: ECUADOR. Pichincha: Carretera Quito-San Juan-Chiriboga-Empalme, Km 59 a 15 km al NO de la carretera. Colecciones en bosque nublado de vegetación primario en bioma mesotermica e hygrófilo, 1700–2000 m, 23 Sep 1986, *V. Zak 1309* (MO); Reserva Floristica-Ecologica "Río Guajalito", 00°13'53"S, 79°48'10"W, 1800–2000 m, 25 Jan 1992, *J. Jaramillo & E. Grijalva 14584* (QCA, NY) and *14627* (QCA); 79°49'10"W, 00°13'38"S, 1800–2000 m, 9 Sep 1994, *J. Mutke 30* (QCA); Santo Domingo de los Colorados, a 3.5 km al NE de la carretera, estribationes occidentales del Volcán Pichincha, 2200 m, 14 Dec 1986, *J. Rodriguez 580* (QCA).

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Anthurium sect. Porphyrochitoniun	2	Species							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. abelardoi	1							1	
A. acutangulum	1					1	1	1	1
A. alatiattenuatum	1								1
A. alatipedunculatum	1							1	
A. alatipetiolatum	1								1
A. albifructum	1								1
A. alexespinosae	1								1
A. alticola	1							1	1
A. ariztutense	1								1
A. attenuatifolium	1								1
A. austinsmithii	1						1	1	
A. bajobonitense	1								1
A. bakeri	1	1	1			1	1	1	1
A. barryi	1								1
A. belenense	1								1
A. bergii	1								1
A. berguidoi	1								1
A. bicollectivum	1								1
A. billdarcyi	1								1
A. billhahnii	1								1
A. botijaense	1								1
A. bratsiense	1							1	
A. brevispadix	1								1
A. brunneum	1								1
A. caloveboranum	1								1
A. carrionii	1								1
A. cartiense	1								1
A. chiriquense	1							1	1
A. churchillii	1								1
A. circinatum	1								1
A. collinsii	1								1

Anthurium sect. Porphyrochitonium	2	Species							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. comincoense	1								1
A. crassilaminum	1								1
A. crassiradix									
ssp. <i>crassiradix</i>	1								1
A. crassiradix ssp. purpureospadix									1
A. crassitepalum	1								1
A. cuadrosii	1								1
A. cuasicanum	1								1
A. curvilaminum	1								1
A. deneversii	1								1
A. dichrophyllum	1								1
A. diversurense ,	1								1
A. duocostatum	1								1
A. durandii	1							1	1
A. dwyeri	1							1	1
A. edtysonii	1								1
A. flagellum	1								1
A. floresii	1								1
A. fragrantissimum	1								1
A. friedrichsthalii	1						1	1	1
A. gentryi	1								1
A. glandulicostum	1								1
A. gracililaminum	1								1
A. gracilispadix	1								1
A. granditepalum	1								1
A. gregneversii	1								1
A. guaboense	1								1
A. guadalupeae	1								1
A. heraclioanum	1								1
A. hughchurchillii	1								1

The current status of Anthurium sect. Porphyrochitonium ...

Anthurium sect. Porphyrochitonium	2				Specie	es			
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. iguanitense	1								1
A. insolitum	1								1
A. jefense	1								1
A. jicoteense	1							1	
A. jimfolsomii	1								1
A. kallunkiae	1								1
A. kensytsmae	1								1
A. kittredgeanum	1								1
A. lactifructum	1								1
A. lancifolium	1						1	1	1
A. lellingeri	1								1
A. longistipitatum	1							1	1
A. loratum	1							1	
A. louisii	1							1	
A. melastomatis	1								1
A. mercadoi	1								1
A. minimum	1								1
A. monroi	1								1
A. morrisii	1								1
A. muscidiradix	1								1
A. neei	1								1
A. nutans	1							1	
A. orosiense	1							1	
A. oxystachyum	1								1
A. pageanum	1							1	1
A. paludosum	1							1	1
A. paulmaasii	1								1
A. pendens	1							1	1
A. perangustum	1								1
A. pirrense	1								1
A. polancoi	1								1

Anthurium sect. Porphyrochitonium	ı	Species							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. ramonense	1						1	1	1
A. redolens	1								1
A. robertii	1								1
A. rupicola	1								1
A. sabanitense	1								1
A. sagawae	1								1
A. scherzerianum	1		1					1	
A. scottmorii	1								1
A. sknappiae	1								1
A. stockwellii	1								1
A. subrotundum	1								1
A. sueae	1								1
A. sukutense	1							1	
A. tacarcunense	1								1
A. tarrazuense	1							1	
A. tayuticense	1							1	
A. terryae	1								1
A. toroense	1								1
A. tsaiae	1								1
A. tscuiense	1								1
A. tuquesense	1								1
A. tutense	1								1
A. unguiaense	1								
A. utleyorum	1							1	
A. vallense	1								1
A. vanninii	1								1
A. veraguense	1								1
A. wendlingeri var. wendlingeri	1						1	1	1
A. wendlingeri var. horichii								1	

Anthurium sect. Porphyrochitonium	ı	Species							
	#	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. wiehleri	1								1
A. zachdufranianum	1								1
A. zapatae	1								1
A. zhui	1								1
Porphyrochitonium totals	122	1	2	0	0	2	7	29	108
New <i>Porphyrochitonium</i> in this paper						0	0	9	59

The current status of Anthurium sect. Porphyrochitonium ...

Anthurium sect. Porpbyrochitonium		Endemics							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. abelardoi	1							1	
A. acutangulum	1								
A. alatiattenuatum	1								1
A. alatipedunculatum	1							1	
A. alatipetiolatum	1								1
A. albifructum	1								1
A. alexespinosae	1								1
A. alticola	1								
A. ariztutense	1								1
A. attenuatifolium	1								1
A. austinsmithii	1								
A. bajobonitense	1								1
A. bakeri	1								
A. barryi	1								1
A. belenense	1								1
A. bergii	1								1
A. berguidoi	1								1
A. bicollectivum	1								1
A. billdarcyi	1								1
A. billhahnii	1								1
A. botijaense	1								1
A. bratsiense	1							1	
A. brevispadix	1								1
A. brunneum	1								1
A. caloveboranum	1								1
A. carrionii	1								1
A. cartiense	1								1
A. chiriquense	1								
A. churchillii	1								1
A. circinatum	1								1
A. collinsii	1								1

Anthurium sect. Porphyrochitonium		Endemics							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. comincoense	1								1
A. crassilaminum	1								1
A. crassiradix	1								1
ssp. crassiraaix	1								1
A. crasstraatx ssp. purpureospadix									1
A. crassitepalum	1								1
A. cuadrosii	1								1
A. cuasicanum	1								1
A. curvilaminum	1								1
A. deneversii	1								1
A. dichrophyllum	1								1
A. diversurense ,	1								1
A. duocostatum	1								1
A. durandii	1								
A. dwyeri	1								
A. edtysonii	1								1
A. flagellum	1								1
A. floresii	1								1
A. fragrantissimum	1								
A. friedrichsthalii	1								
A. gentryi	1								1
A. glandulicostum	1								1
A. gracililaminum	1								1
A. gracilispadix	1								1
A. granditepalum	1								1
A. gregneversii	1								1
A. guaboense	1								1
A. guadalupeae	1								1
A. heraclioanum	1								1
A. hughchurchillii	1								1

The current status of Anthurium sect. Porphyrochitonium ...

Anthurium sect. Porphyrochitonium		Endemics							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. iguanitense	1								1
A. insolitum	1								1
A. jefense	1								1
A. jicoteense	1							1	
A. jimfolsomii	1								1
A. kallunkiae	1								1
A. kensytsmae	1								1
A. kittredgeanum	1								1
A. lactifructum	1								1
A. lancifolium	1								
A. lellingeri	1								1
A. longistipitatum	1								
A. loratum	1							1	
A. louisii	1							1	
A. melastomatis	1								1
A. mercadoi	1								1
A. minimum	1								1
A. monroi	1								1
A. morrisii	1								1
A. muscidiradix	1								1
A. neei	1								1
A. nutans	1							1	
A. orosiense	1							1	
A. oxystachyum	1								1
A. pageanum	1								
A. paludosum	1								
A. paulmaasii	1								1
A. pendens	1								
A. perangustum	1								1
A. pirrense	1								1
A. polancoi	1								1

Anthurium sect. Porphyrochitonium		Endemics							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. ramonense	1								
A. redolens	1								
A. robertii	1								1
A. rupicola	1								1
A. sabanitense	1								1
A. sagawae	1								1
A. scherzerianum	1								
A. scottmorii	1								1
A. sknappiae	1								1
A. stockwellii	1								1
A. subrotundum	1								1
A. sueae	1								1
A. sukutense	1							1	
A. tacarcunense	1								1
A. tarrazuense	1							1	
A. tayuticense	1							1	
A. terryae	1								1
A. toroense	1								1
A. tsaiae	1								1
A. tscuiense	1								1
A. tuquesense	1								1
A. tutense	1								1
A. unguiaense	1								
A. utleyorum	1							1	
A. vallense	1								
A. vanninii	1								1
A. veraguense	1								1
A. wendlingeri									
var. wendlingeri	1								
A. wendlingeri var. horichii								1	

Anthurium sect. Porphyrochitonium		Endemics							
	No.	Mex	Guat	Bel	E. Salv	Hon	Nic	CR	Pan
A. wiehleri	1								1
A. zachdufranianum	1								1
A. zapatae	1								1
A. zhui	1								1
Porphyrochitonium totals	122	0	0	0	0	0	0	13	91
New <i>Porphyrochitonium</i> in this paper						0	0	9	59

Anthurium sect.	SPECIES						
Porphyrochitonium	species	COL	EC	VEN	Gui		
A. abelardoi	1						
A. acutangulum	1	1					
A. alatiattenuatum	1						
A. alatipedunculatum	1						
A. alatipetiolatum	1						
A. albifructum	1						
A. alexespinosae	1						
A. alticola	1						
A. ariztutense	1						
A. attenuatifolium	1						
A. austinsmithii	1						
A. bajobonitense	1						
A. bakeri	1	1	1	1	1		
A. barryi	1						
A. belenense	1						
A. bergii	1						
A. berguidoi	1						
A. bicollectivum	1						
A. billdarcyi	1						
A. billhahnii	1						
A. botijaense	1						
A. bratsiense	1						
A. brevispadix	1						
A. brunneum	1						
A. caloveboranum	1						
A. carrionii	1						
A. cartiense	1						
A. chiriquense	1						
A. churchillii	1						
A. circinatum	1						
A. collinsii	1						

Anthurium sect.	SPECIES						
Porphyrochitonium	species	COL	EC	VEN	Gui		
A. comincoense	1						
A. crassilaminum	1						
A. crassiradix							
ssp. crassiradix	1						
A. crassiradix							
ssp. purpureospadix							
A. crassitepalum	1						
A. cuadrosii	1						
A. cuasicanum	1						
A. curvilaminum	1						
A. deneversii	1						
A. dichrophyllum	1						
A. diversurense ,	1						
A. duocostatum	1						
A. durandii	1						
A. dwyeri	1						
A. edtysonii	1						
A. flagellum	1						
A. floresii	1						
A. fragrantissimum	1	1	1	1	1		
A. friedrichsthalii	1	1	1				
A. gentryi	1						
A. glandulicostum	1						
A. gracililaminum	1						
A. gracilispadix	1						
A. granditepalum	1						
A. gregneversii	1						
A. guaboense	1						
A. guadalupeae	1						
A. heraclioanum	1						
A. hughchurchillii	1						

Anthurium sect.	SPECIES				
Porphyrochitonium	species	COL	EC	VEN	Gui
A. iguanitense	1				
A. insolitum	1				
A. jefense	1				
A. jicoteense	1				
A. jimfolsomii	1				
A. kallunkiae	1				
A. kensytsmae	1				
A. kittredgeanum	1				
A. lactifructum	1				
A. lancifolium Schott	1	1			
A. lellingeri	1				
A. longistipitatum	1				
A. loratum	1				
A. louisii	1				
A. melastomatis	1				
A. mercadoi	1				
A. minimum	1				
A. monroi	1				
A. morrisii	1				
A. muscidiradix	1				
A. neei	1				
A. nutans	1				
A. orosiense	1				
A. oxystachyum	1				
A. pageanum	1				
A. paludosum	1	1	1		
A. paulmaasii	1				
A. pendens	1	1			
A. perangustum	1				
A. pirrense	1				
A. polancoi	1				

Anthurium sect.	SPECIES				
Porphyrochitonium	species	COL	EC	VEN	Gui
A. ramonense	1	1			
A. redolens	1	1			
A. robertii	1				
A. rupicola	1				
A. sabanitense	1				
A. sagawae	1				
A. scherzerianum	1				
A. scottmorii	1				
A. sknappiae	1				
A. stockwellii	1				
A. subrotundum	1				
A. sueae	1				
A. sukutense	1				
A. tacarcunense	1				
A. tarrazuense	1				
A. tayuticense	1				
A. terryae	1				
A. toroense	1				
A. tsaiae	1				
A. tscuiense	1				
A. tuquesense	1				
A. tutense	1				
A. unguiaense	1	1			
A. utleyorum	1				
A. vallense	1	1			
A. vanninii	1				
A. veraguense	1				
A. wendlingeri					
var. wendlingeri	1	1			
A. wendlingeri					
A. wiehleri	1				

Anthurium sect.	SPECIES					
Porphyrochitonium	species	COL	EC	VEN	Gui	
A. zachdufranianum	1					
A. zapatae	1					
A. zhui	1					
Porphyrochitonium totals	122	12	4	2	2	
New Porphyrochitonium						
in this paper						