New Species of *Anthurium* (Araceae) from South America

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ABSTRACT

Eleven new species of *Anthurium* (Araceae) are described as new: *Anthurium apiaense* Croat, *A. aylwardianum* Croat, *A. benktsparrei* Croat, *A. bicordoense* Croat, *A. diversicaudex* Croat, *A. mapiriense* Croat, *A. molaui* Croat, *A. porcesitoense* Croat, *A. punkuyocense* Croat, *A. riojaense* Croat, and *A. straminopetiolum* Croat. All are members of section *Cardiolonchium*, except two of the species, *A. bicordoense* and *A. porcesitoense*, which are members of section *Xialophyllum*. Five of the new species are from Peru but *A. apiaense*, *A. bicordoense* and *A. porcesitoense* are from Colombia and *A. benktsparrei*, *A. diversicaudex* and *A. molaui* from Ecuador.

KEY WORDS

*Anthurium*, Araceae, Colombia, Peru, Ecuador, new species.

INTRODUCTION

This paper is another in a series that studies South American *Anthurium*, especially species from the western Andes where speciation is highest. Both sect. *Cardiolonchium* (with 9 of the 11 new species in this present paper) and sect. *Xialophyllum*, remain poorly known with no revision since Engler’s revision at the turn of the last century (Engler, 1905). The new species were discovered through routine attempts to identify undetermined collections at the Missouri Botanical Garden. Both sect. *Cardiolonchium* and sect. *Xialophyllium* have blades which typically dry greenish (especially in the case of sect. *Cardiolonchium*). While sect. *Xialophyllium* typically have elongated internodes and elongated leaf blades, some collections of section *Xialophyllium* may have short internodes. Similarly section *Cardiolonchium* which typically has larger, ovate-cordate or sagittate blades and short internodes may sometimes have internodes longer than broad. Molecular studies currently being made on *Anthurium* at the sectional level at the Missouri Botanical Garden and the University of Missouri-St. Louis will hopefully allow a better circumscription of these sections.

*Anthurium apiaense* Croat, sp. nov.

Type: COLOMBIA. Risaralda: along road between Apia and Pueblorico, at Km 44.1, 14.6 km NW of Apia,
Anthurium apiaense is endemic to Colombia known only from the type locality in Risaralda Department between Apia and Pueblorico at ca. 1,200 m in a Montane wet forest life zone (Holdridge, 1971).

The species is believed to be a member of sect. Cardiolonchium, despite its dark gray to olive-green drying color and its long internodes. It is characterized by its terrestrial to hemiepiphytic habit loosely attached to trees, cataphylls semi-intact at upper nodes then deciduous, petioles subterete, narrowly and acutely flattened and sometimes with an extra acute low rib on the sides, blades narrowly ovate-sagittate with a hippocrepiform sinus, 7-8 basal veins, 8-10 primary lateral veins, collective veins from the 1st pair of basal veins, as well as by the green, lanceolate spathe and the dark purple, narrowly tapered spadix.

The species is most similar to Anthurium nigrescens Engl. but that species typically has smaller blades and a green or yellow-green spadix.

The species also closely resembles Anthurium diversicaudex Croat (also described in this paper), a species with a similar habit and similar stems and leaves from the Lita-San Lorenzo region in Ecuador but that species has a creamy white spadix, blades with a higher length to width ratio (1.6-1.9 times longer than broad)
compared to 1.25–1.5 times longer than broad for *A. apiaense*), mostly hippocrepiform posterior lobes, more prominent primary lateral veins, collective veins arising from 6th or 7th basal veins, as well as by having the posterior rib naked 3.0–4.5 cm (versus only 2 cm for *A. apiaense*).

In terms of habit the species is closest to another Colombian species, the widespread *Anthurium martae* Croat & Castaño, but that species differs in having the spadix greenish.

The epithet “apiaense” refers to the type locality near Apia.

*Anthurium aylwardianum* Croat, sp. nov. Type: PERU. Huanuco: Leoncio Prado Province, Distrito Padra Abad, along road from Tingo Maria to Pucalpa, 2.4 km N of San Isidro, 09°13'18"S, 75°49'40"W, 891 m, 3 June 1998, T. B. Croat & M. Sizemore 81671 (holotype, MO-04951780; isotypes, K, US, USM). Fig. 1 B.

Internodia brevia, 3.5 cm diam.; cataphylla pro parte maxima decidua; petiolus subteres, 47–56 cm longus; lamina 32–43.5 cm longa, 23.2–39 cm lata; nervis primariis lateralibus 7–9 utroque; pedunculus 22 cm longus; spatha 10 cm longa, 2 cm lata; spadix 2 cm longus, 6 mm diam. in siccus.

Terrestrial on steep bank; internodes short, 3.5 cm diam., dark green; cataphylls deciduous except for a few short pale fibers which persist; cataphyll scars conspicuous­ly raised; petioles 47–56 cm long, subterete, obtusely flattened and sulcate adaxially, faintly ridged (3–5) on either side toward upper edge, dark green, matte, drying matte, greenish yellow-brown; ge­niculum much thicker, narrowly and minutely dark granular-speckled. INFLORES­CENCE erect; peduncles terete, 22 cm long matte; spathe erect-spreading, 14 cm long, 2 cm wide, medium green; stipe ca. 7 cm long; spadix long-stipitate (stipe ca. 7 cm long) 20 cm long, drying ca. 6 mm diam., dark green and weakly glossy, smooth.

*Anthurium aylwardianum* is endemic to Peru, known only from the type locality in Huanuco Department in the region of La Divisora along the Huanuco-Ucayali Departmental border at 891 m in a Pre­mont­tane wet forest life zone transitioning to Tropical moist forest life zone.

The species is a member of sect. *Cardi­olonchium*, characterized by its terrestrial habit, short, thick internodes, cataphylls mostly deciduous, petioles suberete and obtusely flattened, brownish-drying blades sagittate-hastate with a parabolic sinus and especially by the inflorescence with the green lanceolate spathe and the long-stipitate dark green spadix.

In the Lucid *Anthurium* Key, *Anthurium aylwardianum* keys to *A. breviscapum*
Poepp., which differs in having long, moderately narrow internodes, *A. cymbispathum* Sodiro which differs by having a weakly stipitate, short-tapered spadix and scabrid veins on the lower surface and *A. nigrescens* Engl. which differs in having longer internodes and blades with more prominent tertiary veins. Based on the size and shape of the blades, *Anthurium aylwardianum* appears to be closest in appearance to *A. steubelii* Eng!. from Nariño Department in Colombia on Cerro Mayasquer located at about 2,500 m near the Ecuadorian border (0°53′N, 78°04′W) but no species from that part of the western Andes of Colombia and Ecuador on the Pacific slope is known to occur in the Amazon basin.

The species is named in honor of Volunteer Researcher, Steve Aylward, of the Missouri Botanical Garden. Steve regularly keys out undetermined plants to find out if they are likely to be new, just as he did in the case of this specimen which proved to be a new species. Through Steve’s efforts, we have isolated and determined many species, a great number have proved to be new to science, including this one being named in his honor. Steve volunteers about 20 hours each week and his skills as a former Latin teacher are also helpful to our research program.

*Anthurium benktsparrei* Croat, sp. nov.


Fig. 1 C–D.

Internodia 1–5 cm longa, 5–12 mm diam.; cataphylla 6–18 cm longa; petiolum 13–60 cm longus; lamina ovata-sagittata ad ovata-triangulata-sagittata, 15.8–44.5 cm longa, 7.1–25.3 cm lata; nervis primariis lateralibus 5–11 utroque; pedunculus 10.9–41.8 cm longus; spatha decidua; spadix 2.8–10.4 cm longus.

Terrestrial scandent herb in the understore; leaves terminally clustered on an erect stem, internodes 1–5 cm long, 5–
some collections have a noticeably longer indumentum being densely puberulent-villous; collective veins sunken above, raised below, 2–6 (–8) mm from margins, arising usually from the 1st pair of basal veins, sometimes from the lower 1st or 2nd pair of primary lateral veins, frequently from the 2nd or 3rd pair of basal veins (rarely from the 4th pair of basal veins). INFLORESCENCES erect, 14–48 cm in length; peduncle 10.9–41.8 cm long, flattened with broad, convex rib adaxially; spadix 3.8–11 cm long, 7–23 mm wide, green to light green, oblong, acuminate, deciduous; spathe 2.8–10.4 cm long, pink, light violet-red, pinkish red, purplish to red, blackish purple, deep blue to bluish violet, odorless, cylindrical to cylindroid-tapered, matte; flowers 4 visible per spiral, 1.5–4.2 mm long, 1.2–3.9 mm wide; tepals minutely granular, very pale; lateral tepals .5–1.2 mm wide, inner margins rounded, outer margins 2–3-sided; pistils early-emergent, whitish. Fruits not seen.

Antburium benktsparrei is known from southern Ecuador and northern Peru at 1,500–3,000 m in a Montane wet forest life zone.

The species is a member of sect. Cardiolonchium, characterized by its terrestrial, sometime sub-scendent habit, internodes typically longer than broad, suberete weakly sulcate petioles, the ovate-cordate to ovate-triangular-sagittate greenish-drying blades with a typically hippocrepiform sinus as well as by the reddish or purplish cylindrical to cylindroid-tapered spadix. A. dolichocnemum

Another character typical of the species is the puberulous or frosty type of pubescence on the major veins of the lower surface. Antburium benktsparrei is most easily confused with A. dolichocnemum Croat and A. ionanthum Croat. The former differs in having the leaf blades much more prominently constricted on the anterior lobe and the latter differs in having the blade with more or less ovate blades. While most specimens of Antburium benktsparrei have the lower surface granular-puberulent (appearing like a frost) some specimens have a longer puberulent indumentum. There seems to be no graphic correlation involved in the distribution of the pubescence types. The specimens with puberulent indumentum are represented by Harling & Andersson 24078 from 10 km E of Paquissha at 1,400–1,500 m and van der Werff 12494 from the Province of Bolivar between Chillanes & El Tambo at 1,700–2,300 m. One collection (Harling & Lennart Andersson 21283) from the Rio Palanda at crossing with Zumba Road (04°38'52"S, 79°07'55"W), is not listed among the paratypes but it is nevertheless closely related to Antburium benktsparrei. This specimen differs in having a longer subvillous type of pubescence and occurs 300 m lower in elevation than A. benktsparrei.

Two other collections which are similar to Antburium benktsparrei are not listed among the paratypes. These specimens represent a species which seem closely related to A. benktsparrei but the leaves are completely glabrous. The specimens are Leimbbeck & Windeballe 342 from Loja Provence in Podocarpus National Park north of the Cajanuma Visitors Center from 1,700–2,300 m, and a Harling & Andersson collection from near Zamora in Podocarpus National Park. These may represent some other species.

The species is named in honor of Swedish botanist, Baron Benkt Sparre, one of the original authors of the Flora of Ecuador, then based at the Rijksherbarium in Stockholm. Benkt Sparre, often accompanied by his wife, collected many Aracaeae in the early days of exploration by the Swedes. Sparre told the senior author that he made a special point of collecting Araceae and indeed he did collect hundreds of specimens, many of which proved to be new to science.


**Anthurium bicordoense** Croat, sp. nov.  
Type: COLOMBIA. Chocó: Hoya del Río San Juan, Andagoya. Alrededores de campamento de la Compañía Mineros de Chocó, ca. 5°06’N, 76°42’W, 13 Apr 1979, E. Forero, R. Jaramillo, J. Espina Z, & P. Palacios H. 5164 (holotype, COL). Fig. 2 A.

Internodes 3.6–13 cm longa, .4–.8 cm diam.; cataphylla 8.2–9.3 cm longa; petiolus 18.3–27.7 cm longus, 2.0–3.5 mm lata; lamina 23.2–33.5 cm longa, 13.2–25.4 cm lata; nervis primariis lateralibus 9–10 utroque; pedunculus 8.4–15.8 cm longus, 1–3 mm lata; spathe 5 cm longa, .7 cm lata; spadix viridis, 4.8–5.2 cm longus, 3–4 mm diam.

**Internodes** 3.6–13 cm longa, .4–.8 cm diam., drying light yellowish gray, ribbed, slightly granular, few-dispersed pale inclusions, moderately glossy; **cataphylls** 8.2–9.3 cm long, .8–1.4 cm wide, drying greenish gray, pale lineate, persisting as pale fibers; **petioles** 18.3–27.7 cm long, 2.0–3.5 mm wide, subterete, drying yellowish brown but greenish gray at base, few deeply ribbed, slightly glossy, dark inclusions, slightly granular; **geniculum** .7–1.4 cm long, 2–4 mm wide, drying a darker yellowish brown, finely many-ribbed; **blades** broadly ovate, 23.2–33.5 cm long, 13.2–25.4 cm wide, 1.5 times longer than broad, abruptly acuminate at apex, subcordate at base, drying medium, green above, light greenish gray below; **upper surface** densely granular; **lower surface** moderately smooth, weakly pale, short-lineate; **anterior lobe** 17.8–27.8 cm, rounded to broadly rounded; **posterior lobes** 3.8–4.4 cm, 4.3–9.2 cm wide, narrowly rounded; **sinus** acute to parabolic, 2.7–4.5 cm deep, 4.5–4.7 midway; **basal veins** 4–5 pairs, 1st–3rd free to base, 4th fused 1.2–2.1 cm, 5th fused 1.8–3.2 cm; **posterior rib** naked 1.6–2.1 cm; **midrib** narrowly rounded to bluntly acute and concolorous above, narrowly round-raised and paler below;
primary lateral veins 9–10 on both sides, arising at 45–50°, narrowly rounded to convex and concolorous above, narrowly raised and narrowly round-raised and granular below; tertiary veins weak on upper surface, weakly raised and concolorous below; collective veins arising from 3rd basal vein, 2–4 mm from margin. INFLORESCENCES with peduncle 8.4–15.8 cm long, 1–3 mm wide, many-deeply ribbed, cellular inclusions, slightly darker than petiole; spathe spreading, 5 cm long, .7 cm wide, narrowly raised and narrowly round-raised and granular below; tertiary veins weak on upper surface, weakly raised and concolorous below; collective veins arising from 3rd basal vein, 2–4 mm from margin.

Anthurium bicordoense is believed to be endemic to Colombia, known only from the valley of the RIO San Juan in Chocó Department at less than 100 m elevation in a Tropical rain forest life zone. The species is a member of sect. Xialophyllum, characterized by its elongate, light grayish-brown-drying internodes, cataphylls persisting mostly as pale fibers, subterete petals about as long as the blades, the ovate-elliptic, greenish-drying blades which are broadest between the middle and the petiolar plexus as well as by a long-petiolate inflorescence with a green spathe and the slender, cylindroid, green to yellow short-stipitate spadix. The species is named after the locality where it was first collected along the Río Bicordo in Chocó Department. Paratype: COLOMBIA. Chocó: Hoya del Río San Juan, Hoya del Río San Juan, Río Bicordo, above Noanamá, banks of the river, ca. 4°42'N, 76°55'W, ca. 20 m, 6 Apr 1979, E. Forero, R. Jaramillo, J. Espina Z, & P. Palacios H. 4709 (COL).

Anthurium diversicaudex Croat, sp. nov. Type: ECUADOR. Esmeraldas: Lita-San Lorenzo Road, 17 km W of bridge over Río Lita (on old road below Lita), 00°52'11"N, 78°27'06"W, 425 m, 6 July, 1998, T.B. Croat, R. Mansell, L.P. Hannon & J. Whitehill 82390 (holotype, MO-04882024; isotypes, AAU, B, COL, F, K, NY, QCNE, S, SEL, US). Fig. 2 B–C.
drying dark brown; **blades** ovate-sagittate, 41–56 cm long, 23–32 cm wide, 1.5–2.0 times longer than wide, .74–1.23 times as long as petioles, subcoriaceous, dark green and glossy to semiglossy above, moderately to much paler and weakly glossy to glossy below, drying dark blackish brown (rarely grayish green) and semiglossy above, medium blackish brown or rarely yellowish brown below, gradually to abruptly acuminate at apex, deeply lobed at base; **anterior lobe** 29–37 cm long, margins straight to convex; **posterior lobes** 14–18 cm long, 10–12 cm wide, directed toward the base; **basal veins** 6–8 pairs, the 1st and sometimes 2nd free to the base, the 4th and higher order coalesced 3.5–4.5 cm; **posterior rib** naked along the sinus 2–4.5 cm; **sinus** spatulate to narrowly hippocrepiform, 12–14 cm long, 3.5–6 cm wide; **midrib** slightly paler than surface, convex at base, bluntly acute to narrowly raised and concolorous on both surfaces, drying concolorous and acute above, darker and narrowly raise below; **primary lateral veins** 7–9 on both sides, arising at 40–45° angle, narrowly acute to narrowly raised and concolorous above, bluntly acute to convex or round-raised and concolorous to paler below, drying concolorous and acute above, darker and narrowly raise below; **tertiary veins** flat, darker than surface, in part weakly raised, prominulous on drying; **collective veins**, arising from one of the lowermost basal veins, 2–5(–7) mm from margins, often more prominently raised than the primary lateral veins below. **INFLORESCENCES** erect-spreading; **peduncle** 16–49 cm long, dark green, terete; **spathé** 16–21.5 cm long, 2–3 cm wide, medium-green, erect or spreading to reflexed, semiglossy; **spadix** 15–19 cm long, 6–10 mm diam., creamy white, greenish to pale yellowish-green, becoming creamy white at anthesis, sometimes tinged brown toward apex post-anthesis, finally becoming dark green and semiglossy. **INFLORESCENCES** 23–27 cm long, with tepals green; young **berries** 3 mm diam., greenish white or whitish, pale yellow-green to green at maturity.

**Anthurium diversicaudex** is currently assumed to be endemic to Ecuador since it is known only from the Lita-San Lorenzo region at 350–822 m elevation. It is a member of section *Cardiolonchium*, characterized by frequently long internodes which dry light reddish brown to grayish and finely striate, the blackish-drying, obtusely sulcate petioles about as long as the blades, the blackish-drying ovate-sagittate blade with the collective veins arising from one of the lowermost basal veins as well as its pale yellow-green to creamy white spadix and greenish white berries.

The epithet “diversicaudex” refers to the fact that the species is enormously variable in terms of the length of its internodes with the internodes sometime being very short and at other times much longer than broad.

**Paratypes**: ECUADOR. **Esmeraldas**: San Lorenzo Cantón: Lita-San Lorenzo Road, 6.4 km W. of Rio Lita, 609 m, 00°52'08"N, 78°28'09"W, 2 July 1998, Croat 82254; 17.1 km W. of Rio Lita, 00°54'06"N, 78°32'27"W, 822 m, 10 Oct 1999, Croat et al. 83185 (MO, QCNE); 20 July 2000, Croat et al. 84244 (MO, QCNE); 18 km W of Rio Lita, 425 m, Croat 82619 (MO, QCNE); 26.9 km W of Rio Lita, 13.2 km E of El Durango, 00°58'06"N, 78°33'45", 735 m, 17 Oct 1999, Croat et al. 88893 (MO, QCNE); 40.1 km W of Lita, 00°56', 78°40'W, 350 m, 21 Feb 1992, Croat 72317 (MO); 17.3 km W of Alto Tambo, 3.4 km E. of El Durango, 01°02'31"N, 78°37'02"W, 375 m, 8 July, 1998, Croat et al. 82543 (MO, QCNE).

**Anthurium mapiriense** Croat, **sp. nov.**

**Type**: PERU. Junín: Satipo Province, Gran Pajonal, Mapiri, ca. 12 km SW of CheQUITavo, primary and secondary forest, 10°45'S, 74°23'W, 1,300 m, 7 Apr 1974, D. N. Smith 6821A (holotype, MO-405903; isotype, USM). Fig. 2 D.

Internodia 1.8–3.5 cm longa; cataphylla 4.8 cm longa; petiolus 14.5–17 cm longus; nervis primaris lateralibus 7–8 utroque; pedunculus 18.3–18.5 cm longus; spathe viridis, 4.5–5.3 cm longa, 4–6 mm lata;
Fig. 1.  A. Anthurium apiense Croat (Croat 80708). A. Herbarium type specimen. B. Anthurium aylwardianum Croat (Croat 81671). B. Herbarium type specimen. C–D. Anthurium benkstparreit Croat. C. Herbarium specimen (Harling 21787). D. Herbarium type specimen (Luteyn 6577).
spadix viridis, 5–5.9 cm longus. 2–3 mm diam.

Erect terrestrial herb; internodes 1.8–3.5 cm long, 5–6 mm on drying light brown, finely ridged; cataphylls 4.8 cm long, truncate and apiculate, with pale linear cellular inclusions, only the basal, pale fibers persisting at nodes; petioles 14.5–17 cm long, 1.5–2 mm diam., drying greenish brown to light brown, deeply sulcate adaxially with a few obtuse ridges circumferentially; geniculum 15–17 mm long, 1.5 mm diam., drying slightly darker, finely many-ribbed, more or less terete; blades oblong-ovate, 18–23.6 cm long, 7.4–10.7 cm wide, 2.37 times longer than broad, 1.2 times longer than petioles, gradually long-acuminate at apex (acumen sometimes down-turned), deep lobed at base, drying medium yellow-brown above, pale yellow-brown to greenish yellow below; upper surface minutely areolate-ridged-granular with pale-linear cellular inclusions; lower surface moderately smooth with pale-linear cellular inclusions; anterior lobe 14–17.6 cm long, broadly convex to straight, rarely weakly concave posterior lobes 4.6–6.6 cm long, 2.8–4.1 cm wide, directed toward base; basal veins 4–5 pairs, 1st pair free to base; 2nd pair fused 5–7 mm, 3rd–4th pairs fused 20–21 mm; posterior rib naked 9–18 mm; midrib much thicker than broad, bluntly acute, drying slightly darker than surface, minutely granular above; narrowly rounded, drying densely and minutely glandular-ridged, concolorous below; primary lateral veins 7–8 pairs, arising at ca. 55° angle, narrowly rounded and concolorous above, narrowly rounded and concolorous below, both densely granular on drying; interprimary veins present; tertiary veins moderately inconspicuous; collective veins arising from 1st pair of basal veins, 2–4 mm from margin. INFLORESCENCE erect or nearly so; peduncle 18.3–18.5 cm long, 1–2 mm wide; spathe green, drying brownish, 4.5–5.3 cm long, 4–6 mm wide, 9.8 times longer than broad; spadix green, 5.5–5.9 cm long, 2–3 mm diam., 21.6 times longer than broad, stipitate 2 mm, flowers 4–5 visible per spiral, 1.6–2.2 mm long, 1.9–2.1 mm wide, 4-lobed, tepals matte, shield-shaped, minutely granular with several pale subglobular cellular inclusions; lateral tepals 1 mm wide, inner broadly rounded, outer margins 3–4 sided.

Anthurium mapiriense is endemic to Peru, known only from the type locality in Junin Department at 1,300 m in Premontane wet forest and Premontane rain forest life zones.

The species is a member of sect. Cardiolonchium, characterized by its erect terrestrial habit, elongated internodes, cataphylls persisting only as a few weak fibers, the subterete petioles which dry finely ribbed, the narrowly oblong-ovate, brownish-drying blades and a spathulate sinus, as well as by the long-pedunculate inflorescences with a linear spreading green spathe and short-stipitate dark green, long-tapered spadix.

Anthurium mapiriense is similar to both A. benktsparrei Croat and A. molaui Croat, both of which share pale, linear cellular inclusions. The latter species differs in occurring below 500 m and in having a pale green or yellowish green spadix rather than a dark green spadix, pale green leaves and by having generally broader sinus between the posterior lobes, usually narrowly hippocrepiform to parabolic (versus spatulate on A. mapiriense); A. benktsparrei usually occurs at elevations mostly above 2,000 m and has major veins more conspicuously pubescent with a short-tapered pinkish to bluish violet spadix with a promptly deciduous spathe.

Anthurium mapiriense is also related to A. breviscapum Kunth a species with typically thicker internodes, larger leaves and a purple spadix. In addition the epidemis of A. breviscapum is more conspicuously granular on the lower surface and lacks the linear cellular inclusions on the lower surface. Anthurium breviscapum is typically more abundant at elevations above 500 m. Anthurium laurelense Croat differs from A. breviscapum by its typically greenish to greenish yellow, short-cylindroid spadix, smaller leaves. The latter species differs in having typically larger, glossier blades with more prominent ter-
Fig. 2.  A. Anthurium bicordoense Croat (Forero 5164). A. Herbarium type specimen. B–C. Anthurium diversicaudex Croat (Croat 82390). B. Herbarium type specimen. C. Herbarium specimen. D. Anthurium mapiriense Croat (Smith 6821A). D. Herbarium type specimen.
teriary venation and a much longer spadix (19–26 cm long at anthesis).

The species is named for the type locality at Mapiri in Satipo Province in Junin Department of Peru.

**Anthurium molaui** Croat, sp. nov. Type: ECUADOR: Pastaza: Parroqua Cur­aray. Pozo Petroleo Villano 2 de ARCO, between Río Iquino and Río Villano, primary forest on dissected hills, 01°29'S, 77°27'W, 350 m, 4–19 Aug 1993, M. Tirado, V. Zak, L. Vargas & H. Andi 223 (holotype, MO-04583489; isotypes, K, QCNE, US). Fig. 3 A–B.

Internodia 1.5–13 cm longa, 4–7 mm diam.; cataphylla 4–5.3 cm longa; petiolus 14.5–29 cm longus; lamina anguste ovato-sagittata, 15.2–32 cm longa, 11.8–18.7 cm lata; nervis primaris lateralisbus 5–8 utroque; pedunculus 2.3–8 cm longus; spathe 2.1–6.3 longa; spadix 3.8–7 cm longus, 4–6 mm diam., viridis vel viridi-flavus; baccae rubrae vel purpurea.

Hemiepiphytic scrambling herb; **internodes** elongate and slender, 1.5–13 cm long, 4–7 mm diam., drying grayish brown, matte; **cataphylls** 4–5.3 cm long, green, narrowly triangular, promptly deciduous, sometimes with a few short fibers persisting; **petioles** subterete, sulcate, drying moderately and deeply sulcate, medium green drying grayish yellow-green, weakly ribbed and minutely granular. **LEAVES** 30.1–52.7 cm long; **blades** narrowly ovate-sagittate, 15.2–32 cm long, 11.8–18.7 cm wide, broadest usually below the middle and above the petiolar plexus, sometimes at the petiolar plexus, rarely across the posterior lobes, 1.2–2.5 times longer than wide (averaging 27.4 × 15.5 cm), 9–1.9 times as long as petioles, medium dark green and semiglossy above, moderately paler and semiglossy below, drying greenish and weakly glossy above, slightly paler, grayish green and weakly glossy below; **anterior lobe** 15.3–25.9 cm long, broadly rounded along the margins: **posterior lobes** 6–9.5 cm long, 4.6–7.4 cm wide, slightly longer that broad, narrowly rounded at apex, sometimes turned weakly inward; **sinus** 3.1–7.5 cm deep, 3–5.7 cm wide, parabolic to narrowly hippocrepiform; **midrib** narrowly raised and bluntly acute to acute and concolorous above, narrowly round-raised and paler, minutely granular on drying below; **primary lateral veins** 5–8 on each side, arising at 45–55° angle, acute and concolorous above, narrowly round-edged and slightly paler below; **tertiary veins** in part weakly raised; **collective vein** arising from uppermost basal vein, 2–4 mm from margin; **upper surface** moderately smooth, minutely areolate on magnification; **lower surface** minutely granular between the areoles. **INFLORESCENCE** with **peduncle** 2.3–8 cm long, 1.5–2 mm diam; **spathe** lanceolate, 2.1–6.3 cm long, 9–12 mm wide, medium green; **spadix** cylindroid, weakly tapered, greenish to greenish yellow, 3.8–7 cm long, 4–6 mm diam., narrowly rounded at apex; **flowers** 5–6 visible per spiral, 1.5–1.6 mm long, 1.3–1.4 mm wide; tepals smooth, drying light tan-brown with a few pale cellular inclusions; lateral tepals 9–1 mm wide, inner margin rounded; outer margin 2–3-sided. **INFRACTESCENCE** with spadix to 10.5 cm long; **berries** reddish to purple, ovoid, ca. 6 mm long.

*Anthurium molaui* is known from eastern Ecuador Orellana, Pastaza and Morona-Santiago Provinces and N. Peru in Loreto Department, Teniente Lopez Province at 200–500 m in a Tropical moist forest life zone.

The species is a member of sect. *Cardiolonchium*, characterized by its hemiepiphytic, somewhat scandent habit, elongated usually gray-brown internodes, deciduous cataphylls, subterete petioles that at least dry deeply sulcate, by the narrowly ovate-sagittate grayish green-drying blades with a long-acuminate apex and narrowly hippocrepiform to parabolic sinus as well as by the short-pedunculate inflorescence with a green, reflexed, lanceolate spathe and a narrowly cylindroid, weakly tapered greenish to greenish yellow spadix and the small red to purple berries.

*Anthurium molaui* is closest to *A. benktsparrei* Croat and *A. mapiriense* Croat (both species described in this paper)
Fig. 3.  A–B. *Antburium molauti* Croat. A. Herbarium specimen *(Brandbyge 31842)*. B. Herbarium specimen *(Ollgaard 34936)*. C. *Antburium porcesitoense* Croat *(Hodge 6782)*. C. Herbarium type specimen. D. *Antburium punkuyocense* Croat *(Valenzuela 937)*. D. Herbarium type specimen.
differing from both in occurring below 500 m elevation in the Amazon basin. See the discussion following *A. mapiriense* for additional differences.

The only collection from Orellana Department (*Ceron & F. Hurtado 4103*) is described as having a purplish violet spadix but seems not to differ in any other way nor does the spadix appear to have been thus colored since it dries the same color as other specimens in the series.

The species is named in honor of Danish botanist, Ulf Molau, who along with, B. Lojtnant, of Aarhus University, spent six months collecting in Ecuador in 1979 and collected the species twice between May 17th and May 19th. Molau started his collecting career in 1977, spending time in the field with Gunnar Harling and Mike Madison. Later he spent half a year in Ecuador in 1985 and about four months in 1987/88, (this time with his wife, Bente Eriksen Molau). Most of Molau's collecting was at higher altitudes in the Andes including Peru and Bolivia mostly in cloud forest and páramo since he concentrated on *Calceolaria* (completed for the Flora Neotropica in 1988) and *Bartsia* (revised in 1990). Molau, now a professor in Plant Ecology at the University of Gothenburg, also works for the Swedish Ministry of the Environment as a member of the Swedish Delegation to the CBD (the UN Convention on Biological Diversity and is a lead author of IPCC).

**Paratypes:** ECUADOR. **Pastaza:** Río Bobanza, near its mouth at the Río Pastaza, between Destacamento Cabo Pozo and La Boca; river banks and periodically flooded palm forest, dominated by Mauritia, 2°30′–35′S, 76°38′W, ca. 275 m, 21 Jul 1981, B. Ølgaard, E. Asanza C., J. Brandbyge, S. Roth & C. Sterling 34934 (holotype, MO-3039088; isotypes, AAU, QCA).

**Anturium porcesitoense** Croat, sp. nov. Type: COLOMBIA. Antioquia: vicinity of Porcesito in the valley of Río Medellín, 6°32′N, 75°14′04″W, ca. 1,100 m, 16 Apr 1946, W. H. Hodge 6782 (holotype, US; isotypes, GH, P). Fig. 3 C.

Internodia 1.8–8.8 cm longa, .4–.6 cm diam.; cataphylla 4.8–5.5 cm longa; petiolus 10.4–19.7 cm longus, lamina 19.8–23.8 cm longa, 11.5–13.8 cm lata; nervis primariis lateralisibus 6 utroque; pedunculus 11–18.8 cm longus, .2–.3 cm lata; spatha viridis, 2.8–4.2 cm longa, .4–.6 cm lata; spadix viridis vel roseus, 4.4–6.0 cm longus, .2–.3 cm diam.

Terrestrial; internodia 1.8–8.8 cm long, .4–.6 cm diam., 12 times longer than broad, drying grayish brown, finely granular, few deeply-ribbed; cataphylls 4.8–5.5 cm long, .7–8 cm wide, 7 times longer than broad, drying yellow brownish gray, finely ribbed, pale lineate on outer surface; petioles 10.4–19.7 cm long, .2–.3 cm wide, 26 times longer than broad, drying dark brown-gray, finely granular, few moderately deep ribs; geniculum .7–.9 cm long, .2 cm wide, 4 times longer than broad, many shallow ribs, drying yellowish brown; blades ovate, 19.8–23.8 cm long, 11.5–13.8 cm wide, 1.7 times longer than broad, abruptly acuminate at apex, deeply lobed at base, drying greenish gray above, light greenish gray below; upper surface densely, closely and minutely granular; lower surface densely granular, including on the veins; anterior lobe 14.8–19.8 cm long, 11.5–13.8 cm wide, 1.3 times longer than broad; posterior lobe 3.8–5.8 cm long, 3.8–5 cm wide, 1.2 times longer than broad; sinus hippocrepiform to spatulate, parabolic; basal veins 4–5 pairs, 1st–2nd pair free to base, 3rd fused .8–1.1 cm, 4th–5th fused 1.2–1.5 cm; posterior rib naked 1.7–2.5 cm; midrib narrowly round-raised; primary lateral veins 6 on each side, arising at 50–55°, round-raised; tertiary veins moderately prominent above, and below; collective veins arising from 1st basal vein, .1–.4 cm from margin. INFLORESCENCES; peduncle 11–18.8 cm long, .2–.3 cm wide, 70 times longer than broad, drying grayish brown, glossy, cellular inclusions; spathe green, 2.8–4.2 cm long, .4–.6 cm wide, 7 times longer than broad, spreading, acuminate at apex, narrow ovate, granular outer surface, pale inclusions on inner surface; spadix green to
pink with yellowish pistils, 4.4-6.0 cm long, .2-.3 cm diam., 19 times longer than broad, stipitate .2-.4 cm; flowers 3 visible per spiral, 1.1-1.4 mm long, .8-1.1 mm wide, drying reddish brown, granular, 4-lobed, lateral tepals .6 mm, inner margins rounded, outer margins 4-sided; INFRUCTIONS; berries not seen.

*Anthurium porcesitoense* is endemic to Colombia, known only from the valley of the Rio Medellín, above 1,100 m elevation in a Premontane wet forest life zone.

The species is a member of sect. *Xialophyllium*, characterized by its elongate medium yellow-brown drying internodes, promptly deciduous cataphylls, suberetepetioleas as long as the blades, the narrowly ovate-sagittate, greenish-drying blades which are broadest between the middle and the petiolar plexus as well as by a long-petiolate inflorescence with a green spathe and a green reddish spadix with yellowish areas.

The species is similar to *A. oblongocordatum* Engl. a species with proportionately much narrower leaves which are 2.1-2.5 times longer than broad, and occurring at higher elevations.

The species is also close to *Anthurium bicordatum* Croat, another member of sect. *Xialophyllium*, with blades of similar shape and which also have scattered pale cellular inclusions on the lower surface. That species differs in occurring at less than 200 m along the Rio San Juan and by having stems light grayish brown, also by having the upper blade surfaces drying smooth except for scattered granules.

The species is named for the type locality near the village of Porcesito in the valley of the Rio Medellín.

*Paratype*: COLOMBIA. Antioquia: bosques hacienda El Darién, right margin of Rio Chontadural, 13 Sep 1979, R. Fonegra 7346 (HUA).

*Anthurium punkuyocense* Croat, *sp. nov.* Type: PERU. Cusco: La Convención Province, Distrito Santa Ana, Punkuyoc, bosque primario húmedo,
Internodia 2.5 cm longa; cataphylla 11.5 cm longa; petiolus 37.3 cm longus; lamina 28.2 cm longa, 17 cm lata; nervis primariis lateralisibus 3–4 utroque; pedunculus 14.3 cm longus, 1.5 mm lata; spatha viridis, 7.8 cm longa, 1.8 cm lata; spadix viridis, 7.3 cm longus.

Terrestrial to ca. 1 m; internodes 2.5 cm long, 1.1 cm wide on drying grayish brown, finely granulated, finely ridged; cataphylls 11.5 cm long, the base persisting as fine pale fiber, finally deciduous; petioles 37.3 cm long, drying yellowish brown; geniculum 18 mm long, 2.5 mm wide, drying a darker brown, many few-ribbed, finely granulated; blades 28.2 cm long, 17 cm wide, 1.65 cm longer than broad, .75 times as long as petioles, nearly concolorous, drying a dark grayish yellow-greenish on both surfaces, abruptly long-acuminate at apex; upper surface moderately smooth; lower surface moderately smooth but with a few weakly raised bumps in each areole; anterior lobe 20.8 cm, broadly rounded or rarely weakly concave; posterior lobe 8.7 cm long, 8.6 cm wide, directly toward base; basal veins 6–7 pairs, 1st and 2nd pair free to base, 3rd fused 8 mm, 4th fused 23 mm, 5th–6th fused 3.5 cm, 7th fused 16 mm; posterior rib naked 1.4 cm; midrib narrowly rounded to bluntly acute above, narrowly round-raised, minutely granular, sparsely pustular, drying slightly darker than surface below; primary lateral veins 3–4 on both sides, arising at 54° angle, minutely granular, short pale-lineate; tertiary veins not raised but easily visible above, weakly prominulous below; collective veins arising from 1st basal vein, 3–5(–8) mm from margin. INFLORESCENCE; peduncle 14.3 cm long, 1.5 mm wide; spathe green, 7.8 cm long, erect-spreading, 1.8 cm wide, 1.83 times longer than broad, green, drying yellowish brown, narrowly acuminate at apex; spadix green, 7.3 cm long, drying 5 mm diam., 18 times longer than broad, stipitate 3–4 mm; flowers 7 visible per spiral, 1.4 mm long, 1.7 mm wide; lateral 3-lobed, tepals minutely granular with sparse pale inclusions, lateral tepals .6–8 mm wide, inner margins rounded, outer margins 3-sided.

Anthurium punkuyocense is endemic to Peru, known only from Cusco Department, Province of La Convención at 2,000–3,000 m in a Montane moist forest life zone. The species is a member of sect. Cardiolonchium, characterized by its terrestrial habit, internodes longer than broad and densely ridged-granular transversely, a subterete petiole that is pustular near the apex, narrowly ovate-sagittate, grayish green-drying, moderately veiny blades with a spathulate sinus and collective veins arising from the 1st pair of basal veins as well as by the green spathe and cylindroid-tapered spadix. Also characteristic is the granular-ridged major veins on the lower surface of the blades.

Anthurium punkuyocense is most similar to A. benktsparrei and A. mapiriense, both of which have minute granular-puberulence on the major veins on the lower blade surface. Both species differ in having less prominent tertiary veins on the lower surface and in having more or less smooth internodes. Anthurium benktsparrei differs in having the spadix more bluntly tapered and violet to pinkish. Anthurium mapiriense differs in having short pale-lineate cellular inclusions which are lacking on the surface of A. punkuyocense.

The species is named for the type locality near Punkuyoc in La Convención Province of Cuzco Department.

Anthurium riojaense Croat, sp. nov.
Type: PERU. San Martín: Rioja Prov., Pedro Ruiz-Moyabamba Road, km 390, Venceremos, 05°50′S, 77°45′W, 1,800 m, 27 July 1983, D. N. Smith 4400 (holotype, MO-3490701; isotype, USM). Fig. 4 A.

Internodia 4.5 cm longa, 6 mm diam.; cataphylla 5.9 cm longa, 7 mm lata; petiolus
25.2-37.5 cm longus; lamina 26.3-34.3 cm longa, 18.8-23.4 cm lata; nervis primariis lateralibus 5–6 utroque; pedunculus 11.2–14.5 cm longus; spatha 5.8–8.6 cm longa, 9–14 mm lata; spadix luteus, 6.4–7 cm longus

Hemiepiphytic climber; internodes 4.5 cm long, 6 mm diam, drying dark brownish grey, finely granulated, pale inclusions rarely dispersed; cataphylls 5.9 cm long, 7 mm wide, lightly dispersed-pale-lineate, abruptly acuminate at apex; petioles 25.2–37.5 cm long, 3–4 mm wide, drying dark-brownish yellow, D-shaped with 3 ridges adaxially; geniculum 15–17 mm long, 3–4 mm wide, drying dark brown, finely many-ribbed, moderately smooth; blades 26.3–34.3 cm long, 18.8–23.4 cm wide, 1.43 times longer than broad, sub-trilobate, abruptly acuminate at apex, deeply lobed at base, subcoriaceous, weakly bicolorous, drying weakly glossy, medium brown above, grayish yellow-brown below; upper surface moderately smooth, densely pale-lineate; lower surface moderately smooth, less prominently densely pale-lineate; anterior lobe 17.4–25.4 cm long, 7.8–13.3 cm wide, abruptly concave near base, the constricted area 5.8–7.6 cm wide; posterior lobes 8.4–10.2 cm long, 8.0–9.4 cm wide, rounded at apex, 4.6–6.7 cm across the confluent area (from petiolar plexus to inner edge of confluence); concave toward base; basal veins 5–6 pairs, 1st pair free to base, 2nd fused 5–14 mm, 3rd fused 17–27 mm, 4th–6th fused 36–42 mm; posterior rib naked 16–26 mm; midrib narrowly rounded to bluntly acute, darker above, broadly rounded, minutely granular, pale-lineate, drying slightly darker than surface below; primary lateral veins 5–6 on both sides, arising at 50–53°, narrowly round-raised, bluntly acute, darker above, broadly rounded, minutely granular; tertiary veins obscure above, slightly raised below; collective veins arising from 2nd–3rd primary lateral vein, 3–6 mm from margin. INFLORESCENCES erect; peduncle 11.2–14.5 cm long, 1–2 mm wide; spathe green, 5.8–8.6 cm long, 9–14 mm wide, 6.3 times longer than broad, abruptly acute at apex, erect-spreading, hooding spadix, slightly curved, green, drying yellowish brown; spadix 6.4–7 cm long, drying 4–5 mm diam., 13 times longer than broad, stipitate 4–5 mm, yellow, with slight aroma at anthesis; flowers 6 visible per spiral, 1.5–1.6 mm long, 1.4–1.5 mm wide, weakly 4-lobed; tepals minutely granular with pale inclusions, lateral tepals 4–6 mm wide, inner margins rounded, outer margins 4-sided; stamens held in a contiguous cluster around stigma at level of tepals; anthers .5 mm long, .4 wide; thecae parallel.

Anthurium riojaense is endemic to Peru, known only from the type locality in San Martín Department, Rioja Province at 1,800 m in a Montane rain forest life zone or Lower montane wet forest life zone.

The species is a member of sect. Cardiolonchium, characterized by its hemiepiphytic habit, elongated internodes, deciduous cataphylls, D-shaped petioles with 3 ribs adaxially, deeply 3-lobed, yellow-brown blades with the anterior lobe markedly contracted near its base as well as by its moderately pedunculate somewhat hooding spathe and its yellow, weakly tapered, weakly stipitate spadix. Especially characteristic of this species is the presence of pale, linear cellular inclusion which is visible on both surfaces.

Anthurium riojaense appears to be closest to A. izchuchacense Croat which occurs at a similar elevation in the Department of Amazonas. That species differs in having blades which dry darker brown, are more prominently constricted on the anterior lobe, have a proportionately longer peduncle, a more prominently stipitate and a broader green, rather than yellow spadix. Anthurium riojaense is also close to A. siccisilvarum K. Krause which differs in having typically larger blades which tend to dry grayish and a more long-tapered, more prominently stipitate green spadix. The species is named for the type locality in Rioja Province.
Anthurium straminopetiolum is endemic to Peru, known only from the type locality in Amazonas Department in the valley of the Río Cenepa at 200-250 m elevation in a Premontane wet forest life zone. The species is a member of sect. Cardiolonchium characterized by its hemiepiphytic to terrestrial and climbing habit, elongated internodes, mostly deciduous cataphylls, subterete, straw-colored petioles, narrowly ovate-sagittate, greenish drying blades with a hippocrepiform sinus as well as by the green spathe and spadix.

Anthurium straminopetiolum is close to *A. molaui* since both have long internodes and blades of similar shape and drying color and both have a green spathe and green spadix. In addition, both species tend to have the lower surface granular on magnification. However, *A. molaui* differs in having much shorter, more stubby spadices only 10-12 times longer than wide versus about 35 times longer than wide for *A. straminopetiolum*. *Anthurium straminopetiolum* is most similar to *A. breviscapum* Kunth, a species that is more abundant at higher elevations and has a purple long-tapered spadix. The epithet “straminopetiolum” is based on the Latin stramineous (straw-yellow) and petiolus (petiole).

Note that the species was apparently not included in the Flora of Río Cenepa despite having been common there unless it was included in *A. breviscapum* (Croat et al., in press).
LITERATURE CITED
