

TEN NEW SPECIES OF *DICRANOPYGIUM* (CYCLANTHACEAE) FROM COSTA RICA AND PANAMA

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ABSTRACT

Examination of herbarium material in preparation for a treatment of Cyclanthaceae for *Flora Mesoamericana* necessitates the description of the following 10 new species of *Dicranopygium* Harling from Costa Rica and Panama: **D. boqueronense** Hammel, from eastern Panama (just east of the canal); **D. burgeri** Hammel, from numerous localities along the southern Pacific slope and (more rarely) on the central Atlantic slope of Costa Rica; **D. curvitepalum** Hammel, from western Panama; **D. felinum** Hammel, from western and central Panama; **D. hugonis** Hammel, from one collection in Costa Rica and numerous from western and central Panama; **D. microbullatum** Hammel, from eastern Panama; **D. minimum** Hammel, from eastern Panama; **D. nigrescens** Hammel, from western Panama; **D. planifolium** Hammel, from eastern Panama; and **D. subdistichum** Hammel, from eastern Panama.

RESUMEN

En preparación para un próximo volumen de *Flora Mesoamericana*, la examinación de material de herbario reveló la necesidad de describir las siguientes 10 especies nuevas de *Dicranopygium* Harling, de Costa Rica y Panamá: *D. boqueronense* Hammel, del este de Panamá (un poco al este del canal); *D. burgeri* Hammel, de numerosas localidades por la vertiente pacífica sur y (menos común) en la vertiente atlántica central de Costa Rica; *D. curvitepalum* Hammel, del oeste de Panamá; *D. felinum* Hammel, del oeste y centro de Panamá; *D. hugonis* Hammel, de una colección en Costa Rica y numerosas del oeste y centro de Panamá; *D. microbullatum* Hammel, del este de Panamá; *D. minimum* Hammel, del este de Panamá; *D. nigrescens* Hammel, del oeste de Panamá; *D. planifolium* Hammel, del este de Panamá; y *D. subdistichum* Hammel, del este de Panamá.

The genus *Dicranopygium* (Cyclanthaceae) comprises approximately 55 species of mostly terrestrial and stream-loving herbs of the wet New World tropics. The landmark familial monograph of Harling (1958) accepted 44 *Dicranopygium* species, and 11 have been described as new—with very few synonymized—in the intervening years. Although most Cyclanthaceae are large herbs with relatively large leaves, making the gathering and preparation of specimens difficult, many species of *Dicranopygium* are relatively small and easy to collect. Nevertheless, their taxonomy is difficult, and depends to a large extent on the presence of good staminate material, which is by nature very ephemeral (the staminate flowers usually fall off shortly after the inflorescence opens), and in any case the flowers are minute. Much work needs to be done and many species remain to be described. In a recent molecular study covering all genera (Leal et al. 2022), less than half of the 14 species of *Dicranopygium* included could be confidently identified to species. Following Harling (1958), in the Mesoamerican region, *Dicranopygium* is most likely to be confused with *Asplundia*; both are terrestrial and sometimes climbing, with spirally attached leaves with shallowly to deeply bifid blades. In fact, recent molecular studies (Soto Gomez et al. 2021; Leal et al. 2022) recovered the two

genera as sister clades. *Dicranopygium* can often be distinguished merely by where many species grow: on rocks in and along streams, a habitat almost unique to that genus within Cyclanthaceae. Morphologically, the two genera are distinguished by *Dicranopygium* having the spathes clustered right at the base of the spadix (vs. dispersed on the distal portion of the peduncle in *Asplundia*) and the mature fruits remaining intact, with the seeds released under pressure through a thin window at the base of each tepal, and with subterete seeds (vs. fruits usually dehiscent by the stigmatic caps falling off, and with flattened seeds).

The following new species are described in preparation for the forthcoming *Flora Mesoamericana* treatment of Cyclanthaceae. For the most part these descriptions follow the format used by Harling (1958), some of which benefits by explanation: the phrase "perianth lobes" refers to the gland-tipped subligulate structures (of low but variable number) on one side of the staminate flowers; "basal bulb" refers to the swollen proximal part of the staminal stipe, usually only described in relation to the overall structure (e.g., "medium sized"); "filament" refers only to the narrow, unswollen distal part of the staminal stipe (sometimes lacking); "tepals" refer to the four short, succulent, subtruncate structures that surround each complex of four stigmas ("stigmata"). Measurements of staminate flowers and anthers are based on pickled or reconstituted material; all others are based on dried specimens. Whereas the the Latin descriptions of Harling (1958) pertain only to holotypes, the descriptions below include the additional specimens cited as well. Annotations such as "+3" following specimen citations indicate the number of unmounted duplicates available for distribution. As usual, an exclamation point (!) indicates the actual specimen was seen, whereas the same symbol inverted (¡) means that only an image was seen. A few coordinates given here differ from those on the label, i.e., when those estimated on Tropicos correct major errors.

1. DICRANOPYGIUM BOQUERONENSE Hammel, **sp. nov.** **TYPE: PANAMA.** **Colón:** Río Boquerón, ca. 14 mi from hwy. frst along river, 9°23'N, 79°34'W, 100 m, 13 Apr 1985 (fl), *B. Hammel 13502* (holotype, MO!). Figures 1, 2.

Dicranopygium boqueronense Hammel is outwardly similar to the more widespread *D. grandifolium* Harling but differs by its staminate flowers with more numerous stamens (20–24, vs. 12–18) and longer anthers [1.9–2.25 mm, vs. 0.6–0.9(–1) mm]. By its relatively long anthers, the new species is most similar to *D. dolichostemon* Harling (subg. *Dicranopygium* sect. *Macrostemon* Harling), but differs by its stamens with basal bulbs about the same length as the well developed filaments (0.2–0.3 mm vs. large basal bulbs lacking filaments) and shorter anthers (1.9–2.2 mm vs. 2.5–3 mm).

Epilithic plant with the stem not collected (but judging by the width of the base of the petiole, to at least ca. 3.5 cm wide). **Leaves** (sometimes described as "glossy throughout") with the petiole 96–119 cm (sometimes described as "glossy throughout"), the base drying light green, the sheath intact, drying dull, light yellowish tan to nearly white and not cracking (no scales seen); blade 81–109 cm, no scales seen, unicostate, bifid from ca. 1/3–2/5(–1/2 according to label of *Hammel & Mcpherson 14556*) its length, the segments 10.1–15 cm wide, the tips acuminate, the outer margin nearly straight. **Peduncle** ca. 15.4 cm at anthesis, to 13–25.9 cm in later stages, erect. Spathes at least 3, ca. 5–8.5 × 1–2.1 cm, ovate to lanceolate. Spadix ca. 2.8 × 0.9 cm at anthesis, 3–4.7 × 1–1.5 cm (cylindrical) in later stages. **Staminate flowers** ca. 4–5 mm, asymmetrical; receptacle ca. 2.1–3 mm wide, flat, with (3)4 perianth lobes, these gland-tipped, truncate or widely rounded to subacute at apex; stamens ca. 20–24, the basal bulbs medium sized, the filaments ca 0.2–0.3 mm, the anthers ca. 1.9–2.25 × 0.44–0.55 mm. **Pistillate flowers** ca. 2.5–3 mm wide during anthesis, in later stages to at least 6 mm wide; tepals free, 2–3.3 × 2.2–3.7 mm in later stages, slightly lower than to about the same height as the stigmata, entire, truncate to obtuse apically; styles 3–4 mm high, free; stigmata seen from above narrowly to widely elliptical, wholly encircled by the tepals; staminodes to at least ca. 43 mm. **Seeds** not seen.



Figure 1. *Dicranopygium boqueronense*. Habit, specimen of plant with infructescences, *Hammel & de Nevers 13597* (MO). Photo by M. Blomberg.

Additional specimens examined. PANAMA. Colón: Río Guanche, between Colón and Portobelo, just W of Portobelo, in woods along stream ca. 3 km upstream from highway, 9°30'N, 79°40'W, 50 m, 28 Feb 1986 (fr), *Hammel & McPherson 14556* (MO, 2 sheets). **Panamá to Guna Yala** (San Blas): trail from end of rd past Los Altos de Pacora region of Cerro Jefé, on to Cerro Brewster, 9°17'N, 79°17'W, 600–800 m, 20–25 Apr 1985 (fr), *Hammel & de Nevers 13597* (MO).

Etymology. The epithet is a toponym, in reference to the river where the type specimen was collected.

Distribution and habitat. This new species grows mostly on rocks (usually as a rheophyte), and is restricted to central Panama, from the provinces of Colón and Panamá to the comarca Guna Yala. It is known from very wet forests at 10–800 m elevation.

Discussion. *Dicranopygium boqueronense* often has very large leaves, divided mostly 1/3–2/5, and is in some ways similar to *D. curvitepalum*, which has smaller, more deeply divided leaf blades with narrower segments, relatively longer pistillate tepals and much different staminate flowers. In absolute terms, the tepals and styles of *D. boqueronense* are unusually long. Outwardly, this species is similar to *D. grandifolium*, which has similarly large leaves (but with scales), long peduncles and relatively long spadices. *Dicranopygium boqueronense* differs primarily by its staminate flowers with somewhat more numerous stamens (20–24 vs. 12–18) on medium-sized basal bulbs (about the same length as the conspicuous filaments) and with longer anthers [1.9–2.25 mm vs. 0.6–0.9(–1) mm]. These relatively long anthers place the new species in sect. *Macrostemon* of the subg. *Dicranopygium*. The later stage pistillate tepals in the present species also appear to be especially long; 2–3.3 mm, vs. 0.5–0.8 mm in *D. grandifolium*. Apparently none of the other members of sect. *Macrostemon* have inflorescences with such long peduncles nor such long pistillate tepals. Among members of that section, the new species is overall most similar to *D. dolichostemon*, but in addition to its long-pedunculate inflorescences, differs by its somewhat more numerous stamens (20–24 vs. 12–18), basal bulbs about the same length as the substantial filaments (vs. large basal bulbs lacking filaments), and shorter anthers (1.9–2.2 mm vs. 2.5–3 mm).

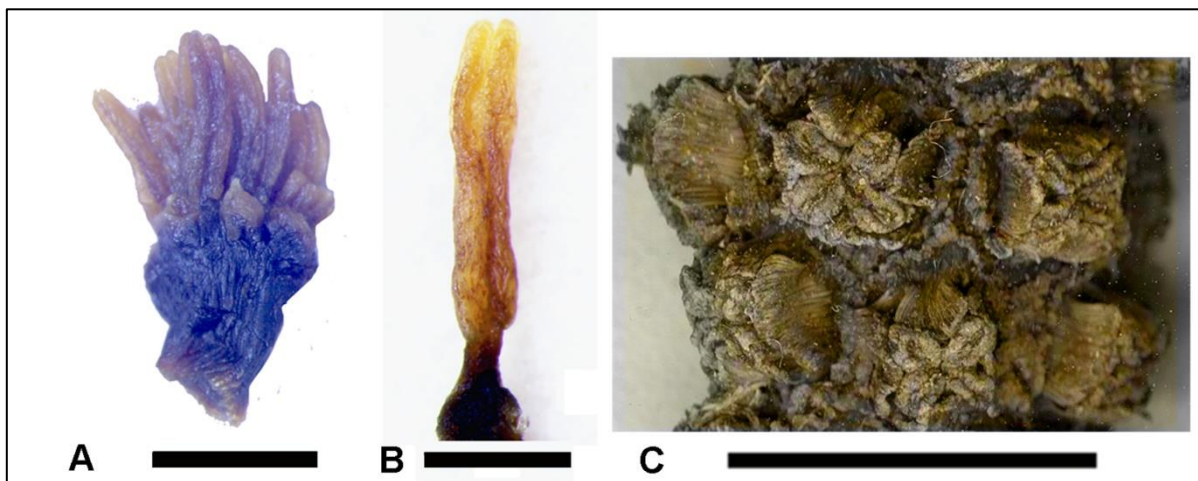


Figure 2. *Dicranopygium boqueronense*. A. Staminate flower. B. Stamen. C. Fruits. A, B from Hammel 13502 (MO); C from Hammel & de Nevers 13597 (MO). Scale bars: A=2 mm, B=1 mm, C=10 mm. Photos A, B by B. Hammel; C by M. Blomberg.

2. DICRANOPYGIUM BURGERI Hammel, *sp. nov.* **TYPE: COSTA RICA.** San José: Cantón de Vázquez de Coronado, P.N. Braulio Carrillo, Carretera 34, ca. 11 km abajo del tunel, por una quebrada a mano derecha de la carretera, 10°7'46"N, 83°58'9"W, 1000 m, 4 Feb 2022 (fl, fr), B. Hammel, I. Pérez, & M.E. Chinchilla 27897 (holotype CR!; isotypes+3!). Figures 3–5.

Dicranopygium burgeri is most similar to *D. harlingii* G.J. Wilder of Panama, but differs by its larger overall size, somewhat longer and narrower fruiting spadices (cylindrical, vs. ellipsoid), and shorter staminodia (4–10 mm vs. ca. 30 mm).

Terrestrial or (usually) epilithic (usually on rocks along streams), sometimes forming large colonies, with the stem to ca. 0.035 m, 0.5–1.4(–2.4) cm wide. **Leaves** with the petiole 7.7–55 cm, the base green (live), the sheath intact, drying dull and not cracking; blade 15–65 cm, lacking or with

scant brownish scales (near the base, lower surface), unicostate, bifid from $(1/3-2/5-1/2 (-4/5))$ its length, the segments 1.5–14 cm wide, the tips acute to acuminate, sometimes cuspidate (with the linear tip 0.4–1.5 cm), the outer margin nearly straight to shallowly convex throughout. **Peduncle** 5.6–12.3 cm at anthesis, 6.5–22.5 cm in fruit, erect. Spathes 3 or 4, ca. $1.2-4 \times 0.4-1.1$ cm, lanceolate-cuspidate, green. Spadix ca. $0.95-1.7 \times 0.35-0.4$ cm at anthesis, $(1.1-1.45-2.3(-3)) \times 0.6-0.7(-1)$ cm (cylindrical) in fruit. **Staminate flowers** ca. 1.3–2.5 mm, asymmetrical; receptacle 0.6–1 mm wide, flat, apparently without perianth lobes, sometimes with 1 or 2 minute, wrinkles visible along one side, these non-glandular; stamens (3–)6–10, the basal bulbs usually substantial (0.2–0.5 mm—those of centrally placed stamens imperceptible) and often flattened, lacking filaments, the anthers ca. $0.4-0.7 \times 0.5-0.8$ mm (mostly wider than long and the anther sacs often widely divergent at the base by the intrusion of the basal bulb (any connective otherwise imperceptible)). **Pistillate flowers** ca. 1.5–3 mm wide during anthesis, in fruit 6–8 mm wide; tepals free, ca. $1 \times 2.5-6$ mm in fruit (often longest along the long axis of the spadix), often slightly lower than the stigmata, entire, subacute to truncate abically; styles ca. 1 mm high, apparently connate (free in flower and young fruit); stigmata seen from above narrowly oblong, wholly encircled by the tepals; staminodes ca. 4–10 mm. **Seeds** amber brown, $0.8-1.1 \times 0.3-0.4$ mm.

Additional specimens examined. COSTA RICA. Limón: Cantón de Pococí, Los Angeles, San Miguel, bosque aldeaño a la catarata, Río Blanco, $10^{\circ}7'30''N$, $83^{\circ}50'45''W$, 700 m, 24 Feb 1990 (fl, fr), *Herrera & Schik 3805* (CR, MO). **Puntarenas:** Cantón de Aguire, forested foothills of the mountains E of Quepos, $9.48^{\circ}N$, $84.05^{\circ}W$, 150 m, 19 Feb 1977 (fl & young fr), *Burger et al. 10591* (CR, F), *10591A* (F); hilly slopes above the Rio Naranjo, near Londres and Villa Nueva, evergreen rainforest formations on the seasonally dry Pacific slope, $9^{\circ}28'N$, $84^{\circ}28'W$, 300 m, 10–12 Feb 1988 (fr), *Burger et al. 12267* (MO), *12275* (MO); bosques residuales a la vera del Río Naranjo, cerca de Londres, $9^{\circ}28'N$, $84^{\circ}3'W$, 150 m, 11 Feb 1988 (fl, fr), *Gómez-Laurito 11690* (CR); cuenca del Savegre, Coopesilencio, 1.5 Km NE del Albergue de Coopesilencio, $9^{\circ}25'6''N$, $84^{\circ}1'22''W$, 163 m, 19 Jan 2001 (fr), *Rodríguez et al. 6959* (CR, MO); Cantón de Golfito, Reserva Forestal Golfo Dulce, between Rincón de Osa and entrance to Parque Nacional Corcovado, along new lumber road on red clay soil ridge in primary forest ca. 5 km NE of Los Patos, $8^{\circ}36'N$, $83^{\circ}28'W$, 200 m, 1 Apr 1988 (fr), *Hammel & Bozzoli 16629* (CR, MO); primary forest along stream, 0 km to 1 km upstream from Los Chiles, very steep slopes on sides of stream, $8^{\circ}31'N$, $83^{\circ}31'W$, 300–400 m, 10 Jul 1977 (fr), *Liesner 3139* (CR, MO); Cantón de Osa, Reserva Forestal Golfo Dulce, Osa Península, Rancho Quemado, ca. 15 km W of Rincón; along Quebrada Quebradón and ridge above it, $8^{\circ}40'N$, $83^{\circ}34'W$, 200 m, 4 Jun 1988 (fl, fr), *Hammel et al. 17010* (CR, MO); Cerro Brujo, cuenca superior de Quebrada Vaquedano, aguas abajo, $8^{\circ}38'45''N$, $83^{\circ}35'25''W$, 400 m, 20 Jul 1990 (fl, fr), *Herrera 3991* (CR); P.N. Corcovado, alrededores de la estación Sirena, $8^{\circ}28'50''N$, $83^{\circ}35'30''W$, 10 m, 14 Apr 1995 (fl), *Picado 144* (CR); P.N. Corcovado, Los Planes, La Gloria, $8^{\circ}37'30''N$, $83^{\circ}40'50''W$, 170 m, 17 Feb 1991 (fr), *Castro 306* (CR); Cerro Brujo, orilla de la Quebrada Vaquedano, en bosque primario, $8^{\circ}38'N$, $83^{\circ}35'W$, 400 m, 22 Jan 1991 (fr), *Cordero 159* (CR); Los Planes, bosque comunal La Gloria, a orillas de Río Claro, $8^{\circ}37'30''N$, $83^{\circ}40'50''W$, 100–120 m, 17 Feb 1991 (fl, fr), *Cordero 272* (CR, MO); Cantón de Parrita, Valle del Río Palo Seco, pie del Cerro Cabeza de Chanco, $9^{\circ}36'44''N$, $84^{\circ}14'00''W$, 300 m, 7 Feb 2000 (fl, fr), *Hammel 22052* (CR, MO). San José: Cantón de Aserrí, Fila Aguabuena, Quebrada Laja, $9^{\circ}40'30''N$, $84^{\circ}11'50''W$, 1100–1200 m, 23 Jan 2003 (fr), *Morales & Hammel 9061* (CR); Cantón de Pérez Zeledón, Refugio de Vida Silvestre Boracayán, Fila Costeña, San José–Puntarenas border, ca. 10 km E of Dominical, catarata del San Luis in the upper, northern Río Higuerón basin, $9^{\circ}15.01'N$, $83^{\circ}44.8'W$, 700–800 m, 27 May 2003 (fl, fr), *Holst et al. 8631* (CR, MO); Cantón de Tarrazú, R.F. Los Santos, Los Llanos de Santa María, $9^{\circ}32'40''N$, $84^{\circ}0'40''W$, 800 m, 9 Jul 1997 (fr), *Estrada et al. 959* (CR); San Carlos, Bajo La virgen, Finca Ríos Paraiso, camino a cerros de Quepos, $9^{\circ}33'38''N$, $84^{\circ}07'27''W$, 200–300 m, 29–30 Jul 2003 (fr), *Rodríguez et al. 8081* (CR); Z. P. Cerro Nara, entre Londres y San Isidro de Dota, ca. 5 km de la estación Tinamú, $9^{\circ}29'03''N$, $84^{\circ}00'10''W$, 600–740 m, 5 Mar 2012 (fr), *Hammel et al. 26164* (CR); Z.P. Cerro Nara,

Londres, área que circunda la toma de agua, 9°29'30"N, 84°1'40"W, 600 m, 12 May 1994 (fl), *Herrera 7035* (CR). **San José:** Cantón de Vázquez de Coronado, P.N. Braulio Carrillo, casi 6 km arriba de la vieja Estación Carrillo, a la par de la carretera, 10°7'46"N, 83°58'9"W, 1000 m, 30 May 1999 (fl, fr), *Hammel 21997* (CR, MO); casi 9.5 km arriba del puente sobre Río Sucio, a la par de la carretera, 10°7'52"N, 83°58'15"W, 1000 m, 29 Apr 2001 (fl, fr), *Hammel 22383* (CR, MO).



Figure 3. *Dicranopygium burgeri*. Habit, specimen of plant, *Burger et al. 10591* (F). Photo courtesy The Field Museum.

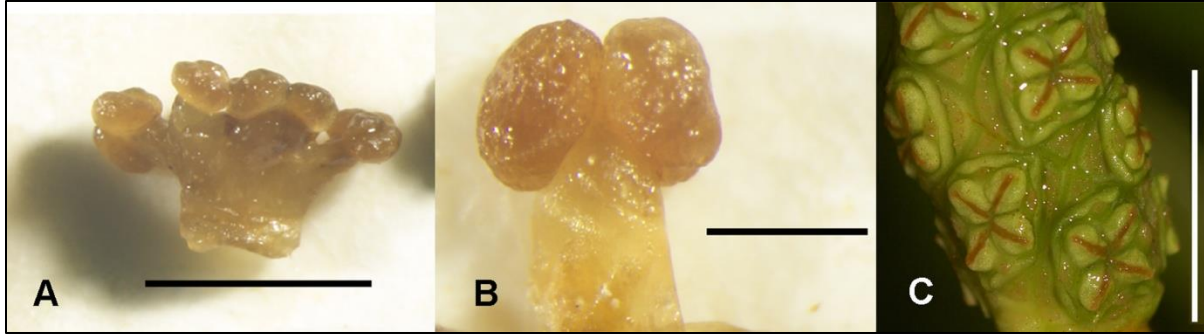


Figure 4. *Dicranopygium burgeri*. A. Staminate flower. B. Stamen. C. Fruits. All from Hammel 27897 (CR). Scale bars: A=2 mm, B=0.5 mm, C=10 mm. Photos all by B. Hammel.

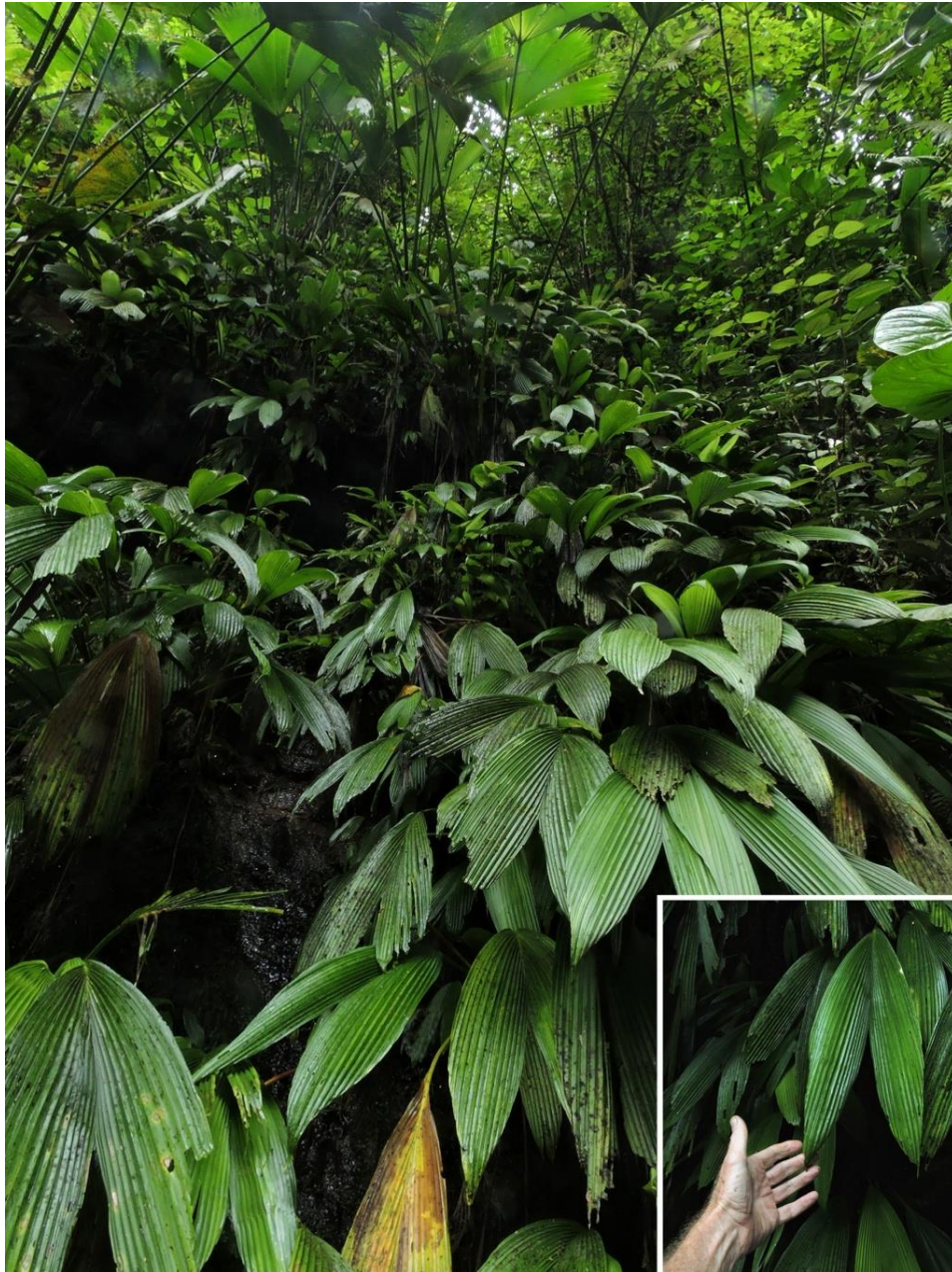


Figure 5. *Dicranopygium burgeri*. Plants at type locality. Photo by B. Hammel.

Etymology. This species is named for Dr. William C. Burger of the Field Museum, long-time student of the Costa Rican flora and author and editor of *Flora Costaricensis* (Burger 1971–2000), as well as apparently the first to collect this species.

Distribution and habitat. *Dicranopygium burgeri* grows mostly on rocks along streams (sometimes in large colonies). It is endemic to Costa Rica, and is the only species of its genus known from the seasonal Pacific slope of that country, where it occurs from the south central to southern part of that versant. It is also known from several collections at two localities on the Atlantic slope, just north of San José, where it has been found locally sympatric with *D. wedelii* Harling. It occurs in very wet forests at 10–1100 m elevation.

Discussion. This species is most similar to *D. harlingii* (subg. *Tomlinsonianthus* G.J. Wilder) of central Panama, with which it shares the minute size of its staminate flowers with virtually no perianth and small stamens, and under which name it was treated in the *Manual de Plantas de Costa Rica* (Hammel, 2003b). Prior to that, much material had been identified (and some distributed) using the unpublished herbarium name “*Dicranopygium osaensis*.” It differs vegetatively from *D. harlingii* by its more robust size and leaves with the petiole twice to nearly seven times as long and the blade twice to nearly four times as long, with segments up to four times as wide. The fruiting spadix appears to be slightly longer and narrower (cylindrical vs. ellipsoid), the pistillate flowers narrower (1.5–3 mm vs. 3–3.8 mm) and the staminodes shorter (4–10 mm vs. ca. 30 mm) than those of *D. harlingii*.

3. DICRANOPYGIUM CURVITEPALUM Hammel, **sp. nov.** **TYPE: PANAMA. Bocas del Toro:** Along highway, between Fortuna and Chiriquí Grande, 2.2 mi N of Continental Divide, 6.3 mi N of bridge over Fortuna Lake, 8°45'N, 82°16'W, 820 m, 12 Mar 1985 (fl), *T. Croat & M. Grayum 60394* (holotype, MO!; isotypes+7!). Figures 6, 7.

For its relatively short and wide anthers *Dicranopygium curvitepalum* is comparable to *D. tatica* Hammel from Costa Rica, but differs by its often less deeply divided leaf blades (3/5–4/5 vs. ca. 4/5) with wider segments 3.3–6.3 cm vs. 1.5–2.5 cm) and (its staminate flowers with fewer stamens (3–8 vs. 11–14).

Terrestrial or (much more frequently) epilithic in and along streams or rivers, with the stem to at least ca. 0.1 m and ca. 2.1 cm wide. **Leaves** with the petiole ca. 11–38 cm, sometimes described as "shiny [at base]," the base drying light (to rarely dark) yellowish tan, the sheath intact, drying dull, light (to rarely dark) yellowish tan to nearly white and not or only rarely (*Hammel 14444*) cracking (no scales seen); blade 26–51 cm, sometimes described as "glossy above" and "dull below," no scales seen, uncostate, bifid for ca. 3/5–3/4 its length, the segments 3.3–6.3 cm wide, the tips acuminate, the outer margin nearly straight. **Peduncle** 2.5–7.5 cm at anthesis, to 4–8 cm in later stages, erect. Spathes 3, ca. 2–5.5 × 0.9–1.8 cm, ovate to lanceolate, sometimes described as "truncate at base," cuspidate. Spadix 1.0–2.2 × 0.5–1.1 cm at anthesis, sometimes described as "sweetly and strongly perfume-scented," 1.35–2.4 × 0.5–1.0 cm (cylindrical) in later stages. **Staminate flowers** ca. 3–4.2 mm, asymmetrical, the basal portion persistent and conspicuous even in fruit; receptacle ca. 2–3.2 mm wide, flat, with 3–5 perianth lobes, these gland-tipped, truncate or widely rounded to obtuse at apex, sometimes described as "purplish;" stamens 3–8, the basal bulbs not evident to (rarely) moderately developed, the filaments usually lacking, at most to ca 0.25 mm, the anthers 0.6–1 × 0.6–0.1 mm (often wider than long and with a wide connective at the base). **Pistillate flowers** ca. 2–3 mm wide during anthesis, in fruit to at least 4 mm wide; tepals free, ca. 1.1–2 × 1.3–3.3 mm in fruit, higher than the stigmata, entire, acute to widely rounded and curving inward; styles ca. 3 mm high, free; stigmata seen from above narrowly ovate-lanceolate, wholly encircled by the tepals; staminodes to at least ca. 34 mm. **Seeds** light brown, 0.9–1 × 0.3–0.5 mm.



Figure 6. *Dicranopygium curvitepalum*. Habit, specimen of the holotype, Croat & Grayum 60394 (MO). Photo by M. Blomberg.

Additional specimens examined. PANAMA. Bocas del Toro: Along oleoducto rd between cntntnl divide at first crossing N from divide, 8°50–55'N, 82°9–12'W, 120 m, 1–2 May 1985 (fr), Hammel 13709 (MO+1); along oleoducto rd between cntntnl divide and Chiriquí Grande, 21 mi S of Chiriquí Grande, along stream by rd, 8°50–55'N, 82°9–15'W, 850 m, 3 May 1985 (fl), Hammel 13750 (MO); Along oleoducto rd between cntntnl divide and Chiriquí Grande, along small stream at cntntnl

divide, 8°50–55'N, 82°9–15'W, 1100 m, 3 May 1985 (fl), 13757 (MO+1); La Fortuna area, Gualaca to Chiriquí Grande, along oil pipeline road, along continental divide W of road, in forest along ridge and small stream, 8°45'N, 82°17'W, 1300 m, 6 Mar 1986 (fl, fr), *Hammel et al.* 14632 (MO, 2 sheets+2/4); on route from Gualaca to Chiriquí Grande along the oil pipeline just N of the continental divide, in forest W of pipeline rd at end of drivable rd, 8°46'N, 82°17'W, 850–950 m, 8 Mar 1986 (fl), *Hammel et al.* 14682 (MO). **Chiriquí:** La Fortuna dam area, N of dam, along Quebrada Arena down stream from road crossing, in swampy forest along stream near continental divide, 8°46'N, 82°14'W, 1000 m, 10 Feb 1986 (fl?), *Hammel* 14444 (MO+2); Vicinity of Fortuna Dam, along Quebrada Arena near continental divide, forest, 8°45'4"N, 82°15'4"W, 1050–1100 m, 24 Feb 1987 (fl), *McPherson* 10516 (MO+1).

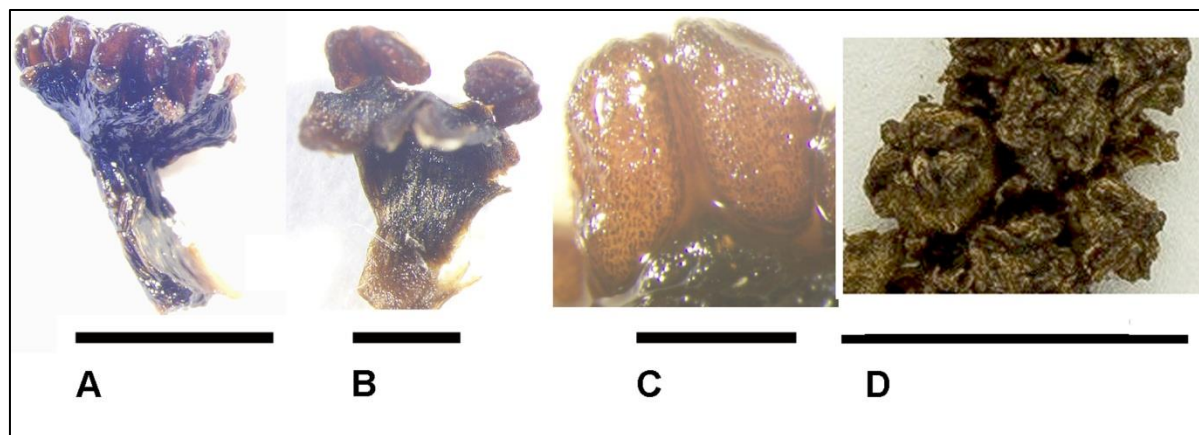


Figure 7. *Dicranopygium curvitepalum*. A, B. Staminate flower. C. Stamen. D. Fruits. A, from *McPherson* 10516 (MO), B from *Croat* 60395 (MO); C from *Hammel* 13750 (MO); D from *Hammel* 13709 (MO). Scale bars: A=2 mm, B=1 mm, C=0.5 mm, D=10 mm. Photos A–C by B. Hammel; D by M. Blomberg.

Etymology. The epithet refers to the inwardly curved pistillate tepals.

Distribution and habitat. This new species is restricted to Bocas del Toro and Chiriquí provinces of western Panama, where it grows mostly on rocks along streams in very wet forest at (120–)850–1300 m elevation.

Discussion. By its relatively short, wide anthers *Dicranopygium curvitepalum* is similar to *D. tatica* Hammel from Costa Rica, but differs by its often less deeply divided leaf blades (3/5–4/5 vs. ca. 4/5) with wider segments (3.3–6.3 cm vs. 1.5–2.5 cm) and its staminate flowers with fewer stamens (3–8 vs. 11–14). By virtue of its stamens of similar size and shape, *D. tatica* was in turn compared (Hammel, 2003a: 62–63) to *D. venezuelanum* Harling, a species unique for its symmetrical staminate flowers. From both, the new species differs additionally by its fruits with relatively long (and inwardly curved) tepals.

4. DICRANOPYGIUM FELINUM Hammel, sp. nov. TYPE: PANAMA. Veraguas: Forested mountains W of Alto de Piedras W of Santa Fe, 3200–5600 ft, 8 Sep 1978 (fl & young fr), *B. Hammel* 4622 (holotype, MO!). Figures 8, 9.

Dicranopygium felinum is most similar to *D. umbrophilum* Hammel, from which it differs by its usually shorter [15.5–31.5 cm vs. (16–)30–45(–47) cm] leaf blades with the outer margin widely rounded (vs. shallowly rounded to nearly straight) and the segments distinctly cuspidate, with the narrow tip up to ca. 2.3 cm (vs. acute to acuminate or more shortly cuspidate).



Figure 8. *Dicranopygium felinum*. Habit, specimen of the holotype, Hammel 4622 (MO). Photo by M. Blomberg.

Terrestrial or shortly root-climbing plant, or (less commonly) epiphytic (sometimes on old logs), with the stem to ca. 1 m, to ca. 1.5(–2.5) cm wide. **Leaves** with the petiole (9.5–)16.5–43.5(–49.5) cm, the base sometimes described as shiny or purple (live), the sheath usually intact or falling in

pieces, rarely partially disintegrated and left as fine fibers, drying dull (dark gray) and not cracking; blade (often drying dark gray) 15.5–31.5 cm, with few brownish orange scales, uncostate, bifid for ca. 1/3–1/2 its length, the segments 3.8–8.7(–9.5) cm wide, distinctly cuspidate with the narrow tip up to ca. 2.3 cm, the outer margin widely rounded (convex). **Peduncle** ca. 5 cm at anthesis, 5.5–20.5 cm and tinged reddish or purple in fruit, erect. Spathes unknown. Spadix ca. 1.3 × 0.65 cm at anthesis, 1.1–2.8 × 0.6–1.5 cm in fruit. **Staminate flowers** ca. 2.9–3.7 mm, asymmetrical; receptacle ca. 2–3 mm wide, flat, with 5 or 6 perianth lobes, these gland-tipped, truncate to widely rounded or obtuse at apex; stamens 23–31, the basal bulbs obvious, the filaments ca. 0.1–0.2 mm, the anthers 0.9–1.1 × 0.5–0.6 mm. **Pistillate flowers** 2.5–3.1 mm wide during anthesis, in fruit to at least 8 mm wide; tepals free, 2–2.9 × 3–7 mm in fruit, about the same height as the stigmata, entire, subacute to truncate apically; styles ca. 1.5–2 mm high, free; stigmata seen from above narrowly (rarely widely) ovate-elliptic, wholly encircled by the tepals; staminodia not seen. **Seeds** brown, ca. 0.9–1.1 × 0.3–0.5 mm.

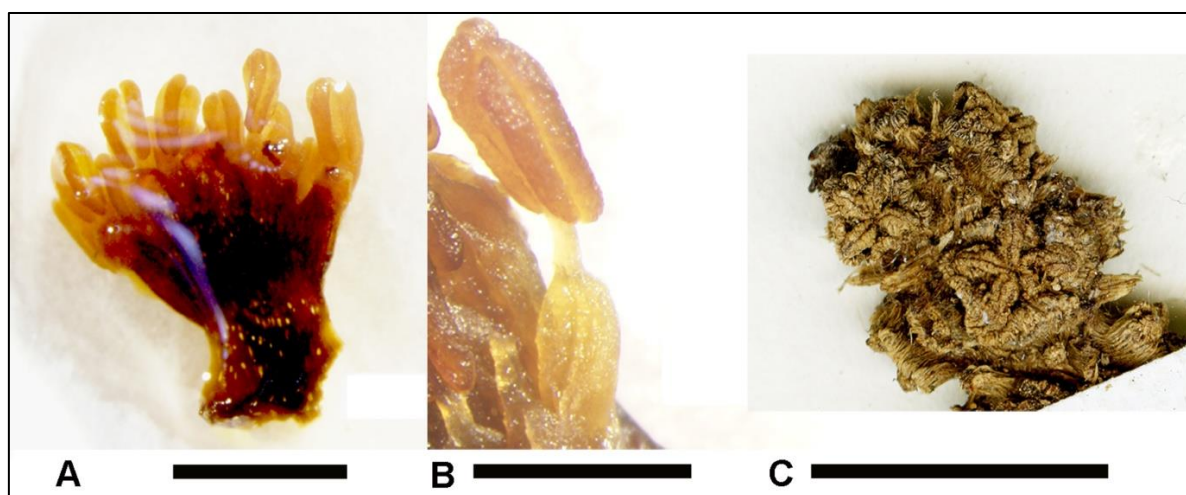


Figure 9. *Dicranopygium felinum*. A, Staminate flower. B, Stamen. C, Fruits. A, B from Hammel 4622 (MO); C from Maas *et al.* 2759 (MO). Scale bars: A=2 mm, B=1 mm, C= ca. 10 mm. Photos A, B by B. Hammel; C by M. Blomberg.

Additional specimens examined. PANAMA. Bocas del Toro: Along oleoducto road between continental divide and Chiriquí Grande, 8°50–55'N, 82°9–15'W, 350–400 m, 30 Apr–1 May 1985 (fr), Hammel 13689 (MO). **Coclé:** El Copé, along gravel road to the right before sawmill, 2400 ft, 18 Oct 1979 (fl & young fr), Antonio 2175 (MO); Omar Torrijos National Park, Peace Corps Trail, 8°39.85'N, 80°35.41'W, 750–850 m, 13 Feb 2005 (fr), Blanco & Penneys 3002 [FLAS_i, PMA(not seen)]; Vicinity of El Copé, 4.1 mi N of village in vicinity along road which leads down into lowlands, straight ahead of the end of the saw mill grounds, 8°39'N, 80°36'W, 680–770 m, 25 Mar 1993 (fr), Croat 74839 (MO); near saw-mill, 8 km N of El Copé (28 km NW of Penonomé), very wet cloud forest, 600–750 m, 1 Sep 1977 (fr), Maas *et al.* 2759 (MO). **Colón:** Teck Cominco Petaquilla mining concession, forest along ridge road, 8°49'33"N, 80°40'11"W, 300 m, 23 Feb 2008 (fr), McPherson & Merello 20203 (MO). **Veraguas:** Trail up E side of Cerro Tute, to 1200 m, 25 Oct 1975 (fr), Witherspoon *et al.* 8865 (MO).

Etymology. The epithet refers the overall shape of the leaf blades as seen on specimens, somewhat remindful of the silhouette of a cat face.

Distribution and habitat. This new species is known from Bocas del Toro province of western Panama east to the region of Coclé and the westernmost district (Donoso) of Colón province. It grows mostly on rocks along streams in very wet forest at 300–850(–1200) m elevation.

Discussion. Although most similar to *Dicranopygium umbrophilum*, because of its often shallowly divided leaf blades, material of this new species (like that of two others described here, *D. nigrescens* and *D. planifolium*) has occasionally been determined as *D. cuatrecasasianum* Harling. That species was described (from Colombia) on the basis of just one collection and without staminate flowers. The type material clearly has the petiole sheaths strongly split up into thick fibers, a character that has been found useful in distinguishing species in this genus. I have seen only one collection determined as *D. cuatrecasasianum*, Doyle 2 (COL), matching it in that respect. Furthermore, none of the Panamanian material that otherwise somewhat resembles said species, and has often been so determined, has notoriously fibrous petiole sheaths. The material described here has a number of additional characters that appear to differ from *D. cuatrecasasianum*, according to the protologue or type material: leaves bifid ca. 1/3–1/2 their length (vs. 1/4–1/3), with the outer margin widely rounded (vs. more shallowly rounded); spadix in fruit 1.1–2.8 cm long (vs. 3 cm); and pistillate flowers 2.5–3.1 mm wide (vs. 5–6 mm). No comparison can be made with regard to the staminate flowers because I have yet to see any staminate material that coincides with true *D. cuatrecasasianum*. Likewise, for the lack of good, mature staminate flowers, I exclude the several collections examined from South America, especially Colombia, currently determined to *Dicranopygium cuatrecasasianum*, that do not agree vegetatively with that species but could prove to represent *D. felinum*.

5. DICRANOPYGIUM HUGONIS Hammel, **sp. nov.** **TYPE: PANAMA. Bocas del Toro.** Along oleoducto road between continental divide and Chiriquí Grande, along small stream at continental divide, 8°50–55'N, 82°9–15'W, 1100 m, 3 May 1985 (fl), *B. Hammel 13758* (holotype, MO!). Figures 10, 11.

Dicranopygium hugonis is most similar to *D. umbrophilum* but differs by its leaf blades more deeply divided [(5/9–)2/3–4/5(–17/20) vs. (1/4–)1/3–2/3] and by the usually narrower segments [(0.8–)2–5.7(–6.7) cm vs. 3–11 cm] with a notoriously long cuspidate tip (the linear portion up to 5.2 cm). The fruiting spadix is usually shorter [1.2–2.5(–3) cm vs. 2–4.5 cm].

Terrestrial or (occasionally) epilithic, or (more often) epiphytic plant ["climbing to ca. 4 m" according to labels of *Hammel et al. 14714* and *14715*], with the stem 0.07–0.16+ m, ca. 1–2 cm wide. **Leaves** with the petiole (8–)19.5–57.2(–61.55) cm, the base sometimes described as maroon or purple (live), or "dull," the sheath disintegrating mostly into fine fibers, drying dull and not cracking (often with abundant brownish scales); blade (8.9–)23–46 cm, often with tan to brown scales (especially along the lower part of the midrib abaxially), uncostate, bifid from (5/9–)2/3–4/5(–17/20) its length, the segments (0.8–)2–5.7(–6.7) cm wide, the tips acuminate, long-cuspidate (with the linear portion 1.3–5.2 cm), the outer margin nearly straight. **Peduncle** sometimes described as "tinged maroon," (3.4–)5.5–6.5(–9) cm at anthesis, to (5.5–)8–13.9(–17.4) cm in later stages, erect. Spathes 3, ca. 3.3–3.7 × 0.7–1.1 cm, lanceolate to ovate-cuspidate. Spadix 1.1–1.3(–2.1) × 0.4–0.7(–0.9) cm at anthesis, 1.2–2.5(–3) × 0.65–1(–1.4) cm (cylindrical to ovoid) in fruit. **Staminate flowers** ca. 1.5–2 mm, asymmetrical; receptacle ca. 1.8 mm wide, flat, with 5 or 6 perianth lobes, these gland-tipped, subtruncate or widely rounded to subacute at apex; stamens to at least 18–21, the basal bulbs obvious, the filaments ca. 0.1 mm, the anthers ca. 0.8–1 × 0.5–0.7 mm. **Pistillate flowers** 2.5–3 mm wide during anthesis, in fruit to at least 6 mm wide; tepals free, 1–2 × 2.3–6 mm in fruit, about the same height as the stigmata, entire, truncate apically; styles 1.3–1.8 mm high, free; stigmata seen from above ovate-elliptic, sometimes narrowly so, wholly encircled by the tepals; staminodes 25–40 mm. **Seeds** brown, ca. 1–1.1 × 0.6 mm.

Additional specimens examined. COSTA RICA. [Limón:] Cerro entre Cerro Chimú y Cerro Matama, 1200 m, 30 Apr 1985 (bud), *Gómez et al. 23575* (MO). **PANAMA. Bocas del Toro:** Oleoducto Road, near Continental Divide, Fortuna Dam area, 8°48'N, 82°12'W, 1000 m, 5 Feb 1984 (fr), *Churchill et al. 4535* (MO), *4584* (MO); Fortuna Dam area, Continental Divide, ridge trail to



Figure 10. *Dicranopygium hugonis*. Habit, specimen of the holotype, *Hammel 13758*. Photo by M. Blomberg.

unnamed peak to E of Oleoducto road, 8°47'N, 82°13'W, 1200 m, 1 Aug 1984 (fr), *Churchill 5871* (MO), *5872* (MO); along oleoducto rd btwn cntntl dvd and Chiriquí Grande, 21 miles S of Chiriquí Grande, along strm by rd., 8°50-55'N, 82°9-15'W, 850 m, 3 May 1985 (fl), *Hammel 13747* (MO); along oleoducto rd btwn cntntl dvd and Chiriquí Grande, along small stream at cntntl dvd, 8°50-55'N,

82°9–15'W, 1100 m, 3 May 1985 (fl), 13759 (MO); La Fortuna area, ca. 2 miles north of continental divide, in forest along stream and on ridge above first house E of road, 8°46'N, 82°15'W, 950–1100 m, 7 Mar 1986 (fr) *Hammel et al.* 14677 (MO); on route from Gualaca to Chiriquí Grande along the oil pipeline just north of the continental divide, in forest W of pipeline road at end of drivable rd., 8°46'N, 82°17'W, 850–950 m, 8 Mar 1986 (st), *Hammel et al.* 14695 (MO); vicinity of Fortuna Dam, below pass on Chiriquí Grande road, forest, c. 8°45'N, 82°15'W, c. 800 m, 27 Jun 1986 (fr), *McPherson* 9723 (MO). **Chiriquí:** Fortuna Dam area, along Quebrada Bonito to W of road, 8°45'N, 82°13'W, 1100 m, 8 Feb 1984 (fr), *Churchill et al.* 4773 (MEXUj), 4907 (MO); Fortuna Dam area, between Quebrada Los Chorros and Quebrada Hondo, N of reservoir, in forest north of road, 8°45'N, 82°14'W, 1100 m, 18 Sep 1984 (fl), *Churchill & Churchill* 6114 (MO); Fortuna Dam area, between Quebrada Los Chorros and Quebrada Hondo, to N of reservoir, in forest N of road, 8°45'N, 82°14'W, 1100 m, 20 Sep 1984 (fr), *Churchill & Churchill* 6152 (MO), 6153 (MO), 6154 (MO), (fl)—6155 (MO), 6156 (MO); Along road between Fortuna Lake and Chiriquí Grande; 4.5–5 km N of dam over Fortuna Lake, 1100–1135 m, 8 Mar 1985 (fr), *Croat & Grayum* 59967 (MO); La Fortuna area; along Quebrada Arena just south of continental divide; down stream ca. 3 km; along highway between Gualaca and Chiriquí Grande, 8°45'N, 82°16'W, 1050 m, 9 Mar 1986 (fr), *Hammel et al.* 14714 (MO), (st)—14715 (MO); forests behind Vivero Forestal de Boquete, 12 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project, Premontane rainforest, 8°43'N, 82°14'W, 1100–1200 m, 17 Jun 1982 (fl, fr), *Knapp & Vodicka* 5539 (MO); Distrito Boquete. Fortuna dam site, mostly collected along stream on white sandy soil with very thin humus layer, 1200 m, 7 Feb 1985 (stamens, fr), *van der Werff & van Hardeveld* 6655 (MO); Distrito Boquete. Fortuna dam site; continental divide, Cloud forest, 1100 m, 9 Feb 1985 (fr), *van der Werff & van Hardeveld* 6794 (MO), 6801 (MO). **Coclé:** Alto Calvario above El Copé, ca. 6 km N of El Copé; Atlantic slope, along trail which leads W off old lumber trail which leads down to Las Ricas, Limón and San Juan, 8°39'N, 80°36'W, 710–800 m, 22 Jun 1988 (fr), *Croat* 68708 (MEXUj). **Veraguas:** Valley of Rio Dos Bocas, 11 km from Escuela Agrícola Alto Piedra (above Santa Fe) on road to Calovebora, primary forest along river, 450 m, 30 Aug 1974 (fr), *Croat* 27491 (MO); N of Santa Fé, ca. 2 km N of Escuela Agrícola Alto de Piedra; in forest, 900 m, 18 Oct 1974 (fr), *Mori & Kallunki* 2627 (MO).

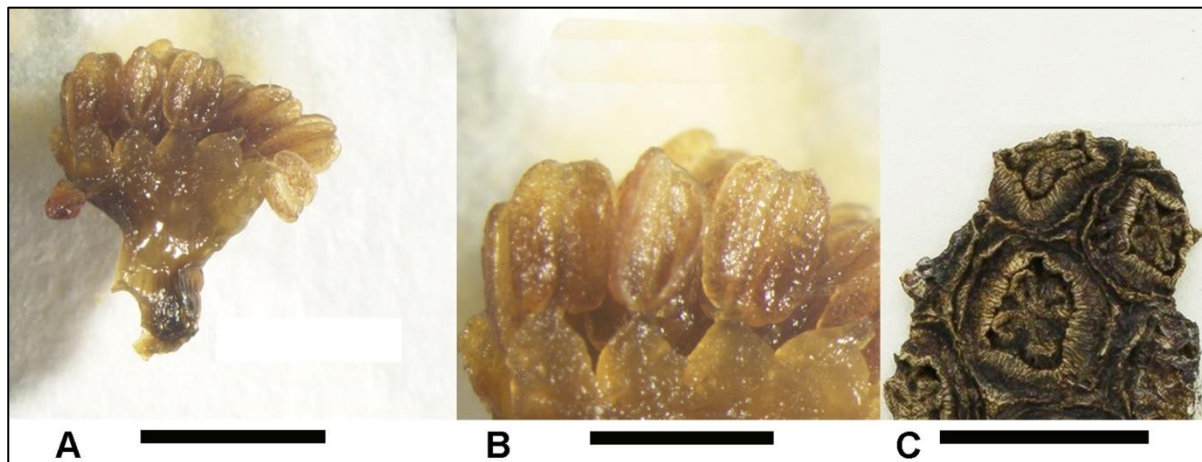


Figure 11. *Dicranopygium hugonis*. A. Staminate flower. B. Stamens. C. Fruits. A, B from *Hammel* 13758, C from *Churchill et al.* 4584. Scale bars: A=2 mm, B=1 mm, C=10 mm. Photos A, B by B. Hammel; C by M. Blomberg.

Etymology. *Dicranopygium hugonis* is named for the late Hugh W. ("Hugo") Churchill (1946-1993), former curator of the Summit Herbarium (SCZ), friend and classmate of the second author of this paper. Although Hugo was primarily a pteridologist, he collected widely in other groups, many of them monocotyledons, and many from the Fortuna area of western Panama, where he gathered numerous specimens (more than anyone else) of this new species.

Distribution and habitat. This new species has been collected most often in Chiriquí province of western Panama but ranges in that country east to Coclé province. It is also known from just one collection in Costa Rica, at 1200 m on the Atlantic slope. It grows in very wet forest at 450–1300 m elevation, mostly climbing up trees.

Discussion. *Dicranopygium hugonis* is unusual for this genus of commonly epilithic, riverine plants in that it is most often found growing up tree trunks, sometimes to as high as at least 4 m above ground, a growth habit that is much more common in *Asplundia*, another large genus in the family. Nevertheless, the closely related *D. umbrophilum*, while most commonly found in the forest understory, can also be found growing up tree trunks, to ca. 0.5 m. Although the elevational range of *D. umbrophilum* overlaps at its upper limits with the lower limit of *D. hugonis*, the former is more of a lowland to mid-elevation species while the latter is restricted to mid elevations [0–850 vs. (450–)700–1200 m].

6. DICRANOPYGIUM MICROBULLATUM Hammel, **sp. nov.** **TYPE: PANAMA.** Guna Yala (San Blas): Llano-Carti road, km 16, in forest W of road, 9°19'N, 78°55'W, 350 m, 5 Oct 1987 (fl, fr), *B. Hammel & H. Herrera 16089* (holotype MO!, isotypes+6!). (Figures 12–15).

Dicranopygium microbullatum differs from the related *D. harlingii* (and all other species of the genus known to me) by virtue of its minutely pustulose upper leaf surface.

Terrestrial or (usually) epilithic, usually on rocks along streams, rarely epiphytic, with the stem to ca. 0.105 m, to ca. 0.5 cm wide. **Leaves** with the petiole 2.3–7 cm, sometimes described as "sometimes purple," the base green (live), the sheath intact, drying dull and not cracking; blade 4–12 cm, lacking scales, uncostate, sometimes described as (very) dark green above and paler below, bifid to ca. its length, the segments 0.6–2.1 cm wide, the tips acute to acuminate, the outer margin nearly straight to shallowly convex throughout, both surfaces distinctly and minutely pustulose (microbullate). **Peduncle** 0.7–2.3 cm at anthesis, 1.5–3.1 cm in fruit, erect. Spathes 3, ca. 1.05–1.3 × 0.55–0.75(–1.3) cm, ovate-cuspidate, green. Spadix 0.4–1 × 0.35–0.65 cm at anthesis, 1.2–1.4 × 0.6–1 cm (ovoid to globose) in fruit. **Staminate flowers** ca. 2 mm, ± asymmetrical; receptacle 1–1.8 mm wide, flat, usually without perianth lobes, rarely with a single (non-glandular), lance-deltate lobe ca. 0.5 × 0.3 mm; stamens 7–12, the basal bulbs usually substantial (0.3–0.7 mm— those of centrally placed stamens imperceptible), lacking filaments, the anthers ca. 0.3–0.5 × 0.5–0.7 mm (mostly wider than long and the anther sacs often widely divergent at the base by the intrusion of the basal bulb, any connective otherwise imperceptible). **Pistillate flowers** ca. 2–3.5 wide during anthesis, in fruit ca. 3–4.5 mm wide; tepals free, ca. 0.3–0.5 × 3–4 mm in fruit (often longest along the long axis of the spadix), often slightly lower than the stigmata, entire, subacute to truncate apically; styles ca. 0.2 mm high, apparently connate (free in flower and young fruit); stigmata seen from above narrowly oblong, wholly encircled by the tepals; staminodes ca. 15–20 mm. **Seeds** amber brown, 0.7–0.9 × 0.15–0.2 mm.

Additional specimens examined. PANAMA. Panamá. El Llano-Cartí highway, 19–20 km north of El Llano, 8 Feb 1974 (fl), *Dressler 4584* (MO, US); El Llano to Carti Road, 13.7 km N of Panamerican Highway, Guna Yala (San Blas) border, 1 Jun 1977 (fr), *Folsom 3499* (MO); Carti road, about 15 km from its beginning, on rocks in draw in forest, 1000 ft, 21 Aug 1983 (fl, fr), *Hammel & Kress 13402* (DUKE, MO); Carti road, 9.7 mi from turnoff at El Llano, in frst alng rd. 9°15'N, 78°58'W, 320 m, 16–17 Apr 1985 (fr), *Hammel 13537* (MO); Carti rd, 7 mi from turnoff at El Llano, in forest along rd., 9°15'N, 78°58'W, 320 m, 16–17 Apr 1985 (fr), *Hammel 13544* (MO); 10 mi from the Pan-American Highway on the El Llano-Cartí Road, 9°14'N, 79°0'W, 350 m, 21 Apr 1982 (fr), *Knapp et al. 4723* (PMA); primary forest, along El Llano Carti-Tupile road, 12 mi above Pan-Am Hwy, 200–500 m, 26–27 Mar 1973 (fl), *Liesner 1205* (MO+4); along El Llano to Carti road, forest along road, 9°15'4"N, 79°0'4"W, 300 m, 6 Mar 1987 (fl, fr), *McPherson 10611* (MO+1); premontane wet forest, El Llano-Carti road, 12 km N of Pan Am. Hwy at El Llano, ca. 400 m, 16 Jan 1974 (fl),

Nee & Dressler 9370 (MO); premontane wet forest along El Llano-Carti road, 12 km N of Pan Am. Hwy at El Llano, vicinity of stream, ca. 400 m, 11 Mar 1974 (fl, fr), *Nee 10471* (MO, PMA). **Panamá to Guna Yala** (San Blas): trail from end of rd past Los Altos de Pacora region of Cerro Jefé, on to Cerro Brewster, 9°17'N, 79°17'W, 600–800 m, 20–25 Apr 1985 (fr), *Hammel & de Nevers 13598* (MO+2). **Panamá & Guna Yala** (San Blas): Valle de Madroño, ca. 10 road miles north of La Margarita (by Chepo), in forest just S of and on continental divide along main trail to Cangandi, 9°19'N, 79°8'W, 350–450 m, 21 Feb 1986 (fl, fr), *Hammel & McPherson 14511* (MO+2). **Guna Yala** (San Blas): Nusigandi, along El Llano-Carti Road, 0.7 mi beyond Cuna Headquarters, located 10.9 mi N of Pan-American Highway, 11.6 mi N of Pan-American Highway, 9°18'N, 79°59'W, 450 m, 3 Apr 1993 (fr), *Croat 75131* (MO, PMA); Nusagandi, El Llano-Carti Road, along a creek on the Atlantic slope, deep shade, 9°19'N, 78°15'W, 300 m, 10 Aug 1984 (fl, fr), *de Nevers & González 3668* (MO+2, PMA); El Llano-Cartí Road, km 26.5, creek draining into Río Cartí Senni, 9°19'N, 78°55'W, 200 m, 13 Mar 1986 (fr), *de Nevers et al. 7383-A* (MO); vecindad del Río Nargandi, tierra firme de Nargana, caminando hacia la costa, 9°26'N, 78°35'W, 0–40 m, 11 Aug 1994 (fl, fr), *Herrera et al. 1746* (MO, PMA); trail along Continental Divide, 9°20'N, 78°56'W, 400 m, 23 Jul 1986 (fl, fr), *McDonagh et al. 333* (BM, MO).



Figure 12. *Dicranopygium microbullatum*. Habit, specimen of the holotype, *Hammel & Herrera 16089*. Photo by M. Blomberg.

CULTIVATED. USA. Missouri. Potted plant in Aroid greenhouse, *Dicranopygium* #2A, obtained from Jay Vannini, grown from seed from plant originally from Panama, "from a small creek ca. 15 km along the L-C [Llano-Cartí] road on the W side of the road,...Caribbean versant," 38°36'N, 90°15'W, 155 m, 21 Jul 2022 (fl), *Grayum 13349* (MO); *Dicranopygium* #2B, obtained from Jay Vannini, grown from seed from plant originally from Panama, "from a small creek ca. 15 km along the L-C [Llano-Cartí] road on the W side of the road, ... Caribbean versant," 38°36'N, 90°15'W, 155 m, 21 Jul 2022 (fl), *Grayum 13350* (MO).

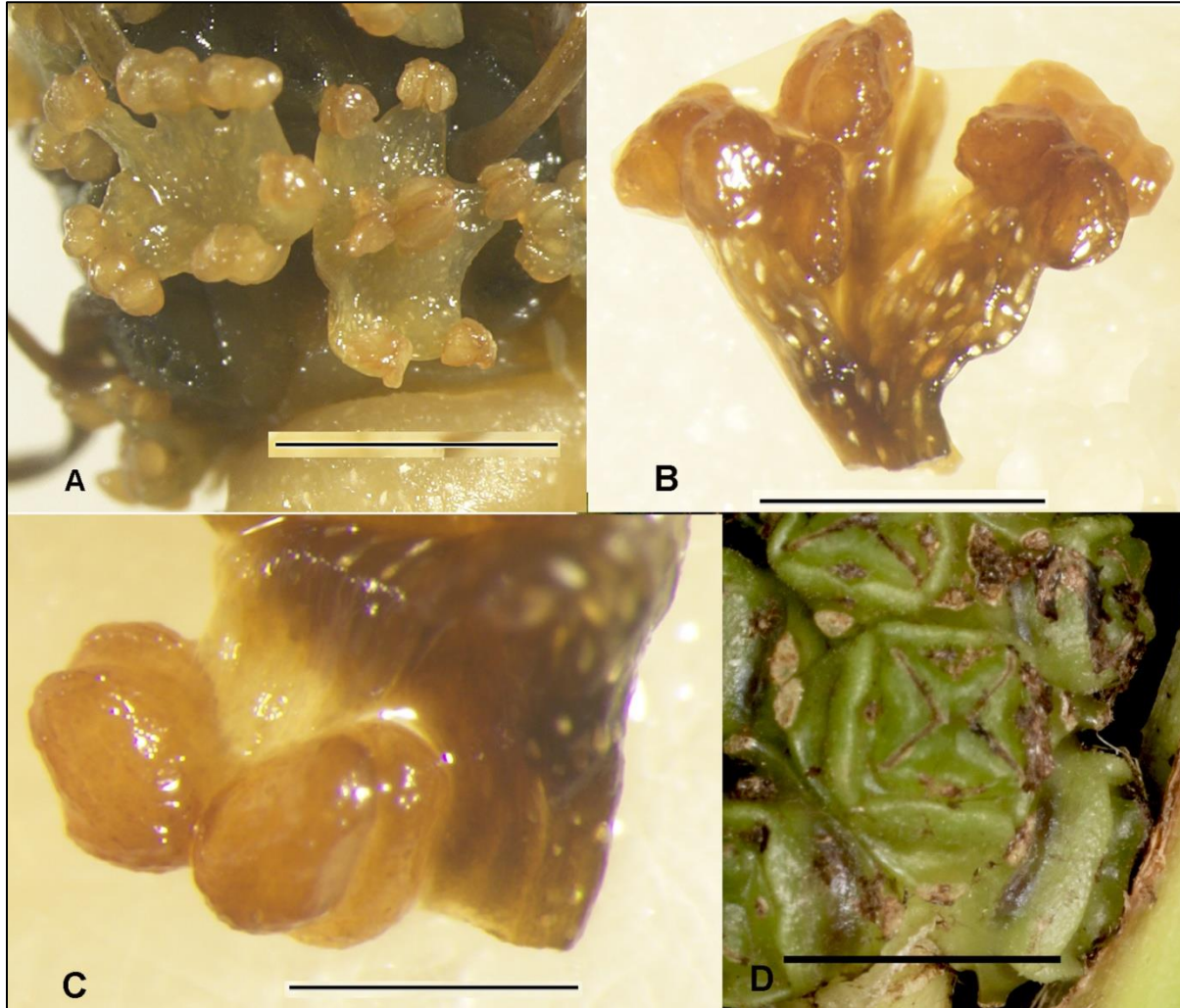


Figure 13. *Dicranopygium microbullatum*. A, B. Staminate flowers. C. Stamen. D. Fruits. A from *Grayum 13349* (MO), B, C from *Hammel & Herrera 16089* (MO), D from live plant in Vannini greenhouse. Scale bars: A=2 mm, B=1 mm, C=0.5 mm, D=ca. 5 mm. Photos A–C by B. Hammel; D by J. Vannini.

Etymology. The epithet of *Dicranopygium microbullatum* refers to the very distinctively and minutely pustulose (microbullate) upper surface of the leaf blades. This surface feature is visible both in live and dry material, and in life contributes to the very dark green appearance of the leaves.

Distribution and habitat. This new species is restricted to eastern Panama, from the Cerro Jefe region to comarca Guna Yala, where it grows (often in dense populations) mostly on rocks in and along small streams in very wet forest at 0–600+ m elevation.

Discussion. *Dicranopygium microbullatum* is similar and surely closely related to *D. harlingii* (subg. *Tomlinsonianthus*) by virtue of its small staminate flowers, usually without perianth lobes, and its very small stamens that are wider than long. It differs markedly from that species by the minutely pustulose texture of the upper surface of the leaf blades, which themselves are often somewhat smaller (4–12 cm vs. 7–17 cm) and less deeply divided ($2/7$ – $3/5$ vs. $1/2$ – $2/3$) than those of *D. harlingii*. The anthers are also shorter in the new species (0.3–0.5 mm vs. 0.5–0.8 mm). The two species, as well as the following related one (*D. minimum*), have all been found along the Llano-Cartí road. All have frequently been found growing in dense populations.



Figure 14. *Dicranopygium microbullatum*. A, B. Leaf surfaces (upper and lower). C. Live plants in habitat. A, B from Grayum 13349, C population of Hammel 13402. Scale bar: 1 mm. Photos all by B. Hammel.

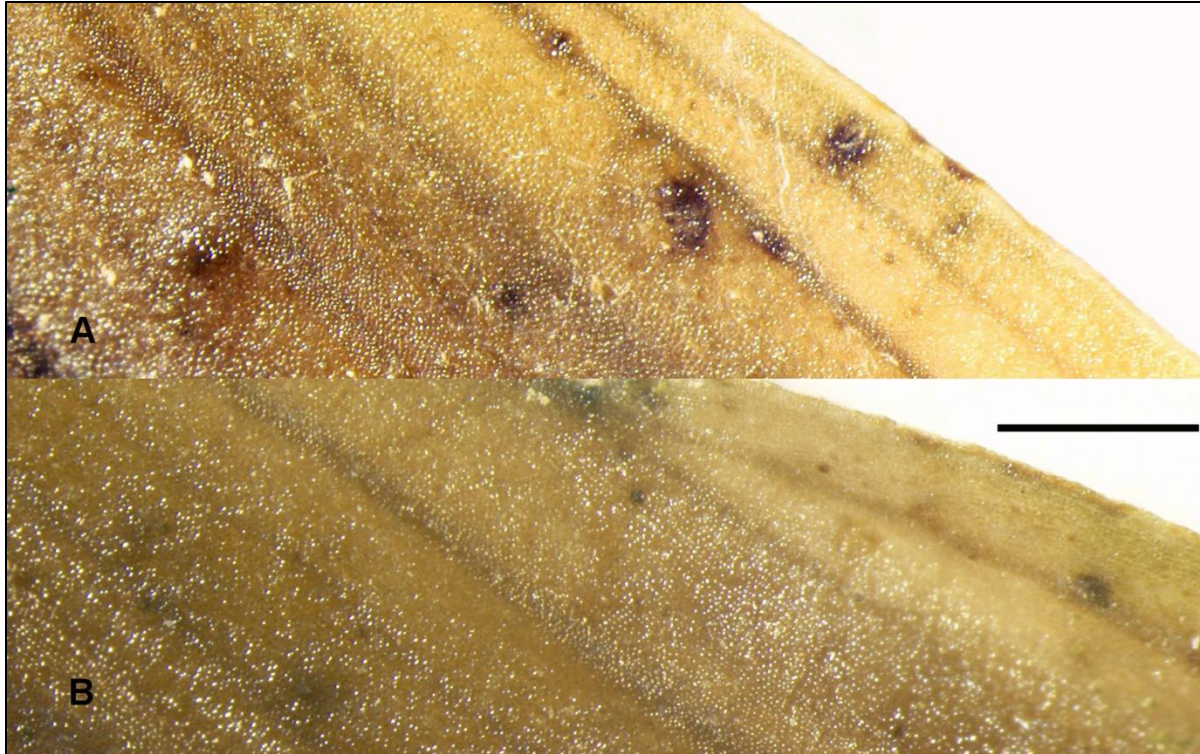


Figure 15. *Dicranopygium harlingii*. A, B. Leaf surfaces (upper and lower). From *Grayum 13352*. Scale bar: 1 mm. Photos by B. Hammel.

7. DICRANOPYGIUM MINIMUM Hammel, *sp. nov.* **TYPE: PANAMA.** Panamá. Road from El Llano to Cartí, the deep ditch, 12.4 km N of Panamerican Highway, 300–400 m, 31 Oct 1977 (fl & fr), *J. Folsom et al. 6180* (holotype MO!, isotypes GB_j, +1!). Figures 16–18.

Dicranopygium minimum differs from the related *D. harlingii* (and virtually all other species in the genus) by its overall small size, with small (4.5–8.2 cm) and shallowly divided [(1/10–)1/7–1/4(–1/3)] leaf blades.

Terrestrial (on soil), most often on rocks in streams, or (less commonly) epiphytic, with the stem to ca. 0.07 m, to ca. 0.5 cm wide, sometimes described as "reddish." **Leaves** sometimes described as "glossy," with the petiole 2–5.5(–9) cm, sometimes described as "purple" or "purplish," the sheath intact, drying dull and not cracking; blade 4.5–8.2 cm, lacking scales, unicostate, sometimes described as "undulate [throughout]," bifid from (1/10–)1/7–1/4(–1/3) its length, the segments (0.4–)0.6–2(–2.6) cm wide, the tips acute to acuminate, rarely cuspidate, the outer margin nearly straight in the proximal half, gradually and shallowly convex in the distal half or shallowly convex throughout. **Peduncle** ca. 1–3 cm at anthesis, 1.3–6.5 cm in fruit, erect. **Spathes** 3, ca. 1.2–1.9 × 0.4–0.5 cm, proximate and within very near the base of the spadix. **Spadix** 0.55–0.7 × ca. 0.4 cm at anthesis, 0.8–1.5 × 0.5–0.9 cm (globose to ovoid) in fruit. **Staminate flowers** (1.3–)2.16–3.0 mm, asymmetrical to subsymmetrical; receptacle 0.8–1.18 mm wide, flat or slightly concave, lacking perianth lobes; stamens 4–6(–9), the basal bulbs usually substantial (0.4–0.85 mm) lacking filaments, the anthers 0.45–0.85 × 0.75–1.05 (mostly wider than long and the anther sacs often widely divergent at the base by the intrusion of the basal bulb, any connective otherwise imperceptible). **Pistillate flowers** ca. (1.8–)2.5–3 mm wide during anthesis, in fruit to at least 4–5 mm wide; tepals free, ca. 0.7–1 × 2.3–5 mm in fruit, about the same height as the stigmata, entire, subacute to truncate apically; styles ca. 0.9–1.2 mm high, free; stigmata seen from above narrowly ovate-elliptic, wholly encircled by the tepals; staminodes ca. 15–20 mm. **Seeds** brown, ca. 0.6–0.9 × 0.25–0.35 mm.



Figure 16. *Dicranopygium minimum*. Habit, specimen of holotype *Folsom et al.* 6180 (MO). Photo by M. Blomberg.

Additional specimens examined. PANAMA. Colón: South approach to Cerro Bruja from Río Escandaloso, ridge top, 20 May 1978 (fr), *Hammel* 3222 (MO); distrito Portobelo, corregimiento Portobelo, Almirante, de la Escuela de Nuevo Tonosí 1.6 km hacia el Oeste, luego tomar una carretera a mano derecha de 4 o 5 km de longitud hasta llegar cerca del río Cascajal, sobre uno de los

tributarios en la base del Cerro Bruja, bosque primario, 9°31'22.1"N, 79°34'7.1"W, 77 m, 10 Mar 2021 (fr), *Jiménez 5538* (PMA); 9°31'18.1"N, 79°34'11.1"W, 152 m, 13 Jan 2022 (fl), *Jiménez 6094* (CR, PMA). **Panamá:** El Llano to Cartí Road, 13.7 km N of Panamerican Highway, Guna Yala (San Blas) Border, 1 Jun 1977 (fr), *Folsom 3499.A* (MO); Cartí road, about 15 km from its beginning, on logs and rocks, banks along draws in forest, 1000 ft., 21 Aug 1983 (fr), *Hammel & Kress 13396* (DUKE); Cartí rd, 7 mi from turnoff at El Llano, in forest along rd, 9°15'N, 78°58'W, 320 m, 16–17 Apr 1985 (fl & fr), *Hammel 13543* (MO). **Panamá/Guna Yala** (San Blas): Nusagandi, El Llano-Cartí road, 9°19'N, 78°55'W, 350 m, Tropical wet lowland forest, 20 Feb 1985 (fr), *van der Werff 7014* (MO). **Guna Yala** (San Blas): El Llano-Cartí highway, ca. 17 km north of El Llano, 1 Feb 1974 (fr) *Dressler 4576* (GB_i); El Llano-Cartí Rd. Km 18.3, 350 m, 9°19'N, 78°55'W, Tropical wet forest, 1 Jul 1985 (anthers & fr), *de Nevers 5937* (MO); trail to Cerro Óbu (Habu of maps) from Río Urgandi (Río Sidra), 100–300ca.9°23'N, 78°48'W, 24 Jun 1986 (fl & fr), *de Nevers et al. 8014* (MO); Llano-Cartí road, km 16, in forest W of road, 9°19'N, 78°55'W, 350 m, 5 Oct 1987 (young fl), *Hammel & Herrera 16090* (MO); Cerro Habú, vicinity of peak, 2500 ft, cloud forest, 9°23'N, 78°49'W, 19 Dec 1980 (fr), *Sytsma et al. 2758* (MO).

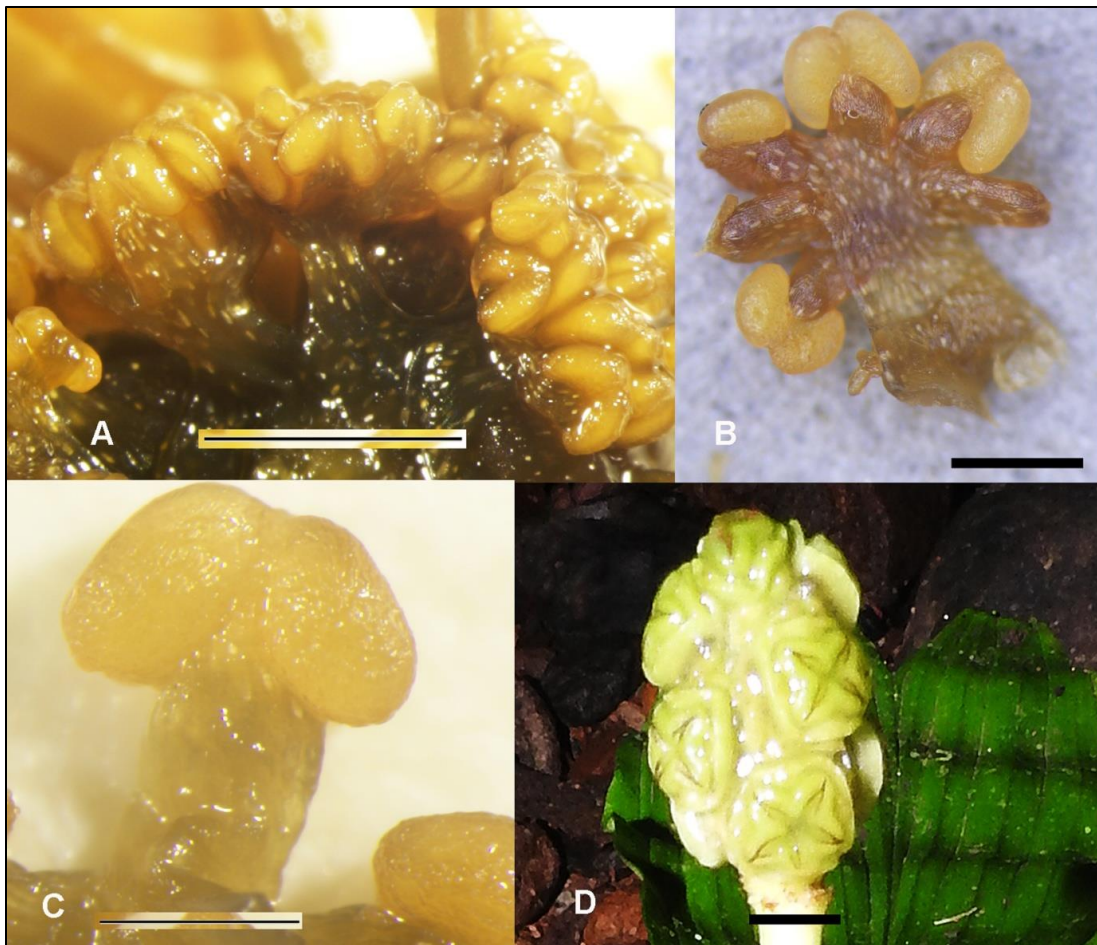


Figure 17. *Dicranopygium minimum*. A, B. Staminate flowers. C. Stamen. D. Fruits. A from *Grayum 13348* (MO), B from *Jiménez 6094* (CR), C from *Grayum 13348* (MO), D from *Jiménez 6094* (CR). Scale bars: A=2 mm, B=1 mm, C=0.5 mm, D=ca. 5 mm. Photos A–C by B. Hammel; D by J. E. Jiménez.

CULTIVATED. USA. Missouri. Potted plant in Aroid greenhouse, *Dicranopygium* #3; obtained from Jay Vannini, grown from seed from plant originally from Panama, "from a small creek ca. 15 km along the L-C [Llano-Cartí] road on the W side of the road, ... Caribbean versant," 38°36'N, 90°15'W, 155 m, 17 Jul 2022 (fl), *Grayum 13348* (MO).

Etymology. The epithet of *Dicranopygium minimum* is in reference to the small size of the plants and especially of their leaf blades, among the smallest of any species in the genus.

Distribution and habitat. This new species is restricted to eastern Panama, from somewhat east of the canal to comarca Guna Yala, where it grows (often in dense populations) mostly on rocks in and along small streams in very wet forest at ca. 80–400(–750) m elevation.

Discussion. *Dicranopygium minimum* is probably related to *D. harlingii* (subg. *Tomlinsoniathus*). Although its staminate flowers lack any indication of perianth lobes, the small anthers that are usually wider than long are overall very similar to those of *D. harlingii*. The new species differs vegetatively from *D. harlingii* by its smaller overall size, and smaller, more shallowly divided leaf blades. The subsymmetrical and sometimes slightly concave staminate flowers, often with fewer stamens [4–6(–9) vs. 3–14], also serve to distinguish *D. minimum* from *D. harlingii*.



Figure 18. *Dicranopygium minimum*. Plants at locality of Jimenez 6094 (CR). Photo by J. E. Jiménez.

8. DICRANOPYGIUM NIGRESCENS Hammel, **sp. nov.** **TYPE: PANAMA. Bocas del Toro.** Along oleoducto road between continental divide and Chiriquí Grande, 19 mi S of Chiriquí Grande, in forest along road, 8°50–55'N, 82°9–15'W, 600 m, 3 May 1985 (fl), *B. Hammel 13742* (holotype, MO!). (Figures 19, 20).

This species has been confused with *Dicranopygium wallisii*, with which it shares leaves with blades that are somewhat shallowly divided (often to ca. 1/3) and anthers mostly longer than 1.5 mm. *Dicranopygium nigrescens* differs from that species by its leaves that are dark drying and usually with smaller blades, and by the staminate flowers with more stamens (23–28 vs. 8–18).



Figure 19. *Dicranopygium nigrescens*. Habit, specimen of holotype Hammel 13742 (MO). Photo by M. Blomberg.

Terrestrial (in forest, on slopes along streams or draws), with the stem to ca. 0.13 m, to 1–1.5 cm wide. **Leaves** with the petiole 17.5–42.2 cm, the sheath intact or falling in pieces, drying dull (dark gray) and not cracking, with abundant light brown scales; blade (drying dark gray) 25.5–37.1 cm with numerous light brown scales, especially on the lower surface, near midrib at base, unicastate, bifid from ca. (3/10–)1/3–2/5(–1/2) its length, the segments 3.7–7.5 cm wide, cuspidate with the

narrow tip up to ca. 2.1 cm, the outer margin shallowly convex to nearly straight (sometimes slightly concave in dried material), sometimes described as "crenate" (the blade occasionally described as lacking elevated ridges on the plicate veins). **Peduncle** ca. 3.7–4.5 cm at anthesis, 8–16.5 cm in fruit, erect. Spathes not seen. Spadix ca. 1.6–1.9 × 0.5–0.89 cm at anthesis, 1.95–3.3 × 0.65–1.4 cm in fruit. **Staminate flowers** ca. 4 mm, asymmetrical; receptacle ca. 3 mm wide, flat, with 4 or 5 perianth lobes, these gland-tipped, subtruncate or widely rounded to subacute at the apex; stamens ca. 23–28, the basal bulbs relatively small, the filaments obsolete, the anthers 1.8–2.2 × ca. 0.5–0.6 mm. **Pistillate flowers** ca. 1.7–2 mm wide during anthesis, in fruit to ca. 3.5–5.5 mm wide; tepals free, ca. 1.5–2 × 1.2–4.5 mm in fruit, about the same height as or slightly lower than the stigmata, entire, truncate apically; styles ca. 2 mm high, free; stigmata seen from above narrowly elliptic, wholly encircled by the tepals; staminodes ("purple at base" according to label of *Hammel 13742*) not found on any specimen, but to ca. 11 mm based on image of *Santamaría et al. 7878*. **Seeds** brown, ca. 0.7–0.8 × 0.25–0.3 mm.

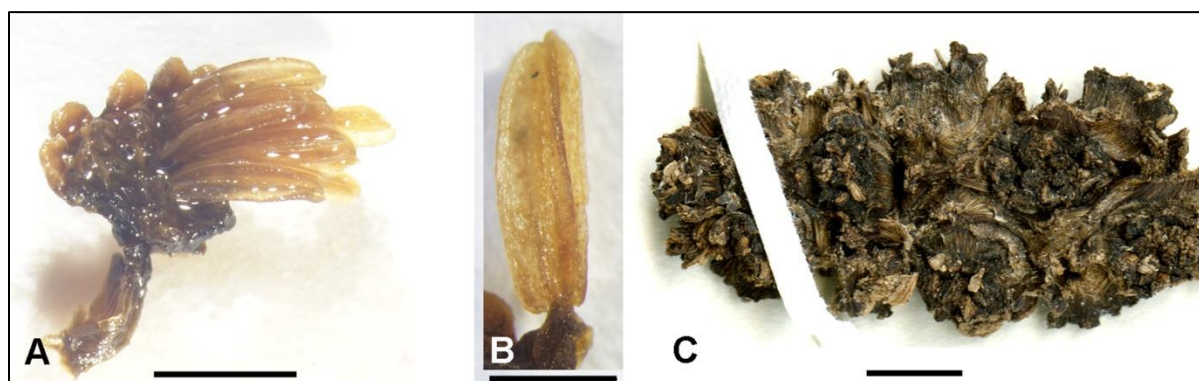


Figure 20. *Dicranopygium nigrescens*. A. Staminate flower. B. Stamen. C. Fruits. A, B from *Hammel 13742* (MO), C from *Hammel et al. 13688* (MO). Scale bars: A=2 mm, B=1 mm, C=5 mm. Photos A, B by B. Hammel; C by M. Blomberg.

Additional specimens examined. PANAMA. Bocas del Toro. Along oleoducto road between continental divide and Chirquí Grande, 8°50–55'N, 82°9–15'W, 350–400 m, 30 Apr–1 May 1985 (fr), *Hammel 13688* (MO+3); La Fortuna area, ca. 8 mi N of continental divide, in forest along E side of highway, 8°40'N, 82°17'W, 300 m, 4 Mar 1986 (st), *Hammel et al. 14583* (MO); La Fortuna area to Chirquí Grande and the oil pipeline, along dirt road 10 mi from continental divide, just past 2nd large bridge, 1 mi N from highway, 8°46'N, 82°11'W, 130 m, 5 Mar 1986 (fl, fr), *Hammel et al. 14608* (MO, 2 sheets); Changuinola, Cerro Frío, headwaters of Río Tskui, Point 23, steep N-facing slope, canopy to 25 m, dbhs 30–60 cm, a stream in deep gully nearby, 09.26127N, 50374W, 1100 m, 29 Oct 2008 (fl), *Santamaría et al. 7878* (PMA) – label data for this specimen clearly involve an unresolved error; furthermore, the estimated coordinates shown on Tropicos (viewed 3 June 2022) are contradictory, as they do not correspond to a locality of the stated elevation and drainage.

Etymology. This species is named for the color of its leaves, which become dark gray to nearly black on drying.

Distribution and habitat. This new species is known only from Bocas del Toro province of western Panama, where it has been found on slopes along streams in very wet forest at ca. 130–600 m elevation.

Discussion. *Dicranopygium nigrescens* has been found only in Bocas del Toro province, and is known for sure only from below 400 m elevation. By its relatively long anthers it would fall in Harling's sect. *Macrostemon* of subg. *Dicranopygium*, wherein it might be confused with *D. wallisii*, which, however, has leaves that dry light tan rather than dark gray and staminate flowers with fewer stamens. For its dark drying leaves and equally staminiferous (23–31) flowers, *D. felinum*, also

described here, is reminiscent of the present species, but has anthers just 0.9–1.05 mm long (vs. 1.8–2.2 mm in *D. nigrescens*).

9. **DICRANOPYGIUM PLANIFOLIUM** Hammel, **sp. nov.** **TYPE: PANAMA. Panamá.** Cartí road, 9.7 mi from turnoff at El Llano, in forest along road, 9°15'N, 78°58'W, 320 m, 16–17 Apr 1985 (fl), *B. Hammel 13530* (holotype, MO!). (Figures 21, 22)



Figure 21. *Dicranopygium planifolium*. Habit, specimen of holotype *Hammel 13530* (MO). Photo by M. Blomberg.

This species is similar to *Dicranopygium wallisii* but differs by its leaves with fewer and lighter colored scales and blades that are often smaller and less deeply divided, with narrower segments, by its shorter spathes, and by its staminate flowers with distinctly acute to acuminate perianth lobes.

Terrestrial (often on slopes along streams or rivers), with the stem to ca. 0.1 m, to 1–1.5 cm wide. **Leaves** with the petiole 7.7–36.1 cm, sometimes described as "grooved for most of its length," the sheath usually intact or falling in pieces, rarely partially disintegrated and left as fine fibers, drying dull and not cracking; blade 13.1–42.3+ cm with few light brown scales (when present, most often on the lower part of the petiole and underside of young blades), unicostate, bifid from ca. 1/5–1/3(–2/5) its length, the segments 1.4–5.9 cm wide, cuspidate with the narrow tip up to ca. 2.7 cm, the outer margin shallowly convex (the blade often described in live material as lacking elevated ridges on the plicate veins). **Peduncle** ca. 1.1–2.1 cm at anthesis, 12.5–14.2 cm in fruit, erect. Spathes 4, ca. 1.6–2.6 × 0.5–1.1 cm, ovate, proximate and within very near the base of the spadix. Spadix ca. 1.1–1.3 × 0.6–0.8 cm at anthesis, 2.3–3.3 × 1–2.7 cm in fruit. **Staminate flowers** ca. 4–5 mm, asymmetrical; receptacle ca. 1.8–2.2 mm wide, flat, with 5 or 6 perianth lobes, these not distinctly glandular, acute to acuminate; stamens 14 or 15, the basal bulbs obvious, the filaments obsolete, the anthers 1.5–2.15 × 0.46–0.6 mm. **Pistillate flowers** 1.5–2.4 mm wide during anthesis, in fruit to ca. 4–7 mm wide; tepals free, ca. 1.5 × 2.5–6.5 mm in fruit, about the same height as or slightly lower than the stigmata, entire, truncate apically; styles ca. 2 mm high, free; stigmata seen from above narrowly elliptic, wholly encircled by the tepals; staminodia ca. 10–12 mm. **Seeds** brown, ca. 0.9–1 × 0.4–0.5 mm.

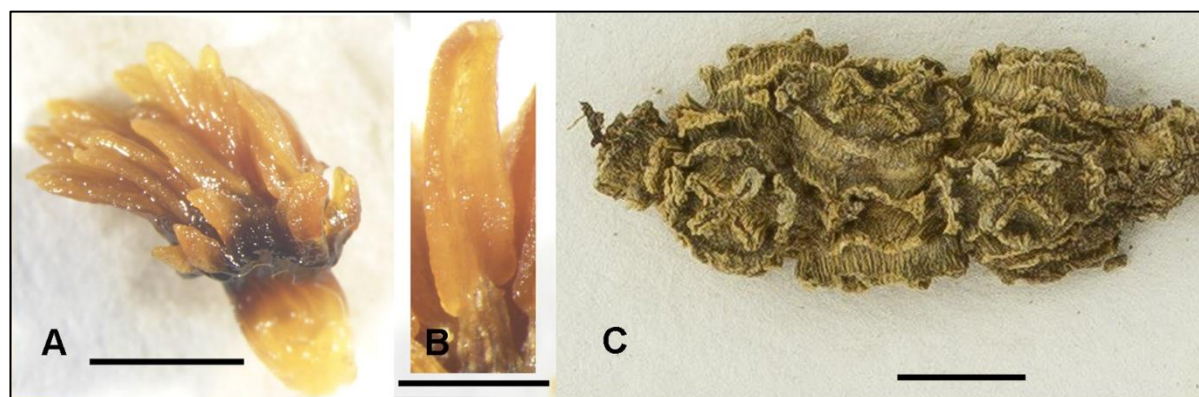


Figure 22. *Dicranopygium planifolium*. A. Staminate flower. B. Stamen. C. Fruits. A from Hammel 13530 (MO), B from Hammel & Trainer 14794 (MO), C from Hammel 3940 (MO). Scale bars: A=2 mm, B=1 mm, C=5 mm. Photos A, B by B. Hammel; C by M. Blomberg.

Additional specimens examined. PANAMA. Colón. Río Boquerón, 6–8 km N of Peluca Hydrographic Station, 29 Aug 1974 (fr), *Dressler 4699* (MO, PMA); head waters of Río Boquerón near fork with Río Nombre de Diosito (near area where abandoned rail-road crosses the ridge), ca. 500 ft, 21 Jul 1978 (fr), *Hammel 3940* (MO); Río Guanache, ca. 5 km upstream from road to Portobelo, in forest and along slopes near river, 9°30'N, 79°40'W, 50 m, 15 Mar 1986 (fl), *Hammel & Trainer 14794* (MO). **Panamá.** Cartí road, 7 mi from turnoff at El Llano, in forest along road, 9°15'N, 78°58'W, 320 m, 16–17 Apr 1985 (st), *Hammel 13542* (MO).

Etymology. The epithet of this new species refers to the observation (often noted in field notes) that the veins running along the top of the ridges of the leaf blade are flush with the surface, not prominent as is usually the case in Cyclanthaceae.

Distribution and habitat. This new species is restricted to Colón and Panamá provinces of Panama, somewhat east of the canal, from along Río Boquerón and Río Guanche east to Cartí road, where it often grows on slopes along streams in very wet forest at 50–320 m elevation.

Discussion. *Dicranopygium planifolium* is so far known only from very wet lowland forests of central Panama. Because of its relatively long anthers (greater than 1.5 mm), the new species would be placed in Harling's (1958) subg. *Dicranopygium* sect. *Macrostemon*, where it most resembles the more widespread *D. wallisii*. Both have relatively shallowly divided leaf blades and a similar number of stamens. The new species differs from *D. wallisii* by its leaves with fewer and lighter colored scales and often smaller and less deeply divided blades with narrower segments (1.4–5.9 cm vs. 5–10 cm wide), by its shorter spathes (ca. 1.6–2.6 cm vs. 2–5.5 cm), and especially by its staminate flowers with distinctly acute to acuminate (vs. subtruncate to truncate) perianth lobes.

10. DICRANOPYGIUM SUBDISTICHUM Hammel, sp. nov. TYPE: PANAMA. Guna Yala (San Blas). El Llano-Cartí Road, Km 19.2, 350 m, 9°19'N, 78°55'W, Tropical Wet Forest, 8 Mar 1986 (fl), *G. de Nevers & H. Herrera 7288* (holotype, MO!). Figures 23, 24.

By its leaves with a yellowish and intact (not splitting into fibers) petiole sheath, and by its relatively long anthers (often more than 1.5 mm), this species is similar to *Dicranopygium testaceum* Harling (sect. *Macrostemon* of subg. *Dicranopygium*) but differs by the epidermis of its petiole sheath dull and entire (rather than shiny and cracking), and leaf blades that are less deeply divided [(1/4–)2/5–1/2 vs. 2/3–3/4]. From that species and all others in the section, it is distinctive by its leaves with an almost distichous appearance.

Terrestrial plant with the stem 0.1–0.4 m, ca. 0.55–1.3 cm wide, with stiff prop roots. **Leaves** with the petiole 19.8–36.3 cm, the base drying yellowish tan, the sheath intact, drying dull, yellowish tan and not cracking (sometimes with scattered brownish scales); blade 26–51.3 cm, often with tan to brown scales (especially along the lower part of the midrib and plicate veins, underside), unicostate, bifid from (1/4–)2/5–1/2 its length, the segments 3.3–6.7 cm wide, the tips acuminate, sort-cuspidate (with the linear portion to ca. 2.4 cm), the outer margin nearly straight. **Peduncle** 6.8.5–9.2(–18.1) cm at anthesis, to 18.8–24 cm in later stages, erect. Spathes 4, ca. 2.5–3.7 × 0.9–1.3 cm, lanceolate to ovate cuspidate. Spadix 1.5–2.2 × ca. 0.3–0.9 cm at anthesis, to at least 1.7 × 0.5–0.9 cm (cylindrical) in later stages. **Staminate flowers** ca. 3.3–4 mm, asymmetrical; receptacle ca. 1.3–3 mm wide, flat, with 3–5 perianth lobes, these gland-tipped, subtruncate or widely rounded to subacute at apex; stamens 8–12(–17), the basal bulbs obvious, the filaments ca 0.1–0.15 mm, the anthers 1.1–2.6 × 0.5–0.6 mm. **Pistillate flowers** 2–2.7 mm wide during anthesis, in fruit to at least 6 mm wide; tepals free, ca. 2? × 2–4 mm in fruit, about the same height as the stigmata, entire, truncate apically; styles ca. 1.8 mm high, free; stigmata seen from above widely elliptical, wholly encircled by the tepals; staminodes to ca. 28 mm. **Seeds** not seen.

Additional specimens examined. PANAMA. Colón, Base of Cerro Bruja along Río Escandaloso, above Mina Boquerón No. 2 (manganese mine), 19 mi from Transisthmian Highway on road to Salamanca, 9°26'30"N, 79°28'W, 10–200 m, 18 Mar 1982 (fl), *Knapp & Kress 4305* (MO, PMA). **Panamá/Guna Yala** (San Blas): Valle de Madroño, ca. 10 road mi N of La Margarita (by Chepo), 9°19'N, 79°8'W, 350–450 m, 21 Feb 1986 (fr), *Hammel & McPherson 14514* (MO); Nusagandi, El Llano-Cartí road, 9°19'N, 78°55'W, 350 m, tropical wet lowland forest, 20 Feb 1985 (fl), *van der Werff 7017* (MO). **Guna Yala** (San Blas): Cerro Obu, 400–500 m, 25 Jun 1986 (fr), *de Nevers et al. 8087* (MO); El Llano-Cartí Road, 20 km and 25 km from turn-off at El Llano, Atlantic slope, 9°21'30"N, 78°58'W, 250 m, 3 Nov 1987 (st), *Hammel 16593* (MO); primary forest, along newly cut road from El Llano to Cartí-Tupile, Continental Divide to 1 mi from divide, 300–500 m, 30 Mar 1973 (fl), *Liesner 1302* (MO).

Etymology. The epithet refers to the unusual leaf arrangement (usually spiral in the genus), appearing subdistichous, at least in dried material.



Figure 23. *Dicranopygium subdistichum*. Habit, specimen of holotype *de Nevers & Herrera* 7288 (MO). Photo by M. Blomberg.

Distribution and habitat. This new species is known from from head waters of the Río Boquerón in Colón province to comarca Guna Yala of Panama, where it often grows on slopes along streams in very wet forest at ca. 10–400+ m elevation.

Discussion. By virtue of its leaves, with a petiole sheath that dries yellowish, and its relatively long anthers (often more than 1.5 mm long), *Dicranopygium subdistichum* appears to be close to *D. testaceum* in sect. *Macrostemon* of subg. *Dicranopygium*. The latter species is distinctive for the shiny, yellowish, and cracking epidermis of its petiole sheaths that remain mostly intact. In the present species, the petiole sheath is yellowish (and likewise does not split up into fibers) but the epidermis is not shiny, nor brittle and cracking, and the blades are less deeply divided [(1/4–)2/5–1/2 vs. 2/3–3/4]. Except for the yellowish color of the petiole sheaths and subdistichous presentation of the leaves, the new species also comes close to the more widespread *D. wallisii*, with brownish red drying petiole sheaths that sometimes split up into fibers and often larger leaf blades (26–51.3 cm vs. 30–66 cm). Other species described in this section (including those described here) either have the leaves often less or more deeply divided, drying dark gray, the petiole sheaths splitting up into coarse fibers, or more numerous and larger anthers. *Dicranopygium subdistichum* is distinctive from all others in the section (if not the entire genus) by its leaves (at least of pressed specimens) with an almost distichous appearance, this perhaps due to its relatively long leaf internodes. The species has been found growing terrestrially, often on steep slopes along streams, but apparently not on rocks in and along streams, as is common for other species in this section (and the genus in general). Notes indicate that it is often supported in this habitat by "stiff prop roots."

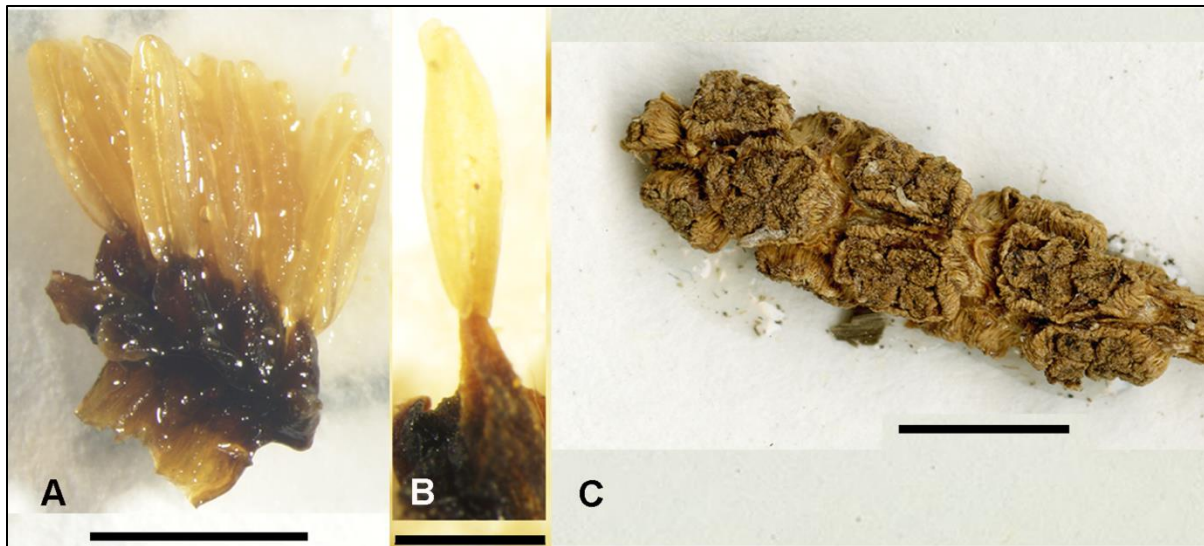


Figure 24. *Dicranopygium subdistichum*. A. Staminate flower. B. Stamen. C. Fruits. A from *de Nevers & Herrera 7288* (MO), B from *Liesner 1302* (MO), C from *Hammel & McPherson 14514* (MO). Scale bars: A=2 mm, B=1 mm, C=5 mm. Photos A, B by B. Hammel; C by M. Blomberg.

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