

**A NEW SPECIES OF SYNECHANTHUS
(ARECACEAE: ARECOIDEAE: CHAMAEDOREEAE)
FROM CENTRAL PANAMA**

MICHAEL H. GRAYUM
Missouri Botanical Garden
P.O. Box 299
St. Louis, Missouri 63166
michael.grayum@mobot.org

JOSÉ DE GRACIA
Minera Panamá S.A.
Torre de Las Américas
Torre A, Piso 21
Punta Pacífica, Panama City
Republic of Panama¹

ABSTRACT

Synechanthus dasystachys De Gracia & Grayum (Arecaceae), from the Atlantic slope of central Panama, is described and illustrated. The new species is unique in its genus in having consistently simple leaves and simple (unbranched) inflorescences. A revised key to the genus is presented, and *S. fibrosus* (H. Wendl.) H. Wendl. is reported from Panama for the first time.

RESUMEN

Se describe e ilustra *Synechanthus dasystachys* De Gracia & Grayum, de la vertiente atlántica de Panamá central. La especie nueva es única en su género por sus hojas consistentemente simples e inflorescencias simples (sin ramificarse). Se presenta una clave revisada del género, y se reporta *S. fibrosus* (H. Wendl.) H. Wendl. por primera vez en Panamá.

The new species of *Synechanthus* H. Wendl. (Arecaceae: Arecoideae: Chamaedoreeae) described in this paper was discovered during botanical inventory work in Donoso District, westernmost Colón Province, Panama, on the site of a large copper-mining concession currently administered by Minera Panamá S. A. This area, ranging in elevation from sea level to 431 m, has proved to harbor a unique flora that, since 2009, has yielded more than 20 previously undescribed species of vascular plants (De Gracia et al., in press), as well as numerous country records and other range extensions.

The palm flora in this region of Tropical Wet Forest (Holdridge et al. 1971) on the Atlantic slope is particularly diverse. An unpublished, largely vouchered list we maintain for the copper-mining site enumerates 45 palm species, including two in the genus *Synechanthus*: *S. warscewiczianus* H. Wendl., a common species ranging from Nicaragua to Ecuador, and the species described here as new, which seems to be a local endemic. The most recent revision of *Synechanthus* (Moore 1971) recognized just two species, *S. warscewiczianus* and the more northerly *S. fibrosus* (H. Wendl.) H. Wendl. The latter ranges from southern Mexico to westernmost Panama (Prov. Bocas del Toro), where it has been collected just once (*Santamaría et al.* 7769; CR, MO, PMA). We believe this to be the first reliable report of *S. fibrosus* from Panama. No new taxa have been described in

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Present address: José De Gracia, Coordinador de Proyecto, Clúster de Desarrollo Sostenible, Programa de las Naciones Unidas para el Desarrollo, Calle Evelio Lara, Casa 136B, Ciudad del Saber, Clayton, Panama City, Republic of Panama, jose.degracia@undp.org

Synechanthus since the publication of the aforementioned revision, so the genus is relatively easy to comprehend taxonomically. *Synechanthus* is broadly characterized morphologically among New World palms by its understory habit, leaflets acute to acuminate at the apex, inflorescences with four or five peduncular bracts, unisexual flowers borne in lines (acervuli) on the inflorescence rachillae, with the proximal flower of each acervulus pistillate and all the distal ones staminate (i.e., the plants are monoecious), sepals connate in a trilobed calyx in the flowers of both sexes, red or reddish, smooth ripe fruits, and seeds with ruminant endosperm.

A single plant of the new species described in this paper was encountered by the first author in the Donoso region in 2014, and a collection including both flowering and fruiting rachillae was prepared. Although grossly resembling certain species of the dioecious genus *Chamaedorea*, this individual exhibited both apparent stamens and mature fruits, suggesting monoecy and a closer affinity with *Synechanthus*. We knew at once that, if this were indeed a *Synechanthus*, it had to be an undescribed species, but we were unable to confirm our suspicions in the field. However, subsequent critical examination of this and additional material obtained in the same region have removed all doubt.

SYNECHANTHUS DASYSTACHYS De Gracia & Grayum, **sp. nov.** **TYPE: PANAMA. Colón.** Donoso Distrito, Minera Panamá copper-mining concession, along upper Río del Medio and on adjacent ridges, 8°50'26–31"N, 80°39'43–57"W, 110–219 m, 1 Sep 2014 (fl, fr), *M.H. Grayum, C. Ramos, I. Vergara-Pérez & L. Rojas 13293* (holotype: PMA; isotype: MO-6707796). Figures 1–7.

Differs from the other members of the genus by its consistently simple leaves and unbranched (spicate) inflorescences, with the rachis pilosulous and the acervuli densely disposed all around it.

Stem cespitose or (rarely) solitary, procumbent to erect, 0.5–1.5(–2.0?) m tall, 2–3 cm diam., brown, smooth, ringed. **Leaves** 5–10, simple; sheath 15–30 cm long; petiole green, 35–60 cm long, ca. 1 cm diam., sulcate adaxially; blade 45–85 × 15–30 cm, narrowly obovate, bifid (divided ca. 1/4–1/2 to the base), the distal lobes acuminate at apex, with 15–20 primary lateral veins per side. **Inflorescences** 2–5 per plant, infrafoliar, simple, bisexual; prophyll ca. 2 cm long, tubular, bicarinate; peduncle 24–37 cm long; peduncular bracts 5, 2–10 cm (the proximal 3) or 15–30 cm (the distal 2) long, fibrous; rachis 10–24 cm × 1.5–3.5 mm, acutely angled to narrowly winged longitudinally, pilosulous with uniseriate trichomes to ca. 0.3(–0.4) mm long, with lines of flowers (acervuli) distributed all around the circumference. **Flowers** cream-colored; **staminate flowers** (5)6 or 7(–10) in each acervulus, biseriate, ca. 1.5–2.0 mm tall, turbinate and ± strongly trigonous in bud, maturing basipetally; **calyx** deeply trilobed, the lobes ca. 1 × 1 mm, ovate to triangular, acute at the apex, weakly if at all nerved (when dried); **petals** 3, valvate, apparently connate basally, ca. 1.5 × 2.0 mm, broadly rhombic, subacute at the apex, strongly nerved (when dried); **stamens** 3, the filaments 2–3 mm long, inflexed distally in bud, long-exserted at anthesis, the anthers basifixed, ca. 1 mm long; **pistillode** absent (or not clearly evident); **pistillate flower** 1 and proximal in each acervulus, ca. 1.5–2.2 mm tall, subhemispherical and weakly trigonous in bud; **calyx** shallowly to deeply trilobed, the lobes 0.8–1.0 × ca. 2.0 mm, transversely rectangular or transversely oblong to semicircular or broadly triangular, subtruncate to broadly rounded at the apex, weakly nerved (when dried); **petals** 3, imbricate, apparently distinct, 1.5–2.0 × 1.5–3.0 mm, suborbicular and ± cucullate, rounded at the apex, strongly nerved (when dried); **staminodes** evident in all flowers examined, to at least 4, adnate to the petals, sometimes at least partly connate in a low ring basally, minute to ca. 0.5 mm long, rimlike to dentiform; **stigmas** 3, short, recurved. **Fruits** green to yellow or orange to red, 1.8–2.0 × 0.8–1.0 cm, narrowly oblongoid or ellipsoid to obovoid, smooth, glabrous, with basal stigmatic residue. **Seed** dark brown, ca. 15 × 6 mm, with ruminant endosperm. **Germination** and eophylls unknown.



Figure 1. *Synechanthus dasystachys*. Habit, with leaves (mainly adaxial surfaces) and very young infructescence. From Vergara-Pérez *et al.* 1035 (photo by José De Gracia).

The new species is endemic to Panama and known by just six collections, all from the Distrito de Donoso, Provincia de Colón, in lowland tropical rainforest at elevations below 300 m (91–294 m). We estimate that only about 30 individuals have been located in the wild to date. Plants have been found with both flowers and fruits in March, September, and December.

Synechanthus dasystachys bears a strong superficial resemblance to various simple-leaved species of *Chamaedorea* Willd. (see, e.g., Hodel 1992), from which it may be distinguished by its monoecious (rather than dioecious) sexuality, with staminate and pistillate flowers borne together in lines (acervuli) on each inflorescence. In these respects, it accords more closely with *Gaussia* H. Wendl. (see especially Quero & Read 1986), an oligospecific genus of northern Mesoamerica and the Greater Antilles; however, the new species differs from *Gaussia* (and finds a home in *Synechanthus*) by virtue of its understory (vs. arborescent) habit (Dransfield et al. 2008: 370), sepals connate in a trilobed calyx (vs. distinct) in the flowers of both sexes (Henderson 1990: 9), and seeds with ruminant (vs. homogeneous) endosperm (Quero & Read 1986: 150–151). Our own observations confirm the foregoing differences and suggest that *Gaussia* is also distinct in having pistillate flowers that are smaller than the staminate flowers and with the petals valvate or subvalvate (at least distally), vs. subequal to or slightly larger than the staminate flowers and with the petals imbricate in *Synechanthus* (including our new species).



Figure 2. *Synechanthus dasystachys*. Top to bottom: Leaves (showing abaxial surface of upper leaf and adaxial surface of lower leaf), inflorescence, and three infructescences at varying stages (the uppermost with ripe fruits). From Grayum et al. 13293 (photo by Christel Ramos).



Figure 3. *Synechanthus dasystachys*. Top to bottom: Three infructescences at varying stages (the lowermost with ripe fruits) and inflorescence at anthesis (with portion of rachis toward right; note exserted stamens). From Grayum *et al.* 13293 (photo by Christel Ramos).



Figure 4. *Synechanthus dasystachys*. Section of inflorescence, showing staminate (triangular) and pistillate (rounded, e.g., left of center) flowers, all in bud; dark spots are scars of fallen staminate flowers. Note also pubescence (especially near left side of image). From Vergara-Pérez *et al.* 1035 (photo by José De Gracia).



Figure 5. *Synechanthus dasystachys*. Staminate flower at anthesis (with adjacent pistillate bud at left; note imbricate aestivation of petals). From Vergara-Pérez *et al.* 1035 (photo by José De Gracia).



Figure 6. *Synechanthus dasystachys*. Nearly mature fruits. From Vergara-Pérez *et al.* 1055 (photo by José De Gracia).



Figure 7. *Synechanthus dasystachys*. Ripe seed. From Vergara-Pérez *et al.* 1075 (photo by José De Gracia).

It may seem imprudent of us to be describing a new species in *Synechanthus*, given the notorious morphological variability of one of the established species, *S. warscewiczianus* (see, e.g., Moore 1971). Yet, *Synechanthus dasystachys* differs notably from both of its congeners in having consistently simple, bifid leaves and unbranched (spicate) inflorescences, with the rachis relatively thick and pilosulous and the acervuli disposed comparatively densely (especially proximally) all around it (the flowers of each sex being distinguishable by their slightly different sizes and, especially, shapes and aestivation types). Both of the other species in the genus typically have pinnately compound leaves, but *S. warscewiczianus* varies remarkably in this regard, and populations with simple leaves have been documented (see, e.g., Grayum 2003: 292); indeed, simple-leaved individuals of *S. warscewiczianus* apparently occur in the Donoso region, if we may accept the comments of Meerman (2009: 14) associated with his photos labeled "*Hyospathe elegans*" (but which clearly depict *S. warscewiczianus*).

The two previously recognized species of *Synechanthus* always have branched inflorescences, so far as we know, typically with 17–75 rachillae. But here again, *S. warscewiczianus*, as presently circumscribed, is highly variable and populations with reduced

numbers of inflorescence rachillae are especially frequent in central Panama, whence specimens with as few as three rachillae have been collected (e.g., *Croat 14277*, MO; *Mori & Kallunki 2730*, MO). The rachillae of these aberrant specimens are, however, filiform (ca. 0.8–1.5 mm thick), glabrous, and with distichous acervuli, as typical of *S. warscewiczianus* but not *S. dasystachys*; moreover, the specimens in question all have pinnately compound leaves. The new species agrees with *S. fibrosus* in having relatively few staminate flowers per acervulus, but its individual staminate flowers have just three stamens with the filaments inflexed distally in bud and long-exserted at anthesis, as is characteristic of *S. warscewiczianus* (see, e.g., Grayum 2003: 290). According to our investigation, the "minutely scaberulous" (Moore 1971: 12, 14) inflorescence rachillae of *S. fibrosus* often scarcely differ perceptibly from the glabrous or glabrate rachillae of *S. warscewiczianus*; however, on some specimens of *S. fibrosus* (e.g., *Rivera H. et al. 1234*, MO; southern Mexico), this "scaberulous" rachillar indumentum rises nearly to the level of pilosulous or hispidulous (at least on a microscopic level), differing from that of *S. dasystachys* only by degree (the individual enations or trichomes never attaining even 0.1 mm in *S. fibrosus*). We carefully considered the possibility that *Synechanthus dasystachys* might have been described previously in another genus (particularly *Chamaedorea*) but believe we have falsified that hypothesis to our satisfaction.

Once the significance of our discovery was realized, we conducted thorough herbarium searches at MO and PMA for additional material of our new species, not only in the *Synechanthus* folders but also those for related or superficially similar genera including *Chamaedorea*, *Gaussia*, *Geonoma* Willd., and *Hyospathe* Mart., as well as palm specimens undetermined to genus. This search (which included South American material) yielded but a single additional specimen of *S. dasystachys*: *McPherson & van der Werff 20004* (MO, PMA), also from the Donoso region, collected during the early stages of the mine-site inventory. Rather embarrassingly, this collection (with immature fruits) had been examined previously by the first author of this paper, who determined it (in 2008) as *Chamaedorea deckeriana* (Klotzsch) Hemsl.! The last-mentioned species is indeed strikingly similar (especially in fruit) to *Synechanthus dasystachys* in its gross morphology, and as the latter was not yet known to exist, no genus other than *Chamaedorea* was considered in identifying this specimen, hence acervuli were not sought (though the scars of the fallen staminate flowers are clearly visible under the dissecting scope, in linear formation). There is also evidence that *S. dasystachys* was encountered at some point between June 2007 and February 2009 by J.C. Meerman, an ecologist based in Belize who inventoried palms and cycads at the Donoso mine site during that period. Meerman, with a good general knowledge of Central American palms, produced an illustrated guide for the mine site (Meerman 2009) but prepared no herbarium vouchers (indeed, it was a need for proper palm vouchers that instigated our work). Meerman's photos (2009: 11) labeled "*Geonoma cf. cuneata*" almost certainly depict *Synechanthus dasystachys* (no *Geonoma* species known to us has yellow fruits), but in the absence of a voucher, it is impossible to be certain. Likewise unverifiable are Meerman's comments about his "*Geonoma cf. cuneata*," which state that the leaves can "rarely" be pinnate. While such leaf dimorphy has been documented for many palm species (including the real *Geonoma cuneata* H. Wendl. ex Spruce), none of the specimens of *S. dasystachys* in our possession has pinnate leaves, and Meerman may have been conflating two or more species in his account.

The epithet of the new species name, a noun used in apposition, reprises the long-abandoned genus name *Dasystachys* Oerst., established originally (Örsted 1859: 25–26) to accommodate the palm species now known as *Chamaedorea deckeriana*, to which our new species bears a close superficial resemblance. The literal meaning of the name, from the Greek *dasys* (= hairy or dense) and *stachys* (= spike), is also especially apt (in both senses of its first element) for the new species.

Additional material examined. PANAMA. Colón: Teck Cominco Petaquilla mining concession, streamside forest by old Petaquilla camp, 8°50'14"N, 80°41'17"W, 91 m, 6 Dec 2007 (fr), *McPherson & van der Werff 20004* (MO, PMA); Donoso, área de concesión del proyecto Minera

Panamá S. A., Valle Grande, antiguas oficinas MPSA, quebrada arriba hacia Patio Limoso, 8°49'35.2"N, 80°40'16.2"W, 294 m, 04 Nov 2015, *Vergara-Pérez et al. 1035* (PMA); Donoso, área de concesión del proyecto Minera Panamá S. A., Valle Grande, antiguas oficinas MPSA, quebrada arriba hacia Patio Limoso, 8°49'35.2"N, 80°40'16.2"W, 294 m, 10 Dec 2015 (fr), *Vergara-Pérez et al. 1055* (MO, PMA); Donoso, área de concesión del proyecto Minera Panamá S. A., antiguas oficinas MPSA, quebrada abajo hacia Río Petaquilla, 8°49'32.7"N, 80°40'42.6"W, 153 m, 11 Dec 2015 (fl, fr), *Vergara-Pérez et al. 1056* (MO, PMA); Donoso, área de concesión del proyecto Minera Panamá S. A., TMF, Cofferdam Jujuca, 8°53'24.9"N, 80°40'31.6"W, 105 m, 20 Mar 2016 (fl, fr), *Vergara-Pérez et al. 1075* (MO, PMA).

REVISED KEY TO THE SPECIES OF *SYNECHANTHUS*

1. Leaves simple and bifid; inflorescences simple (unbranched), the rachis 1.5–3.5 mm thick, pilosulous with trichomes to 0.3(–0.4) mm; acervuli distributed all around the rachis; central Panama ***Synechanthus dasystachys***
- 1'. Leaves pinnately compound, rarely simple and bifid; inflorescences racemosely to paniculately branched, the rachillae (3–)17–75, ca. 0.8–1.5 mm thick, glabrous or glabrate or, if minutely scaberulous, with enations or trichomes <0.1 mm; acervuli mostly distichous on the rachillae; southern Mexico to Ecuador.
2. Inflorescences paniculately or subpaniculately branched (at least one basal branch itself branching or bifurcate); leaves always pinnately compound, the leaflets in interrupted groups, arranged in various planes (at least in the proximal half), subsigmoid; staminate flowers 5–7 per acervulus; stamens 6, the filaments included at anthesis, the anthers subequal to or longer than the filaments; southern Mexico to westernmost Panama ***Synechanthus fibrosus***
- 2'. Inflorescences racemosely branched (all the branches simple); leaves simple (rarely) or, if pinnately compound, then the leaflets regularly or irregularly spaced (but not in groups), arranged in a single plane, and more or less straight; staminate flowers 6–15 per acervulus; stamens 3, the filaments long-exserted at anthesis, the anthers much shorter than the filaments; Nicaragua to Ecuador ***Synechanthus warscewiczianus***

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