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New Species of Chamaedorea from Costa Rica and Panama

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Recent work in support of a project on *Chamaedorea* in cultivation that the International Palm Society will publish in 1991 has yielded several undescribed species native to Costa Rica and/or Panama. Since they are all being grown by collectors and/or botanical gardens, it is appropriate to name them at this time.

Chamaedorea robertii D. R. Hodel & N. W. Uhl **sp. nov.** (Figs. 1–3).

Subgeneris *Chamaedoropsis* Oerst. *C. pumilae* H. A. Wendl ex Dammer et *C. sullivanioris* D. R. Hodel & N. W. Uhl affinis sed laminis smaragdinis non venetis, marginibus dentatis remotioribus, inflorescentiis masculis spicatis, floribus masculis albidis, floribus femineis aureis differt; *C. pumilae* affinis sed laminis longioribus et latioribus, pluribus nervis differt; *C. sullivanioris* affinis sed laminis magis profunde bifidis differt. Typus: *D. R. & R. M. Hodel 737* (holotypus, BH; isotypus, PMA).

Stem solitary, erect apically, short, not apparent but creeping at or slightly below the leaf litter, 2.5 cm diam., green, prominently ringed, internodes 1.5 cm long, overall height including leaves less than 1 m.

Leaves 5–7, erect-spreading, simple and bifid (Fig. 1); sheath to 12 cm long, splitting deeply opposite the petiole, cylindric and clasping tightly in a tubular manner only in the basal third, green, ragged and brown-margined apically; petiole 20–25 cm long, green and flattened adaxially and slightly channeled from the lower margins of the blade extending downward to the sheath, green and rounded abaxially; rachis 20 cm long, green and angled adaxially, green and rounded abaxially; blade rich green, 40–50 × 20 cm, simple, bifid apically to nearly half its length, each lobe 20–25 cm long, acuminate, tips 18–20 cm apart, 12–16 raised and prominent primary nerves on each side of the rachis adaxially and abaxially, secondaries numerous and faint, margin conspicuously toothed.

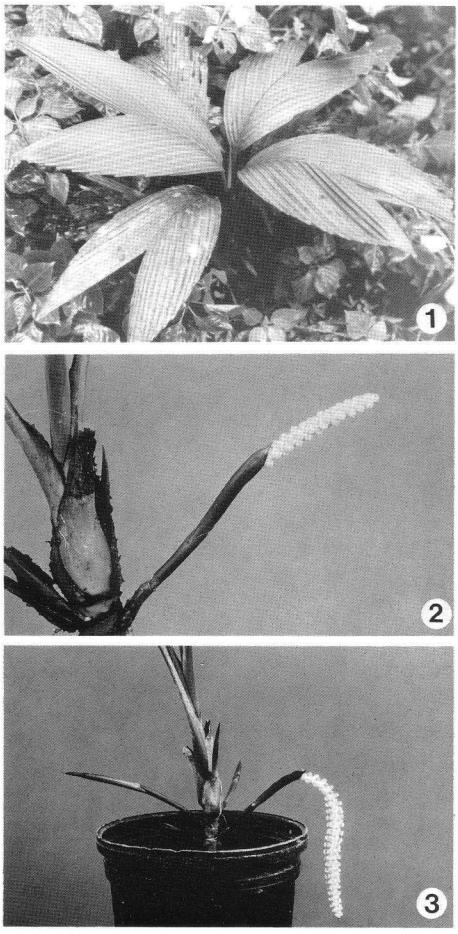
Inflorescences infrafoliar or sometimes interfoliar, often emerging from the leaf litter of the forest floor, spicate. Staminate inflorescence (Fig. 3) with a peduncle to 25 cm long, 5 mm wide at the base and there ± flattened, 4 mm wide at the apex and there rounded, erect-ascending, pale green or yellowish where exposed at anthesis; bracts 5, acute-acuminate, greenish at anthesis ageing to dark brown or nearly black, tubular, tightly sheathing basally, the upper ones inflated apically to 8 mm diam. for two-thirds their length, ± leathery, longitudinally striate-nerved, prophyll 2 cm long, 2nd bract 3–4 cm long, 3rd 5 cm long, 4th 12 cm long, 5th 15 cm long, uppermost equalling or slightly exceeding the peduncle, sometimes 5th bract very short and concealed by the 4th; rachis or flower-bearing portion to 10–15 cm long, 3–4 mm diam., pendulous, whitish, longitudinally ridged around each flower. Pistillate inflorescence (Fig. 2) ascending but often horizontal in fruit; peduncle similar to that of the staminate

but orange in fruit; bracts 5, similar to those of the staminate but burgundy in color when newly emerged, browning only slightly by anthesis, brownish in fruit; rachis to 10 cm long, ± stiff, horizontal, pale yellow or whitish at anthesis, 5 mm in diam., orange in fruit.

Staminate flowers arranged in 3 densely spiralling rows, closely placed but not contiguous, bullet-shaped, 5 × 3.5 mm, greenish-white, immersed in elliptic pits 3–4 mm long; calyx cupular, 1–1.25 × 3.5 mm, whitish tinged with green apically, shallowly 3-lobed, lobes broadly rounded, sepals imbricate, membranous; corolla with the petals erect, valvate, free more than half-way to the base, 4 × 3 mm, acute, green but with a whitish base; stamens exserted beyond the corolla, filaments columnar, 4 × 0.6 mm, clear-colored, anthers bilobed, held beyond the corolla, 1.25 mm long; pistillode columnar, 4 × 0.75 mm, clear, trifid apically. Pistillate flowers densely arranged, some contiguous but most not, 1–1.5 mm distant, very depressed-globose, 2.5 × 3.5 mm, yellow, immersed in circular depressions 4 mm across; calyx ringlike, 1 × 3.5 mm, pale yellowish or whitish, very shallowly and inconspicuously 3-lobed; corolla with the petals imbricate, spreading slightly apically, 2.5 × 4.5–5 mm, yellow, truncated and mucronate apically; pistil strongly depressed-globose, 2.5 × 3–3.5 mm, light yellowish, styles very short or lacking, stigmas pointed, erect, pale. Fruits black, globose, 7 mm diam., densely crowded.

Distribution: PANAMA. Chiriquí. Bocas del Toro. Veraguas. Coclé. COSTA RICA. Guanacaste. Alajuela. Heredia. San José. Dense, wet forest, mostly on the Atlantic slope, 650–1,500 m elevation.

Specimens Examined: PANAMA. Chiriquí: Fortuna, *G. de Nevers & G. McPherson 6854* (MO); *B. Hammel 2256* (MO); *H. Churchill 5263, 5264, 5756* (MO); *S. Knapp et al. 4055, 4057* (MO); Cerro Colorado, *S. Mori & R. Dressler 7814* (MO); *J. Folsom & L. Collins 1800* (MO). Bocas del Toro: Fortuna, *H. & A. Churchill 6191* (MO); *G. McPherson 6816* (MO); Quebrada Higueron and Quebrada Gutierrez, *J. Kirkbride Jr. & J. Duke 739* (MO, BH). Veraguas: Bajo Chitra, *G. de Nevers & G. McPherson 6765* (MO); Santa Fe, *T. Antonio 3543* (MO). Coclé: El Copé, *D. R. & R. M. Hodel 737* (holotype, BH; isotype, PMA); *J. Fol-*



1. *Chamaedorea robertii, D. R. Hodel 624,* cultivated in the JBRCW, Costa Rica. 2. Pistillate plant of *C. robertii, D. R. Hodel 828,* cultivated in Los Angeles, California. It was originally collected at the type locality in Panama. 3. Staminate plant of *C. robertii, D. R. Hodel 857,* cultivated in Los Angeles, California. It was originally collected at the type locality in Panama.

som 3243 (MO); *J. Folsom & J. Kauke 2648* (MO); *G. de Nevers et al. 6384* (MO); *B. Hammel 2421, 4094* (MO). COSTA RICA. Guanacaste: Río Negro, *W. Haber ex E. Bello C. 5874* (MO). Alajuela: Río Laurencito de San Ramón, *I. Chacón et al. 2200* (CR). Heredia: Braulio Carrillo National Park, *R. Chazdon 196* (CR). San Jose: Braulio Carrillo National Park, *D. R. Hodel et al. 971, 975, 976* (BH, CR). CULTIVATED. United States. California: Los Angeles, in greenhouse, *D. R. Hodel 828, 857* (BH), originally collected at the type locality. Costa Rica. Puntarenas: San Vito, Jardín Botánico Robert y Catherine Wilson (JBRCW), *D. R. Hodel 624* (BH), originally collected at the type locality.

The name honors Hodel's son Robert who, at age seven, made the walk from El Copé to the Continental Divide and assisted in collecting the type.

Chamaedorea robertii is an attractive and unusual species because of its simple, bifid, heavily nerved leaves, acaulescent habit, and spicate inflorescences. The flower-bearing portion of the staminate inflorescence is pendulous (Fig. 3) and densely crowded with relatively large, white-tinged-with-green flowers. The pistillate inflorescence has densely crowded, yellow flowers and the peduncle is sheathed in attractive, burgundy-colored bracts.

When it flowered for the first time in the greenhouse in Los Angeles, we originally thought this taxon was a member of subgenus *Stephanostachys* because of the densely placed staminate flowers. However, subsequent collections from this cultivated material show that the staminate flowers of *C. robertii*, while closely placed, are clearly distinct and not contiguous, thus excluding it from *Stephanostachys*. *C. robertii* is most closely related to *C. pumila* and *C. sullivaniorum*. *C. robertii* can be distinguished from both by its forest-green leaves with more remotely toothed margins, spicate staminate inflorescences with whitish flowers, and yellow pistillate flowers. It differs from *C. pumila* in the larger, broader leaf with more nerves (12–15 rather than 10) and from *C. sullivaniorum* in the leaf being more deeply bifid.

Chamaedorea palmeriana D. R. Hodel & N. W. Uhl. **sp. nov.** (Figs. 4,5).

Subgeneris *Chamaedorea* Mart. ex H. A. Wendl. *C. amabili* H. A. Wendl. ex Dammer affinis sed laminis bifidis usque ad medi vel ultra, nervis multo paucioribus, floribus masculis angulatis differt; *C. simplici* Burret affinis sed laminis pluribus nervis, marginibus dentatis, inflorescentiis masculis non spicatis differt. Typus: *D. R. & M. A. Hodel 726A* (holotypus, BH; isotypus, PMA).

Stem solitary, erect but often creeping or procumbent and rooting along its length, to 1 m high, 7–10 mm diam., smooth, green, ringed, internodes 5–10 cm long, often with aerial roots at the base.

Leaves 7 or sometimes more, simple and bifid (Fig. 4), held horizontally; sheath 5–7 cm long, cylindric, green, minutely white-spotted, obliquely open apically, faintly longitudinally striate-nerved; petiole to 15 cm long, green and flattened adaxially, green and rounded abaxially and there with a faint pale yellow or light green band extending from the rachis to the sheath; rachis 8–12 cm long, green and angled adaxially, green and rounded abaxially;

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4. *Chamaedorea palmeriana, D. R. & M. A. Hodel 726B*, in wet forest at the type locality in Chiriquí, Panama. 5. Staminate inflorescence of *C. palmeriana* cultivated in Los Angeles, California. The plant was originally collected at the type locality in Panama. 6. Herbarium specimen of *C. correae, R. Liesner 1001*, showing simple, bifid leaves and spicate inflorescences. 7. Herbarium specimen of *C. correae, B. Hammel 2413*, showing prostrate stem rooting at the nodes.


4


5


MISSOURI
BOTANICAL GARDEN
HERBARIUM
6


MISSOURI
BOTANICAL GARDEN
HERBARIUM
7

blade bright emerald green, ± thin, ± papery, to 25 × 25 cm, deeply bifid apically to more than one-half its length, lobes to 15 × 9 cm, corrugated with 12–14 prominent nerves at the top of each ridge adaxially, exterior margins dentate.

Inflorescences interfoliar, erect; peduncles to 20–30 cm long, slender, 5–7 mm wide at the base and there ± flattened, 2–3 mm diam. at the apex and there rounded, greenish at anthesis, orange in fruit; bracts 4–5, green at anthesis, tightly sheathing, longitudinally striate-nerved, acuminate, bifid, prophyll 5 cm long, 2nd–4th bracts 15 cm long, uppermost not exceeding the peduncle. Staminate inflorescence (Fig. 5) with a rachis 1–5 cm long, flexuous, greenish at anthesis; rachillae 2–7, ascending-spreading, to 15 cm long, 1–1.5 mm diam., longitudinally ridged, green. Pistillate inflorescence spicate or rarely with 2–3 rachillae; rachis or flower-bearing portion erect, 15–20 cm long, greenish at anthesis and 1.5–2 mm diam., orange and thickened in fruit to 2.5 mm diam.

Staminate flowers in moderately dense spirals, angular-globose, 2.5 × 2.5 mm, greenish apically, yellowish basally, slightly immersed; calyx low-cupular, 0.5 × 1.75 mm, brownish, 3-lobed, lobes broadly rounded; corolla with petals connate at their tips and there adnate to the pistillode and opening by small basal apertures, these elliptic, 0.5 mm long, corolla greenish-yellow except orange-brown around the apertures, petals 2.5 × 2–2.5 mm, rounded-triangular, acute; stamens included; pistillode columnar, 2.5 mm high. Pistillate flowers rather densely arranged, 3–4 mm apart, depressed-globose, 2 × 2 mm, pale green, slightly immersed; calyx low-cupular, very briefly imbricate or connate basally, shallowly 3-lobed, lobes broadly rounded, 0.25–0.5 mm high; corolla with the petals imbricate basally, spreading apically, greenish or yellowish, 2–2.5 mm long at anthesis, 3 mm wide at the base, acute, broadly rounded, 3 mm long in fruit, petals and sepals very lightly nerved on the inside; pistil globose-subglobose, green, rounded, acute. Fruits when immature ellipsoid, 12 × 6 mm, green, closely spaced on rachillae, black when mature, ovoid to globose, 12 × 8–10 mm.

Distribution: PANAMA. Chiriquí. Veraguas. COSTA RICA. Alajuela. Heredia. San José. Limón. Dense, wet forest, 450–1,800 m elevation on the Atlantic slope up to and just over the Continental Divide.

Specimens Examined: PANAMA. Chiriquí: Boquete, *D. R. & M. A. Hodel 726A* (holotype, BH; isotype, PMA); *726B* (BH, PMA); La Zorrea, Río Mali, *J. Kirkbride Jr. & J. Duke 735* (MO); Fortuna, *S. Knapp & M. Vodica 5535, 5064* (MO); *K. Sytsma & W. Stevens 2246* (MO); *T. Croat 49890, 49926* (MO); *R. Hampshire & C. Whitefoord 945* (BM); *B. Hammel 2312* (MO); *H. & A. Churchill 6115, 6124, 6116, 6123* (MO); *H. Churchill 5757, 5941, 5539, 5538* (MO); *T. Antonio 5065* (MO); *S. Knapp 5077* (MO). Veraguas: Santa Fe, *S. Mori & A. Bolten 7667* (BH, MO). COSTA RICA. Alajuela: near San Miguel along the Río Sarapiquí, *L. Gómez & G. Herrera 23328* (MO); *I. Chacón & G. Herrera 1204* (MO). Heredia: upper Río Sarapiquí, *H. E. Moore, Jr. 6644* (BH); Braulio Carrillo National Park, *L. Gómez 20086* (MO); *R. Chazdon 181, 193, 194* (CR); *M. Grayum & G. Herrera 7827* (CR). San Jose: Braulio Carrillo National Park, *M. Grayum & P. Sleeper 6121, 6122* (MO); *R. Chazdon 128, 140, 144, 146* (BH), *217* (CR); *L. Gómez et al. 20873* (MO, CR); *N. Zamora et al. 518* (MO); *I. Chacón & G. Herrera 1704, 1731* (MO, CR), *1742* (CR); *D. R. Hodel et al. 972* (BH, CR); Zurquí, *R. Chazdon 241* (CR); *B. Hammel et al. 17340* (CR). Cartago: Moravia, *H. E. Moore Jr. 6693* (BH). Limón: Cerro Chimu, *L. Gómez & G. Herrera 23548* (MO); Río Peje, *L. Gómez & G. Herrera 23514* (MO). CULTIVATED. United States. California: Los Angeles, in greenhouse, *D. R. Hodel 726A bis* (BH).

The name honors Richard W. Palmer of Whittier, California, who has encouraged and supported Hodel's work on palms and especially that on *Chamaedorea*. Chazdon, in a report on the palm flora of Braulio Carrillo National Park (*Brenesia* 28: 107–116, 1987), referred to *C. palmeriana* as *Chamaedorea* sp. "bifida."

Similar to *C. amabilis* in habit, *C. palmeriana* can be distinguished by its blades bifid at the apex to at least half, rather than one-fourth, their length; half the number of nerves on each side of the rachis (12–14 rather than 20–25); and the staminate flowers angular rather than globose. From *C. simplex*, it is distinguished by the thinner blades with more nerves (12–14 rather than 6–7) and dentate margins; the erect and branched, rather than spicate and pendulous, staminate inflorescences.

Chamaedorea palmeriana is relatively widespread, occurring in very wet forest from Veraguas Province in Panama westward to at least the upper reaches of the Río Sarapiquí in Costa Rica. It occurs mainly on the Atlantic slope in Costa Rica and Panama. However, in Panama where the Continental Divide is at a lower elevation, *C. palmeriana* is sometimes found just over it on the Pacific slope.

An attractive species often flowering when no more than 30 cm tall, *C. palmeriana* is noted for its simple, deeply bifid, corrugated, emerald green leaves. In the wild or when well grown, it is a very leafy plant, often holding 7–10 leaves in a handsome and compact crown. Unfortunately, like other species of the genus from wet, cool, relatively high areas, *C. palmeriana* is somewhat difficult to cultivate.

Chamaedorea correae D. R. Hodel & N. W. Uhl. **sp. nov.** (Figs. 6,7).

Subgeneris *Chamaedoropsis* Oerst. Species egregia caulibus longis gracilibus repentibus, laminis simplicibus bifidis vel raro pinnatis segmentis basalibus paucis, paribus apicalibus latioribus, inflorescentiis spicatis vel furcatis, petalis liberis viridiflavis; *C. guntherianae* D. R. Hodel & N. W. Uhl affinis sed laminis grandioribus, lobis latioribus magis divergentibus, pedunculis longioribus, floribus masculis maturescentibus simul secus axem differt. Typus: *S. Knapp & R. Dressler 3801* (holotypus, MO; isotypus, PMA).

Stem solitary, procumbent with prostrate portion longer than erect portion, to 2–3 m long, briefly erect apically to 1 m tall, rooting at the nodes where touching the ground, slender, 5–10 mm diam., ringed, nodes swollen, internodes 5–10 cm long.

Leaves 4–5, erect-spreading, dull green or gray-green, ± thick, simple and bifid or infrequently pinnate; sheath to 15 cm long, tubular, tightly clasping, obliquely open at the apex, light green, longitudinally striate-nerved; petiole to 10 cm long, gray-green and flat adaxially, rounded and gray-green abaxially with a pale yellow or light green band extending from the rachis onto the sheath; rachis 5–15 cm long, gray-green and angled adaxially, rounded and pale abaxially; rachis, petiole, and upperpart of sheath densely but minutely white-spotted; blade simple and deeply bifid apically to three-fourths its length, 15–25 cm long, lobes broadly divergent, 15–25 × 4–12 cm, lanceolate, slightly sigmoid, acuminate, 8–10 primary nerves adaxially, exterior margin toothed toward the apex, or infrequently blade pinnate with a pair of small basal pinnae, these lanceolate, sigmoid, acuminate, narrowed at the base, 8–12 × 1.5–3 cm, 2–3 prominent nerves adaxially.

Inflorescences infrafoliar, erect-ascending, slender. Staminate inflorescence with a peduncle 10–15 cm long; bracts 5–6, tubular, tightly sheathing, flaring abruptly apically, longitudinally striate-nerved, acute-acuminate, bifid, prophyll 5 mm long, 2nd bract 1 cm long, 3rd 2–3 cm long, 4th 4 cm long, 5th 6–8 cm long, 6th 8–

10 cm long, uppermost not exceeding the peduncle; rachillae 2–3 or sometimes spicate, flower-bearing portion 15–20 cm long, 1.5 mm diam., ascending, finely longitudinally striate. Pistillate inflorescence spicate or less often furcate; peduncle 15 cm long, erect-ascending, or nodding when laden with fruits; bracts similar to those of the staminate; rachis or flower-bearing portion to 15–20 cm long, 2 mm diam., finely longitudinally striate, ascending in flower, horizontal and red-orange in fruit.

Staminate flowers, rather densely arranged, subglobose in immature bud, 2 × 2.5 mm, greenish-yellow, just prior to anthesis 2.5 × 2 mm, yellowish, ± superficial; calyx low, 2.5–3 mm across, membranous, 3-lobed, lobes connate basally; corolla with the petals valvate, connate only briefly basally, spreading apically, petals rounded-triangular, 2–2.5 × 2.5 mm, acute, obscurely nerved; stamens with the filaments very short, anthers 0.75–1.25 mm long, flush against the base of the pistillode; pistillode columnar, 1.5–2 mm high, green or yellowish, broadly lobed apically, flared at the base and there adnate to the filaments. Pistillate flowers, rather densely arranged, ovoid-globose, 2 × 2 mm, greenish-yellow, ± superficial; calyx green, 2.5 mm across, 3-lobed, lobes 1–1.25 mm high, sepals connate briefly basally, ± fleshy; corolla with the petals imbricate basally, spreading apically, yellowish, 2–2.5 × 2 mm, long-triangular, acute; pistil globose, pale or greenish, 2–2.5 × 2 mm, styles short, stigmas flattened, recurved, pointed. Fruits ellipsoid-globose, black, 5–8 mm long.

Distribution: PANAMA. Veraguas. Coclé. Colón. Dense, wet forest and cloud forest mainly on the Atlantic slope at or near the Continental Divide, 800–1,000 m elevation. Probably endemic.

Specimens Examined: PANAMA. Veraguas: Santa Fe, *S. Knapp & W. Kress 4358* (MO); *S. Mori 6717, 6775* (MO); *R. Liesner 1001* (MO) (Fig. 6); *C. Hamilton & R. Dressler 3075* (MO). Coclé: El Valle, *W. H. Lewis et al. 1775* (BH, MO); *K. Sytsma 3806* (MO); *S. Knapp 5296* (MO); El Copé, *T. Croat 44680, 49190* (MO); *T. Antonio 3037* (MO); *J. Folsom 1272, 2491, 3191* (MO); *J. Folsom et al. 5735* (MO) *B. Hammel 2413* (Fig. 7), *2604, 13649* (MO); *H. E. Moore Jr. 10531* (BH); El Potroso, *K. Sytsma 1814* (MO); Los Pedregales, Cerro Tife, *S. Knapp & R. Dressler 3801* (holotype, MO; isotype, PMA); Cerro Caracoral, *J. Kirkbride 1097* (MO). Colón: Santa Rita Ridge, *H. Churchill 5547* (MO).

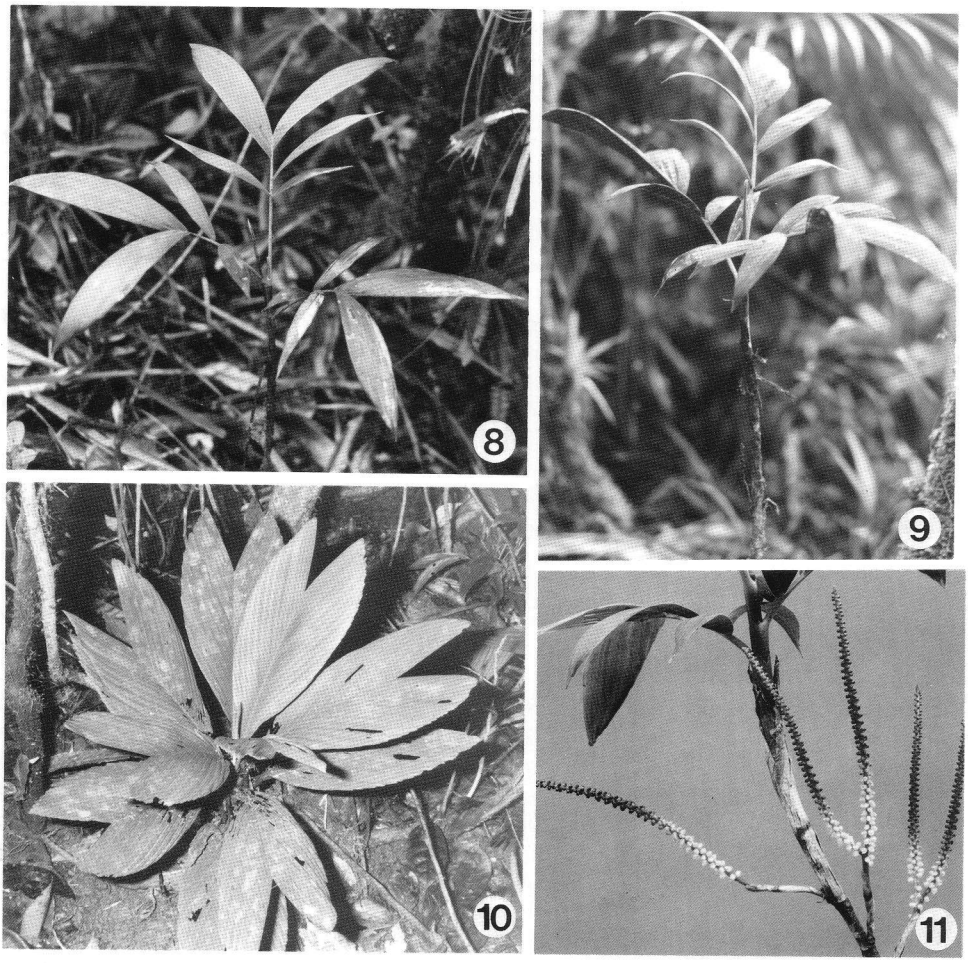
The name honors Mireya Correa, well known botanist and professor at the University of Panama. With creeping stems that root at the nodes and thickish and somewhat leathery, gray-green leaves, *C. correae* is one of the most distinctive members of the genus. It inhabits wind-swept, elfin cloud forest near or at the Continental Divide. *C. correae* is close to *C. guntheriana* but can be distinguished by its larger leaves with broader, more divergent lobes, longer peduncles, and flowers attaining anthesis at more or less the same time along the axis rather than in a conspicuously progressive, basal to apical manner.

Chamaedorea guntheriana D. R. Hodel & N. W. Uhl. **sp. nov.** (Figs. 8, 9,11).

Subgeneris *Chamaedoropsis* Oerst. Species egregia foliis parvis rigidis, laminis segmentis paucis paribus apicalibus latioribus vel raro simplicibus bifidis, inflorescentiis furcatis vel rachillis 3 raro spicatis, petalis liberis, flavis; *C. correae* D. R. Hodel & N. W. Uhl affinis sed floribus masculis maturescentibus conspicue secus axem e basi ad apicem differt. Typus: *D. R. & M. A. Hodel 746* (holotypus, BH; isotypus, PMA).

Stem solitary, erect or procumbent, to 1 m tall, 5–7 mm diam., smooth, green, ringed, conspicuously and minutely white-spotted, internodes to 2–4 cm long.

Leaves 4–5, spreading, ± stiff, ± thick,



8–9. *Chamaedorea guntheriana, D. R. & M. A. Hodel 746,* at the type locality on Cerro Jefe in Panama. 10. *Chamaedorea sullivaniorum* at the type locality near El Valle, Panama. Note the short petioles and compact crown. 11. Staminate inflorescences of *C. guntheriana, D. R. Hodel 856,* on plant cultivated in Los Angeles, California. It was originally collected at the type locality. Note the manner in which the flowers attain anthesis successively up the axis.

pinnate (Figs. 8,9) or less often simple and bifid; sheath to 9 cm long, tubular, tightly clasping, longitudinally striate-nerved, obliquely open at the apex; petiole to 9 cm long, gray-green and ± rounded or slightly flattened adaxially, rounded and gray-green abaxially with a faint yellow band extending from the rachis onto the sheath; rachis to 12 cm long, greenish and angled adaxially, rounded and greenish abaxially; petiole adaxially and abaxially and the rachis abaxially gray-green and densely white-spotted; pinnae 1–4 on each side of the rachis, basal ones to 12 × 2.5 cm, lanceolate, falcately acuminate, narrowed at the base, ± thick and coriaceous, 2–3 prominent nerves, apical pair larger (or if simple and bifid), to 19 × 3.5 cm with 5 conspicuous primary nerves, all pinnae with numerous secondary nerves, these ± faint, pinnae drying heavily striated.

Inflorescences infrafoliar, stiff and

ascending, to 15–20 cm long. Staminate inflorescence furcate, with 2 rachillae (Fig. 11), or infrequently spicate; peduncle to 5–6 cm long, 2.5–4 mm wide at the base and there ± flattened, 1.5–3.5 mm diam. at the apex and there rounded, ascending, greenish at anthesis; bracts 4, these brownish at anthesis, coriaceous, acute-acuminate, bifid, prophyll 5 mm long, 2nd bract 1 cm long, 3rd 2–3 cm long, 4th 4 cm long, tightly sheathing basally, ± inflated apically; rachis or flower-bearing portion if spicate or rachillae to 10–12 cm long, to 2 mm diam., green, ascending. Pistillate inflorescence spicate; peduncle similar to that of the staminate but brownish or dull orange in fruit; bracts similar to those of the staminate but greenish at anthesis; rachis or flower-bearing portion to 6 cm long, 2.5 cm diam., erect, greenish at anthesis, becoming thickened and dull orange in fruit.

Staminate flowers in moderately dense spirals, maturing basally first and then attaining anthesis progressively toward the apex of the axis, oblong to bullet-shaped, 2.5–3 × 2–2.5 mm, bright yellow, slightly immersed; calyx ringlike, 1 × 2.5 mm, pale green or yellowish, shallowly 3-lobed, lobes broadly rounded, sepals imbricate basally; corolla with the petals valvate, erect, spreading, free nearly to the base, 2–2.5 × 2 mm, acute, ± thick; stamens 1–1.5 mm high, filaments short, clear-colored, anthers brownish, bilobed, 0.5 mm long; pistillode columnar, 2–2.5 mm long, whitish, expanded basally and there 0.8 mm diam., apically 0.5 mm diam. and there yellow ageing to red. Pistillate flowers in moderately dense spirals, bullet-shaped, 2.5–3 × 1.5–2 mm, yellow, slightly immersed; calyx ringlike, thickened, 0.75 × 2.5–3 mm, pale green; corolla with the petals imbricate basally, spreading apically, 2 × 2.5–3 mm; pistil pale greenish, stigmas short, pale, recurved. Fruits globose, black, 6 mm diam.

Distribution: PANAMA. Panama. Windswept, moist, relatively open, dwarf cloud forest, 900–1,000 m elevation, at or near the Continental Divide. Probably endemic.

Specimens Examined: PANAMA. Panama: Cerro Jefe, *D. R. & M. A. Hodel 746* (holotype, BH; isotype, PMA); *J. & F. Witherspoon 8496* (MO); *R. Foster & H. Kennedy 1887* (MO); *J. Dwyer & S. Hayden 8090* (MO); *S. Mori & J. Kallunki 2378* (BH, MO), *3794, 6094* (MO). Pavon Road, *S. Mori & J. Kallunki 2723* (MO). CULTIVATED. United States. California: Los Angeles, in greenhouse, *D. R. Hodel 856* (BH), originally collected at the type locality in Panama.

The name honors Bill Gunther of Del Mar, California, who has encouraged and supported Hodel's work on *Chamaedorea.*

Chamaedorea guntheriana is a most unusual palm in habitat and habit. It occurs sparingly in dwarf, windswept, relatively open cloud forest at the Continental Divide in central Panama. This is not the typical, dripping-wet cloud forest festooned with epiphytes that one encounters in other parts of Panama and Costa Rica. Rather, certain elements of it seem to be of an almost sclerophyllous nature. The low, open, shrubby forest contains no tall trees. Many of the species occurring there have thick, grayish-green leaves as does *C. guntheriana.* Another aspect in which *C. guntheriana* is unusual is the manner in which the staminate flowers attain anthesis; this they do in a very pronounced, progressive manner successively from the basal end of the rachis or rachillae to the distal end (Fig. 11).

With grayish-green, thick, stiffish pinnae, *C. guntheriana* is similar to *C. correae* but can be distinguished by its slightly smaller and usually pinnate leaves and the staminate flowers attaining anthesis in a progressive manner along the axis basally to apically rather than simultaneously.

Chamaedorea sullivaniorum D. R. Hodel & N. W. Uhl. **sp. nov.** (Figs. 10,12).

12. *Chamaedorea sullivaniorum, D. R. & M. A. Hodel 740B,* in a ravine at the type locality. Note the larger leaves with longer petioles and the spicate infructescence. 13. *Chamaedorea pedunculata, D. R. & M. A. Hodel 708A,* at the type locality in forest remnants adjacent to the JBRCW, Costa Rica.

Subgeneris *Chamaedoropsis* Oerst. *C. pumilae* H. A. Wendl. ex Dammer et *C. robertii* D. R. Hodel & N. W. Uhl affinis sed laminis non profunde bifidis, stigmatibus in depressiones apicibus gynoceiorum differt; *C. pumilae* affinis sed nervis 15 utrinsecus, petalis masculis tenuibus differt; *C. robertii* affinis sed laminis venetis, marginibus serratis, inflorescentiis masculis ramosis, floribus masculis viridiflavis, floribus femineis viridibus differt. Typus: *D. R. & M. A. Hodel 740A* (holotypus, BH; isotypus, PMA).

Stem solitary, creeping, shortly erect to 25 cm tall, often subterranean or buried in leaf litter so to appear acaulescent, 1–1.5 cm diam., light green but often covered with old persistent leaf bases, prominently ringed, internodes congested, 0.7–1 cm long.

Leaves in rosettes of 10 (Fig. 10) but often as many as 15, erect-spreading, simple, bifid; sheath 3–4 cm long, open, splitting deeply opposite the petiole and clasping completely and in a circular manner only at the base, distally the margins rolled inward forming a tube; petiole 10–16 cm long, dark green, flattened adaxially and with both margins of the blade decurrent and continuing down the petiole to form a channel, rounded abaxially; rachis to 20–25 cm long, gray-green and angled adaxially, paler and rounded abaxially; blade oblong in outline, to 25–40 × 10–17 cm, incised apically to ca. one-third its length, thickened, pliable, coriaceous, dark velvety nearly iridescent mottled green, plicate, with 15 prominent primary nerves adaxially, each along the ridge of a fold resulting in a corrugated effect, nerves light green or white adaxially and abaxially, exterior margins conspicuously toothed.

Inflorescences interfoliar, emerging through the tubelike upper rolled margins of the sheath and flumelike upper surface of the petiole, erect, often appearing through the leaf litter of the forest floor. Staminate inflorescence with a peduncle to 22 cm long, 2–3 mm wide at the apex, 7–9 mm wide at the base; bracts 5, green, longitudinally striate-nerved, tightly sheathing, membranous, ± rotting away prior to flowering; rachis 2.5 cm long; rachillae 4–8, to 10 cm long, 1.5–2 mm diam., ± drooping, light green. Pistillate inflorescence spicate or rarely furcate; peduncle to 32 cm long, ascending, greenish or pale at anthesis, dull orange in fruit; bracts 5–6, similar to those of the staminate; rachis or flower-bearing portion 15–20 cm long, 3 mm diam., strongly curved, light green in flower, thickened and orange in fruit.

Staminate flowers arranged in fairly dense spirals but not contiguous, 2 mm apart, oblong, 4 × 2.5–3 mm, pale green to yellow-green, slightly immersed; calyx coroniform, low, 0.5–0.75 × 2 mm, light greenish-yellow, shallowly 3-lobed, lobes broadly rounded; corolla 3 × 2.5–2.75 mm, petals free nearly to the base, narrowly acute at the apex, 3 × 1.75 mm, light yellowish-green basally and green apically, thin and ± membranous; stamens one-half as high as the corolla; pistillode three-fourths as high as the corolla, globose basally and narrowly attenuate apically, light yellowish-green. Pistillate flowers arranged in ± dense spirals but not contiguous, 2–3 mm apart, depressed-globose, 3 × 3–3.5 mm, pale greenish-yellow, slightly immersed; calyx coroniform, 0.75–1 × 2.5–2.75 mm, light green, shallowly 3-lobed, lobes broadly rounded; corolla 3 × 3–3.5 mm, petals fleshy, imbricate nearly to the apex, there acute and flared slightly upward and outward, 3.5 × 3 mm, greenish-yellow; pistil flattened-globose, 1.5 × 2 mm, green with a depression or pit at the apex, styles lacking, stigmas pointed, slightly recurved, not exceeding the rim of the depression. Fruits black, ± globose, 6–8 mm diam.

Distribution: PANAMA. Bocas del Toro. Veraguas. Coclé. Colón. San Blas? COSTA RICA. San José. Limón. Puntarenas. Dense, wet mainly on the Atlantic slope up to and just over the Continental

Divide, 600–1,500 m elevation; infrequent in southeastern Costa Rica on the Pacific slope below 400 m elevation.

Specimens Examined: PANAMA. Bocas del Toro: Fortuna, *T. Croat & M. Grayum 60214* (MO). Veraguas: Santa Fe, *B. Hammel 4722* (MO); *G. McPherson 7156* (MO); *T. Antonio 2968.* Coclé: El Copé, *B. Hammel 2388* (MO); El Valle, *D. R. & M. A. Hodel 740A* (holotype, BH; isotype, PMA), *740B* (BH, PMA). Colón; Cerro Bruja, *B. Hammel 3121* (MO). COSTA RICA. San José: Alfombra, *W. Burger & R. Baker 10122* (CR). Limón: Río Segundo, Asuncion, *L. Gómez & G. Herrera 23486* (CR). Puntarenas: Osa Peninsula, *H. Kennedy 1927* (MO); *M. Grayum 4050, 4051* (MO). CULTIVATED. United States. California: Los Angeles, in greenhouse, *D. R. Hodel 854, 855* (BH), originally collected from the type locality. Costa Rica. Puntarenas: San Vito de Coto Brus, JBRCW, *D. R. & M. A. Hodel 626A, 626B* (BH), originally collected at the type locality.

The name honors Pauleen Sullivan and her late husband Joe who have encouraged and supported Hodel's interest and work on palms.

Chamaedorea sullivaniorum occurs in dense, wet forest, mainly on the Atlantic slope in western Panama and eastern Costa Rica. There is a report of it occurring in San Blas in eastern Panama but this has not been verified. Where the Continental Divide is low enough, as at El Valle, Panama, *C. sullivaniorum* may occur just over it on the Pacific slope. In southeastern Costa Rica, disjunct and isolated populations occur on the Osa Peninsula below 400 m elevation.

At the type locality in Panama, *C. sullivaniorum* is very localized and never widespread. There it occurs in dense, dark forest often on the sides or bottoms of steep ravines although we also found it in more open forest along rounded ridge tops. It grows with *C. amabilis* and *C. allenii* among others. During one visit to the type locality in April, 1987, the leaf litter on the forest floor was actually dusty dry. Several months later in December, the leaf litter was spongy wet.

Chamaedorea sullivaniorum is similar to *C. pumila* but can be distinguished by the blades incised at the apex only about one-third, rather than one-half, their length and with 15, rather than 10–12, nerves on each side of the rachis; the staminate flowers with thin, rather than thick and fleshy, petals; the pistillode basally globose and narrowly attenuate apically rather than ± columnar; and the pistillate flowers with the pistil having a depression at the apex in which the stigmas are situated. It can be distinguished from *C. robertii* by the branched, rather than spicate, staminate inflorescences; the greenish-yellow, rather than white, staminate flowers; the greenish, rather than yellow, pistillate flowers; and the blade with the margins serrate rather than dentate and not deeply bifid at the apex.

A striking plant to see in the wild because of its thick, leathery, heavily nerved, simple leaves only shallowly bifid at the apex, *C. sullivaniorum* is a handsome ornamental that exhibits a fairly wide range of foliar variation, especially in the length of the blade and petiole. In higher light, the crown is a rosette of 10–15 (Fig. 10), stiffish leaves with short petioles. In extremely low light, the crown contains fewer, softer, larger leaves with longer petioles (Fig. 12). It is highly sought after by collectors and hobbyists who, in some instances, have completely decimated local populations (see letter to the editor by D. R. Hodel, *Principes* 32(3): 95, 1988).

Chamaedorea pedunculata D. R. Hodel & N. W. Uhl. **sp. nov.** (Figs. 13,14).

Subgeneris *Chamaedoreae* Mart. ex H. A. Wendl. *C. macrospadici* Oerst. affinis sed segmentis late rhombicis-lanceolatis, floribus masculis rhombicis depressis dif-

14. Pistillate inflorescence (right), staminate inflorescence (left), and leaf (middle) of *Chamaedorea pedunculata, D. R. & M. A. Hodel 708A, 708B.*

fert. Typus: *D. R. & M. A. Hodel 708A* (holotypus, BH; isotypus, CR).

Stem solitary, erect or decumbent, to 2–3 m tall, 2.5 cm diam., green, ringed, internodes 7.5 cm long.

Leaves 4–6 (Fig. 13), erect-spreading, pinnate; sheath 25 cm long, splitting opposite the petiole and obliquely long-open, tubular only in the basal half; petiole 30–35 cm long, green and slightly grooved adaxially, rounded and pale-banded abaxially; rachis 1 m long, slender and attenuate toward the apex, green and sharply angled adaxially, green and rounded abaxially; pinnae 4–8 on each side of the rachis, regularly arranged, opposite or subopposite, broadly rhombic-lanceolate, slightly sigmoid, somewhat cupped downward, lower middle the largest, these to 35–37 × 12–13 cm, becoming progressively smaller toward the apex of the rachis, long-acuminate with drooping apices, narrowly contracted at the base with 8–10 nerves, these not very prominent adaxially, more prominent with an equal number of secondary nerves abaxially.

Inflorescences interfoliar, erect, becoming horizontal in fruit or flower, long-pedunculate (Fig. 13); peduncle to 1 m long or slightly more, 2–2.5 cm wide at the base, 1 cm wide at the apex, green or pale in flower, orange in fruit; bracts 7–8, tightly sheathing, obliquely open apically, drying brown at anthesis; rachis 6–10 cm long, green in flower, red-orange in fruit. Staminate inflorescence with 20 rachillae, these to 30 cm long, slender, pendulous, green. Pistillate inflorescence with 12–15 rachillae, these to 20–25 cm long, spreading, greenish-yellow at anthesis, red-orange in fruit.

Staminate flowers arranged in fairly dense spirals but not contiguous in bud, depressed-diamond-shaped, 3 × 2.5 mm, greenish-yellow; calyx low, green; corolla with petals connate at the tips and there adnate to the pistillode and opening by lateral slits, yellow-green, petals longitudinally striate-nerved. Pistillate flowers not known. Fruits black, obovoid-globose, 7–8 mm long.

Distribution: COSTA RICA. Puntarenas. Dense, wet forest on the Pacific slope, 1,000 m elevation. Probably endemic.

Specimens Examined: COSTA RICA. Puntarenas: San Vito de Coto Brus, forest remnants adjacent to JBRCW, *D. R. & M. A. Hodel 708A* (holotype, BH; isotype, CR), *708B* (BH); *H. E. Moore Jr. 10507* (BH).

The epithet refers to the long, conspicuous peduncle of this species.

Chamaedorea pedunculata is similar to *C. macrospadix* but can be distinguished by the broadly rhombic-lanceolate, rather than long-lanceolate, pinnae and the depressed-diamond-shaped, rather than ovoid, staminate flowers. Collected only at the type locality, *C. pedunculata* is uncommon in forest remnants near JBRCW where it grows with *C. warscewiczii, C. crucensis,* and *C. brachyclada.*

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Principes, 34(3), 1990, p. 133

PALM LITERATURE

WESSELS BOER, J. G. 1988. Palmas Indigenas de Venezuela. Pittieria 17: 1–332.

Wessels Boer (1971) provided a key to the genera and species of Venezuelan palms, and wrote then that the key was based on a critical revision, which was also cited as Wessels Boer (1971). Now, 17 years later, this "critical revision" has actually been published.

The work is in Spanish and has no illustrations. It begins with an introduction, followed by a discussion of the distribution and ecology of Venezuelan palms. Numerous references are cited in the text, but a full list of literature citations is not provided. The main part of the work is taken up with taxonomy.

Wessels Boer treats 145 species under the title "Palmas Indigenas de Venezuela." By my own estimate 17 of these have not yet been collected in the country. This leaves 128 species, and I estimate that, after taking into account at least 9 synonyms, approximately 120 species actually occur in Venezuela.

We now have such a clear outline of generic concepts in palms (Uhl and Dransfield 1987) that Wessels Boer's work seems out-of-date at the generic level. Yet even 17 years ago *Lepidocaryum* and *Mauritiella* were distinct from *Mauritia*; *Jessenia* from *Oenocarpus*; *Prestoea* from *Euterpe*; *Socratea*, *Dictyocaryum*, and *Iriartella* from *Iriartea*; *Catoblastus* from *Wettinia*; *Maximiliana*, *Scheelea*, and *Orbignya* from *Attalea*; and *Barcella* from *Elaeis*. This broad generic concept means that at least 30 species have names that are not currently accepted. But even if we overlook Wessels Boer's generic concepts, at the species level the work is still very uneven.

The treatments of *Aiphanes*, *Chamaedorea*, *Ceroxylon*, and *Hyospathe* consist of an uncritical compilation of the then-available literature. *Iriartea* (sensu Wessels Boer) and *Attalea* (again sensu W. B.) are both confusing. The author even goes as far as to describe a new species, *Attalea pycnocarpa*, without having seen the staminate flowers. He suspects they may be of the "*Orbignya*-type." I suspect, with such a broad generic concept, it doesn't really matter what the flowers look like. Treatment of the largest genus, *Bactris*, is also very uneven. Take, for example, the complex of species centered around *B. major* (*B. bifida*, *B. gastoniana*, *B. cruegeriana*, *B. major*, and *B. gaviona*). *Bactris gastoniana* and *B. gaviona* have, as far as I know, never been collected in Venezuela. Inclusion of *B. bifida* is based on two sterile specimens which I had difficulty deciding were *Bactris* and not *Astrocaryum*. Inclusion of *B. cruegeriana* also rests on two specimens, one of which I considered not to represent that species.

In general, I suppose, it is better that this work has at last been published. Unfortunately it will serve to perpetuate incorrect names and unrealistic generic con-

(*Continued on p. 142*)