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Two New Species of *Chamaedorea* from Costa Rica

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Since publication of a monograph of *Chamaedorea* (Hodel 1992a) and additional new species (Hodel 1992b, 1995, Hodel et al. 1995), field work in Costa Rica has enabled me to name and describe two additional species.

Chamaedorea coralliformis Hodel sp. nov. (Figs. 1-3).

Subgenus *Stephanostachydis* Klotzsch, floribus masculis contiguus. *C. allenii* L. H. Bailey affinis sed fructibus aurantiacis echinulatis coralliformibus differt. Typus: Costa Rica, Puntarenas, Hodel & Binder 1345 (Holotypus BH; isotypus CR).

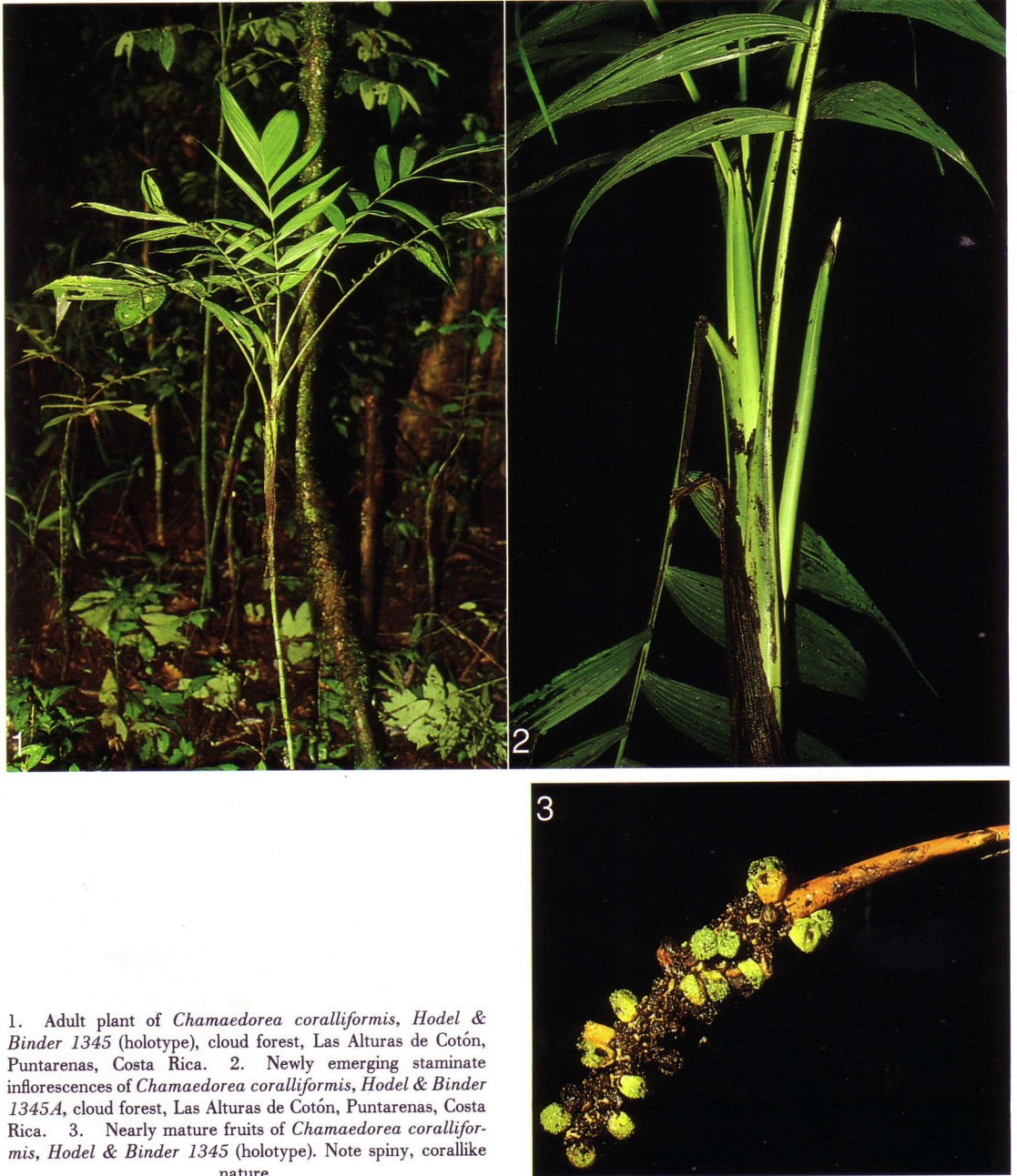
Solitary, erect, to 3 m tall (Fig. 1). Stem 1-1.5 cm diam., green, ringed, internodes to 10 cm long. Leaves 5, spreading, pinnate, occasionally simple; sheath to 20 cm long, becoming obliquely long-open and splitting deeply opposite the petiole, tubular only near base, arranged \pm in a triangular fashion, longitudinally striate with heavy raised yellowish (in life) costa extending from abaxial surface of petiole; petiole to 30 cm long, flat or slightly grooved adaxially, rounded and yellow-banded abaxially; rachis to 30 cm long, angled adaxially, rounded abaxially; up to 6 pinnae per side, lower middle longest, these to 25×4 cm, thin-papery, falcate, slightly sigmoid, acuminate, 5-10 prominently nerved, terminal pinnae 13×7 cm, 13-15 nerved, basal pinnae 20×3 cm. Inflorescences 3-4, inter- or infrafoliar in flower (Fig. 2), infrafoliar in fruit, spicate, spreading; pistillate to 45 cm long, curved; peduncle to 38 cm long, 1 cm wide at base, 3 mm diam. at apex, swollen and orange in fruit in life; rachis or flower-bearing portion 8 cm long; bracts 4-5, prophyll attached 5 mm above base, 5 cm long, bifid, acute, 2nd bract attached 1.5 cm above base, 12 cm long, 3rd attached 5.5 cm above base, 30 cm long, 4th attached 12.5 cm above base, 22 cm long, bracts 2-4 obliquely open, acute, all thin-

papery, longitudinally nerved; staminate inflorescence still enclosed in bracts, peduncle 9 cm long; rachis or flower-bearing portion 21 cm long, probably pendulous; bracts as in pistillate, prophyll 5 cm long, 2nd bract 12 cm long, 3rd 26 cm long, 4th 23 cm long. Staminate flowers in bud in dense spirals, angled from mutual pressure, 1.5×1 mm, oblong, flat-topped, cream-colored (Hammel 18606), leaving superficial elliptic scars 2×0.8 mm; calyx a high thin membranous sheathing tube nearly as tall as petals, sepal tips triangular, inflexed over petals, sepals connate to $\frac{5}{8}$ their height; petals valvate, thin, tips triangular; stamens 1.25 mm high, anthers 1 mm long, oblong, bilobed, filaments 0.75 mm long, dorsifixed in middle; pistillode 1.5 mm tall, just exceeding stamens; pistillate flowers contiguous or nearly so, leaving superficial oval scars 1.5×1 mm; calyx cupular, 0.75 mm high, sepals imbricate nearly to apex, truncate; petals imbricate, thickened, and expanded in fruit, $3-4 \times 3-4$ mm; style short or lacking, stigma lobes trifid, recurved, pointed. Fruits $9-10 \times 5$ mm, \pm obovoid but corn-kernel-shaped and angled from mutual pressure, greenish changing to orange when soft ripe (Fig. 3), aging black; epicarp in apical region densely and sharply wrinkled, giving surface a nearly spiny appearance and texture.

Distribution: COSTA RICA. Puntarenas. San José. Wet forest and cloud forest of the Río General and Río Cotón basins; 1700-2300 m elevation.

Specimens Examined: COSTA RICA. Puntarenas: Las Alturas de Cotón Hodel & Binder 1345 (holotype BH; isotype CR), 1345A (BH, CR); Binder s. n. (USJ); Río Coto Brus near Cotón, Croat 26665 (MO). San José: Cantón de Pérez Zeledón Hammel & Hammel 18529 (MO); Hammel 18606 (MO); Tomlinson s. n. (BH).

The epithet is from the Latin *coralliformis*, meaning corallike, and refers to the fruits. *Chamaedorea coralliformis* is very close to *C. allenii* from Panamá and Colombia. The latter species



1. Adult plant of *Chamaedorea coralliformis*, Hodel & Binder 1345 (holotype), cloud forest, Las Alturas de Cotón, Puntarenas, Costa Rica. 2. Newly emerging staminate inflorescences of *Chamaedorea coralliformis*, Hodel & Binder 1345A, cloud forest, Las Alturas de Cotón, Puntarenas, Costa Rica. 3. Nearly mature fruits of *Chamaedorea coralliformis*, Hodel & Binder 1345 (holotype). Note spiny, corallike nature.

differs in its black fruits with a rough rather than spinylike surface and bright yellow staminate flowers. The rough fruit surface in *C. allenii* is due to minute, solitary, cone-shaped protuberances while the spinylike fruit surface of *C. coralliformis* results from series of dense, sharp, ridgelike wrinkles. In

the key to subgenus *Stephanostachys* (Hodel 1992a, p. 234), *C. coralliformis* would key out next to *C. allenii* and *C. crucensis*. Differences of the former were discussed above. The latter differs in its smooth, black fruits and staminate sepals free nearly to the base.



4. Adult plant of *Chamaedorea binderi*, Hodel & Binder 1340 (holotype), moist rain forest, Fila Las Cruces, Putarenas, Costa Rica. 5. Old staminate inflorescence of *Chamaedorea binderi*, Hodel & Binder 1339, moist rain forest, Fila Las Cruces, Putarenas, Costa Rica. 6. Pistillate flowers and fruits of *Chamaedorea binderi*, Hodel & Binder 1340 (holotype).

Chamaedorea binderi Hodel sp. nov. (Figs. 4–6).

Subgeneris *Chamaedoropsi* Oerst. inflorescentiis masculis solitariis, floribus masculis solitariis petalis patentibus apicaliter pertinens. *C. brachycladae* H. Wendl. affinis sed habitu, foliis et inflorescentiis minoribus, pinnis paucioribus minoribus flavivirentibus recitis, inflorescentia feminea reclusiori, rachillis gracilioribus distantibus, fructibus majoribus differt. Typus: Costa Rica, Puntarenas, *Hodel & Binder 1340* (Holotypus BH, isotypus CR).

Solitary, erect, to 50 cm tall (Fig. 4). Stem short, nearly lacking, subterranean or buried in leaf litter, prominently ringed, nodes congested, internodes 3–5 mm long. Leaves 3–4, ascending, pinnate; sheath 8 cm long, obliquely open apically, splitting deeply opposite petiole, tubular near base, longitudinally striate; petiole 15 cm long, grooved adaxially, rounded and green abaxially; rachis 28 cm long, angled adaxially, rounded abaxially; pinnae 20 per side, to 9×1.5 cm, decreasing progressively toward apex and there 4.5×0.8 cm, basal pinnae 6×0.8 cm, all pinnae straight, acuminate to long-acuminate, lower margin decurrent on rachis, midrib and 2 submarginal nerves conspicuous adaxially but only midrib whitish, others green, abaxially 5-nerved, midrib and 2 submarginals whitish, 1 nerve each between midrib and submarginal green to whitish. Inflorescences arising from base, long-pedunculate, arcuate; staminate inflorescence with peduncle (Fig. 5) 28 cm long; bracts 8, prophyll 5 mm long, 2nd bract 1 cm long, 3rd 2 cm long, 4th and 5th 5 cm long, 6th–8th 7 cm long, thin-papery, longitudinally nerved, lower 6 bifid, acute, upper 2 acuminate; rachis 5 cm long, 4 mm diam., narrowing toward tip; up to 60 rachillae, to 5 cm long, slender, filiform, undulate apically, diverging from rachis at right angles; pistillate inflorescence (Fig. 6) similar to staminate, peduncle 18 cm long; bracts as in staminate but smaller; rachis 8 cm long, 1–2 mm diam., slender; up to 30 rachillae, to 5 cm long, slender, filiform, diverging from rachis at right angles. Staminate flowers not seen; pistillate flowers (Fig. 6) remote, scattered, 4–6 mm distant, 2×1.5 mm, superficial; calyx cupular, 0.5–0.75 mm high, membranous, sepals connate nearly to apex, acute; petals 2×2 mm, imbricate nearly to apex, acute; pistil 1.9×1 mm, ovary ovoid, style exerted 0.5 mm above ovary, slender, stigma lobes long, slender, pointed, only slightly recurved;

staminodes conspicuous, toothlike. Fruits 6–8 mm diam., globose, black (Fig. 6). Eophyll pinnate.

Distribution: COSTA RICA. Puntarenas. San José. Moist to wet forest on the Pacific slope, 1 140–1 900 m elevation.

Specimens Examined: COSTA RICA. Puntarenas: Fila Las Cruces, *Hodel & Binder 1339* (BH, CR), *1340* (holotype BH; isotype CR); *Maas & McAlpin 1387* (U); Jardín Botánico Robert y Catherine Wilson, ridge west of Río Jaba, *Grayum 9280* (MO). San José: Fila Aguabuena, Candelaria, *Chavarria et al. 107* (CR).

The epithet honors Mark Binder of Los Angeles, California, who brought this species to my attention, assisted in collecting the type, and did exemplary work with the palm collection, chamaedoreas in particular, at the Jardín Botánico Robert y Catherine Wilson. *Chamaedorea binderi* is very close to *C. brachyclada* with which it has been confused. *C. brachyclada* differs in its much larger (2–4 times as large) habit, leaves, and inflorescences, more numerous, larger, dark green, conspicuously falcate pinnae, more compact pistillate inflorescence with more numerous and thicker, close-set rachillae, and smaller fruits. The two species grow sympatrically in forest remnants not too far from the Jardín Botánico Robert y Catherine Wilson near San Vito in southeastern Costa Rica. That there are no intermediate forms lends credence to their validity as distinct species. *C. binderi*, along with *C. brachyclada*, *C. stenocarpa*, *C. scheryi*, *C. undulatifolia*, and *C. pygmaea*, belongs to a natural subgroup of species characterized by its essentially stemless habit, pinnate leaves with lower margins decurrent on the rachis, and long-pedunculate inflorescences arising from the base (Hodel and Uhl 1990).

In the key to subgenus *Chamaedoropsis* (Hodel 1992a, p. 124), *Chamaedorea binderi* would key out next to *C. brachyclada* and *C. stenocarpa*. Differences of the former were discussed above. The latter differs in its spicate or forked pistillate inflorescence.

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