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A New Species and Synopsis of a Distinctive and Natural Subgroup of *Chamaedorea*

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Recent work in support of a project on *Chamaedorea* in cultivation that will be published by the International Palm Society in 1991 has enabled us to gain an understanding of a distinctive and natural subgroup within the genus. This group of about five or so species is distinguished by a combination of characters including their acaulescent habit, long-pedunculate inflorescences arising from the base of the plant, the pinnae with the lower margin decurrent on the rachis, and pinnate eophylls. For lack of a better term, we have called this association of species the "pinnatifid group" but, at this time, have given it no taxonomic status. It is, however, a member of subgenus *Chamaedoropsis* Oerst. by virtue of a combination of characters including the persistent fruiting perianth and the solitary staminate flowers with apically spreading petals.

Although appearing acaulescent, members of the pinnatifid group actually possess a short, creeping stem (Fig. 1) at or near the ground and often buried in the leaf litter of the forest floor. The nodes are very prominent and densely placed, the internodes as short as 1 mm and no more than 5-7 mm long. The inter- or infrafoliar inflorescences are erect-ascending and often arcuate. Frequently they appear to be emerging from the soil or leaf litter since the stem is usually wholly below the ground or leaf litter.

The lower margins of the pinnae are decurrent along the rachis (Fig. 2). This

means that the lower margin of a leaflet extends downward along the rachis, often to the next leaflet. When examined closely the rachis appears to be winged between adjacent leaflets. Although this is a constant feature within a species of this group, it varies from species to species. Some species have the leaflets with their lower margin only briefly decurrent while others have their margins decurrent all the way to the next lowest leaflet. This character is easily overlooked, especially on dried herbarium material. It is most easily seen on living material and is especially noticeable on one- and two-leaf seedlings.

Finally, the eophyll is pinnate although there may be an exception to this since, unfortunately, we did not have the opportunity to observe seedlings of the simple-leaved forms of *C. pygmaea*. The only other species of the genus with a pinnate eophyll is *C. elegans* which differs substantially from those in the pinnatifid subgroup in floral structure, inflorescence, and habit. The pinnate eophyll is an extremely attractive feature and plants are highly prized, even as small seedlings (Fig. 3).

Another interesting, yet somewhat confusing, feature of members of the pinnatifid group is that they tend to flower when very young and small, even when as little as one-fifth their eventual size. When this occurs, all parts of the plant are correspondingly small. Leaves and inflorescences are much reduced and have fewer

and/or shorter parts including pinnae, peduncles, rachillae, and bracts. Pinnae of young and old plants, both mature, of the same species are often shaped differently. Although this phenomenon occurs in species throughout *Chamaedorea*, it is very pronounced in the pinnatifid group, resulting in inconsistencies in descriptions and applications of names.

The pinnatifid group ranges from northern Colombia to Guatemala though it attains its greatest diversity and number of species on the wet Atlantic slope from western Panama to central Costa Rica.

Members of the pinnatifid group are similar ecologically. Nearly absent from warm, lowland forest, most occur in wet forest or cloud forest at middle to relatively high elevations (800–1,500 m). A notable exception to this is *C. pygmaea* which occurs as low as 100 m elevation in the Darién region of Panama. Most species of the pinnatifid group occur in forests characterized by constant, year-round, high rainfall and high humidity and moderate temperatures with little daily or seasonal fluctuation.

Here we provide a key to the species of the pinnatifid group, describe a new species and propose a name for it, and include abbreviated descriptions and discussions of previously named species; complete descriptions of these will be in Hodel's forthcoming treatment of *Chamaedorea* in cultivation. We also provide comments on cultivating these plants since they are difficult to grow well.

KEY TO THE SPECIES OF THE
PINNATIFID GROUP WITHIN
CHAMAEDOREA

1. Leaves simple and bifid. *C. pygmaea*
1. Leaves pinnate. 2
2. Leaves with pinnae not decreasing in length toward the apex of the rachis. *C. pygmaea*
2. Leaves with pinnae decreasing in length toward the apex of the rachis. 3
3. Margins of pinnae undulate, pistillate rachillae strongly recurved, hooklike in fruit.
..... *C. undulatifolia*

3. Margins of pinnae not undulate, pistillate rachillae \pm straight or only slightly curved. 4
4. Pistillate inflorescence spicate or rarely furcate, generally smaller plants with leaves usually less than 70 cm long. *C. stenocarpa*
4. Pistillate inflorescence with three or more rachillae, generally larger plants with leaves 0.7–1.5 m long. 5
5. Leaves erect-ascending, 20 or more pinnae on each side of the rachis; pistillate inflorescence with 60–100 filiform, short, \pm stiff rachillae.
..... *C. brachyclada*
5. Leaves spreading, less than 20 pinnae on each side of the rachis; pistillate inflorescence with 3–15 rather thick rachillae. *C. scheryi*

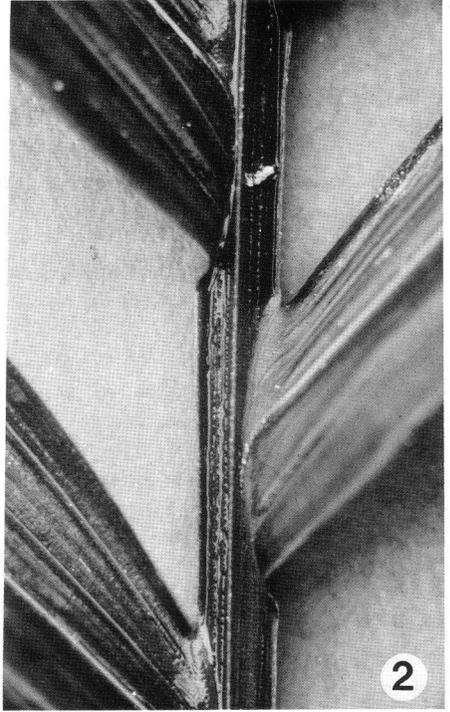
***Chamaedorea brachyclada* H. A. Wendl.**, Regel Gartenfl. 29: 101, 1880.
Type: Cult., *H. Wendland s.n.*, unlabeled, unmounted specimen annotated as "HOLOTYPUS?" by M. H. Grayum, 23 July 1987 (Neotype, GOET).

Nunnezharia brachyclada (H. A. Wendl.) O. Kuntze, Rev. Gen. Plant. 2: 730, 1891.

Stem solitary, overall height including leaves to 1–2 m. Leaves 3 (Fig. 4), erect-ascending, pinnate, 1–2 m long; sheath to 35 cm long; petiole 40–80 cm long, erect; rachis 1–1.25 m long, petiole and rachis with a covering of minute, rough, white, glistening spots especially at rachis-petiole junction; pinnae 20–30 on each side of the rachis, dark green, linear-lanceolate, acuminate, largest to 30 \times 2–3 cm, 5-nerved, fairly rough abaxially.

Inflorescences infrafoliar; peduncles to 60 cm long, green and \pm rounded in flower, reddish-orange in fruit; bracts 5–9; rachis 10–12 cm long, green in flower, reddish-orange in fruit. Staminate inflorescence with 40–50 rachillae, these spreading, filiform, green, lowermost the longest, these to 10 cm long. Pistillate inflorescence bottle-brushlike; rachillae 60–100, filiform, stiffish, 3–5 cm long, green in flower, reddish-orange in fruit.

Staminate flowers greenish, oblong-ovoid; calyx cupular, 3-lobed, lobes broadly rounded; petals spreading apically and free



to about the middle, green, acute and slightly recurved apically, thickened and lighter green medially on the adaxial surface; stamens with filaments and anthers yellow; pistillode equalling the stamens, columnar, yellowish. Pistillate flowers greenish; calyx very short; petals erect, convolute-imbricate. Fruits globose, black, 3–5 mm diam.

Distribution: PANAMA. Chiriquí. COSTA RICA. Puntarenas. Dense, moist or wet forest on the Pacific slope, 1,100–1,300 m elevation.

Specimens Examined: PANAMA. Chiriquí: Cerro Panda, *T. Croat 15904* (MO). COSTA RICA. Puntarenas: San Vito de Coto Brus, *M. Grayum 3351, 3352, 3365, 9280* (MO); *G. de Nevers 7763* (MO); *H. E. Moore Jr. 9995* (BH); *H. Hobbs 0583-102* (CR); *D. R. & M. A. Hodel 705A, 705B*, (BH, CR); Fila Aguabuena, Candelaria Acosta, *M. Charria Diaz 107* (CR). CULTIVATED. United States. California: Los Angeles, in greenhouse, *D. R. Hodel 865* (BH), from plants grown from seeds originally collected near San Vito de Coto Brus, Costa Rica; Huntington Beach, in the garden of F. Ketchum, *D. R. Hodel 674* (BH), from plants grown from seeds originally collected near San Vito de Coto Brus, Costa Rica. Germany. Hannover: Herrenhausen, photograph of unmounted, unlabeled specimen annotated as "Holotypus?" by M. H. Grayum, 23 July 1987 (Neotype, GOET), presumably a plant grown from seeds introduced from Chiriquí, Panama.

Zahn collected seeds of this palm in Chiriquí in Panama and sent them to the famous plantsman Veitch in Europe prior

to 1880. Wendland (1880) then described *C. brachyclada* from a cultivated pistillate plant he obtained from Veitch. It was apparently lost to cultivation until the 1960s when Robert G. Wilson established Las Cruces Tropical Botanical Garden [now Jardín Botánico Robert y Catherine Wilson (JBRCW)] at San Vito in Costa Rica near the Panamanian border. Wilson's garden included some native forest which contained populations of *C. brachyclada*. Wilson established and cultivated the species in his garden and from these plants and the wild plants in the adjacent forest he distributed seeds to fellow palm enthusiasts and botanical gardens. Through Wilson's efforts, collectors have cultivated *C. brachyclada* in California, Florida, and Hawaii since the late 1960s and early 1970s. Of all the species in the pinnatifid group, *C. brachyclada* may be the easiest to cultivate.

Although originally collected in Chiriquí, Panama, *C. brachyclada* is very rare there; in fact, we have seen only one collection of it from this area. Much of Chiriquí has been extensively deforested as have adjacent areas of Costa Rica. Grayum and de Nevers (1988) noted that this species is clearly threatened and endangered since suitable habitat is extremely scarce in this area. As recently as 1987, though, a healthy, reproducing population of this palm existed in forest remnants at JBRCW.

A very distinctive species, *C. brachyclada* is easily distinguished from other members of the pinnatifid group by its few (3–4), erect, long-pinnate leaves with numerous, straight segments and long-

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1. The staminate inflorescence of *Chamaedorea scheryi*, *D. R. Hodel & M. H. Grayum 697A*, Tapantí, Costa Rica, arises from near the base of the plant, a feature common in species of the pinnatifid group.
2. The decurrent pinnae form a "wing" along the rachis between two adjacent segments. *Chamaedorea scheryi*, *D. R. & M. A. Hodel 720A*, Río Sarapiquí, Costa Rica.
3. An attractive feature of the pinnatifid group is that usually even the youngest seedling leaves are pinnate. *Chamaedorea scheryi*, Río Sarapiquí, Costa Rica.
4. Marianne Hodel holds leaves of *Chamaedorea brachyclada*, *D. R. & M. A. Hodel 705A*, in forest remnants adjacent to JBRCW. Costa Rica.

pedunculate, arcuate inflorescences with numerous, short rachillae. The pistillate inflorescence somewhat resembles a bottle brush with its slender, sturdy peduncle terminating in numerous, short, densely placed, stiff rachillae.

Chamaedorea pygmaea H. A. Wendl., Otto & Dietr. Allg. Gartenzeit. 20: 217, 1852. Type: Cult., *H. Wendland s.n.* (Holotype GOET).

Stachyophorbe pygmaea (H. A. Wendl.) Oerst., Vidensk. Meddel. Kjoeb. 1858: 10, 1859.

Nunnezharia pygmaea (H. A. Wendl.) O. Kuntze, Rev. Gen. Plant. 2: 731, 1891.

Chamaedorea terryorum Standl., Field Mus. Nat. Hist. Bot. 22: 326, 1940. Type: Panama, *M. & R. Terry 1452* (Holotype MO).

Cladandra pygmaea (H. A. Wendl.) O. F. Cook, Nat. Hort. Mag. 22: 148, 1943, name of no botanical standing.

Stem solitary, overall height of the plant usually less than 60 cm. Leaves 3–8, erect-spreading; sheath short; petiole 10–25 cm long; blade 20–30 × 6–15 cm, pinnate or simple and bifid, if pinnate the pinnae usually 9–12 on each side of the rachis, falcately lanceolate, 12–15 × 1–2.5 cm, apical pinnae wider and not decreasing noticeably in length toward apex of the rachis, a prominent midrib and one intramarginal nerve conspicuous on each side of this adaxially, if simple the blade incised at the apex to ca. one-third its length, 12–14 prominent primary nerves on each of the rachises, 2 secondaries conspicuous between each pair of primaries abaxially, or the blade variously pinnate with a broad terminal pair of pinnae and several basal ones.

Inflorescences inter- or infrafoliar, arising from the base of the plant, erect, shorter than or about equalling the leaves; peduncles to 20 cm long; bracts 4–8. Staminate inflorescence with rachis to 10 cm long, greenish at anthesis; rachillae 10–25, to 6–8 cm long, widely spreading or some-

what recurved or drooping, greenish at anthesis. Pistillate inflorescence spicate or furcate; rachis or flower-bearing portion 10 cm long, curved, pale greenish at anthesis, orange and swollen in fruit. Staminate flowers green, fragrant; calyx ± cuplike; petals valvate, 3 mm long; stamens $\frac{1}{2}$ – $\frac{3}{4}$ as long as the petals; pistillode pale or greenish. Pistillate flowers green, fragrant; petals elongate, spreading apically; staminodes 6; pistil depressed-globose, 3-lobed, stigmas recurved slightly. Fruits black, globose-oblong, 6–8 mm long.

Distribution: COLOMBIA. Socorro. PANAMA. Darién. Chiriquí. COSTA RICA. Puntarenas. Dense, wet forest; 100–2,000 m elevation.

Specimens Examined: COLOMBIA. Without a specified locality, *Funck & Schlim 1654*, annotated by H. E. Moore, Jr. as Isotype (BR). PANAMA. Darién: Chepigana, *M. & R. Terry 1452* (Holotype of *C. terryorum*, MO; Isotypes, GH, F); *1451* (F); *1453* (MO, F); Cerro Pirre, *G. de Nevers et al. 8268* (MO); *S. Mori & J. Kallunki 5388* (MO). Chiriquí: Planes de Hornito, *T. Croat 48854* (MO); Bajo Mona, *R. Woodson Jr. & R. Schery 585* (MO). COSTA RICA. Puntarenas: Río Canasta, *G. Davidse et al. 28355, 28490, 28506* (MO), *28488* (MO, CR), *28358* (CR); Las Alturas, *P. Maas & B. McAlpin 1488* (BH, U); *1489* (U); Río Burú, *L. Gómez 21419* (MO), *21407* (CR), *21683* (MO, CR). CULTIVATED. Germany. Hannover: Herrenhausen, *H. Wendland s.n.* (photograph of Holotype at GOET; Isotype, C).

Wendland (1852) described and named *C. pygmaea* from cultivated plants that Linden introduced to Europe, apparently from Diablo in Socorro Province of New Granada (Colombia) prior to 1850. Interestingly, the word “Chiapas” is written on the isotype at Copenhagen despite the fact that Wendland stated in his 1852 article that *C. pygmaea* was collected in Colombia. However, whoever wrote “Chiapas” easily could have been confused since New Granada was a term applied to both Colom-

bia and Chiapas, México by botanists of the time. *C. pygmaea* is extremely variable vegetatively with leaves being completely pinnate to simple with a bifid apex. The type has leaves with up to 12 pinnae on each side of the rachis. In addition, *C. pygmaea* has the widest altitudinal range of any species of the pinnatifid group. Although occurring mainly from 600–2,000 m elevation, a few collections from the Darién region in Panama place it as low as 100 meters.

Standley (1940) described and named *C. terryorum* from the Darién region of eastern Panama adjacent to Colombia. Standley's type (*M. & R. Terry 1452*) has leaves that are simple and bifid; however, another collection from the same population (*M. & R. Terry 1453*) has leaves that are completely pinnate and was annotated by L. H. Bailey as *C. pygmaea*. This latter collection fits *C. pygmaea* very well, substantiating the case that *C. terryorum* is a simple-leaved form of *C. pygmaea*.

Chamaedorea pygmaea is close to *C. stenocarpa* but can be distinguished by the pinnae not decreasing noticeably in length toward the apex of the rachis.

Although Guillaumin (1923) reported that *C. pygmaea* was once common in European glasshouses, it is rare in cultivation today. The only living plants that we have seen are a few cultivated in a remote location of the JBRCW, Costa Rica (Fig. 5). Bruce McAlpin collected them in 1974 in the upper valley of the Río Cotón, Puntarenas, Costa Rica.

Chamaedorea scheryi L. H. Bailey, *Gentes Herb.* 6: 252, Fig. 133, 1943. Type: Panama, *R. Woodson & R. Schery 680* (Holotype MO).

Stem solitary, overall height including leaves 1–1.5 m. Leaves 4–6, erect-spreading; sheath 15–30 cm long; petiole 30–45 cm long; rachis 0.8–1 m long; pinnae 16–20 on each side of the rachis, light to dark green, \pm straight or only slightly sigmoid, falcately long-acuminate,

linear-lanceolate, the middle and lower middle the longest, these 20–35 \times 2.5–4.0 cm, a midrib and 2 marginal nerves on each side of this prominent adaxially and sometimes a less prominent secondary nerve between each of these, 5 nerves prominent abaxially.

Inflorescences inter- or infrafoliar, erect; peduncles to 50–75 cm long, greenish at anthesis, dull orange in fruit; bracts 5–10. Staminate inflorescence with a rachis to 10–20 cm long, green; rachillae 15–30 or perhaps more, lower ones the longest, these 10–15 cm long, slender, green. Pistillate inflorescence with a rachis 1–8 cm long, green at anthesis, orange in fruit; rachillae 4–15, to 10 cm long, \pm stiff, erect, straight and parallel or slightly curved, green at anthesis, orange in fruit.

Staminate flowers greenish, fairly close in bud and abruptly short-pointed; calyx 3-lobed and spreading; petals valvate, free nearly to the base, spreading; stamens with the filaments white; pistillode columnar, greenish, broadly 3-lobed apically. Pistillate flowers greenish; calyx low, 3-lobed; petals pointed, fleshy, imbricate basally, free apically; pistil depressed-obovoid, green. Fruits globose, black, 5–7 mm diam.

Distribution: PANAMA. Chiriquí. Coclé. COSTA RICA. Alajuela. Heredia. San José. Cartago. Dense, wet forest, mainly on the Atlantic slope but, perhaps, elsewhere, 800–2,000 m elevation.

Specimens Examined: PANAMA. Chiriquí: Bajo Chorro, *R. Woodson & R. Schery 680* (Holotype, MO); Boquete, *D. R. & M. A. Hodel 727A, 727B* (BH, PMA); Fortuna, *H. & A. Churchill 6193, 6194* (MO); *T. Croat 50094* (MO). Coclé: El Copé, *D. R. & R. M. Hodel 738* (BH, PMA); *J. Folsom & L. Collins 6445* (MO); *B. Hammel 3522* (MO); *G. de Nevers et al. 6382* (MO). COSTA RICA. Alajuela: Río San Lorencito de San Ramón, *J. Gómez-Laurito 10294* (CR); Bajos de Jamaical de San Ramón, *I. Chacón 1767* (CR). Heredia: above San Miguel along the Río Sarapiquí, *D. R. & M. A. Hodel 720A, 720B* (BH, CR); *I. Chacón & G. Herrera*



1176 (MO, CR), 1173 (CR); *W. Burger* & *T. Antonio* 11150 (CR); Braulio Carrillo National Park, *R. Chazdon* 179, 180 (CR); Río Sardinal, *M. Grayum* 7359, 7360 (MO, CR). San José: Río Zurquí, *M. Grayum* & *P. Sleeper* 6124 (MO); Braulio Carrillo National Park, *R. Chazdon* 220 (CR). Cartago: Tapantí, *L. Gómez* 18739, 19246, 19248 (MO); *T. Croat* & *M. Grayum* 68254 (MO); *D. R. Hodel* & *M. Grayum* 697A, 697B (BH); *R. Lent* 910 (CR); *R. Baker et al.* 209 (CR).

Bailey (1943) described and named *Chamaedorea scheryi* from material that Woodson and Schery collected in Chiriquí, Panama. Apparently confined to wet forests from central Costa Rica to central Panama, it exhibits a fair amount of foliar variation over this range. Collections from the vicinity of the Río Sarapiquí in Costa Rica (Fig. 7) differ slightly from those from Tapantí, Costa Rica (Fig. 6) in the rachis being more sharply angled adaxially and the pinnae darker green with the lower margin more conspicuously decurrent along the rachis to the next lower pinna, and the nerves less pronounced. Material from near Boquete in Chiriquí, Panama (Fig. 8) differs from that from Costa Rica in the pinnae slightly broader and with the nerves even less pronounced. These differences seem insignificant when taken over the entire range.

Only recently introduced to cultivation, *C. scheryi* is rare in collections and gardens in California.

Chamaedorea stenocarpa Standl. & Steyerl., *Field Mus. Nat. Hist. Bot.* 23: 206, 1947. Type: Guatemala, *J. Steyermark* 41893 (Holotype F).

Stem solitary, overall height including leaves 50–60 cm. Leaves 3–5 (Fig. 9),

erect-spreading, pinnate, to 40–50 cm long, light forest green; sheath 3–8 cm long petiole to 5–25 cm long; rachis to 15–30 cm long; blade in outline 15–33 × 10–20 cm; pinnae 10–20 on each side of the rachis, narrowly oblong-lanceolate, to 5–18 × 2.5 cm, slightly sigmoid, falcately-acuminate, pinnae decreasing in length noticeably in a progressive manner toward the apex of the rachis, terminal pair slightly wider, a midrib and a submarginal nerve on either side of this prominent adaxially.

Inflorescences interfoliar or infrafoliar, erect, ± equalling the leaves; peduncles to 15–20 cm long, erect, greenish at anthesis, orange in fruit; bracts 5. Staminate inflorescence with a rachis to 15 cm long, green; rachillae 10–25, these 6–8 cm long, filiform, ± pendulous or flexible, green. Pistillate inflorescence spicate or rarely furcate, ± straight or slightly curved, ± stiff; rachis or flower-bearing portion 5–15 cm long, green at anthesis, thicker and reddish-orange in fruit.

Staminate flowers green; petals oblong, acute, spreading. Pistillate flowers green; calyx broadly 3-lobed, sepals imbricate; corolla with the petals tightly imbricate and open only briefly at the apex, petals oblong, acute; pistil depressed-globose, green, 3-lobed. Fruit yellow maturing black, globose, 7 mm diam.

Distribution: GUATEMALA. Izabal. COSTA RICA. Puntarenas. Alajuela. Heredia. PANAMA. Veraguas. Dense, wet forest, 300–1,000 m elevation.

Specimens Examined: GUATEMALA. Izabal: *J. Steyermark* 41893 (Holotype F); *D. R. Hodel* & *J. J. Castillo Mont* 870 (BH, AGUAT). COSTA RICA. Puntarenas: south of San Vito above the Río Claro, *R. Wilson* 66-33 (BH); *H. Hobbs* 0583-101 (CR). Alajuela: Los Angeles de

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5. *Chamaedorea pygmaea* cultivated in the JBRCW, Costa Rica. 6. Staminate plant of *Chamaedorea scheryi*, *D. R. Hodel* & *M. H. Grayum* 697A, Tapantí, Costa Rica. 7. Marianne Hodel and *Chamaedorea scheryi*, *D. R. & M. A. Hodel* 720B, Río Sarapiquí, Costa Rica. 8. *Chamaedorea scheryi*, *D. R. & M. A. Hodel* 727B, Chiriquí, Panama.



9. A staminate plant of *Chamaedorea stenocarpa*, D. R. & M. A. Hodel 619A, grows at the JBRCW, Costa Rica.

San Ramón, S. Brenes 6111 (CR). Heredia: Varablanca, R. Roig 12 (F, CR). PANAMA. Veraguas: Santa Fe, S. Mori & J. Kallunki 3113 (MO), 3843 (BH, MO); T. Croat 27694 (MO); Río Segundo, P. Maas & R. Dressler 1656 (U). CULTIVATED. Costa Rica. Puntarenas: San Vito de Coto Brus, JBRCW, D. R. & M. A. Hodel 619A, 619B (BH). United States. California: La Habra, in the garden of L. Hooper, D. R. Hodel 824A, 824B (BH), originally received from JBRCW, Costa Rica. Hawaii: Honolulu, Ho'omaluhia Botanic Garden of the Honolulu Botanic Gardens, D. R. Hodel 833 (BH), accessioned as HBG 77.1331, originally collected at JBRCW, Costa Rica.

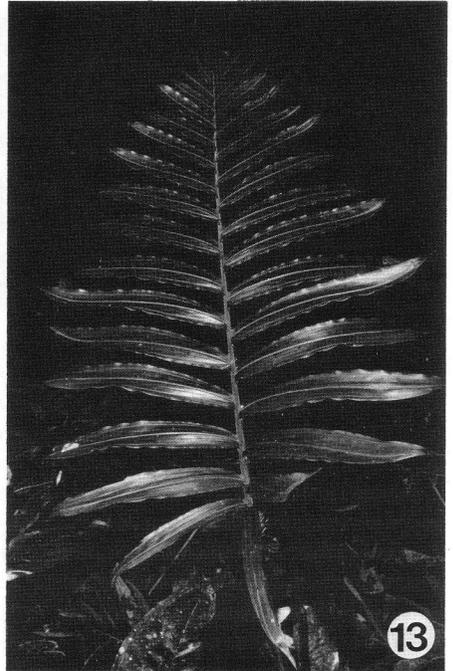
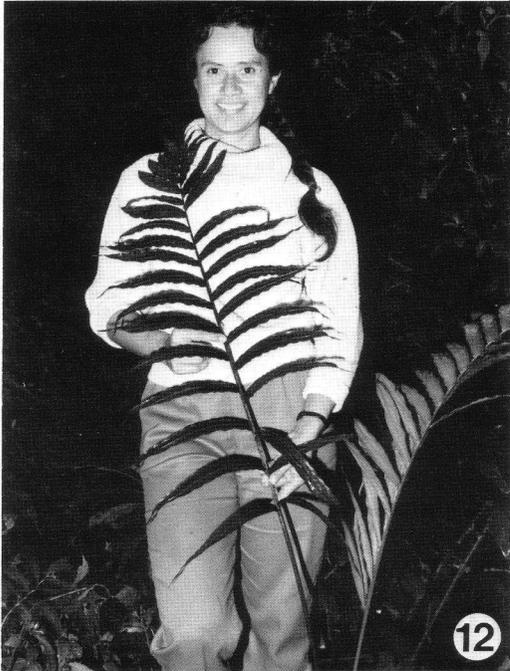
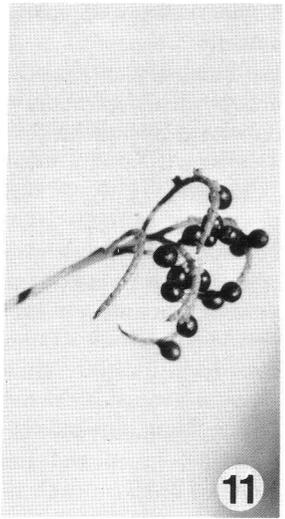
Chamaedorea stenocarpa is closest to *C. pygmaea* but can be distinguished by the greater number of pinnae that decrease markedly in length and in a progressive manner toward the apex of the rachis.

The late Robert G. Wilson of San Vito in southeastern Costa Rica is responsible for introducing this species to cultivation.

In the 1960s he established fruiting populations in his garden, JBRCW. One of these plants in Wilson's garden is handsomely illustrated on the cover of *Principes* Vol. 25, No. 2, April, 1981. These plants were brought to him by local collectors or collected by Wilson in forest remnants in the mountains above San Vito, Costa Rica. Over the years, he distributed seeds and plants as the "Las Cruces elfin dwarf" or "dwarf pinnate" *Chamaedorea* to interested collectors and hobbyists. Today, *C. stenocarpa* is cultivated in Hawaii, California, Florida, Australia and, probably, elsewhere.

***Chamaedorea undulatifolia* D. R. Hodel & N. W. Uhl. sp. nov.** (Figs. 10-13).

Subgeneris *Chamaedoropsis* Oerst. *C. scheryi* L. H. Bailey affinis sed segmentis marginibus undulatis, rachillis fructificantibus valde recurvatis et unciformibus differt. Typus: H. E. Moore Jr. 10179 (Holotypus BH).



10. *Chamaedorea undulatifolia*, D. R. & M. A. Hodel 695B, in cloud forest at the type locality, Monteverde, Costa Rica. 11. Fruiting rachillae of *Chamaedorea undulatifolia* are strongly recurved and hooklike, D. R. & M. A. Hodel 695B. 12. Marianne Hodel holds leaf of *Chamaedorea undulatifolia*, D. R. & M. A. Hodel 695A, at the type locality. Note the undulate margins of the pinnae. 13. A close-up of a leaf of a young plant of *Chamaedorea undulatifolia* at the type locality clearly shows the undulate margins of the pinnae.

Stem solitary, appearing acaulescent but actually creeping at or slightly below the leaf litter, densely ringed, nodes prominent and swollen, internodes very short, to 5 mm long, overall height including leaves 1–1.5 m.

Leaves 3–5 (Fig. 10), erect-spreading, pinnate; sheath to 10 cm long, green, brown-margined apically, splitting deeply opposite the petiole, clasping completely in a tubular manner only near the base; petiole elongate, to 60 cm long, green and flat or very slightly channeled adaxially, green and rounded abaxially; rachis to 50–75 cm long, green and slightly angled adaxially, green and rounded abaxially; pinnae 12–18 on each side of the rachis, bright forest green, thin, lower margin decurrent along the rachis, lanceolate, slightly sigmoid, acuminate, alternate or subopposite, lower and central pinnae the largest, these to 12.5–19 × 1.6–2.7 cm, becoming progressively smaller toward the apex of the rachis, margins undulate (Figs. 12, 13), midrib prominent and 1–2 lateral nerves on either side of this adaxially and abaxially, these yellowish when dry, midrib with warty-roughened surface at the base abaxially.

Inflorescences interfoliar, erect, sometimes infrafoliar in fruit, frequently appearing to arise from the ground, glabrous. Staminate inflorescence to 70 cm high but often smaller; peduncle to 47 cm long, greenish at anthesis; bracts 6, these tubular, tightly sheathing, acute-acuminate, bifid, longitudinally striate-nerved, ± papery, green but browning at anthesis; rachis 24 cm long, greenish at anthesis; rachillae 30, green, slender, lower ones the longest, these to 15 cm long, spreading, simple or once-branched, those above the middle shorter, to 5–11 cm long. Pistillate inflorescence to 55 cm long but often smaller; peduncle to 44 cm long, greenish at anthesis, orange in fruit; bracts 8, these similar to those of the staminate; rachis very short, 0.25–2.5 cm long, green at anthesis, orange in fruit; rachillae 2–6,

2.5–11 cm long, strongly recurved, hook-like (Fig. 11) and orange in fruit.

Staminate flowers green, 1.5–2 mm high; calyx membranous, shallowly 3-lobed, 0.5 mm high, flaring and drying light brown with darker margins; corolla with the petals valvate, drying dark, 1.5 mm high, ovoid, ± acute, free at anthesis; stamens with the anthers sessile, not deeply bifid at the apex; pistillode slightly shorter than anthers, 3-angled and ± angled-enlarged at the apex. Pistillate flowers with the calyx flaring, briefly 3-lobed, similar to that of the staminate; corolla 2 mm high, petals valvate but separating and recurving only at the tip at anthesis and corolla ± urceolate; pistil green. Fruits black, ellipsoid-globose, 8 × 6 mm; perianth persistent but not prominently nerved when dry.

Distribution: COSTA RICA. Puntarenas. Alajuela. Heredia. San José. Dense, wet montane forest and cloud forest on the Atlantic slope or just over the Continental Divide, 800–1,700 m elevation. Probably endemic.

Specimens Examined: COSTA RICA. Puntarenas: Monteverde, *H. E. Moore Jr. et al.* 10179 (Holotype, BH), 10180 (BH); *D. R. & M. A. Hodel* 695A, 695B (BH, CR); *B. Hammel* 13867 (MO, CR); *V. Dryer* 149, 150B, 185, 273 (CR). Alajuela: La Peña de Zarcero, *A. Smith H-1005* (F); La Paz, NW of San Ramón, *R. Liesner et al.* 15476 (MO); Balsa, NW of San Ramón, *R. Liesner & E. Judziewicz* 14886 (MO, CR). Heredia: *M. Valerio* 1590 (F). San José: Braulio Carrillo National Park, *R. Chazdon* 225, 236 (CR). Cartago: Quebrada Casa Blanca at Tapaní, *M. Grayum & P. Sleeper* 3691, 3692 (MO).

The specific epithet refers to the leaves with the pinnae having undulate margins. Chazdon (in *Brenesia* 28: 107–116, 1987) referred to *C. undulatifolia* as *Chamaedorea* sp. “elegantissima.” Because of its stemless habit and decurrent pinnae with strikingly undulate margins, *C. undulatifolia* bears a remarkable resemblance,

especially when young, to certain ferns in the genus *Polypodium*. Although the undulating margins of the pinnae are quite striking and occur even on material cultivated in Costa Rica and California, they are not readily apparent on dried herbarium material.

Chamaedorea undulatifolia is similar to *C. scheryi* but can be distinguished by the undulate margins of the pinnae and the pistillate rachillae strongly recurved and hooklike, rather than straight, in fruit (Fig. 11).

Cultivation

That they are confined to a climate with such constant, exacting parameters is probably largely responsible for difficulty in cultivating members of the pinnatifid group. They are notoriously difficult to grow well and never appear as vigorous as those in the wild. They seem to do best in a moderate or slightly cool tropical climate with little variation. These conditions are difficult to duplicate in cultivation. Even in places renowned for benign climate such as wet areas of Hawaii, plants do not attain the same quality as in the wet mountain forests of Costa Rica and Panama. In places like California, they fare even worse, tending to hold very few leaves and these are marred by the pinnae with yellow and brown tips. The "tip burn" so characteristic of the pinnatifid group in cultivation is probably due to low atmospheric humidity and, to a certain extent, extremes of temperature.

Generally, in cultivation plants have crowns which are much reduced, being composed of only two-three leaves, and take on a rather poor appearance. In addition, they are susceptible to infestations of mites and thrips in cultivation, especially in areas of low humidity. Naturally slow-growing, they are even slower in cultivation and, more often than not, languish

and go into a slow decline from which they seldom recover.

Growers of species in the pinnatifid group may have the best results by using a well drained medium high in organic matter and a slow release, organic type of fertilizer, situating the plants in deep shade, and, if possible, maintaining constant temperatures between 15 and 27° C (60–80° F) and relative humidities above eighty percent. These conditions are sometimes difficult to maintain. In addition, periodic leaching of the root zone with distilled or rain water would be beneficial in areas where water quality is poor and/or mineral content is high.

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LITERATURE CITED

- BAILEY, L. H. 1943. New palms in Panama and others. *Gentes Herb.* 6: 198–264.
- GRAYUM, M. H. AND G. DE NEVERS. 1988. New and rare understory palms from the Peninsula de Osa, Costa Rica, and adjacent regions. *Principes* 32(3): 101–114.
- GUILLAUMIN, M. A. 1923. Les *Chamaedorea* Cultivés. *Jour. Soc. Nat. Hort. France*, ser. 4, 24: 223–244.
- STANDLEY, P. C. 1940. Studies of Central American plants II. *Field. Mus. Nat. Hist. Bot.* 22: 326.
- WENDLAND, H. 1852. Beschreibung einer neuen *Chamaedorea*. *Otto & Dietr. Allg. Gartenzeit.* 20: 217–218.
- . 1880. Beitrag zur Palmenflora Amerika's. *Regel Gartenflora* 29: 101–105.