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ARECACEAE

By A. Henderson.

Monoecious or dioecious, iteroparous or rarely semelparous, spiny or non-spiny, palmate- or pinnate-leaved palms. Stems solitary or clustered, rarely dichotomously branched, short and subterranean to large and aerial, usually erect, occasionally creeping, sometimes climbing, sometimes ventricose, sometimes supported by stilt roots. Leaves few to numerous, spirally or rarely distichously arranged, palmate, costapalmate, or pinnate (or pinnately veined if undivided); sheaths usually open, sometimes closed and tubular and then forming a crownshaft; petioles absent, short, or elongate; rachises absent in palmate leaves, short in costapalmate leaves, and short to elongate in pinnate leaves; palmate and costapalmate leaves divided into few numerous, induplicate or rarely reduplicate segments, pinnate leaves divided into few to numerous, reduplicate or rarely induplicate pinnae; apices of segments and pinnae usually acute or acuminate, less often praemorse. Inflorescences borne singly at a node, less often multiple at a node, interfoliar or infrafoliar, branched to 1-4 orders or sometimes spicate; peduncles short to elongate; prophylls short to elongate; peduncular bracts 1-several, papery, fibrous, or woody, often sulcate; rachises absent, short, or elongate, occasionally covered with rachis bracts; rachillae few to numerous; flowers bisexual or unisexual, borne singly, in dyads, triads, or acervuli; sepals usually 3, connate, valvate, or imbricate; stamens (3-)6(-numerous); filaments sometimes connate basally, inflexed or straight at the apex; connectives

sometimes split and bifid and then the thecae free; staminodes of pistillate flowers digitate or forming a ring, or absent; pistillodes of staminate flowers absent to well-developed; gynoecia apocarpous or syncarpous, 1-several loculate, 1-several ovulate; fruits variously shaped, often globose or ellipsoid, usually rostrate; epicarps smooth, striate, covered with scales, or spinulose, or covered with warty projections; mesocarp fibrous or fleshy; epicarps thin or thick and bony with 1-few pores; seeds with homogeneous or ruminant endosperm; eophylls undivided, bifid, palmate, or pinnate. Approx. 182 gen., approx. 2473 spp. Widely distributed in tropical and subtropical areas of the world, most common in rainforest habitats. In Mesoamerica, the family consists of 40 genera and 229 species.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

Numerous, non-native species of palm are cultivated in the Mesoamerican region, in parks, gardens, and other areas. These are not included here. One Asian species, *Nypa fruticans*, has recently and inadvertently been introduced into Panama (Duke, 1991).

1. Leaves palmate or costapalmate.

2. Stems covered with root-spines.

15. Cryosophila

2. Stems not covered with root-spines.

3. Petiole margins with stout, sharp thorns.

4. Stems slender, clustered, forming large clusters.

1. Acoelorrhaphe

4. Stems stout, solitary.

8. Brahea

3. Petiole margins without thorns.

5. Leaves costapalmate. **34. Sabal**
5. Leaves palmate.
6. Leaf sheaths split lengthways. **38. Thrinax**
6. Leaf sheaths not split lengthways.
7. Fruits white. **35. Schippia**
7. Fruits yellowish-brown or dark brown to purple-black.
8. Fruits 6.8-7.4 mm diameter; seeds with irregular, grooves radiating from the base but not reaching the apex. **12. Coccothrinax**
8. Fruits 11-35 mm diameter; seeds without grooves.
9. Central leaf segments single-fold **14. Colpothrinax**
9. Central leaf segments multi-fold **11. Chelyocarpus**
1. Leaves pinnate, or pinnately-veined if undivided.
10. Fruits covered with scales. **31. Raphia**
10. Fruits not covered with scales.
11. Stems, leaves, and inflorescences spiny.
12. Pinnae praemorse. **3. Aiphanes**
12. Pinnae not praemorse.
13. Pinnae grayish-white abaxially. **5. Astrocaryum**
13. Pinnae green abaxially.
14. Stems slender and flexuous, usually climbing, rarely non-climbing and then pinnae with long filiform apices; rachises usually terminating in a cirrus with acanthophylls. **16. Desmoncus**

14. Stems slender to stout, not flexuous, erect, not climbing; rachises not terminating in a cirrus.

15. Stems 25-40 cm diameter, solitary; distal, staminate part of the rachillae with bracteoles forming a network of shallow pits.

2. Acrocomia

15. Stems seldom to 25 cm diameter, usually much less, usually clustered; distal parts of rachillae without a network of shallow pits.

7. Bactris

11. Stems, leaves, and inflorescences not spiny.

16. Stems with a cone of prominent stilt roots at the base; pinnae praemorse.

17. Pinnae divided into approximately equal segments, these white-gray waxy abaxially.

17. Dictyocaryum

17. Pinnae divided into unequal segments, or undivided, these green abaxially.

18. Stems often swollen; inflorescence buds elongate, horn-shaped, curved down below the crownshaft before anthesis; peduncular bracts to 15.

23. Iriarteia

18. Stems not swollen; inflorescence buds not elongate, erect before anthesis; peduncular bracts to 5.

19. Stilt roots forming an open cone; inflorescences solitary at a node.

36. Socratea

19. Stilt roots forming a closed cone; inflorescences usually multiple at a node.

40. Wettinia

16. Stems without a cone of prominent stilt roots at the base; pinnae acute or acuminate, or with serrate margins.

20. Flowers borne in small pits in the rachillae, each pit covered before anthesis by a proximal lip.

21. Peduncular bracts inserted near apex of peduncle, persistent or more often deciduous before anthesis and leaving a circumsessile scar at peduncle apex; pistillate flowers with petals united into a tube, with the distal ca. 1/3 forming a cap which is shed at anthesis.

9. Calyptrogyne

21. Peduncular bracts inserted at base of peduncle, not leaving a circumsessile scar; pistillate petals not united into a tube.

22. Stems to 22.5 m long, 10-25 cm diameter; rachillae 12.2-31.9 mm diameter.

39. Welfia

22. Stems to 15 m long, usually much less, to 5 cm diameter, usually less; rachillae to 5 mm diameter.

23. Leaf blades undivided, deeply bifid; peduncles elongate, rachises very short or absent with few, equally long, radiating rachillae.

4. Asterogyne

23. Leaf blades usually divided, if undivided then not deeply bifid; peduncles, rachises, and rachillae not as above.

24. Sheaths, petioles, rachises, and inflorescences densely covered with reddish-brown tomentum; fruits compressed, obovoid in lateral view with an asymmetric base, ellipsoid in frontal view, with a ridge on one side and several lesser ridges on opposite side.

27. Pholidostachys

24. Sheaths, petioles, rachises, and inflorescences not densely covered with tomentum; fruits not compressed with ridges.

21. Geonoma

20. Flowers superficial on the rachillae.

25. Fruits covered with short, pyramidal projections or with pronounced, woody projections.

26. Pinnae with serrate margins. **24. Manicaria**
26. Pinnae without serrate margins. **28. Phytelephas**
25. Fruits not covered with projections.
27. Flowers and fruits borne singly on a pseudopedicel. **30. Pseudophoenix**
27. Flowers usually borne in groups, not pedicellate.
28. Inflorescences with 1 peduncular bract; flowers arranged in triads or a derived pattern.
29. Endocarps thick and bony with 3 basal or subapical pores.
30. Fruits 20-30 cm long, 12-20 cm diameter. **13. Cocos**
30. Fruits less than 9 cm long, less than 5 cm diameter.
31. Petioles with recurved thorns on the margins; endocarps with subapical pores. **18. Elaeis**
31. Petioles without thorns on the margins; endocarps with basal pores. **6. Attalea**
29. Endocarps thin.
32. Pinnae often with windows at the base; stamens 8-49; gynoecia trilocular, triovulate. **32. Reinhardtia**
32. Pinnae without windows at the base; stamens 6, rarely 7-20; gynoecia unilocular, uniovulate.
33. Stems to 58 cm diameter, solitary; inflorescences branched to 4 orders; fruits with basal stigmatic remains. **33. Roystonea**
33. Stems to 27 cm diameter, usually less, solitary or clustered; inflorescences spicate or branched to 1 order; fruits with subapical to lateral stigmatic remains, rarely basal.
34. Inflorescences spicate. **25. Neonicholsonia**

34. Inflorescences branched.
35. Inflorescences hippuriform. **26. Oenocarpus**
35. Inflorescences not hippuriform.
36. Fruits with basal stigmatic remains. **22. Hyospathe**
36. Fruits with subapical to lateral stigmatic remains.
37. Leaf sheaths closed and forming a compact crownshaft; prophylls and peduncular bracts equal or subequal. **19. Euterpe**
37. Leaf sheaths open and not forming a crownshaft, or occasionally partly closed and forming a partial crownshaft; prophylls shorter than the peduncular bracts. **29. Prestoea**
28. Inflorescences with several peduncular bracts; flowers not arranged in triads.
38. Plants dioecious. **10. Chamaedorea**
38. Plants monoecious.
39. Stems to 7 cm diameter, solitary or clustered. **37. Synechanthus**
39. Stems to 30 cm diameter, solitary. **20. Gaussia**

1. Acoelorrhaphe H.Wendl.

Paurotis O.F. Cook, *Acanthosabal* Prosch.

By A. Henderson.

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems clustered, forming large clusters, covered with persistent leaf bases; sheaths open, fibrous, persistent;

petioles elongate, covered along the margins with stout, sharp thorns; hastulas present adaxially; leaf blades divided into numerous, equal, rigid, induplicate, basally connate segments, these green adaxially and somewhat silvery-gray abaxially, each segment briefly bifid apically. Inflorescences interfoliar, branched to 4 orders, usually erect and projecting above the leaves; prophylls well-developed; peduncular bracts 2; rachises covered with numerous bracts; rachillae numerous, pubescent; flowers bisexual, borne singly or in small groups; sepals 3, imbricate, briefly connate basally, with ciliate margins; petals 3, valvate, basally connate; stamens 6; pistils 3-4; fruits globose, 1-seeded, black, with apical stigmatic remains; seeds with homogeneous endosperm and basal embryo; eophylls undivided. 1 sp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

1. *Acoelorrhaphe wrightii* (Griseb. & H.Wendl.) H.Wendl. ex Becc., *Webbia* 2: 109 (1907). *Copernicia wrightii* Griseb. & H.Wendl., *Cat. Pl. Cub.*: 220 (1866), *Paurotis wrightii* (Griseb. & H.Wendl.) Britton in N.L.Britton & J.A.Shafer, *N. Amer. Trees*: 141 (1908). Isotype: Cuba, *Wright 449* (MO, n.v.). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 6 (1995). N.v.: tasiste, G; tique, H.

Acoelorrhaphe pinetorum Bartlett, *Brahea psilocalyx* Burret, *Paurotis psilocalyx* (Burret) Lundell, *Paurotis schippii* Burret

Stems clustered, to 7 m long, 5-15 cm diameter, brown, erect, covered in persistent leaf bases. Leaves 9-15; petioles to 1 m long, with thorns along the margins; adaxil hastulas well-developed; segments numerous, stiff and erect, bifid at the apices.

Inflorescences projecting above the leaves, branched to 4 orders; rachillae 15-22 cm long, densely tomentose, orange in fruit; fruits 7.5-9 mm diameter, globose, ripening from green through orange to black. *Low-lying, wet areas, especially savannas or pine woods.* T (*Novelo & Ramos 2773*, MO), Y (*Chan & Rico-Gray 5116*, MO), C (*Menéndez 481*, MO), QR (*Palestina 725*, MO), B (*Davidse & Brant 32489*, MO), H (*Balick et al. 1719*, MO), N (*Seymour 2976*, MO), CR (*Flores et al. 34*, MO). Sea level. (United States, Mexico, Belize, Honduras, Nicaragua, Costa Rica, Colombia [San Andres Island], Bahamas, Cuba).

Listed for Chiapas, Mexico and Guatemala by Henderson et al. (1995) but no specimens from there have been seen.

2. *Acrocomia* Mart.

Gastrococos Morales, *Acanthococos* Barb.Rodr.

By A. Henderson.

Monoecious, iteroparous, spiny, pinnate-leaved palms. Stems solitary, either large and occasionally swollen, or small and subterranean. Leaves pinnate, reduplicate, usually spiny; sheaths open and not forming a crownshaft; petioles short; rachises long; pinnae irregularly arranged and spreading in different planes. Inflorescences interfoliar, branched to 1 order, spiny; peduncles bearing a prophyll and 1 peduncular bract; rachises bearing few to numerous rachillae; flowers borne in triads proximally on rachillae, paired

or solitary staminate distally; distal, staminate part of the rachillae with bracteoles forming a network of shallow pits; staminate flowers with sepals 3, imbricate; petals 3, imbricate; staminodes 6; gynoecia trilocular, triovulate, stigmas large, reflexed; fruits 1-seeded, globose, with apical stigmatic remains; endocarp with 3 pores near the equator; seeds with homogeneous endosperm and lateral embryos opposite one of the pores; eophylls simple, linear. 3 spp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995). Henderson, A. *Palms of the Amazon* (1995).

1. *Acrocomia aculeata* (Jacq.) Lodd. ex R.Keith, *Miller's Dict. Gard.*: 63 (1834). *Cocos aculeata* Jacq., *Select. Stirp. Amer. Hist.*: 278 (1763). Lectotype (designated by Glassman, 1972); Jacq., *Select. Stirp. Amer. Hist.* t. 169 (1763). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pl. 39 (1995). N.v.: coyol, QR; gru-gru, B, H.

Acrocomia mexicana Karw. ex Mart., *A. panamensis* L.H.Bailey, *A. belizensis* L.H.Bailey, *A. vinifera* Oerst.

Stems 4-12 m long, 25-40 cm diameter, solitary, erect, occasionally swollen near the middle, occasionally covered with persistent leaf sheaths; internodes smooth or with spines to 15 cm long (generally younger plants with spines, older plants with smooth stems), often with visible cone of roots to 40 cm long at base. Leaves 10-30 per stem; sheaths 30-90 cm long, fibrous on margins, sheaths, petioles, and rachises with moderate to dense covering of black spines to 10 cm long; petioles (3-)28-100 cm long; rachises 1.9-3.7 cm long; pinnae 141-190 per side of rachis, irregularly arranged in clusters and

spreading in different planes, linear, long acuminate; middle pinnae 60-83 cm long, 2-4 cm wide, scarcely to densely pilose abaxially. Inflorescences interfoliar; peduncles 20-90 cm long; prophylls to 70 cm long; peduncular bracts 0.8-1.4 m long, densely covered with brown, velvety tomentum and scattered black spines to 2 cm long; rachises 60-90 cm long; rachillae 50-137, 10-36 cm long; flowers arranged in a few isolated triads on proximal ca. half of the rachillae, paired or solitary staminate distally; staminate flowers to 6 mm long, crowded; sepals spreading, ovate, to 2.5 mm long; petals ovate, to 5.5 mm long; pistillodes 2 mm long; pistillate flowers at anthesis 8 mm long; sepals widely ovate, 3 mm long; petals widely ovate, 5 mm long; staminodial ring 3 mm long, adnate to petals basally, free above and with 6, minute, stamen-like staminodes; fruits 2.5-3.5 cm diameter, globose, yellowish or yellowish-green at maturity, spiny, glabrescent, the epicarp usually cracking. *Seasonal forest and dryer, open areas, often in disturbed places.* QR (*Sanders 1717*, NY), B (*Balick 3681*, NY), G (*Wahl 261*, NY), H (*Balick 1754*, NY), ES (*Calderón 693*, NY), N (*Stevens 16405*, NY), CR (*Rodríguez González s.n.*, NY), P (*Bartlett 16977*, NY). 0-500 m. (Mexico, Mesoamerica, Colombia, Venezuela, Surinam, French Guiana, Bolivia, Brazil, Paraguay, Argentina, Trinidad, Greater and Lesser Antilles).

3. *Aiphanes* Willd.

Marara H.Karst., *Curima* O.F.Cook, *Tilmia* O.F.Cook

By F. Borchsenius & R. Bernal.

Monoecious, iteroparous, spiny, pinnate-leaved palms. Stems solitary or clustered, with up to 20 stems, armed with rings of black, appanate spines inserted in bands or spirals below the nodes, sometimes becoming unarmed with age. Leaves spirally arranged or distichous; sheaths open nearly to base in older leaves, densely armed with black or yellow spines; petioles nearly absent or well-developed, armed like sheaths or unarmed; rachises rounded below, ridged adaxially, unarmed or spiny; lamina reduplicate, undivided, or paripinnately divided with up to 70 pinnae per side; pinnae regularly inserted or grouped, lanceolate to broadly cuneate, apex (or outer margin of undivided leaves) praemorse; midribs of pinnae normally with 1-several rigid spines abaxially. Inflorescences interfoliar, protandrous, erect or curving, often becoming recurved or pendulous in fruit, spicate or branched to 1 or occasionally to 2 orders; prophylls short, lanceolate, winged, \pm enclosed in the leaf sheath; peduncular bracts long and slender, unarmed or spiny, persistent or soon disintegrating; peduncles normally longer than rachis, \pm spiny; rachillae up to 300, spreading, fastigiate, or appressed, sometimes with a long basal flowerless part; fertile part of proximal rachillae with triads of 1 pistillate and 2 staminate flowers for ca. 1/2 their length, sometimes also with a few tetrads of 2 pistillate and 2 staminate flowers, distally with dyads of staminate flowers, or near apex with a few single ones; distal rachillae staminate or with a few triads at base; flowers unisexual, trimerous; staminate sepals free or shortly connate, membranous, imbricate, carinate, often cap-shaped and enclosing the entire bud before anthesis; petals free or shortly connate, fleshy, ovate-acuminate, valvate; stamens 6, in 2 whorls, inflexed in bud; filaments basally connate in a ring; anthers latrorse to introrse; pistillodes small, trifid;

pistillate flowers generally larger than the staminate; sepals free, cartilaginous, ovate to reniform, imbricate; petals fleshy, connate for 1/2 their length, lobes acute-acuminate, valvate, or occasionally imbricate; staminodes 6, fused in an acuminate lobed to nearly truncate staminodial cup, rarely incompletely fused; pistils conical, glabrous or spinulose, with 3 sessile stigmas; ovules 3, sub-basal; fruits globose or ellipsoid, red, or more rarely white, orange, or purple at maturity, glabrous, black spinulose, or golden spiny; mesocarp fleshy to dry; endocarps black at maturity, hard, smooth or variously pitted-grooved, with 3 sub-equatorial germination pores each surrounded by an asterisk of applanate fibers; seeds 1, globose-irregular, brown; endosperm white, homogeneous, with a small to large central cavity; embryos lateral, conical; eophylls simple, bifid, spiny, with praemorse outer margins. 38 spp. Neotropics.

Bibliography: Borchsenius, F. & Bernal, R. *Fl. Neotrop.* 70: 1-94 (1996).

1. *Aiphanes hirsuta* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 573 (1932).

Neotype (designated by Borchsenius & Bernal, 1996): Colombia, *Bernal & Tobon 1396* (COL!).

Stems (2-)3-10 m long, 2.5-10 cm diameter, clustered, with 1-8(-20) stems per cluster, armed with black spines, to 12(-25) cm long, distal half of stem rarely covered with persistent old leaf sheaths. Leaves 4-8 per stem, erect and arching; sheaths 20-90 cm long, covered with brown spines, to 12 cm long; petioles 9-100 cm long, green, unarmed to densely armed with spinules and spines similar to those on sheath; rachises 86-194 cm long, with a grey to brown, scaly, caducous indument, unarmed to densely covered with black spinules, sometimes with many brown to black spines, to 4 cm long; pinnae 9-40

per side, inserted in dense to lax groups of (1-)2-9 separated by 5-21 cm, spreading in the same plane or more often in different planes, \pm rigid, weakly to strongly plicate, linear to broadly cuneate, 1-14 times as long as wide, truncate to lobulate praemorse, or occasionally slightly incised praemorse at apex, with a 1-6 cm long finger-like projection on the distal margin, adaxial side glabrous, abaxial side rough, or both sides sparsely to densely covered with up to 5 mm long, yellow spinules; basal pinnae 17.5-45 \times 1-13 cm; middle pinnae 11-65 \times 5-22 cm; apical pinnae 22-45 \times 7-32 cm. Inflorescence erect or more often curving, branched to 1 order; prophylls 25-52 cm long, 1.5-4.5 cm wide; peduncular bracts 70-133 cm long, 2.5-12 cm wide, with a brown, scaly, caducous indument, often covered with brown to black spinules, sometimes armed with brown to violet spines, to 2 cm long; peduncles (21-)43-170 cm long, 2-9 mm diameter at junction with rachis, minutely spinulose or sparsely to very densely armed with numerous short spinules and brown spines, to 3(-5) cm long; rachises 17-100 cm long, unarmed or armed like peduncles, spines fewer and shorter distally; rachillae 9-100, white to light brown at anthesis, densely covered with light brown, purple, or black spinules, minute or to 2.5 mm long; basal rachillae 23-90 cm long, sometimes with an up to 18 cm long flowerless part, with triads for 1/2 to 2/3 of the remaining length, in this part 2-5 mm diameter at anthesis, often thicker in fruit, distally ca. 1-2 mm diameter, with staminate dyads; apical rachillae 11-40 cm long, staminate or in inflorescences with <30 rachillae often with a few triads at base; fruiting rachillae occasionally very thick and fastigiate; triads inserted in shallow depressions in the rachillae, subtended by a short rim-like bract covering the pistillate flower for ca. 1/3 its length; dyads slightly sunken, subtended by an up to 1 mm long narrow bract; staminate flowers 1.5-3.4 mm long, purple to white, sometimes yellow

in the center, with white to yellow anthers; sepals narrowly triangular, imbricate, keeled, 1-3 mm long; petals almost free or basally connate, valvate, ovate to oblong, 2-3 mm long; filaments 0.7-1 mm long; anthers nearly square to linear, 0.5-1.2 × 0.4-0.7 mm; pistillodes 0.5-1 mm high, trifid; pistillate flowers brown to violet, 3-7 mm long; sepals rounded to broadly ovate, almost enclosing the petals before anthesis, 4-6 mm long, often with scattered minute spinules adaxially; petals connate for 1/3 to 1/2 of their length, valvate distally, 3-8 mm long, basally with minute, pale, or yellowish spinules abaxially, lobes triangular, rounded-acute to acuminate, spreading to recurved at anthesis; staminodial cup 2-5 mm high, acutely lobed to nearly truncate, basal half adnate to corolla tube, distal part appressed to the pistil; pistil 3-7 mm high, glabrous, or more often spinulose especially at base; fruits 7-20 mm diameter, dark red to purple, or occasionally white, globose, sometimes shortly rostrate, glabrous or with many minute, black spinules; endocarps 6-18 mm diameter, small endocarps finely pitted, especially distally, larger ones deeply pitted, sometimes longitudinally grooved and 3-lobed in cross-section, more rarely without pits; seeds globose to very irregular. *Lowland to montane rainforest*. 100-2200 m. (Costa Rica, Panama, Colombia, Ecuador).

1a. *Aiphanes hirsuta* subsp. *hirsuta*. Illustr.: Bailey, L. *Gentes Herbarum* 6: 210, fig. 107 (1943).

Aiphanes fuscopubens L.H.Bailey.

Stems 4-10 m long, clustered, with 2-8(-20) stems per cluster. Leaves 4-8 per stem; sheaths 20-45 cm long; petioles 9-35 cm long, densely armed with spinules and spines; rachises 86-135 cm long, unarmed or spiny; pinnae 9-26 per side, in groups of 2-

5, spaced by 15-21 cm, in different planes, narrowly to broadly cuneate, 1-6 times as long as wide, nearly glabrous to densely covered with yellow spinules, truncate to lobulate-praemorse apex, rarely slightly incised-praemorse; middle pinnae 11-45 × 5-16 cm. Peduncles 43-120 cm long, 2-9 mm diameter at apex, minutely spinulose densely covered with brown spines, to 3(-5) cm long; rachises 17-46 cm long, unarmed or spiny; rachillae 9-28, densely covered with brown to black spinules 0.5-1.5 mm long; basal rachillae 23-40 cm long, basally without flowers for 0.5-2.5 cm, often strongly thickened in the androgynous part, with closely inserted triads; staminate flowers 1.5-3.4 mm long; anthers rectangular to shortly linear, 0.5-0.7 × 0.4-0.5 mm; pistillate flowers 4.5-7 mm long, often acuminate; pistils ca. 3 mm high, glabrous or with some minute spinules at base; fruits ca. 7-11 mm diameter, red to purple, globose, glabrous to minutely spinulose; endocarps 6-9.5 mm diameter, 0.5-1 mm thick, globose, with numerous fine pits apically. *Lowland to montane rainforest. P (Henderson & Contraires 99, NY), CR (Aguilar et al. 2716, MO). 700-1350 m. (Costa Rica, Panama, Colombia, Ecuador).*

4. *Asterogyne* H. Wendl. ex Hook.f.

Aristeyera H.E.Moore

By F. Stauffer & A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems smooth, brownish, erect, sometimes basally decumbent, occasionally with basal and/or lateral vegetative

branches; internodes short; adventitious roots forming a basal cone. Leaves spirally arranged, 6-31 per stem, erect to arching, marcescent; sheaths brown or cream colored, short, tubular, splitting opposite petiole, the margins stiff fibrous, the tomentum brown to reddish brown; petioles slender, adaxially flat or channeled, glabrous, abaxially rounded or angled, brown tomentose; blades bifid, undivided, sometimes becoming irregularly split with age, narrowly cuneate at base; veins 25-70, emerging at 20-35° angle from rachis, prominent at one or both surfaces of blade. Inflorescences interfoliar, solitary, branched to 1 order, rarely spicate or forked, erect at anthesis, becoming pendent in fruit, protandrous; peduncles long, slender, brown to whitish tomentose; prophylls tubular, fibrous, membranous or chartaceous, bicarinate, brown tomentose, inserted near base of peduncle; peduncular bracts 1-2, tubular, chartaceous or membranous, inserted 1 to several cm above base of peduncle; rachises with short, ovate, pointed bracts, subtending rachillae, salmon to pink at anthesis, brown to reddish brown in fruit; rachillae 1-16, ca. equal in length, ending in a short, sterile apex, same color as inflorescence rachis; flower pits containing triads, the pits spirally arranged on rachis, covered by a rounded upper lip that overlaps the lower, immersed lip when in bud; floral bracts 3, the largest bract subtending the second staminate flower, a medium-sized, 2-keeled bract subtending the pistillate flower, and a small bract representing the prophyll of the pistillate flower; staminate flowers oblong to oblong-obovoid, borne abaxially to pistillate flowers; sepals 3, unequal, united basally, narrow, elongate, keeled dorsally; petals 3, ca. as long as or longer than sepals, united into a tube for ca. 2/3 their length, distally valvate; stamens 6-27; filaments united into a tube up to mid-length, white or yellow, with or without a papillate epidermis; connectives bifid, tanniferous, bearing separated thecae, the anthers

inflexed toward center of flower and introrse in bud, spread and extrorse at anthesis; pistillate flowers oblong to oblong-ovoid; sepals 3, unequal, imbricate in bud, dorsally keeled; petals 3, united up to midlength, distally valvate; staminodes 5-22, fused to corolla and united basally, fleshy, with tanniferous tips; gynoecia syncarpous, trilocular, triovulate, the nectary septal; styles basal to lateral, elongate; stigmatic branches 3, papillate, reflexed at anthesis; ovules anatropous, inserted at mid-height of locule, pendent; fruits ellipsoid to ellipsoid-ovoid, 1-seeded, dorsiventrally compressed, slightly to conspicuously keeled at apex, the remains of the stigma basal; epicarps smooth, purplish black or garnet red at maturity; mesocarp fleshy and juicy, with an inner layer of closely appressed, longitudinal fibers; endocarps thin, crustaceous, and shiny; eophylls with a bifid simple blade. 5 spp. Neotropics.

Bibliography: Stauffer, F. et al. *Brittonia* 55: 327-356 (2003).

1. *Asterogyne martiana* (H.Wendl.) H.Wendl. ex Hemsl., *Biol. Cent.-Amer., Bot.* 3: 409 (1885). *Geonoma martiana* H.Wendl., *Linnaea* 28: 342 (1856). Holotype: Cultivated in Germany, *Wendland* 56 (GOET *n.v.*). Illustr.: Stauffer, F. et al., *Brittonia* 55: 332 fig. 7 (2003). *N.v.*: capoca G; pacuquilla H; suitea N; pacaya CR.

Geonoma trifurcata Oerst., *Asterogyne minor* Burret

Stems 0.4-1.6(-3) m long, 2.5-5 diameter, solitary, erect, sometimes basally decumbent, dull brown to orange; internodes (1-)2.5-3 cm long; aerial roots forming an irregular basal cone, each root 4-8 cm long, 0.3-0.4 cm diameter; pneumatodes brownish cream-colored, conical, to 1 mm long. Leaves (6-)12-20 per stem, yellowish red when young, green when mature, the old ones sometimes persistent; sheaths (8-)11-16(-38) ×

3 cm, with reddish brown tomentum, longitudinally splitting, the margins slightly fibrous; petioles (4-)20-68(-75) × 0.5-1.5 cm, keeled to channeled adaxially, rounded to angled abaxially, almost glabrous to densely brown tomentose, toward the base slightly fibrous at margins; midveins (33-)55-79(-108) × 0.2-0.7 cm, greenish yellow, glabrous or with pinkish brown tomentum, slightly keeled adaxially, rounded abaxially; blades 0.4-1.3 × 0.15-0.3 m, light to dark green, deeply bifid at apex for 18-32 cm; primary veins 28-40 per side, emerging at 20-35° angle at midvein, prominent at both surfaces of blade, yellow when dry. Inflorescence branched to 1 order or very rarely spicate; peduncles (20-)34-70(-125) cm long, 0.4-0.7 cm diameter, dorsiventrally compressed; prophylls 11-26(-36) cm long, 0.6-1.5(-2) cm diameter, inserted at base of peduncle; peduncular bracts 1, rarely 2, chartaceous, brownish cream-colored, the indumentum same as on prophyll; first peduncular bract 20-31(-40) × 0.5-1.5 cm, inserted 0.5-2 cm above base of peduncle; second peduncular bract, when present, 15 × 0.5-0.9 cm, inserted 25-27 cm above base of peduncle; rachises absent or 0.5-3(-7) cm long, 0.3-0.5(-1.2) cm diameter, dorsiventral to irregularly compressed, salmon to pink at anthesis and in fruit, glabrous or with indumentum same as on peduncle; rachillae (2-)3-5(-14), terete, erect in bud, slightly pendent in fruit, the color same as inflorescence rachis, the tomentum white, farinose or short and appressed; basal rachillae (9-)14.5-22(-27) cm long, 0.4-0.6(-1.1) cm diameter; middle rachillae (8.5-)14-21(-23.5) cm long, 0.4-0.6(-1) cm diameter; apical rachillae (9-)15-22 cm long, 0.4-0.6(-1.2) cm diameter, the sterile apex acute, 0.2-1.1(-5.5) cm long; flower pits spirally arranged, ca. 2-3 mm apart from each other, covered with a lower semicircular lip, 1-2 × 1-2 mm, the lip becoming reflexed in fruit; staminate flowers oblong-obovoid in bud, 6-9 mm long, 2-3 mm diameter, white at anthesis, the pedicel to

0.7 mm long; sepals oblong-lanceolate, $3.6-4.8 \times 1$ mm; petals oblong-lanceolate, $5-7 \times 1-1.3$ mm; stamens 6, the filaments united into a tube up to 5.4-7 mm long, the free parts 2.4-3 mm long, 0.3-0.5 mm diameter, remarkably thinner at apex and therefore the anther versatile, white, without a papillate epidermis; connectives slightly swollen, 0.7-1.1 mm long; thecae 0.7-1.6 mm long; pistillodes 2-5 mm long, 1 mm diameter, basally fused with the staminodial tube; pistillate flowers oblong in bud, 6-8 mm long, 2.7-3.1 mm diameter; sepals oblong, $4-5 \times 1-1.5$ mm; petals oblong, $4.4-5.5 \times 1.1-1.8$ mm; ovaries 1 mm long, 0.8 mm diameter; styles 6-8 mm long; stigmatic branches 1-2 mm long; staminodial tubes 3.9-5 mm long, the lobes 6, 1.5-2.1 mm long; fruits $0.8-1.2 \times 0.4-0.7$ cm, ellipsoid to ellipsoid-ovoid; epicarp orange to red when young, purplish black at maturity; seeds $0.7-0.8 \times 0.4-0.5$ cm, ellipsoid. *Lowland to montane rainforest*. B (*Gentle 9072*, NY), G (*Moore & Cetto 8213*, BH), H (*Yuncker 5002*, NY), N (*Neill 7151*, MO), CR (*Henderson 53*, NY), P (*Henderson & Ferreira 3048*, NY). 0-1400 m. (Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador).

5. *Astrocaryum* G.Mey.

Avoira Giseke, *Toxophoenix* Schott, *Hexopetion* Burret

By A. Henderson.

Monoecious, iteroparous, spiny, pinnate-leaved palms. Stems solitary or clustered, short and subterranean or aerial and then moderate to large. Leaves pinnate or occasionally

undivided; sheaths open and not forming a crownshaft; petioles long; rachises long; pinnae either regularly arranged and spreading in the same plane or irregularly arranged in clusters and spreading in different planes, grayish-white abaxially. Inflorescences interfoliar, branched to 1 order; peduncle bearing a prophyll and 1 peduncular bract; rachises bearing numerous rachillae, the distal part thickened; flowers in triads on proximal part of rachillae, staminate flowers only distally; staminate flowers with 3 sepals, briefly connate basally, free above; petals 3, free or connate basally, valvate; stamens (3-)6(-12); pistillodes small; pistillate flowers with sepals connate into a 3-lobed, cupular or tubular calyx; petals connate into a tubular or urceolate corolla; staminodes borne in a ring or rarely digitate or absent; gynoecia syncarpous, trilocular, triovulate, with large styles and stigmas; fruits 1-seeded, globose to obovoid or irregularly shaped, spinulose or non-spinulose, with apical stigmatic remains, dehiscent or indehiscent; endocarps black, thick, bony, with 3 lateral pores; seeds with homogeneous endosperm and lateral embryos; eophylls bifid. 18 spp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995). Kahn, F. *Revista Peruana Biol.* 15(Supl. 1): 31–48 (2008). Pintaud, J.-C., Millán, B. & Kahn, F. *Revista Peruana Biol.* 15(Supl. 1): 49–54 (2008).

1. Pinnae irregularly arranged and spreading in different planes; fruits smooth or covered with minute spinules.

2. Inflorescences and infructescences erect; peduncles 30-37 cm long. **2. A. confertum**

2. Inflorescences erect, becoming pendulous in fruit; peduncles 130-170 cm long.

4. A. standleyanum

1. Pinnae regularly arranged and spreading in the same plane; fruits covered with spinules.

3. Stems 10-17 cm diameter, covered with persistent leaf bases. **1. A. alatum**

3. Stems 2.5-8 cm diameter, not covered with persistent leaf bases. **3. A. mexicanum**

1. *Astrocaryum alatum* Loomis, *J. Washington Acad. Sci.* 29: 142 (1939).

Hexopetion alatum (H.F.Loomis) F.Kahn & Pintaud, *Revista Peru. Biol.* 15(Supl. 1): 53 (2008). Holotype: Costa Rica, *Cook & Doyle 584* (US!). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 52 (1995). N.v.: coquito, CR; coquillo, P.

Stems 1.5-7 m long, 10-17 cm diameter, solitary, covered with persistent, spiny leaf bases. Leaves 6-30, strongly arching, to 3 m long; sheaths and petioles to 75 cm long; rachises to 180 cm long; pinnae ca. 18 per side of rachis, unequally wide, regularly arranged and spreading in the same plane, often closely inserted and the leaf appearing undivided with serrate margins, grayish-white abaxially. Inflorescences interfoliar, pendulous; rachillae with 1 pistillate flower at the base, all staminate distally; fruits 3.8-5 cm long, 3.2-3.8 cm diameter, obovoid to nearly globose, densely crowded, yellow-brown, covered with straight, black spinules; epicarps splitting at maturity. Lowland rainforest. N (*Bunting 1080A*, NY), CR (*Burger 5087*, NY), P (*Henderson 704*, NY). 0-500 m. (Endemic). (Nicaragua, Costa Rica, Panama).

Astrocaryum alatum and *A. mexicanum* have been included in a separate genus, *Hexopetion* (Pintaud et al. 2008), but this is not generally accepted.

2. *Astrocaryum confertum* H.Wendl. ex Burret, *Repert. Spec. Nov. Regni Veg.* 35: 136 (1934). Holotype: Costa Rica, *Wendland s.n.* (K!). N.v.: coyolillo, CR; pina-pina, P.

Astrocaryum polystachyum H.Wendl. ex Hemsl.

Stems 10-17 m long, 14-20 cm diameter, solitary, stout and erect, densely covered with black spines to 17 cm long. Leaves 5-12, stiffly erect, to 4 m long; sheaths to 60 m long; petioles 70-100 cm long; rachises 290-350 cm long; pinnae 114-129 per side of rachis, irregularly arranged in clusters and spreading in different planes, grayish-white abaxially. Inflorescences interfoliar, erect; peduncles 30-37 cm long; rachillae with several pistillate flowers at the base; fruits 3.3-3.7 cm long, 1.82 cm diameter, obovoid, orange, covered with minute spinules. Lowland rainforest. CR (*Grayum 8970*, MO), P (*de Nevers 5818*, MO). 0-250 m. (Endemic). (Costa Rica, Panama).

3. *Astrocaryum mexicanum* Liebm. ex Mart., *Hist. Nat. Palm.* 3: 323 (1853). *Hexopetion mexicanum* (Liebm. ex Mart.) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 12: 156 (1934). Isotype: Mexico, Veracruz, *Liebmann s.n.* (K!). N.v.: chocho, H.

Astrocaryum rostratum Hook.f., *A. warszewiczii* H.Karst., *A. chichon* Linden, *A. cohune* (S.Watson) Standl., *Bactris cohune* S.Watson

Stems 1.5-8 m long, 2.5-8 cm diameter, solitary, spiny, not covered with persistent leaf bases. Leaves ca. 11, arching; sheaths to 30 cm long; petioles to 90 cm long; rachises to 1.5 m long; pinnae 13-32 per side of rachis, unequally wide, the apical ones often not split and with toothed margins, regularly arranged and spreading in the same plane, grayish-white abaxially. Inflorescences erect; rachillae with 1 pistillate

flower at the base, staminate distally; fruits 4-6 cm long, 4-6 cm diameter, ellipsoid to obovoid, brownish, densely covered with short, black spinules. *Lowland rainforest*. T (Conrad et al. 2880, MO), Ch (Croat 40290, MO), B (Vargas 99, NY), G (Contreras 2257, NY), ES (Tucker 845, NY), H (Wilson 441, NY). 40-750 m. (Mexico [Chiapas, Oaxaca, Tabasco, Veracruz], Guatemala, Belize, El Salvador, Honduras, Nicaragua).

Astrocaryum mexicanum is reported by Henderson et al. (1995) from Nicaragua but no specimens from there have been seen.

4. *Astrocaryum standleyanum* L.H.Bailey, *Gentes Herbarum* 3: 88 (1933).

Lectotype (designated here): Bailey, L. *Gentes Herbarum* 3: fig. 69 (1933). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 54 (1995). N.v.: chonta, P.

Stems 6-15 m long, 16-22 cm diameter, solitary, spiny. Leaves 11-18, horizontally spreading and somewhat curved, to 4 m long; sheaths to 100 cm long; petioles 50-100 cm long; rachises to 300 cm long; pinnae 92-105 per side of rachis, irregularly arranged and spreading in different planes, grayish-white abaxially. Inflorescences interfoliar, erect, becoming pendulous in fruit; peduncles 130-170 cm long; rachises 90 cm long; rachillae with 1-8 pistillate flowers at the base; fruits 2.5-6 cm long, 2-3 cm diameter, obovoid, orange, almost smooth or with minute spinules. *Lowland rainforest*. CR (Thomsen 1319, NY), P (de Nevers 7218, NY). 10-450 m. (Costa Rica, Panama, Colombia, Ecuador).

6. *Attalea* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth

Maximiliana Mart., *Orbignya* Mart. ex Endl., *Lithocarpos* O.Targ.Tozz. ex Steud.,
Scheelea H.Karst., *Englerophoenix* Kuntze, *Pindarea* Barb.Rodr., *Bornoa* O.F.Cook,
Heptantra O.F.Cook, *Temenia* O.F.Cook, *Ethnora* O.F.Cook, *Parascheelea* Dugand,
Sarinia O.F.Cook, *Ynesa* O.F.Cook, *Markleya* Bondar, × *Attabignya* Balick,
A.B.Anderson & Med.-Costa, × *Maximbignya* Glassman

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems large and caulescent or acaulescent. Leaves pinnate; sheaths open, fibrous along the margins; petioles short or absent or well-developed; rachises well-developed; pinnae regularly or irregularly arranged, or arranged in distant clusters, with or without auricles at the bases, sometimes distalmost few pinnae remaining joined at their apices and with ‘windows’ between them. Inflorescences usually unisexual; staminate rachillae arranged all around rachis or absent from adaxial surface, with abundant, few or no raphides; staminate monad/dyad bracteoles usually ribbed, the same texture as the rachilla and continuous with it abaxially or not ribbed, crustaceous, different in texture from the rachilla and appearing separate from it by an abaxial, proximal margin; staminate flowers variously arranged in monads, rarely dyads; staminate petals variously shaped, lanceolate or linear, sometimes curved over at the apices, the surfaces smooth, coriaceous, ribbed, sometimes granular tomentose, the margins smooth or minutely denticulate or minutely serrate; stamens exerted from petals, or much shorter than petals, or neither exerted from nor much shorter than petals; anthers straight or coiled and twisted; pistillate rachillae arranged all

around rachis or absent from adaxial surface, at least proximally; pistillate petals cuspidate or not, with elaborate, lobed margins or with aculeate or irregular margins; staminodial rings poorly developed, forming a low, membranous ring or usually well-developed, forming a prominent cupule, deeply lobed or not lobed although often splitting irregularly as fruits develop; fruits borne on short rachillae with 1 fruit per rachilla or borne on short to long rachillae with 1-several fruits per rachilla, brown tomentose; endocarp surfaces with stout, rounded, adherent fibers or smooth or with few, thin fibers, proximally usually with clear outlines of three locule divisions, these marked by irregular, small pits, uneven, longitudinally ridged or smooth, not ridged, the bases irregularly pointed, the endocarps becoming thinner and flanged, or regularly rounded, or regularly lobed; endocarps in cross-section with abundant fibers or without or with few fibers, fibers, when present, in regular clusters or scattered or rarely in a few, irregular clusters, 1-seeded, the abortive locules visible in endocarp cross-section appressed to fertile locule or 1-several-seeded, the abortive locules, when present, visible in endocarp cross-section but not appressed to fertile locules; seeds usually solid in cross-section, sometimes with a well-developed central cavity in cross-section. 30 spp. Neotropics.

Bibliography: Henderson, A. *Phytotaxa* 444: 1-76 (2020).

1. Stems acaulescent.
2. Pinnae arranged in distant clusters and spreading in different planes. **1. A. allenii**
2. Pinnae regularly arranged and spreading in the same plane. **4. A. iguadummat**
1. Stems caulescent.
3. Stamens 23-34; anthers coiled and twisted. **3 A. cohune**

3. Stamens 6; anthers straight.

2. *A. butyracea*

1. *Attalea allenii* H.E.Moore, *Gentes Herbarum* 8: 191 (1949). Holotype: Panama, *Allen 4103* (MO *n.v.*). Illustr.: Moore, H. *Gentes Herbarum* 8: fig. 82 (1949). *N.v.*: mangué, P.

Stems length and diameter not recorded, acaulescent. Leaves 8-13 per stem; sheaths not recorded; petioles 150-225 cm long; rachises 372 cm long; pinnae 100-103 per side of rachis, arranged in distant clusters and spreading in different planes, usually without an auricle at the base; middle pinnae 53.5-80 × 2.6-4.1 cm; distalmost few pinnae remaining joined at their apices, sometimes with ‘windows’ between them. Peduncular bracts and peduncles length not recorded; staminate rachillae number not recorded, 3-4.8 cm long, arranged all around rachis, without raphides; staminate monad/dyad bracteoles not ribbed, crustaceous, different in texture from the rachilla and appearing separate from it by an abaxial, proximal margin; staminate flowers 9.8-14.4 mm long, mostly in monads, rarely dyads, superficial on rachillae, alternately arranged along abaxial surface of rachillae; staminate petals lanceolate, acuminate, flattened, free, not or only slightly curved at the apices, flat in cross-section, the surfaces ribbed, not coriaceous, granular tomentose, the margins minutely serrate; stamens 6, neither exerted from nor much shorter than petals; anthers straight; pistillate rachillae number not recorded, 0.3-0.5 cm long, arranged all around rachis; pistillate petals cuspidate, with elaborate, lobed margins; fruits 64.8-91.6 × 31.9-51.4 mm, brown, borne on short rachillae with 1 fruit per rachilla; endocarp surfaces uneven, longitudinally ridged, with stout, rounded, adherent fibers, without small pits proximally, the bases regularly lobed;

seeds 1-3, cross-section not recorded. *Lowland rainforest*. P (de Nevers 7301, MO). 15-350 m. (Panama, Colombia).

2. *Attalea butyracea* (Mutis ex L.f.) Wess.Boer, *Pittieria* 17: 312 (1988). *Cocos butyracea* Mutis ex L.f., *Suppl. Pl.*: 454 (1782). *Scheelea butyracea* (Mutis ex L.f.) H.Karst. ex H.Wendl. in O.C.E.de Kerchove de Denterghem, *Palmiers*: 256 (1878). Neotype (designated by Henderson, 2020): Colombia, *Bernal et al.* 3448 (COL!). Illustr.: Henderson, A. *Phytotaxa* 444: fig. 5 (2020). N.v.: coquito, G: palma real, CR.

Cocos regia Liebm. in Mart., *Scheelea liebmannii* Becc., *Attalea liebmannii* (Beccari) Zona, *Scheelea preussii* Burret, *Scheelea costaricensis* Burret, *Scheelea zonensis* L.H.Bailey, *Scheelea lundellii* Bartlett, *Attalea lundellii* (Bartlett) Zona

Stems 7.5-24 m long, 40-55 cm diameter. Leaves 22 per stem; sheaths length not recorded; petioles short or absent; rachises 822 cm long; pinnae 188-212 per side of rachis, regularly arranged, with an auricles at the base; abaxial and proximal part of mid-vein without or rarely with dense patches of brown hairs; middle pinnae length not recorded, 2.8-4.5 cm wide; distalmost few pinnae free from one another. Peduncular bracts and peduncles length not recorded; staminate rachillae number not recorded, 10.5-36.5 cm long, arranged all around rachis, with abundant raphides; staminate monad/dyad bracteoles usually ribbed, the same texture as the rachilla and continuous with it abaxially; staminate flowers 7.9-16.6 mm long, in monads or dyads, superficial on rachillae, loosely and spirally or somewhat irregularly arranged all around rachillae (sometimes fewer or absent from adaxial, proximal surface of rachillae); staminate petals linear, free, not curved at the apices, flat in cross-section, the surfaces ribbed, not

coriaceous, not granular tomentose, the margins smooth; stamens 6, much shorter than petals; anthers straight; pistillate rachillae number not recorded, 11-27 cm long, arranged all around rachis; pistillate petals cuspidate, with irregular margins; fruits 43-59.9 × 22.6-31.8 mm, yellow, orange, or orangeish, borne on long rachillae with several fruits per rachilla; endocarp surfaces uneven, longitudinally ridged, with stout, rounded, adherent fibers, without small pits proximally, the bases irregularly pointed, the endocarps becoming thinner and flanged; seeds 1-3, solid in cross-section, rarely with an irregular central cavity. *Lowland rainforest (especially along river margins), seasonal forest, or savannas, and persisting in disturbed areas.* G (Steyermark 47732, MO), N (Little 25118, US), CR (Henderson 1805, NY), P (Bartlett 16352, NY). 20-425 m. (Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Trinidad and Tobago).

3. *Attalea cohune* Mart. in A.D.d'Orbigny, *Voy. Amér. MÉR.* 7(3): 121 (1844). *Orbignya cohune* (Mart.) Dahlgren ex Standl., *Trop. Woods* 30: 3 (1932). Lectotype (designated by Henderson, 2020): Martius 1845: t. 167 IV. Illustr.: Henderson, A. *Phytotaxa* 444: fig. 8 (2020). N.v.: cohune, B, G, H.

Cocos guacuyule Liebm. ex Mart., *Orbignya guacuyule* (Liebm. ex Mart.) Hern.-Xol., *Attalea guacuyule* (Liebm. ex Mart.) Zona, *Cocos cocoyule* Mart.

Stems 2-7 m long, 30-34 cm diameter. Leaves 15 per stem; sheaths 150 cm long; petioles absent; rachises 614-700 cm long; pinnae 179-216 per side of rachis, regularly arranged, with or without auricles at the bases; abaxial and proximal part of mid-vein with or without dense patches of brown hairs; middle pinnae 69-99.5 × 3.1-5.1 cm;

distalmost few pinnae free from one another. Peduncular bracts 210 cm long; peduncles 50-120 cm long; staminate rachillae number not recorded, 11.5-24 cm long, arranged all around rachis, with abundant raphides; staminate monad/dyad bracteoles not ribbed, crustaceous, different in texture from the rachilla and appearing separate from it by an abaxial, proximal margin; staminate flowers 5.4-13 mm long, in dyads, slightly sunken in rachillae, spirally arranged all around rachillae; staminate petals spatulate, free, curved over at the apices, flat in cross-section, the surfaces smooth, coriaceous, not granular tomentose, the margins smooth; stamens 23-34, neither exerted from nor much shorter than petals; anthers coiled and twisted; pistillate rachillae 60, 6-25 cm long, arranged all around rachis; pistillate petals cuspidate, with irregular margins; fruits 51.9-83.4 × 36.3-51 mm, brown, borne on long rachillae with 1-several fruits per rachilla; endocarp surfaces uneven, longitudinally ridged, with stout, rounded, adherent fibers, without small pits proximally, the bases irregularly pointed, the endocarps becoming thinner and flanged; seeds 1-3, solid in cross-section or with an irregular central cavity. *Lowland rainforest or deciduous forest, persisting in disturbed areas.* QR (*Balslev 8190*, NY), B (*Cordero 9*, NY), G (*Steyermark 45693*, F), H (*Balick 1710*, NY). 125-600 m. (Mexico [Colima, Guerrero, Nayarit, Oaxaca, Quintana Roo], Belize, Guatemala, Honduras, Colombia).

Attalea cohune has been reported from Costa Rica (Standley, 1937) but no specimens from there have been seen.

4. *Attalea iguadummat* de Nevers, *Ann. Missouri Bot. Gard.* 74: 506 (1987).

Isotype: Panama, *de Nevers 7197* (MO!).

Stems length and diameter not recorded, acaulescent. Leaves 13-15 per stem; sheaths not recorded; petioles 60-65 cm long; rachises 689-815 cm long; pinnae 100-117 per side of rachis, regularly arranged, without auricles at the bases; middle pinnae 108-123 × 4.4-6.6 cm; distal most few pinnae free from one another. Peduncular bracts 130-176 cm long; peduncles 65-70 cm long; staminate rachillae number not recorded, 9.5-13.5 cm long, arranged all around rachis, with abundant raphides; staminate monad/dyad bracteoles usually ribbed, the same texture as the rachilla and continuous with it abaxially; staminate flowers 13.7-16.6 mm long, in monads or dyads, superficial on rachillae, loosely and spirally or somewhat irregularly arranged all around rachillae (sometimes fewer or absent from adaxial, proximal surface of rachillae); staminate petals linear, free, not curved at the apices, flat in cross-section, the surfaces ribbed, not coriaceous, not granular tomentose, the margins smooth; stamens 8-9, neither exerted from nor much shorter than petals; anthers straight; pistillate rachillae number not recorded, 1.3 cm long, arranged all around rachis; pistillate petals cuspidate, with aculeate or irregular margins; fruits 92-92.6 × 49.2-63.6 mm, color not recorded, borne on short rachillae with 1 fruit per rachilla; endocarp surfaces uneven, longitudinally ridged, with stout, rounded, adherent fibers, proximally with clear outlines of three locule divisions, these marked by irregular, small pits, the bases regularly rounded; seeds 2-3, cross-section not recorded. *Lowland rainforest*. P (*Hammel 14507*, MO). 65-500 m. (Panama, Colombia).

7. *Bactris* Jacq. ex Scop.

Guilielma Mart., *Augustinea* H.Karst., *Pyrenoglyphis* H.Karst., *Amylocarpus* Barb.Rodr.,
Yuyba (Barb.Rodr.) L.H.Bailey

By A. Henderson.

Monoecious, iteroparous, spiny, pinnate-leaved palms. Stems clustered or solitary, usually aerial, sometimes short and subterranean, spiny on internodes. Leaves pinnate or pinnately veined if undivided, reduplicate, with various types of spines; sheaths open or closed but not forming a crownshaft; petioles moderate to long; rachises short to long; pinnae regularly or usually irregularly arranged, spreading in the same or different planes, or commonly blade undivided. Inflorescences interfoliar, branched to 1 order or commonly with 1 rachilla, spiny; peduncles bearing a prophyll and 1 (rarely 2) peduncular bracts; rachises bearing 1 or few to numerous rachillae; flowers borne in regularly arranged triads, or triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers with 3 sepals, these connate basally into a 3-lobed calyx; petals 3, connate basally for ca. half their length, free and valvate above; stamens (3-)6(-12); pistillodes minute or absent; pistillate flowers with 3-lobed, annular, cupular or tubular calyces and 3-lobed, tubular corollas; staminodes minute or absent, or forming a staminodial ring; gynoecia syncarpous, trilocular, triovulate; fruits 1-seeded, globose, ellipsoid, obovoid or ovoid, with apical stigmatic remains, usually either orange-yellow or purple-black, glabrous or spinulose; mesocarp starchy or juicy; endocarps thick and bony, with or without fibers, with 3 pores at or above equator; seeds with homogeneous

endosperm and embryo opposite 1 of the pores; eophylls bifid or rarely pinnate. 73 spp.
Neotropics.

Bibliography: Henderson, A. *Fl. Neotrop.* 79: 1-181 (2000).

1. Rachillae filamentous, numerous, (24-)40-90; triads \pm regularly arranged (but often with solitary staminate flowers interspersed) on proximal ca. half of rachillae, and there tending to be absent from adaxial side of rachillae (paired or solitary staminate flowers only on distal ca. half of rachillae); fruits obovoid, orange or red, sometimes spinulose.

2. Fruits spinulose; pinnae glabrous abaxially; Panama. **1. B. barronis**

2. Fruits not spinulose; pinnae (or blades) pubescent abaxially; Costa Rica, Panama.

3. Petioles and rachises not or sparsely spiny; pinnae densely pilose abaxially; pistillate corolla with long, contorted spinules. **8a. B. glandulosa** var. **glandulosa**

3. Petioles and rachises spiny; pinnae sparsely pilose abaxially, mainly along veins; pistillate corolla glabrous or minutely spinulose. **8b. B. glandulosa** var. **baileyana**

1. Rachillae not filamentous, usually fewer than 90; triads variously arranged but not as above; fruits variously shaped and colored, usually not spinulose.

4. Stems 4-18 m long, 8-25 cm diameter; pinnae 40-141 per side; rachillae 35-77; fruits yellow, orange, or red; endocarp fibers sometimes adherent to endocarp; petiole spines sometimes in 3 longitudinal rows. **7. B. gasipaes**

4. Stems to 10 m long, 0.3-6(-10) cm diameter; pinnae 2-68(-80) per side, or blade undivided; rachillae 1-51; fruits variously colored; endocarp fibers rarely adherent to endocarp; petiole spines not in 3 longitudinal rows.

5. Fruits yellowish, orange, or red; epicarps glabrous; endocarp fibers usually few or absent.

6. Leaves undivided, blade to 3.1 m long and to 25.5 cm wide at apex of rachis, elongate cuneate-oblongate in outline, gradually expanded from a narrowly cuneate base to the bifid apex; Costa Rica.

17. B. militaris

6. Leaves pinnate, or, if undivided, to 1.5 m long and not shaped as above.

7. Endocarp fibers numerous, with juice sacs attached; leaves undivided.

8. Fruits globose, rostrate, 5-8 mm diameter; Panama.

3. B. charnleyae

8. Fruits broadly obovoid, indistinctly rostrate, 1.4-1.6 cm diameter; Costa Rica, Panama.

18. B. neomilitaris

7. Endocarp fibers few or absent, without juice sacs; leaves pinnate or undivided.

9. Leaves irregularly pinnate with the apical pinna much wider than the others, or undivided; pinnae or blade thick and leathery, strongly plicate.

10. Rachillae 24-30, 8-14 cm long; Panama.

12. B. kunorum

10. Rachillae 18-25, 5-6 cm long; Nicaragua, Costa Rica.

10. B. grayumii

9. Leaves pinnate (rarely undivided), the apical pinna not much wider than the others; pinnae not thick and leathery or strongly plicate.

11. Rachillae 14-29 cm long; fruits 1.4-1.7 diameter; Costa Rica, Panama.

5. B. coloradonis

11. Rachillae 2-16 cm long; fruits usually less than 1.4-1.7 cm diameter.

12. Leaf spines terete, dark brown or yellowish-brown, to 6 cm long; blade or pinnae usually minutely, densely and softly white-pubescent abaxially; Honduras, Nicaragua, Costa Rica, Panama.

19. B. obovata

12. Leaf spines not as above, usually black; blade or pinnae not as above.

13. Pinnae 15-19(-25) per side, narrowly to broadly elliptical or oblanceolate, often sigmoid; rachillae 2-3.4 cm long; Panama. **20. B. panamensis**

13. Pinnae not as above.

14. Fruits prominently rostrate; rachillae 7-17; sheath, petioles and rachises densely and minutely spinulose; Nicaragua, Costa Rica, Panama. **6. B. dianeura**

14. Fruits bluntly or obscurely rostrate; rachillae 8-35; sheath, petiole, and rachis not minutely spinulose.

15. Inflorescences compact with closely spaced rachillae, these 5-10 cm long; pinnae glaucous, concave; Nicaragua, Costa Rica, Panama. **2. B. caudata**

15. Inflorescences lax with loosely spaced rachillae, these 7-16 cm long; pinnae not glaucous, not concave.

16. Pinnae linear to sigmoid; middle pinnae (30-)45-60 cm long; rachillae 12-36, 8-16 cm long; Mexico, Belize, Guatemala, Honduras, Nicaragua. **16. B. mexicana**

17. Pinnae sigmoid, irregularly arranged in clusters, spreading in different planes, glabrous abaxially; petioles and rachises with scattered, black spines.

16a. B. mexicana var. mexicana

17. Pinnae linear, regularly arranged (but with gaps) and spreading in the same plane, pubescent abaxially; petioles and rachises usually without spines.

16b. B. mexicana var. trichophylla

16. Pinnae narrowly elliptical; middle pinnae 18-39(-45) cm long; rachillae 8-23, 7-10 cm long; Nicaragua, Costa Rica, Panama. **9. B. gracilior**

5. Fruits purple-black, brown, purplish-brown, or yellowish-brown; epicarps minutely spinulose to spinulose, or glabrous; endocarp fibers with juice-sacs attached.

18. Fruits (and pistillate flowers) with staminodial ring; Mexico, Belize, Guatemala, Honduras, El Salvador, Costa Rica, Panama. **14. B. major**

18. Fruits (and pistillate flowers) without staminodial ring.

19. Fruits broadly obovoid, prominently rostrate, 1.5-3 cm long, 1.5-2(-3) cm diameter, yellowish-brown, covered with short brown spinules; Panama. **4. B. coloniata**

19. Fruits not as above.

20. Pinnae pale gray-green abaxially, readily falling from rachis on dried specimens; Nicaragua, Costa Rica, Panama. **11. B. guineensis**

20. Pinnae green abaxially, not falling from rachis on dried specimens.

21. Fruits covered with short spinules; pinnae 59-68 per side, linear, pilose abaxially; Panama. **21. B. pilosa**

21. Fruits rarely minutely spinulose; pinnae 2-32 per side (or blade undivided), seldom linear or pubescent.

22. Leaf spines terete, black; pinnae linear to narrowly elliptic, with marginal spines 1-2 cm long; Costa Rica. **13. B. longiseta**

22. Leaf spines flattened, yellow; pinnae sigmoid; Costa Rica, Panama. **15. B. maraja**

1. Bactris barronis L.H.Bailey, *Gentes Herbarum* 3: 101 (1933). Holotype: Panama, *Bailey 503* (BH!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 9.3 (2000). N.v.: caña conga, P.

Stems 2-8 m long, 3.5-8 cm diameter, clustered, forming dense clusters, the internodes prominently spiny. Leaves 4-9 per stem; leaf spines mostly solitary and scattered, black, slightly flattened, to 12 cm long, dense on sheaths and proximal, lateral surfaces of petioles; sheaths 30-84 cm long; ocreas not recorded; petioles 14-57 cm long; rachises 0.7-2.6 m long; pinnae 31-45 per side (rarely leaves undivided), usually regularly arranged and spreading in the same plane, occasionally irregular or with gaps, linear to linear-lanceolate, conspicuously cross-veined, spiny on margins; middle pinnae 47-82 cm long, 1.5-6 cm wide. Inflorescences interfoliar; peduncles (9-)16-25 cm long, strongly recurved and flattened, spinulose; prophylls 6-19 cm long; peduncular bracts 18-51 cm long, covered with dense black spines to 1(-2) cm long; rachises 3-8(-17) cm long; rachillae 80-90, filamentous, to 12 cm long, at anthesis covered with whitish, moniliform trichomes; triads \pm regularly arranged (but often with solitary staminate flowers interspersed) on proximal ca. half or more of rachillae, and there tending to be absent from adaxial side of rachillae (paired or solitary staminate flowers only on distal ca. half of rachillae); staminate flowers not recorded; pistillate flowers 3-6 mm long; calyces cupular, to 1 mm long; corolla tubular, to 3.5 mm long, pubescent or spinulose; staminodes absent; fruits 1-1.6 cm diameter, densely clustered, obovoid, prominently rostrate, orange-red, with short spinules, glabrescent; mesocarp starchy; endocarps turbinate, the pores equidistant or the sterile pores displaced longitudinally; endocarp fibers few, free, terete; fruiting perianths with minute calyx and crenate corolla, irregularly split by the enlarging fruit, without staminodial ring. *Lowland rainforest*. P (Nee 7560, MO). 50-300 m. (Panama, Colombia).

2. *Bactris caudata* H.Wendl. ex Burret, *Repert. Spec. Nov. Regni Veg.* 34: 230 (1934). Neotype (designated by de Nevers et al., 1996): Costa Rica, *Wendland 53* (GOET!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 14.3 (2000).

Bactris dasychaeta Burret

Stems 1-5 m long, 2-2.4 cm diameter, solitary or clustered, spiny or not spiny on the internodes. Leaves 5-8 per stem; leaf spines scattered, black, terete, to 6.5 cm long, on sheaths, petioles and rachises; sheaths 41-67 cm long; ocreas not recorded; petioles 40-54 cm long; rachises to 98 cm long; pinnae 19-26 per side, irregularly arranged in clusters, spreading in different planes, linear to ovate, concave, smooth to plicate with veins prominent adaxially, long-acuminate, glaucous, dark green adaxially, paler abaxially, glabrous, with forward- or backward-pointing spinules 1-3 mm long on the margins; middle pinnae (21-)40-50 cm long, 2.5-5 cm wide (apical one wider, narrowly obovate). Inflorescences interfoliar, compact; peduncles to 11 cm long, strongly recurved, sparsely to densely spiny; prophylls 5.5-8.5 cm long, 2-2.5 cm wide; peduncular bracts 16-36 cm long, sparsely to densely covered with black spines; rachises 1.5-2 cm long; rachillae 18-31, 5-10 cm long, closely spaced, at anthesis densely covered with moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers not recorded; pistillate flowers to 3.5 mm long; calyces cupular, 0.5 mm long; corolla tubular, 2.5-3 mm long; staminodes minute or absent; fruits 0.9-1.3 × 1-1.2 cm, in a tight bunch, obovoid, prominently and bluntly rostrate, orange-red; endocarps turbinate, pitted apically, the sterile pores slightly displaced longitudinally; endocarp fibers lacking; fruiting perianths with minute calyx and truncate to crenate corolla,

without staminodial ring. *Lowland rainforest*. N (Moreno 15134, MO), CR (Moore 6749, BH), P (McPherson 11486, MO). 5-600 m. (Endemic). (Nicaragua, Costa Rica, Panama).

3. *Bactris charnleyae* de Nevers, A.J.Hend. & Grayum, *Proc. Calif. Acad. Sci.*, ser. 4, 49: 176 (1996). Holotype: Panama, *de Nevers et al.* 4463 (MO!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 17.1 (2000).

Stems 0.5-2 m long, 6-9 mm diameter, clustered. Leaves 3-6 per stem; leaf spines absent except for apex of pinnae; sheaths 5-6 cm long; ocreas to 2 cm long; petioles 7-11 cm long; rachises 11-15 cm long; blades undivided, bifid, with 10-14 main veins, these raised adaxially, glabrous, veins with minute spinules abaxially, with spinules 1-7 mm long on margins; blades 25-31 cm long, 10-18 cm wide at apex of rachis. Inflorescences interfoliar, projecting from the top of the sheath; peduncles 3-5 cm long, \pm straight, densely spinulose; prophylls 2-3 cm long; peduncular bracts 8-8.5 cm long, moderately covered with fine, straight spinules 1.5-2.3 cm long; rachises 2-2.6 cm long; rachillae 5-8, 1.5-3 cm long, at anthesis densely covered with whitish, moniliform trichomes; triads irregularly arranged amongst paired or solitary flowers; staminate flowers not recorded; pistillate flowers 2-3 mm long; calyces cupular, ca. 0.5 mm long; corollas tubular, ca. 2 mm long; staminodes minute or absent; fruits 5-8 mm diameter, globose, rostrate, yellow or orange, striate; mesocarp starchy; endocarps turbinate, the sterile endocarp pores displaced longitudinally; endocarp fibers numerous, with juice sacs attached; fruiting perianths with obscure calyx and crenate corolla, without staminodial ring. *Lowland rainforest*. P (Henderson & H. Herrera 731, NY). 100-350 m. (Endemic). (Panama).

4. *Bactris coloniata* L.H.Bailey, *Gentes Herbarum* 3: 106 (1933). Lectotype (designated by de Nevers et al., 1996): Panama, *Bailey* 77 (BH!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 17.3 (2000). N.v.: uvita, P.

Stems 3.5-7 m long, 2-5 cm diameter, clustered, rarely solitary, forming open clusters, spiny on internodes. Leaves 5-7 per stem; leaf spines scattered, somewhat flattened, yellowish-brown, darker at base and apex, to 5 cm long; sheaths 27-85 cm long; sheaths, petioles (and rachises) reddish-brown-tomentose; ocreas prominent, to 30 cm long; petioles 39-70(-108) cm long; rachises (0.4-)1.2-1.4(-2) m long; pinnae (4-)14-23(-60) per side (or rarely leaf undivided), regularly or irregularly arranged in clusters of 4-12, spreading in the same or different planes, linear-lanceolate, elliptic or slightly sigmoid, the apex long-caudate and drooping, without conspicuous cross-veins, glabrous; middle pinnae 30-75 cm long, 2.5-7.2 cm wide. Inflorescences interfoliar; peduncles 16-25 cm, strongly recurved, not spiny; prophylls 15-49 cm; peduncular bracts (26-)42-60 cm long, densely covered with appressed, brown, flattened spines; rachises 4-10 cm long; rachillae 9-16(-25), 14-25 cm long, to 3 mm diameter in fruit, densely covered at anthesis with moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers to 4 mm long; sepal lobes 1-3 mm long; petals to 4 mm long; stamens 6; pistillodes absent; pistillate flowers 5-7 mm long; calyces urceolate, 4-6 mm long; corollas urceolate, 5-6 mm long, with minute spinules; staminodes absent; fruits 1.5-3 × 1.5-2(-3) cm, broadly obovoid, prominently rostrate, yellowish-brown, covered with short brown spinules; mesocarp juicy; endocarps turbinate, the pores equidistant or the sterile pores slightly displaced longitudinally; endocarp fibers numerous, wiry, with juice sacs attached; fruiting perianths with calyx only slightly

shorter than the corolla, both crenulate-margined, without staminodial ring. *Lowland rainforest*. P (Mori & Kallunki 5547, MO). 20-200 m. (Panama, Colombia, Ecuador, Peru).

5. *Bactris coloradonis* L.H.Bailey, *Gentes Herbarum* 3: 104 (1933). Lectotype (designated by de Nevers et al., 1996): Panama, *Bailey & Bailey 502* (BH!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 19.1 (2000). N.v.: coyolito, N.

Bactris porschiana Burret

Stems 1.5-10 m long, 3-8 cm diameter, solitary or clustered, spiny on internodes. Leaves 2-6 per stem; leaf spines solitary or somewhat clustered, black, terete, to 9 cm long, on lateral surfaces of petiole, fewer on abaxial surface of rachis; sheaths 43-60(-100) cm long, sheaths, petioles (and rachises) usually white-woolly-tomentose; ocreas to 10 cm long; rachises 0.9-2.1 m long; pinnae 17-38(-80) per side (or rarely the leaves undivided), irregularly arranged in clusters, spreading in the same or in different planes, linear-lanceolate, aristate, glabrous, usually spiny on the margins, usually with obvious cross-veins; middle pinnae 21-86 cm long, 3-7 cm wide. Inflorescences interfoliar; peduncles 9.5-23 cm long, recurved, scarcely spiny; prophylls 9-23 cm long; peduncular bracts 27-37 cm long, sparsely to densely covered with spreading, terete, black or brown spines to 1 cm long; rachises 3.5-9 cm long; rachillae 20-51, 14-29 cm long, at anthesis covered with long, brown trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-4 mm long; sepal lobes 1-2.5 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 2-3 mm long; calyces tubular, to 1 mm long; corolla tubular, 2-3 mm long; staminodes 6, minute; fruits 1.5(-

2.5) × 1.4-1.7(-2) cm, broadly obovoid, briefly and bluntly rostrate, orange-red; mesocarp starchy; endocarps turbinate, pitted apically, the sterile endocarp pores slightly displaced longitudinally; endocarp fibers few; fruiting perianths with obscure calyx and truncate or slightly undulate-margined corolla, without staminodial ring. *Lowland rainforest*. CR (Davidse & G. Herrera 31101, MO), P (Henderson & Bernal 2049, NY). 10-1200 m. (Costa Rica, Panama, Colombia, Ecuador).

6. *Bactris dianeura* Burret, *Repert. Spec. Nov. Regni Veg.* 34: 217 (1934).

Neotype (designated by de Nevers et al., 1996): Costa Rica, *Burger et al.* 10753 (F!).

Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 24.1 (2000).

Stems 2-5(-10) m long, 1-3 cm diameter, clustered, forming small clusters of 2-8 stems, spiny on internodes. Leaves 5-7 per stem; leaf spines scattered, black or brown and then darker at apex, terete or sometimes somewhat flattened, to 6.5 cm long, on sheaths, lateral surfaces of petioles, and abaxial surface of rachises; sheaths 17-45 or more cm long, sheath, petiole, and rachises whitish or brownish tomentose, spinulose; ocreas to 8 cm long; petioles 26-80 cm long; rachises 58-90(-125) cm long, with few spines to ca. 7.5 cm long; pinnae 14-20 per side, irregularly arranged in clusters of 2-3, lanceolate to oblanceolate, obscurely to clearly cross-veined, with spinules to ca. 6 mm long on margins; middle pinnae 26-44(-56) cm long, (1.4-)2.7-4.5(-6.3) cm wide. Inflorescences interfoliar; peduncles 6-12.5 cm long, recurved, spiny; prophylls 10-11 cm long; peduncular bracts to 26 cm long, densely covered with yellowish-brown to black spines to 2 cm long; rachises 1.6-3.4 cm long; rachillae 7-17, 4.3-11 cm long, densely covered at anthesis with moniliform trichomes; triads irregularly arranged amongst paired

or solitary staminate flowers; staminate flowers 3-4 mm long; sepal lobes 1-1.5 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 3.5-5.5 mm long; calyces cupular, 1-2 mm long; corollas tubular, 3-5 mm long; staminodes 1-3, minute; fruits 1.2-1.8 × 1.2-1.7 cm, subglobose or usually obovoid, prominently rostrate, bright orange; mesocarp starchy; endocarps turbinate, the sterile pores slightly displaced longitudinally; endocarp fibers few or absent; fruiting perianths with minute calyx and longer corolla, irregularly split at apex by enlarging fruit, without staminodial ring.

Lowland to montane rainforest. N (Coronado et al. 940, MO), CR (Grayum et al. 9103, MO), P (de Nevers et al. 8747, NY). 600-1650 m. (Endemic). (Nicaragua, Costa Rica, Panama).

7. *Bactris gasipaes* Kunth in F.W.H.A.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 1: 302 (1816). *Guilielma gasipaes* (Kunth) L.H.Bailey, *Gentes Herbarum* 2: 187 (1930). Holotype: Colombia, Bonpland s n. (P!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 27.3 (2000). N.v.: pijibaya, N; pejibaye, H, CR.

Stems 4-18 m long, 8-25 cm diameter, solitary or clustered, spiny or rarely not spiny on internodes. Leaves 7-20 per stem; leaf spines scattered or somewhat clustered, slightly flattened, brown or yellowish-brown, to 1(-3) cm long, often in 3 longitudinal rows on petioles, sometimes all over, often on abaxial and adaxial surface of rachises, rarely absent; sheaths and petioles 0.7-1.3 m long, sheath, petioles and rachises whitish-tomentose abaxially, occasionally densely spinulose; ocreas absent on adult plants, present on juveniles and basal shoots; rachises 1.8-3.5 m long; pinnae 90-141 per side, irregularly arranged in obscure clusters of 2-5, spreading in different planes, linear,

unequally bifid with midrib terminating subapically; middle pinnae 0.5-1 m long, 2-3(-4) cm wide. Inflorescences at first interfoliar; peduncles 15-32 cm long, recurved, spinulose or not spiny; prophylls 12-25 cm long; peduncular bracts 47-70 cm long, moderately to densely covered with blackish or brownish spines to 1 cm long; rachises 15-30 cm long; rachillae 40-77, 17-32 cm long, at anthesis densely covered with moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 4-6 mm long, deciduous; sepal lobes 1.2-2 mm long; petals 3.5-6 mm long; stamens 6; pistillodes absent; pistillate flowers 3.5-8 mm long; calyces annular, 1-3 mm long; corolla tubular, 3-8 mm long; staminodes minute; fruits 1.2-6.5 × 1.1-4.5(-6) cm, subglobose to widely ovoid, yellow, orange or red; mesocarp oily; endocarps globose to ellipsoid, the sterile pores displaced longitudinally, the fertile pore displaced latitudinally; endocarp fibers stout, flattened, adherent to the endocarp, anastomosing; fruiting perianths with small calyx with undulate margins and much longer, scarcely lobed or smooth-margined corolla, without staminodial ring. *Widely cultivated in tropical Central and South America.*

7a. *Bactris gasipaes* var. *gasipaes*

Guilielma utilis Oerst., *Bactris utilis* (Oerst.) Benth. & Hook. f. ex Hemsley

Fruits 3.5-6.5 × 3-4.5(-6) cm, widely ovoid. *Widely and commonly cultivated.* H (Standley 55564, F), N (Long 156, F), CR (Henderson 43, NY), P (de Nevers et al. 7469, MO). 25-50 m.

8. *Bactris glandulosa* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren.*

Kjøbenhavn 1858: 184 (1859). *Bactris bifida* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1858: 44 (1859), *nom. illeg.* *Bactris oerstediana* Trail, *J. Bot.* 15: 43 (1877), *nom. illeg.* Lectotype (designated by de Nevers et al., 1996): Costa Rica, *Oersted 6536* (C!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 30.2 (2000). N.v.: guiscoyol, CR; palma branca, P.

Stems 1.5-5 m long, 2-4.5 cm diameter, solitary or clustered, spiny. Leaves 4-6 per stem; leaf spines scattered, black or yellowish-brown, terete, to 5 cm long, dense on sheath, fewer on lateral surfaces of petioles and abaxial surface of rachises, or absent from petioles and rachises; sheaths 26-86 cm long; ocreas not recorded; petioles (8)16-80 cm long; rachises (0.4)1-1.7 m long; pinnae 14-29 per side (or occasionally leaf undivided), irregularly arranged in clusters of 2-7, spreading in different planes, linear to elliptic, both surfaces (or sometimes only abaxially) bearing a fine, short, golden pubescence; middle pinnae 30-60 cm long, 3-7 cm wide. Inflorescences interfoliar; peduncles 8-13 cm long, recurved, spiny; prophylls 8-16 cm; peduncular bracts 15-30 cm long, densely hirsute with fine, soft to stiff, black spines and golden hairs; rachises 3-6 cm long; rachillae (24-)40-50, 5-11 cm long, filamentous, at anthesis densely covered with brownish or whitish moniliform trichomes and other trichomes; triads \pm regularly arranged (but often with solitary staminate flowers interspersed on proximal ca. half or more of rachillae, and there tending to be absent from adaxial side of rachillae (paired or solitary staminate flowers only on distal ca. half of rachillae)); staminate flowers 3.5-4 mm long, persistent; sepal lobes 0.5-1 mm long; petals 3.5-4 mm long; stamens 6; pistillodes absent; pistillate flowers to 4 mm long; calyces cupular, to 1.5 mm long;

corollas tubular, to 3 mm long, usually pubescent and spinulose, rarely glabrescent; staminodes absent; fruits 0.5-1.7 cm diameter, obovoid, red; mesocarp starchy; endocarps turbinate, black or white, the pores \pm equidistant or sterile pores displaced longitudinally; endocarp fibers absent; fruiting perianths with minute calyx and irregularly lobed corolla, without staminodial ring. *Lowland rainforest*. 30-1150 m. (Costa Rica, Panama, Colombia).

8a. *Bactris glandulosa* var. *glandulosa*

Bactris fusca Oerst., *B. alleniana* L.H.Bailey, *B. herrerana* Cascante

Stems 1.5-5 m long, 2-4.5 cm diameter, solitary or clustered, spiny. Leaves 4-6 per stem; leaf spines black or yellowish-brown, terete, to 5 cm long, dense on sheaths, mostly absent from petioles and rachises; blade usually pinnate, sometimes undivided, densely pilose abaxially. Inflorescences interfoliar; pistillate corollas with long, contorted spinules. *Lowland rainforest*. CR (*Henderson et al.* 1812, NY), P (*Henderson & Bernal* 2037, NY). 30-600 m. (Costa Rica, Panama, Colombia).

8b. *Bactris glandulosa* var. *baileyana* (H.E.Moore) de Nevers, *Proc. Calif.*

Acad. Sci., ser. 4, 49: 183 (1996). *Bactris baileyana* H.E.Moore, *Gentes Herbarum* 8: 155 (1949). Holotype: Panama, *Allen 5023* (MO!).

Stems 1.5-5 m long, 2-4.5 cm diameter, solitary or clustered, spiny. Leaves 4-6 per stem; leaf spines black or yellowish-brown, terete, to 5 cm long, dense on sheaths, scattered along lateral surfaces of petioles and abaxial surface of rachises; pinnae sparsely pilose abaxially. Inflorescences interfoliar; pistillate corollas glabrous or minutely

spinulose. *Lowland rainforest*. CR (Henderson et al. 1806, NY), P (Hammel 5438, MO). 100-1150 m. (Endemic). (Costa Rica, Panama).

9. *Bactris gracilior* Burret, *Repert. Spec. Nov. Regni Veg.* 34: 216 (1934).

Neotype (designated by de Nevers et al., 1996): Costa Rica, *Sánchez s.n.* (CR!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 33.2 (2000). N.v.: biscoyol, CR.

Bactris aureodrupa L.H.Bailey.

Stems 2-4(-5) m long, ca. 2 cm diameter, clustered, spiny on internodes. Leaves 5-9 per stem; leaf spines scattered, black, terete, to 2(-5) cm long, on lateral surfaces of sheath, usually absent from petioles and rachis, rarely on rachis; sheaths to 28 cm long; ocreas to 10 cm long; petioles 0.2-1.1 m long; rachises 42-96 cm long; pinnae 10-24 per side, irregularly arranged in clusters on alternating sides of the rachises proximally, more regularly arranged distally, spreading in different planes, narrowly elliptical, gradually aristate, glabrous, dull green adaxially, brownish and shiny abaxially on drying, sometimes with minute, forward pointing marginal spines; middle pinnae 18-39(-45) cm long, 2.5-4.4 cm wide. Inflorescences interfoliar; peduncles 6-10 cm long, recurved, not spiny or sparsely spiny; prophylls 8-12 cm long, thin, chartaceous; peduncular bracts 15-24 cm long, sparsely covered with short, black or brown spines, occasionally almost glabrous; rachises 3-3.6 cm long; rachillae 8-23, 7-10 cm long, at anthesis densely covered with moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-4 mm long; sepal lobes ca. 1 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers to 3 mm long; calyces cupular, to 1 mm long; corolla tubular, to 3 mm long; staminodes 6, minute, or absent; fruits 1-1.5

× 0.9-1.1 cm, obovoid, bluntly rostrate, orange; mesocarp mealy; endocarps turbinate, pitted apically, the pores equidistant or displaced longitudinally; endocarp fibers few; fruiting perianths with minute calyx and truncate corolla, without staminodial ring.

Lowland rainforest. N (*Stevens 8906*, MO), CR (*Henderson et al. 60*, NY), P (*McPherson 11151*, MO). 20-700 m. (Endemic). (Nicaragua, Costa Rica, Panama).

10. *Bactris grayumii* de Nevers & A.J.Hend., *Proc. Calif. Acad. Sci.*, ser. 4, 49: 188 (1996). Holotype: Costa Rica, *Davidse & G. Herrera 30954* (MO!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 33.3 (2000).

Stems 1.5-3.5 m long, 2.2-3 cm diameter, solitary, rarely clustered, usually spiny on internodes. Leaves 4-9 per stem; leaf spines scattered, black, terete, to 6 cm long, few on sheaths, petioles and abaxial surface of rachises; sheaths 20-29 cm long; ocreas not recorded; petioles 40-45 cm long; rachises 29-70 cm long; blade usually undivided and deeply bifid, concave, glabrous, thick and leathery, strongly plicate, with prominent veins adaxially, occasionally irregularly pinnate; blade to 1 m long, 36-38 cm wide at apex of rachis, when pinnate the pinnae 55-90 cm long, 2.5-10 cm wide (the apical one much wider). Inflorescences interfoliar; peduncles 10-11 cm long, strongly recurved, glabrous or spiny; prophylls 11-12 cm long; peduncular bracts 23-27 cm long, sparsely covered with short black spines to 0.5 cm long, occasionally almost glabrous; rachises 1.8-3 cm long; rachillae 18-25, 5-6 cm long; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers not recorded; pistillate flowers to 3.5 mm long; calyces annulate, to 1 mm long; corollas urceolate, to 3 mm long; staminodes absent; fruits 1.1-1.3 × 0.9-1.1 cm, obovoid, bluntly rostrate, orange; mesocarp mealy;

endocarps turbinate, the sterile pores displaced longitudinally; endocarp fibers few, free, terete; fruiting perianths with a minutely 3-lobed calyx and truncate corolla, without staminodial ring. *Lowland rainforest*. N (*Stevens 6362*, MO), CR (*Grayum et al. 8310*, MO). 2-320 m. (Endemic). (Nicaragua, Costa Rica).

11. *Bactris guineensis* (L.) H.E.Moore, *Gentes Herbarum* 9: 251 (1963). *Cocos guineensis* L., *Mant. pl.* 137 (1767). Lectotype (designated by Moore, 1963): Jacq., *Select. stirp. amer. hist.*, pl. 171, fig. 1 (1763). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 35.1 (2000). N.v.: coyolito, N; viscoyol, CR; corocillo, P.

Bactris horrida Oerst., *B. oraria* L.H.Bailey

Stems 0.8-3 m long, 2-3 cm diameter, clustered, spreading by rhizomes, sometimes forming large clusters, often covered with persistent, decaying leaf bases. Leaves 5-11 per stem; leaf spines yellowish, black at base and apex, terete or slightly flattened, to 9(-15) cm long, dense and short on sheaths, scattered and longer on petioles and rachises; sheaths 15-60 cm long, fibrous on margins, sheaths, petioles and rachises whitish-brown-tomentose; ocreas to 5 cm long; petioles to 5 cm long; rachises 20-40 cm long; pinnae 20-42 per side, regularly or slightly irregularly arranged (often with gaps), spreading \pm in the same plane or in different planes, linear or lanceolate, asymmetrically and briefly bifid subapically, pale gray-green, readily falling from dried specimens; middle pinnae 15-30 cm long, 0.9-2 cm wide. Inflorescences interfoliar; peduncles 10-20 cm long, straight, spiny; prophylls to 20 cm long; peduncular bracts 25-35 cm long, whitish-tomentose, moderately covered with spreading, yellowish spines to 1 cm long; rachises 2-5 cm long; rachillae 11-30, 8-11 cm long, at anthesis densely covered with

moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-4 mm long; sepal lobes 1.5-2 mm long; petals 3-4 mm long; stamens 6; pistillodes small; pistillate flowers 2.5-4 mm long; calyces cupular, 0.7-1 mm long; corollas tubular, 2.5-4 mm long; staminodes minute or absent; fruits 1.5-2 cm diameter, depressed-globose, briefly rostrate, purple-black; mesocarp juicy; endocarps depressed-oblong, the sterile pores markedly displaced longitudinally to one end; endocarp fibers numerous, with juice sacs attached; fruiting perianths with entire, 3-lobed calyx and truncate corolla, without staminodial ring. *Open, often disturbed places, and deciduous forest, often near the coast, in areas that experience prolonged dry seasons.* N (Standley 9460, F), CR (Gentry & Woodruff 71520, MO), P (Standley 25496, US). 0-250 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela).

12. *Bactris kunorum* de Nevers & Grayum, *Proc. Calif. Acad. Sci.* ser. 4, 49: 195 (1996). Holotype: Panama, *de Nevers & H. Herrera 6672* (MO!). Illustr.: Henderson, *A. Fl. Neotrop.* 79: fig. 41.3 (2000).

Stems 2-6 m long, to 5 cm diameter, clustered, in tight clusters of 4-6 stems, usually spiny on internodes. Leaves 4-9 per stem; leaf spines scattered, black, terete, to 6 cm long, dense on lateral surfaces of sheaths and petioles, fewer on abaxial surface of rachises; sheaths 22-54 cm long, sheath, petioles and rachises whitish-brown-tomentose; ocreas not recorded; petioles 20-27 cm long; rachises (42-)65-135 cm long; pinnae 4-14 per side, irregularly arranged in clusters, spreading in different planes, concave, glabrous, thick and leathery, strongly plicate, with prominent veins adaxially; middle pinnae 45-87 cm long, 3.5-5.5 cm wide (apical and sometimes basal ones much wider), blade

occasionally undivided, bifid, 90-110 cm long, 22-36 cm wide at apex of rachis. Inflorescences interfoliar; peduncles 10-29 cm long, strongly recurved, densely spiny; prophylls 11-14 cm long; peduncular bracts 30-45 cm long, 3-5 cm wide, sparsely covered with short, black spines to 0.5 cm long; rachises 3-7 cm long; rachillae 24-30, 8-14 cm long, at anthesis densely covered with brown or white, moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 2-4 mm long; sepal lobes 1-1.5 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 3-5 mm long; calyces cupular, 1 mm long; corollas tubular, 3-4 mm long; staminodes 6, minute, or absent; fruits 1.4-1.9 × 1.3-2 cm, obovoid, prominently and bluntly rostrate, orange or red; mesocarp mealy; endocarps turbinate, pitted or smooth, the sterile pores slightly displaced longitudinally; endocarp fibers few, terete or flat; fruiting perianths with minutely 3-lobed calyx and crenate corolla, without staminodial ring. *Lowland rainforest*. P (Croat 22705, MO). 300-850 m. (Endemic). (Costa Rica).

13. *Bactris longiseta* H.Wendl. ex Burret, *Repert Spec. Nov. Regni Veg.* 34: 213 (1934). Lectotype (designated by de Nevers et al., 1996): Costa Rica, *Wendland 81* (GOET!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 43.1 (2000). N.v.: huiscoyol, CR.

Bactris polystachya H.Wendl. ex Grayum

Stems 3-4.5 m long, 2-2.5 cm diameter, clustered, forming dense to loose clumps, spiny on internodes. Leaves 6-7 per stem; leaf spines black, terete, to 2(-6.5) cm long, dense or sparse on sheaths, mostly absent or occasionally scattered on petioles and rachises; sheaths 30-41 cm long; ocreas not recorded; petioles 37-85 cm long; rachises to

135 cm long; pinnae 15-29 per side, regularly or irregularly arranged in distinct clusters, spreading in slightly different planes, linear to elliptic, caudate, with spines 1-2 cm long on the margins, rarely lacking spines; middle pinnae 30-72 cm long, 3.5-7 cm wide. Inflorescences interfoliar; peduncles ca. 10 cm long, strongly recurved, spinulose; prophylls 7.5-15 cm long; peduncular bracts 23-30 cm long, densely covered with erect, black or brown spines to 1 cm long; rachises 1.5-3 cm long; rachillae 20-30, 4.5-11 cm long, at anthesis densely covered with brownish or whitish trichomes and moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3.5-5 mm long, \pm persistent after anthesis; sepal lobes 1-1.5 mm long; petals 3.5-5 mm long; stamens 6; pistillodes absent; pistillate flowers to 5 mm long; calyces cupular, 1.5-3 mm long; corolla tubular, 4 mm long; staminodes absent; fruits 1.5-1.6 \times 1.3-1.6 cm, obovoid, rostrate, purple-brown; mesocarp juicy; endocarps turbinate, pitted at apex, the sterile pores slightly displaced longitudinally; endocarp fibers numerous, with juice sacs attached; fruiting perianths with small calyx and crenate corolla, without staminodial ring. *Lowland rainforest. CR (Grayum 6742, MO). 100-750 m. (Endemic). (Costa Rica).*

Grayum (1998) recognized *Bactris polystachya* as distinct from *B. longiseta*; de Nevers et al. (1996) did not.

14. *Bactris major* Jacq., *Select. Stirp. Amer. Hist.*, ed. 2: 134 (1781). *Augustinea major* (Jacq.) H.Karst., *Linnaea* 28: 395 (1857). *Pyrenoglyphis major* (Jacq.) H.Karst., *Fl. Columb.* 2: 141 (1866). Lectotype (designated by Glassman, 1972): Jacq., *Select.*

stirp. amer. hist., ed. 1: t. 171, fig. 2 (1763). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 43.3 (2000). N.v.: hone, B; huiscoyol, ES, G; biscoyol, H; coyolito, N; palma brava, P.

Stems 1-10 m long, 2-6 cm diameter, clustered, forming dense or open clumps, spiny on internodes. Leaves 3-10 per stem; leaf spines brown or black, \pm terete, to 11 cm long, moderate to dense on sheath, petioles and rachises; sheaths 22-55 cm long, fibrous on margins; ocreas to 20 cm long, becoming fibrous; petioles 0.1-1.5 m long; rachises 0.7-1.8 m long; pinnae 24-46 per side, \pm regularly arranged, sometimes irregularly, spreading in the same plane, linear, aristate, minutely spiny on margins, with a metallic sheen on drying; middle pinnae 25-62 cm long, 1-3.5 cm wide. Inflorescences interfoliar; peduncles 15-40 cm long, recurved, spinulose or densely spiny; prophylls 13-30 cm long; peduncular bracts 28-60 cm long, densely to moderately covered with black, dark brown, or yellowish-brown spines to 1(-2) cm long; rachises 0.5-4 cm long; rachillae (1-)5-10(-17), 9-23 cm long, ca. 2 mm diameter at anthesis, 3-4 mm thick in fruit, at anthesis scarcely covered brown tomentum; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-8 mm long, somewhat persistent; sepal lobes 1.5-3 mm long; petals 3-7 mm long; stamens 6; pistillodes absent; pistillate flowers 4-9 mm long; calyces tubular, 4-8 mm long, minutely spinulose; corollas tubular, 3-5 mm long, minutely and densely spinulose; staminodial rings adnate to corolla, 1-3 mm long; fruits 1.5-4.5 \times 1-3.5 cm, subglobose, irregularly ellipsoid, ellipsoid-oblong, or broadly obovoid, brown or purple-black, with minute spinules or small brown scales; mesocarp juicy; endocarps ellipsoid or obovoid, the pores equatorial, equidistant, but fertile one displaced proximally; endocarp fibers numerous, free; fruiting perianths with regularly lobed calyx shorter than the regularly lobed, swollen corolla, with staminodial ring adnate

to corolla. *Lowland rainforest or open areas near streams or standing water, often in coastal areas, and in disturbed places.* 0-1150 m. (Mexico, Mesoamerica, Colombia, Venezuela, Guayanas, Bolivia, Brazil, Trinidad).

14a. *Bactris major* Jacq. var. *major*.

Augustinea ovata Oerst., *Pyrenoglyphis ovata* (Oerst.) H.Karst., *Bactris ovata* (Oerst.) H.Wendl. in O.C.E.de Kerchove de Denterghem, *B. augustinea* L.H.Bailey, *Augustinea balanoidea* Oerst., *Pyrenoglyphis balanoidea* (Oerst.) H.Karst., *B. balanoidea* (Oerst.) H.Wendl. in O.C.E.de Kerchove de Denterghem, *B. superior* L.H.Bailey, *Pyrenoglyphis superior* (L.H.Bailey) Burret.

Leaves 3-10 per stem; pinnae 28-46 per side, ± regularly arranged, occasionally clustered, spreading in the same plane. Inflorescences interfoliar; peduncular bracts 28-60 cm long, densely to moderately covered with black or dark brown spines to 1(-2) cm long, closing or remaining open after anthesis; rachillae (3-)5-10(-17); pistillate flowers and fruits usually without a staminodial ring between the calyx and corolla; fruits 3.3-4.5 × 2.3-3.5 cm, obovoid, ellipsoid, irregularly ellipsoid or broadly obovoid, brown or purple-black, with minute spinules or small brown scales, glabrescent. *Lowland rainforest or open areas near streams or standing water, often in coastal areas, and in disturbed places.* T (Doyle 265, US), CH (Davidse 9433, MO), B (Croat 23437, MO), G (Steyrmark 39211, F), H (Balick et al. 1713, NY), ES (Croat 32793, MO), N (Stevens 21796, MO), CR (Stevens 21796, MO), P (Gentry 6479, MO). 0-300 m. (Mexico [Tabasco, Chiapas, Oaxaca, Veracruz], Mesoamerica, Colombia, Venezuela, Guayanas, Brazil, Trinidad).

15. *Bactris maraja* Mart., *Hist. Nat. Palm.* 2: 93 (1826). *Pyrenoglyphis maraja* (Mart.) Burret, *Repert. Spec. Nov. Regni Veg.* 34: 252 (1934). *Bactris maraja* subsp. *maraja* Trail, *J. Bot.* 6: 44 (1877). Holotype: Brazil, *Martius s.n.* (M!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 46.1 (2000). N.v.: uvita, P.

Stems 1-7(-10) m long, 1-4 cm diameter, solitary or clustered, usually in open clusters of 2-15 stems, spiny on internodes. Leaves 3-10 per stem; leaf spines yellowish and then black at base and apex, or brown, flattened, to 5(-10) cm long, moderate to dense on sheaths, petioles, fewer on rachises; sheaths 12-35 cm long, sheath, petioles and rachises occasionally densely brown-tomentose; ocreas to 15 cm long; petioles 13-76 cm long; rachises 30-130 cm long; pinnae (2-)6-30 per side (occasionally leaf undivided), irregularly arranged in clusters of 2-5, spreading in different planes, or regularly arranged and spreading in the same plane, sigmoid to lanceolate, long acuminate, occasionally pilose abaxially; middle pinnae 20-48 cm long, 3-7 cm wide. Inflorescences interfoliar; peduncles 11-18 cm long, recurved, not spiny or spinulose; prophylls 8-26 cm long; peduncular bracts 15-38 cm long, whitish-brown tomentose, velvety brown-tomentose, not spiny or occasionally with flattened, yellowish or brownish spines to 8 mm long especially at the apex; rachises 1-5 cm long; rachillae 2-17, 5-15 cm long, at anthesis densely brown-tomentose; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3.5-5 mm long, deciduous; sepal lobes 0.5-1.5 mm long; petals 3-5 mm long; stamens 6; pistillodes absent; pistillate flowers 3-4 mm long; calyces tubular, 2.5-4 mm long, rarely spinulose; corolla tubular, 2.5-4 mm long, usually spinulose; staminodes absent; fruits to 1.7 cm diameter, widely depressed obovoid,

rostrate, purple-black, usually minutely spinulose; mesocarp juicy; endocarps depressed-oblong, the sterile pores displaced longitudinally; endocarp fibers free, numerous, with juice sacs attached; fruiting perianths with deeply 3-lobed calyx half as long as the deeply 3-lobed, often spinulose corolla, without staminodial ring. *Lowland rainforest*. 0-1500 m. (Costa Rica, Panama, Colombia, Venezuela, Guyana, Suriname, Ecuador, Peru, Bolivia, Brazil).

15a. *Bactris maraja* var. *maraja*

Bactris divisicupula L.H.Bailey, *B. fuscospina* L.H.Bailey

Sheaths, petioles (and rachises) with moderate to dense covering of flattened, yellowish-brown spines; pinnae to 22 per side (rarely blade undivided), irregularly arranged in clusters, spreading in different planes, usually sigmoid, often pilose abaxially. Inflorescences interfoliar; peduncular bracts glabrous or whitish-brown tomentose, often with few, flattened, yellowish-brown spines to 8 mm long, especially at the apex; rachillae to 17; fruits to 1.7 cm diameter, broadly obovoid. *Lowland rainforest*. CR (Moore 6711, BH), P (Mori & Kallunki 2704, MO). 25-800 m. (Costa Rica, Panama, Colombia, Venezuela, Guyana, Suriname, Ecuador, Peru, Bolivia, Brazil).

16. *Bactris mexicana* Mart. in A.D.d'Orbigny, *Voy. Amér. MÉR.* 7(3): 65 (1844).

Holotype: Mexico, *Schiede s.n.* (M!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 46.3 (2000). N.v.: hone, B; huiscoyol, G.

Stems 2-3(-5) m long, 2-3.5 cm diameter, clustered, usually spiny on internodes. Leaves 5-7 per stem; leaf spines scattered, or occasionally somewhat clustered, black,

terete, to 7 cm long, moderate on sheaths, fewer on lateral surfaces of petioles and abaxial surface of rachises, or absent from petioles and rachises; sheaths 20-37 cm long; ocreas to 10 cm long; petioles 35-100 cm long; rachises 0.8-1.5 m long; pinnae 8-29 per side, irregularly arranged in clusters, spreading in different planes, or regularly arranged (but with gaps) and spreading in the same plane, linear to sigmoid, narrowed at base, aristate, glabrous or sparsely to densely pubescent abaxially, the margins often spinulose with 3 mm long, straight spinules; middle pinnae (30-)45-60 cm long, 2-5 cm wide.

Inflorescences interfoliar; peduncles 6-15 cm long, recurved, spiny; prophylls 9-14 cm long, 2-4 cm wide; peduncular bracts 19-25(-30) cm long, 3-5 cm wide, densely covered with short black spines to 1 cm long; rachises 1.2-6.5 cm long; rachillae 12-36, 8-16 cm long, at anthesis densely covered with brown or white, moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 2-4.5 mm long; sepal lobes 1 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 3-5 mm long; calyces cupular, to 1 mm long; corollas tubular, 3-4 mm long; staminodes 6, minute, or absent; fruits 0.8-1.2 × 0.9-1.2 cm, obovoid, bluntly rostrate, orange; mesocarp mealy; endocarps turbinate, pitted on top, the sterile endocarp pores slightly displaced longitudinally; endocarp fibers few; fruiting perianths with minutely 3-lobed calyx and truncate to crenate corolla, without staminodial ring. *Lowland rainforest*. 50-1000 m. (Mexico, Belize, Guatemala, Honduras, Nicaragua).

16a. *Bactris mexicana* Martius var. *mexicana*

Bactris acuminata Lieb. ex Mart.

Stems 2-3 m long, 2-3.5 cm diameter, clustered, usually spiny on internodes. Leaves 5-7 per stem; leaf spines scattered, or occasionally somewhat clustered, black, terete, to 7 cm long, moderate on sheaths, fewer on lateral surfaces of petioles and abaxial surface of rachises; pinnae sigmoid, irregularly arranged in clusters, spreading in different planes, glabrous abaxially. *Lowland rainforest*. T (Cowan *et al.* 3985, NY), Ch (Breedlove 38304, MO). 100-250 m. (Mexico [Chiapas, Oaxaca, Tabasco, Veracruz])

16b. *Bactris mexicana* var. *trichophylla* (Burret) A.J.Hend., *Proc. Calif. Acad. Sci.*, ser. 4, 49: 204 (1996). *Bactris trichophylla* Burret, *Repert. Spec. Nov. Regni Veg.* 32: 113 (1933). Neotype (designated by de Nevers *et al.*, 1996): Belize, *Schipp S520* (B!).

Stems 2-3(-5) m long, 2-3.5 cm diameter, clustered, usually spiny on internodes. Leaves 5-7 per stem; leaf spines scattered, or occasionally somewhat clustered, black, terete, to 7 cm long, moderate on sheaths, usually absent from petioles and rachises; pinnae linear, regularly arranged (but with gaps) and spreading in the same plane, pubescent abaxially. *Lowland rainforest*. B (Croat 23972, MO), G (Steyermark 44418, NY), H (Standley 56776, F), N (Stevens 21746, NY). 50-1000 m. (Endemic). (Belize, Guatemala, Honduras, Nicaragua).

17. *Bactris militaris* H.E.Moore, *Gentes Herbarum* 8: 229 (1951). Holotype: Costa Rica, *Allen 5276* (BH!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 50.1 (2000).

Stems 3-5 m long, 2.5-4 cm diameter, clustered, in tight clusters of 5-20 stems. Leaves 6-8 per stem, erect; leaf spines widely scattered, black, terete, to 9 cm long, few on sheaths, lateral surfaces of petioles, abaxial surface of rachises, and margins of blades;

sheaths to 37 cm long; ocreas not recorded; petioles to 20 cm long; rachises to 2.8 m long; blade undivided, elongate cuneate-oblongate in outline, gradually expanded from a narrowly cuneate base to the bifid apex, without cross-veins; blade to 3.1 m long, to 25.5 cm wide at apex of rachis. Inflorescences interfoliar; peduncles 20-38.5 cm long, straight, not spiny; prophylls 13-19 cm long; peduncular bracts 30-49 cm long, densely tomentose, sparsely covered with slender brown spines to 4 mm long; rachises to 10 cm long; rachillae 14-23, to 6 cm long, at anthesis densely covered with brown, moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-4 mm long; sepal lobes 1-1.5 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 3-4 mm long; calyces annular, 0.5-1 mm long; corollas urceolate, 3-3.5 mm long; staminodes minute; fruits 1.5-1.7 cm diameter, broadly obovoid, indistinctly rostrate, red; mesocarp mealy; endocarps turbinate, pitted, the sterile pores displaced longitudinally; endocarp fibers few; fruiting perianths with minute calyx and longer corolla, without staminodial ring. *Low, wet, swampy sites near the sea. CR (Hodel et al. 1353, NY). Low elevations. (Endemic). (Costa Rica).*

18. *Bactris neomilitaris* de Nevers & A.J.Hend., *Brittonia* 51: 77 (1999).

Holotype: Panama, *de Nevers et al. 10648* (PMA!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 50.3 (2000).

Bactris militaris subsp. *neomilitaris* (de Nevers & A.J.Hend.) Grayum

Stems 1-2 m long, 2.5-3 cm diameter, clustered. Leaves 5-8 per stem; leaf spines widely scattered, black, terete, to 7 cm long, few on sheaths, lateral surfaces of petioles, abaxial surface of rachises, and margins of blade; sheaths not recorded; ocreas not

recorded; petioles 28-43 cm long; rachises 0.8-1.4 m long; blade undivided, elongate cuneate-oblongate in outline, gradually expanded from a narrowly cuneate base to the bifid apex, without cross-veins; blade to 1.5 m long, 18-27 cm wide at apex of rachis. Inflorescences interfoliar; peduncles to 14 cm, straight, not spiny; prophylls 7-9 cm long; peduncular bracts to 17.5 cm long, tomentose; rachises 1-2 cm long; rachillae 5-8, to 4 cm long, at anthesis densely covered with brown, moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 4-5 mm long; sepal lobes 1-1.5 mm long; petals 4 mm long; stamens 6; pistillodes present; pistillate flowers 3-4 mm long; calyces annular, to 1 mm long; corollas tubular, 3-4 mm long; staminodes absent; fruits 1.4-1.6 cm diameter, broadly obovoid, indistinctly rostrate, orange; mesocarp juicy; endocarps turbinate, the sterile pores slightly displaced longitudinally; endocarp fibers numerous, free, terete, with juice sacs attached; fruiting perianths with minute calyx and longer corolla, without staminodial ring. *Low, wet, swampy sites in lowland rainforest. P (de Nevers et al. 10648, PMA), CR (Grayum et al. 4476, MO). 500 m. (Endemic). (Costa Rica, Panama).*

19. *Bactris obovata* H.Wendl. ex Schaedtler, *Hamburger Garten-Blumenzeitung* 31: 67 (1875). Holotype: Costa Rica, *Wendland s.n.* (GOET n.v.). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 39.2 (2000). N.v.: sih, H; coyolillo, N; biscoyol, CR; pacaya de danto, P.

Bactris pubescens Burret, *B. wendlandiana* Burret, *B. standleyana* Burret, *Bactris hondurensis* Standley, *B. paula* L.H. Bailey, *Yuyba paula* (L.H.Bailey) L.H.Bailey, *B. ana-juliae* Cascante

Stems 1-2.5(-4) m long, 0.5-1.5 cm diameter, solitary or sometimes clustered. Leaves 5-9 per stem; leaf spines scattered, terete, dark brown or yellowish-brown and then darker at the base and apex, to 6 cm long, on sheaths, petioles, and rachises, sometimes absent; sheaths 9-25 cm long; ocreas to 2 cm long; petioles 16-27 cm long; rachises 15-50 cm long; blades usually undivided, bifid, often with a pair of broad (rarely narrow) apical pinnae and 1-8(-15) per side, narrower, irregularly spaced, sigmoid proximal pinnae, occasionally with cross-veins, usually minutely, densely and softly white-pubescent abaxially; blade 36-71 cm long, 26-39 cm wide at apex of rachis. Inflorescences interfoliar; peduncles 7-11 cm long, straight, spiny; prophylls 8-9 cm long; peduncular bracts 13-18 cm long, densely to moderately covered with soft, spreading, yellowish, black or brown spines to 1 cm long; rachises 1-3 cm long; rachillae 3-7, 2-5 cm long, slender, at anthesis densely covered with whitish, moniliform trichomes; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-7 mm long; sepal lobes 1-1.5 mm long; petals 3-4 mm long; stamens 6; pistillodes absent; pistillate flowers 2-4 mm long; calyces cupular, ca. 1 mm long; corolla tubular, 2-4 mm long; staminodes minute or absent; fruits 1.2-1.5 cm diameter, broadly obovoid, bluntly rostrate, orange or red; mesocarp mealy; endocarps turbinate, pitted apically, the sterile pores slightly displaced longitudinally; endocarp fibers few or absent; fruiting perianths with minute calyx and irregularly lobed corolla, without staminodial ring. *Lowland rainforest*. H (*MacDougal et al.* 3335, MO), N (*Gentry et al.* 43892, MO), CR (*Henderson* 46, NY). P (*Henderson & Bernal* 2050, NY). 20-1000 m. (Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador).

20. *Bactris panamensis* de Nevers & Grayum, *Proc. Calif. Acad. Sci.*, ser. 4, 49: 205 (1996). Holotype: Panama, *McPherson 9992* (MO!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 52.3 (2000).

Stems 1.5-3 m long, 0.7-0.9 cm diameter, clustered. Leaves number unknown; leaf spines black, terete, to 3 cm long, dense on sheaths, few or absent on petioles and rachises; sheaths 13-22 cm long; ocreas to 2 cm long; petioles 18-28 cm long; rachises 31-62 cm long; pinnae 15-19(-25) per side, irregularly arranged in clusters of 2-3 in proximal half of leaf, more regularly arranged distally, narrowly to broadly elliptical or oblanceolate, often sigmoid, with spinules to 2 mm long on the margins; middle pinnae 10-19 cm long, 1.6-3.6 cm wide. Inflorescences interfoliar; peduncles 3.5-6 cm long, recurved, spiny; prophylls not recorded; peduncular bracts 8.5-12.5 cm long, covered with blackish spines to 1.2 cm long; rachises 1.5-2 cm long; rachillae 8-12, 2-3.4 cm long; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers not recorded; pistillate flowers 3 mm long; calyces cupular, 0.5 mm long; corollas campanulate to urceolate, 2.5 mm long; staminodes not recorded; fruits 0.7-1 × 0.7-0.8 cm, obovoid, prominently rostrate, orange; mesocarp mealy; endocarps turbinate, the pores equidistant; endocarp fibers lacking; fruiting perianths with minute calyx and deeply 3-lobed corolla, without staminodial ring. *Lowland rainforest*. P (*Croat 26072*, MO). 350-1200 m. (Endemic). (Panama).

21. *Bactris pilosa* H. Karst., *Linnaea* 28: 405 (1857). Neotype (designated by Henderson, 2000): Venezuela, *Bunting & Fucci 7791* (NY!). Illustr.: Henderson, A. *Fl. Neotrop.* 79: fig. 54.2 (2000).

Stems 2-10 m long, 2.5-4 cm diameter, usually clustered, rarely solitary, forming large, dense clusters, spiny on internodes. Leaves 4-8 per stem; leaf spines somewhat clustered, yellowish-brown or black, darker at base and apex, or black, terete, to 5 cm long, dense on sheaths and lateral, adaxial surfaces of petioles, fewer on abaxial surface of rachises; sheaths 20-80 cm long, sheath, petioles and rachises brown-tomentose; ocreas to 10 cm long; petioles 28-60 cm long; rachises 1.2-2.2 m long; pinnae 59-68 per side, regularly or irregularly arranged (and then with gaps), spreading in the same or different planes, linear, aristate, slightly to densely pilose on adaxial and abaxial surface; middle pinnae 27-47 cm long, 1.5-2.2 cm wide. Inflorescences interfoliar; peduncles 14-35 cm long, recurved, spiny; prophylls 16-18 cm long; peduncular bracts 27-47 cm long, brown-tomentose, densely covered with soft, appressed, brown spines, with longer, black spines intermixed; rachises 4-6 cm long; rachillae 6-26, 13-25 cm long, at anthesis not recorded; triads irregularly arranged amongst paired or solitary staminate flowers; staminate flowers 3-5.5 mm long; sepal lobes 1-1.5 mm long; petals 3-5 mm long; stamens 5-6; pistillodes absent; pistillate flowers 3-6 mm long; calyces cupular, 3-5 mm long, spinulose or glabrous; corolla urceolate, to 4.5 mm long, lepidote; staminodes absent; fruits 1.3-2.5 × 1-2 cm, depressed obovoid, rostrate, purple-black, covered with short spinules; mesocarp juicy; endocarps turbinate, the sterile pores displaced longitudinally; endocarp fibers numerous, with juice sacs attached; fruiting perianths with spinulose calyx longer than the corolla, without staminodial ring. *Lowland rainforest*. P (Croat 68989, MO). Below 600 m. (Panama, Colombia, Venezuela).

8. *Brahea* Mart.

Erythea S.Watson, *Glaucothea* O.F.Cook

By A. Henderson

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary or rarely clustered, stout, short and subterranean or long and aerial, with close nodes, often covered with persistent leaf bases. Leaves palmate, reduplicate; sheaths open, fibrous; petioles elongate, often the margins covered with thorns; hastulas prominent; blades divided to the middle or more into numerous, stiff segments, these bifid at the tips. Inflorescences interfoliar, branched to 4 orders, elongate, often greatly exceeding the leaves; prophylls closely sheathing the peduncle; peduncular bracts 0-several; rachises elongate, covered with rachis bracts; rachillae numerous, often tomentose; flowers bisexual, often tomentose, spirally arranged, solitary or in groups 2-3; sepals 3, imbricate; petals 3, united basally into a tube; stamens 6; carpels 3; fruits globose to ovoid, 1-seeded, dark blue or black, with apical stigmatic remains; seeds with homogeneous endosperm and sub-basal or lateral embryos; eophylls undivided. 9 sp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

Brahea is poorly known taxonomically and there is no recent revision (but see Hodel, 2017). The present treatment follows Henderson et al. (1995).

1. *Brahea dulcis* (Kunth) Mart., *Hist. Nat. Palm.* 3: 244 (1838). *Corypha dulcis* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 1: 300 (1816). Holotype: Mexico, *Bonpland 3938* (P n.v.). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 6 (1995). N.v.: palma de sombrero, ES; suyate, H.

Brahea calcarea Liebm. in Mart., *Acoelorrhaphe cookii* Bartlett, *Erythea cookii* (Bartlett) H.E.Moore, *B. salvadorensis* H.Wendl. ex Becc., *Acoelorrhaphe salvadorensis* (H.Wendl. ex Becc.) Bartlett, *Erythea salvadorensis* (H.Wendl. ex Becc.) H.E.Moore, *B. prominens* L.H.Bailey, *B. nitida* Schaedtler, *B. frigida* Devansaye, *B. edulis* var. *montereyensis* Becc., *B. dulcis* var. *montereyensis* (Becc.) Becc., *B. berlainieri* Bartlett, *B. konzattii* Bartlett, *B. schippii* Burret, *Acoelorrhaphe schippii* (Burret) Dahlgren, *B. dulcis* f. *humilis* Miranda, *B. bella* L.H.Bailey, *Copernicia depressa* Liebm. ex Dahlgren, *Corypha frigida* Mohl ex Mart., *Livistona occidentalis* Hook.f., *Thrinax tunica* Hook.f.

Stems solitary or clustered, 2-7 m long, 12-20 cm diameter, erect or leaning. Leaves 10-15, dull green to somewhat glaucous; petioles with marginal thorns 2-4 mm long; blades split to half their length into 30-50 rigid segments. Inflorescences exceeding the leaves, arching; rachillae rather thick, densely tomentose, the tomentum obscuring the solitary flower buds; fruits 0.9-1.6 cm long, ovoid to obovoid, brownish or greenish, tomentose. *Dry forest, often oak forest, or open areas, on calcareous soils.* Ch (*Martínez-Camilo et al. 1153*, MO), G (*Castillo Mont 2699*, NY), ES (*Monro et al. 2119*, MO), H (*Balick 1740*, NY), N (*Stevens et al. 29335*, MO). 300-2300 m. (Mexico, Guatemala, Belize, El Salvador, Honduras, Nicaragua).

Brahea dulcis is recorded from Belize but no specimens from there have been seen.

9. *Calyptrogyne* H.Wendl.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, often subterranean, less often short and aerial. Leaves arching, marcescent or occasionally persistent below the crown; sheaths open, not forming a crownshaft, the sheaths and petioles not clearly distinguished, both with dark brown, deciduous tomentum; hastulas present on adaxial surface of petioles or more often on the proximal, adaxial surface of the rachis, or absent; leaves undivided or irregularly pinnate with few pinnae per side, the pinnae usually irregular in width, rarely the proximal pinnae small and vestigial.

Inflorescences interfoliar; peduncles elongate or contracted, straight and erect or curved and arching at anthesis, with a layer of flat, brown tomentum to 0.1 mm thick or with wooly tomentum to 0.7 mm thick; prophylls inserted at the base of the peduncle; peduncular bracts inserted near apex of peduncle, persistent on the peduncles during anthesis and fruit development, or more often deciduous before anthesis and leaving a circumsessile scar, this without shoulders, with shoulders, or with swollen shoulders; peduncular bracts surfaces glabrous or tomentose, with plicate or flat outer surface; rachillae usually 1, less often 2-5, glabrous or rarely with a few, scattered hairs, or with dense, reddish-brown, wooly tomentum, or with stellate hairs, red, orange, or purple in

fruit, rarely white; flowers borne in pits in the rachilla, the proximal lip of the pit collapsing after anthesis (in those pits without developing fruit) or more often remaining erect or recurved, the distal lip present or absent; flowers borne in triads; staminate flowers with 3, free sepals; petals 3, united below for about half their length, free above; stamens 6, the filaments united into a fleshy stalk; anthers sagittate, dorsifixed; pistillate flowers with 3, free sepals; petals united into a tube, briefly free distally, with the distal ca. 1/3 forming a cap (the calyptra) which is shed at anthesis; staminodes united into a tube, briefly lobed at the apex, the distal part shedding to reveal the stigmas; gynoecium trilocular, triovulate; fruits obovoid, black or brown, rarely yellow; seeds basally attached; endosperm homogeneous; eophylls bifid. 18 spp. Neotropics.

Bibliography: Henderson, A. *Syst. Bot.* 30: 60-83 (2005).

1. Peduncular bracts persistent after anthesis.

2. Peduncles 4.7-57.5 cm long, with a layer of flat tomentum to 0.1 mm thick; rachillae 1-5; Serranía de San Blás in Panama.

2. C. anomala

2. Peduncles to 229 cm long, with a layer of wooly tomentum to 0.7 mm thick; rachilla 1; Atlantic lowlands near the western end of the Cordillera Central in Panama.

14. C. pubescens

1. Peduncular bracts falling before anthesis, leaving a circumsessile scar at the peduncle apex.

3. Distal lip of flower pits present.

4. Peduncles with a layer of wooly tomentum to 0.7 mm thick; uplands at western end of the Cordillera Central in Panama.

8. C. fortunensis

4. Peduncles with a layer of flat tomentum to 0.1 mm thick.
5. Rachillae tomentose.
6. Rachillae with stellate hairs. **10. C. herrerae**
6. Rachillae with dense, wooly tomentum.
7. Peduncular bracts scars without shoulders; Cordilleras de Guanacaste, Tilarán, and Central in Costa Rica. **16. C. trichostachys**
7. Peduncular bracts scars with swollen shoulders.
8. Proximal pinnae vestigial; Cerro Tute in Cordillera Central in Panama. **17. C. tutensis**
8. Proximal pinnae laminar, not reduced; Atlantic lowlands at western end of Cordillera Central in Panama and adjacent Costa Rica. **5. C. condensata**
5. Rachillae glabrous or nearly so.
9. Peduncular bracts scars without shoulders; Cerros Tute, Gaital, and Campana, and Cordillera Central in Panama.
10. Distance between peduncular bracts scar and first bracteole 0.8-8.2 cm; western end of Cordillera Central in Panama. **13d. C. panamensis** subsp. **occidentalis**
10. Distance between peduncular bracts scar and first bracteole 0.3-2.7 cm.
11. Distance between peduncular bracts scar and first bracteole 0.3-1.2 cm; Cerros Gaital and Campana in Panama. **13a. C. panamensis** subsp. **panamensis**
11. Distance between peduncular bracts scar and first bracteole 0.7-2.7 cm.
12. Pinnae to 4 per side of rachis, or leaves undivided; Cordillera Central in Panama. **15b. C. panamensis** subsp. **centralis**
12. Leaves undivided; Cerro Tute in Panama. **13c. C. panamensis** subsp. **tutensis**

9. Peduncular bracts scars with shoulders.

13. Hastulas present; fruiting rachilla white; Cerro Colorado in western part of Cordillera Central in Panama.

4. *C. coloradensis*

13. Hastulas absent; fruiting rachilla red; eastern end of Serranía de San Blás in Panama.

7. *C. deneversii*

3. Distal lip of flower pits absent.

14. Peduncular bracts scars with shoulders.

15. Peduncles straight; fruits brown or yellow; western end of the Serranía de San Blas.

15. *C. sanblasensis*

15. Peduncles curved; fruits black or brown.

16. Peduncular bracts plicate; eastern end of Cordillera Central and Serranía de San Blás, and Serranía del Darién in Panama.

17. Leaf rachises 6.3-15.8 mm wide; Serranía del Darién in Panama.

6c. *C. costatifrons* subsp. *dariensis*

17. Leaf rachises 3.2-14 mm wide; Serranía de San Blás and eastern end of Cordillera Central in Panama.

18. Rachillae 3.8-7.3 mm wide; Serranía de San Blás in Panama

6a. *C. costatifrons* subsp. *costatifrons*

18. Rachillae 3.5-5.4 mm wide; eastern end of Cordillera Central in Panama.

6b. *C. costatifrons* subsp. *occidentalis*

16. Peduncular bracts with a flat surface.

19. Leaf rachises 43-70 cm long; rachillae 6.3-8 mm wide; Cerros Brewster and Obu in Serranía de San Blás in Panama.

11. *C. kunorum*

19. Leaf rachises 12.1-33.5 cm long; rachillae 1.4-5.1 mm wide; Cerros Campana, Gaital, and Central in Panama

20. Basal pinnae angle 41-71°; peduncles 1.3-3.8 mm wide; Cerros Campana and Gaital in Panama

1a. *C. allenii* subsp. *allenii*

20. Basal pinnae angle 20-67°; peduncles 1.6-3.3 mm wide; Cordillera Central in Panama

1b. *C. allenii* subsp. *centralis*

14. Peduncular bracts scars without shoulders.

21. Proximal lip of flower pits collapsing into pit after anthesis; Mexico, Belize, Guatemala, Honduras, Nicaragua, and the Atlantic slope of Cordillera Central and Atlantic lowlands in Costa Rica.

22. Peduncular bracts tomentose, plicate; Atlantic slope of the northern end of Montaña del Tiburon complex, and western end of Cordillera Nombre de Dios in Honduras

9c. *C. ghiesbreghtiana* subsp. *hondurensis*

22. Peduncular bracts glabrous, with a flat surface.

23. Fruits 12.3-14.8 × 7.3-8.8 mm; Atlantic slope of the Meseta Central de Chiapas in Mexico.

9a. *C. ghiesbreghtiana* subsp. *ghiesbreghtiana*

23. Fruits 8.8-13.5 × 4.5-8.6 mm; all other areas.

24. Fruits 10-13.5 × 6.4-8.5 mm; Maya Mountains and adjacent lowlands in Belize and eastern end of Sierra de las Minas and adjacent lowlands in Guatemala

9b. *C. ghiesbreghtiana* subsp. *spicigera*

24. Fruits 8.8-13.5 × 4.5-8.6 mm; Atlantic slope of Cordillera Central in Costa Rica and Atlantic lowlands of Costa Rica and southwestern Nicaragua.

9d. *C. ghiesbreghtiana* subsp. *glauca*

21. Proximal lip of flower pits remaining erect; Costa Rica.

25. Peduncular bracts glabrous; Cordilleras de Guanacaste, Tilarán, Central, and Talamanca in Costa Rica.

3. *C. brachystachys*

25. Peduncular bracts tomentose; Pacific slopes of Fila Costeña and Península de Osa in Costa Rica.

12. *C. osensis*

1. *Calyptrogyne allenii* (L.H.Bailey) de Nevers, *Proc. Calif. Acad. Sci.* 48: 336 (1995). *Geonoma allenii* L.H.Bailey, *Gentes Herbarum* 6: 204 (1943). Holotype: Panama, *Allen 2947* (BH!). Illustr.: Bailey, L. *Gentes Herbarum* 6: fig. 104 (1943).

Stems 0.5-3.9 m long, 1.7-3 cm diameter. Leaves 14-27 per stem; sheaths and petioles 15.8-50.9 cm long; rachises 12.1-33.5 cm long, 2-4.9 mm wide; hastulas present, inserted 1-8 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 5 per side of rachis, or leaves undivided; basal pinna angle with rachis 20-71°; apical pinna angle with rachis 8-32°; apical pinna 6.6-27 cm long. Inflorescence peduncles 36.1-80 cm long, 1.3-3.8 mm, elongate, curved, with flat tomentum to 0.1 mm thick; prophylls 12-24.5 cm long; peduncular bracts 13.4-28.5 cm long, tomentose, with a flat surface, deciduous, the scars with shoulders; distance between peduncular bracts scar and first bracteole 0.5-2.2 cm; rachilla 1, 8-20.3 cm long, 1.4-5.1 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 2-5.5 mm; fruits 10.4-15.7 × 5.5-9.5 mm, black. *Lowland rainforest*. P. 450-1167 m. (Panama).

1a. *Calyptrogyne allenii* subsp. *allenii*

Rachises 12.1-32 cm long; pinnae 2-5 per side of rachis; basal pinna angle with rachis 41-79°; apical pinna angle with rachis 15-23°; apical pinna 6.6-15 cm long. Peduncles 1.3-3.8 mm wide; rachilla 8-17.4 cm long. *Lowland rainforest*. P (Croat 37372, MO). 600-1167 m. (Endemic). (Panama).

1b. *Calyptrogyne allenii* subsp. *centralis* A.J.Hend., *Syst. Bot.* 30: 76 (2005).

Holotype: Panama, *de Nevers et al.* 6375 (NY!).

Rachises 16-33.5 cm long; pinnae to 3 per side of rachis, or leaves undivided; basal pinna angle with rachis 20-67°; apical pinna angle with rachis 8-25°; apical pinna 11-27 cm long; peduncles 1.6-3.3 mm wide; rachilla 8.3-20.3 cm long. *Lowland rainforest*. P (Croat 23221, MO). 450-1125 m. (Endemic). (Panama).

2. *Calyptrogyne anomala* de Nevers & A.J.Hend., *Syst. Bot.* 13: 428 (1988).

Holotype: Panama, *de Nevers & Henderson* 6322 (MO!). Illustr.: de Nevers, G. & Henderson, A. *Syst. Bot.* 13: fig. 1 (1988).

Stems 0.1-0.5 m long, 4-5 cm diameter. Leaves 6-16 per stem; sheaths and petioles 26-77 cm long; rachises 22.5-69.5 cm long, 2.4-7.4 mm diameter; hastulas present or absent, inserted 1.1-14.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 5 per side of rachis, or leaves undivided; basal pinna angle with rachis 3-38°; apical pinna angle with rachis 11-25°; apical pinna 25.2-58.5 cm long. Inflorescence peduncles 4.7-57.5 cm long, 1.5-8.2 mm wide, contracted, curved, with flat tomentum to 0.1 mm thick; prophylls 6.5-26 cm long; peduncular bracts 10.5-24.8 cm long, tomentose, plicate, persistent, the scars obscured; distance between peduncular

bracts scar and first bracteole 0.7-6 cm; rachillae 1-5, 6.4-12.3 cm long, 2.6-6.4 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 1.3-5 mm; fruits 9.8-12.2 × 4.8-6 mm, color not recorded. *Lowland rainforest*. P (Henderson & H. Herrera 713, NY). 75-850 m. (Endemic). (Panama).

3. *Calyptrogyne brachystachys* H.Wendl. ex Burret, *Bot. Jahrb. Syst.* 63: 132 (1930). Neotype (designated by Henderson, 2005): Costa Rica, *Moore 6565* (BH!).

Stems 0.5-1 m long, diameter not recorded. Leaves 5-16 per stem; sheaths and petioles 38.5-117.5 cm long; rachises 19.8-51.5 cm long, 1.5-4 mm wide; hastulas present, inserted 0.1-4.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 9 per side of rachis, or leaves undivided; basal pinna angle with rachis 25-73°; apical pinna angle with rachis 10-30°; apical pinna 11.5-30.5 cm long. Inflorescence peduncles 73-149.5 cm long, 1.7-5.6 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 18-39 cm long; peduncular bracts 19.7-37.5 cm long, glabrous, with a flat surface, deciduous, the scars without shoulders; distance between peduncular bracts scar and first bracteole 0.6-3.8 cm; rachilla 1, 10-29.8 cm long, 2.8-5.6 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 2.2-5.8 mm; fruits 8.7-12.3 × 6.1-8.6 mm, black. *Lowland to montane rainforest*. CR (*de Nevers et al.* 7778, MO). 440-2200 m. (Endemic). (Costa Rica).

4. *Calyptrogyne coloradensis* A.J.Hend., *Syst. Bot.* 30: 78 (2005). Holotype: Panama, *McPherson 9573* (MO!).

Stems length and diameter not recorded. Leaves number not recorded; sheaths and petioles length not recorded; rachises 22-26 cm long, 2-3 mm wide; hastulas present, inserted 0.2-0.8 cm above base of blade; proximal pinna laminar, not reduced; pinna 1 per side of rachis; basal pinna angle with rachis 21-31°; apical pinna angle with rachis 10-23°; apical pinna 17.5-26.5 cm long. Inflorescence peduncles length not recorded, 2.5-3.4 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls length not recorded; peduncular bracts not recorded, the scars with shoulders; distance between peduncular bracts scar and first bracteole 0.9-2 cm; rachilla 1, 13.2-15.5 cm long, 4-4.8 mm wide, glabrous, white in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 3.7-4.6 mm; fruits not recorded. *Montane rainforest*. P (Hammel & Trainer 14897, MO). 1425-1500 m. (Endemic). (Panama).

5. *Calyptrogyne condensata* (L.H.Bailey) Wess.Boer, *Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect.* 58: 69 (1968). *Geonoma condensata* L.H.Bailey, *Gentes Herbarum* 6: 209 (1943). Holotype: Panama, *von Wedel* 2972 (BH!). Illustr.: Bailey, L. *Gentes Herbarum* 6: fig. 106 (1943).

Stems length and diameter not recorded. Leaves number not recorded; sheaths, petioles, and rachises not recorded; hastulas not recorded; proximal pinna laminar, not reduced; number of pinnae not recorded; basal pinna angle with rachis not recorded; apical pinna angle with rachis 28°; apical pinna length not recorded. Inflorescence peduncles length not recorded, 4-5 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls length not recorded; peduncular bracts 19.7 cm long, tomentose, with a flat surface, deciduous, the scars with swollen shoulders; distance between

peduncular bracts scar and first bracteole 0.5-1.4 cm; rachilla 1, 9.6-14.4 cm long, 4.7-6.3 mm wide, tomentose, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 0.7-2 mm; fruits 10.1×5.9 mm diameter, color not recorded.

Lowland to montane rainforest. CR (Grayum & Burton 4310, MO), P (Croat & Porter 16268, MO). 5-30 m. (Endemic). (Costa Rica, Panama).

6. *Calyptrogyne costatifrons* (L.H.Bailey) de Nevers, *Proc. Calif. Acad. Sci.* 48: 336 (1995). *Geonoma costatifrons* L.H.Bailey, *Gentes Herbarum* 6: 206 (1943).
Holotype: Panama, *Fairchild & Jobbins* 2639 (BH!). Illustr.: Bailey, L. *Gentes Herbarum* 6: fig. 105 (1943).

Stems 0.2-5.4 m long, 2-4 cm diameter. Leaves 9-23 per stem; sheaths and petioles 24-86 cm long; rachises 27-113 cm long, 3.2-15.8 mm wide; hastulas present, inserted 3.5-64 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 13 per side of rachis, or leaves undivided; basal pinna angle with rachis $9-81^\circ$; apical pinna angle with rachis $8-26^\circ$; apical pinna 16-46.5 cm long. Inflorescence peduncles 46.5-143 cm long, 2-8.4 mm wide, elongate, curved, with flat tomentum to 0.1 mm thick; prophylls 28-77.5 cm long; peduncular bracts 24.4-48 cm long, tomentose, plicate, deciduous, the scars with shoulders; distance between peduncular bracts scar and first bracteole 0.6-6.8 cm; rachilla 1, 15.1-39.5 cm long, 3.5-9.6 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 1-5.9 mm; fruits $12-19.6 \times 8.2-11.8$ mm, black or brown. *Lowland rainforest.* P. 1-866 m. (Panama, Colombia).

6a. *Calyptrogyne costatifrons* subsp. *costatifrons*

Rachises 3.2-14 mm wide; pinnae to 13 per side of rachis, or leaves undivided; rachilla 17-39.5 cm long, 3.8-7.3 mm wide; fruits 12-19.6 × 8.2-11.1 mm. *Lowland rainforest*. P (*de Nevers & Henderson 6410*, MO). 1-866 m. (Panama).

6b. *Calyptrogyne costatifrons* subsp. *occidentalis* A.J.Hend., *Syst. Bot.* 30: 74

(2005). Holotype: Panama, *de Nevers et al. 6750* (NY!).

Rachises 3.3-7.2 mm wide; pinnae 3-8 per side of rachis; rachilla 15.1-25.5 cm long, 3.5-5.4 mm wide; fruits not recorded. *Lowland rainforest*. P (*de Nevers et al. 6753*, MO). 250-400 m. (Endemic). (Panama).

6c. *Calyptrogyne costatifrons* subsp. *dariensis* A.J.Hend., *Syst. Bot.* 30: 74

(2005). Holotype: Panama, *Mabberley & Sugden 1827* (PMA!).

Rachises 6.3-15.8 mm wide; pinnae 13 per side of rachis; rachilla 27-39 cm long, 7.5-9.6 mm wide; fruits 16.3-19.4 × 9.3-11.8 mm. *Lowland rainforest*. P (*Croat 16749*, MO). 25-350 m. (Panama, Colombia).

7. *Calyptrogyne deneversii* A.J.Hend., *Syst. Bot.* 30: 77 (2005). Holotype:

Panama, *de Nevers et al. 4459* (NY!).

Stems 0.2-1 m long, diameter not recorded. Leaves 6-12 per stem; sheaths and petioles 34-64.5 cm long; rachises 20-49.5 cm long, 2-5.2 mm wide; hastulas absent; proximal pinna laminar, not reduced; pinna 1 per side of rachis; basal pinna angle with rachis 15-37°; apical pinna angle with rachis 11-30°; apical pinna 19-34.8 cm long.

Inflorescence peduncles 65-150 cm long, 1.7-3.6 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 27.2(15-37.5) cm long; peduncular bracts 18.8-30 cm long, glabrous, plicate, the scars with shoulders; distance between peduncular bracts scar and first bracteole 1.4-5.1 cm; rachilla 1, 12.5-19 cm long, 3.7-7 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 2.5-4.5 mm; fruits 9.1-11.6 × 6.5-8.4 mm, color not recorded. *Lowland rainforest*. P (*de Nevers et al.* 6200, MO). 200-850 m. (Endemic). (Panama).

8. *Calyptrogyne fortunensis* A.J.Hend., *Syst. Bot.* 30: 72 (2005). Holotype: Panama, *Knudsen & Asmussen* 645 (PMA!).

Stems 1 m long, diameter not recorded. Leaves 3 per stem; sheaths and petioles length not recorded; rachises 35-40.5 cm long, 3.3-4.6 mm diameter; hastulas present, inserted 0.2 cm above base of blade; proximal pinna laminar, not reduced; pinnae 5-6 per side of rachis; basal pinna angle with rachis 46-90°; apical pinna angle with rachis 12-17°; apical pinna 23.5-31.3 cm long. Inflorescence peduncles 69.5 cm long, 3.7-4.5 mm wide, elongate, erect, with wooly tomentum to 0.7 mm thick; prophylls 11.5 cm long; peduncular bracts 21.5-22 cm long, tomentose, with a flat surface, deciduous, the scars with swollen shoulders; distance between peduncular bracts scar and first bracteole 0.8-1.5 cm; rachilla 1, 12.4-19.2 cm long, 4.7-6.2 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 2.2-3.7 mm; fruits not recorded. *Lowland rainforest*. P (*Churchill* 5885, MO). 900-1500 m. (Endemic). (Panama).

9. *Calyptrogyne ghiesbreghtiana* (Linden & H.Wendl.) H.Wendl., *Bot. Zeitung (Berlin)* 17: 72 (1859). *Geonoma ghiesbreghtiana* Linden & H.Wendl., *Linnaea* 28: 343 (1856). Holotype: Mexico, *Ghiesbreght s.n.* (GOET!). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 55 (1995). N.v.: capoca, G; coligallo, CR.

Stems 0.1-1 m long, 2.5-3 cm diameter. Leaves 10-12 per stem; sheaths and petioles 34.5-63.5 cm long; rachises 29-118 cm long, 1.9-11.7 mm diameter; hastulas present, inserted 8-51.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 15 per side of rachis, sometimes leaves undivided; basal pinna angle with rachis 10-61°; apical pinna angle with rachis 7-26°; apical pinna 18-44 cm long. Inflorescence peduncles 82-167.5 cm long, 2-7.8 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 33.5-48 cm long; peduncular bracts 28.5-52 cm long, glabrous or tomentose, plicate or with a flat surface, deciduous, the scars without shoulders; distance between peduncular bracts scar and first bracteole 0.6-5.1 cm; rachilla 1, 18.5-41.5 cm long, 3.7-8.9 mm wide, glabrous, red in fruit; pits with collapsed proximal lips and without distal lips; inter-pit distance 2-8.5 mm; fruits 8.8-14.8 × 4.5-8.9 mm, black. *Lowland rainforest*. 0-940 m. (Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica).

9a. *Calyptrogyne ghiesbreghtiana* subsp. *ghiesbreghtiana*

Fruits 12.3-14.8 × 7.3-8.8 mm. *Lowland rainforest*. T (*Guadarrama et al.* 5043, MEXU), Ch (*Miranda 6631*, MEXU). Ca. 225 m. (Mexico [Veracruz, Chiapas, Tabasco]).

9b. *Calyptrogyne ghiesbreghtiana* subsp. *spicigera* (K.Koch) A.J.Hend., *Syst. Bot.* 30: 81 (2005). *Calyptrogyne spicigera* (K.Koch) H.Wendl., *Bot. Zeitung (Berlin)* 17: 72 (1859). *Geonoma spicigera* K.Koch, *Wochenschr. Gärtnerei Pflanzenk.* 1: 244 (1858).
Holotype: Guatemala, *Warscewicz s.n.* (K!).

Calyptrogyne donnell-smithii (Dammer) Burret, *Geonoma donnell-smithii*

Dammer

Fruits 10-13.5 × 6.4-8.5 mm. *Lowland rainforest.* B (*Davidse 35681*, MO), G (*Castillo Mont & Hodel 1116*, CAS). 0-940 m. (Endemic). (Belize, Guatemala).

9c. *Calyptrogyne ghiesbreghtiana* subsp. *hondurensis* A.J.Hend., *Syst. Bot.* 30: 81 (2005). Holotype: Honduras, *Davidse et al. 34399* (NY!).

Fruits 11.8-14.5 × 6.9-8.9 mm. *Lowland rainforest.* H (*Standley 52653*, F), G (*Castillo Mont & Hodel 1116*, CAS). 50-785 m. (Endemic). (Honduras).

9d. *Calyptrogyne ghiesbreghtiana* subsp. *glauca* (K.Koch) A.J.Hend., *Syst. Bot.* 30: 81 (2005). *Calyptrogyne glauca* (Oerst.) H.Wendl., O. C. E. de Kerchove de Denterghem, *Palmiers* 238 (1878). *Geonoma glauca* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1858: 35 (1858). Lectotype (designated by Wessels Boer, 1968): Nicaragua, *Oersted 6565* (C!).

Calyptrogyne sarapiquensis H.Wendl. in O. C. E. de Kerchove de Denterghem, *Synechanthus sarapiquensis* Schaedtler.

Fruits 8.8-13.5 × 4.5-8.6 mm. *Lowland to montane rainforest.* N (*Rueda et al. 1568*, MO), CR (*Moore 6687*, NY). 1-500 m. (Endemic). (Nicaragua, Costa Rica).

10. *Calypstrogyne herrerae* Grayum, *Phytologia* 84: 309 (1998 publ. 1999).

Isotype: Costa Rica, *Grayum 11043* (MO!).

Stems not recorded. Leaves number not recorded; sheaths and petioles length not recorded; rachises 89.5 cm long, 7.5 mm wide; hastulas present, inserted 35.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae 14 per side of rachis; basal pinna angle with rachis 28°; apical pinna angle with rachis 15°; apical pinna 29.5 cm long. Inflorescence peduncles length not recorded, 3.4 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls length not recorded; peduncular bracts deciduous, the scars with shoulders; distance between peduncular bracts scar and first bracteole 1 cm; rachilla 1, 23.4 cm long, 3.7 mm wide, with stellate hairs; pits with proximal lips remaining erect and without distal lips; inter-pit distance 3.7 mm; fruits not recorded. *Montane rainforest*. CR (*G. Herrera & Rojas 8492*, MO). 1250 m. (Endemic). (Costa Rica).

11. *Calypstrogyne kunorum* de Nevers, *Proc. Calif. Acad. Sci.* 48: 338 (1995).

Holotype: Panama, *de Nevers et al. 6261* (CAS!).

Stems 0.5-1.7 m long, 7 cm diameter. Leaves 15-22 per stem; sheaths and petioles 33-87 cm long; rachises 43-70.7 cm long, 6.3-8.1 mm wide; hastulas present, inserted 16.4-31.5 cm above base of blade; proximal pinna laminar, not reduced; leaves undivided; basal pinna angle with rachis 16-29°; apical pinna angle with rachis 10-25°; apical pinna 38.5-53 cm long. Inflorescence peduncles 79.8-112 cm long, 3.9-5.3 mm wide, elongate, curved, with flat tomentum to 0.1 mm thick; prophylls 27-46.5 cm long;

peduncular bracts 27.7-30 cm long, tomentose, with a flat surface, deciduous, the scars with shoulders; distance between peduncular bracts scar and first bracteole 0.6-1 cm; rachilla 1, 20.4-24 cm long, 6.3-8 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 2-3.2 mm; fruits 18.7-24.1 × 11.5-13.8 mm, brown. *Lowland rainforest*. P (*de Nevers et al.* 8042, MO). 450-850 m. (Endemic). (Panama).

12. *Calyptrogyne osensis* A.J.Hend., *Syst. Bot.* 30: 80 (2005). Holotype: Costa Rica, *Henderson et al.* 1809 (NY!).

Stems 0.5 m long, diameter not recorded. Leaves 15-19 per stem; sheaths and petioles 50 cm long; rachises 67-85 cm long, 2.2-9.1 mm wide; hastulas present, inserted 23 cm above base of blade; proximal pinna laminar, not reduced; pinnae 2-10 per side of rachis; basal pinna angle with rachis 7-35°; apical pinna angle with rachis 10-22°; apical pinna 32-48 cm long. Inflorescence peduncles 100-155 cm long, 3.8-5.8 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 50 cm long; peduncular bracts 41.5-47.5 cm long, tomentose, with a flat surface, deciduous, the scars without shoulders; distance between peduncular bracts scar and first bracteole 1-3.7 cm; rachilla 1, 19.3-31.8 cm long, 3.7-6.1 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 3-6 mm; fruits 14.8-20.1 × 8.7-12 mm, black. *Lowland rainforest*. CR (*Estrada et al.* 862, NY). 100-960 m. (Endemic). (Costa Rica).

13. *Calyptrogyne panamensis* A.J.Hend., *Syst. Bot.* 30: 78 (2005). Holotype: Panama, *Henderson & Bernal 2038* (NY!).

Stems 0.1-1 m long, 2-5 cm diameter. Leaves 4-12 per stem; sheaths and petioles 21-68 cm long; rachises 19.5-76.7 cm long, 1.8-9.1 mm wide; hastulas present, inserted 1-24.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 4 per side of rachis, or leaves undivided; basal pinna angle with rachis 9-60°; apical pinna angle with rachis 11-35°; apical pinna 14.5-44 cm long. Inflorescence peduncles 46-157.4 cm long, 1.6-5.1 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 17-49.9 cm long; peduncular bracts 13.8-37.5 cm long, glabrous, plicate, deciduous, the scars without shoulders; distance between peduncular bracts scar and first bracteole 0.3-8.2 cm; rachilla 1, 6.9-32 cm long, 3.1-7.2 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 2.5-5.7 mm; fruits 8.8-15.2 × 5-7.9 mm, black. *Lowland rainforest*. P. 300-1166 m. (Panama).

13a. *Calyptrogyne panamensis* subsp. *panamensis*

Rachises 37-66.5 cm long, 3.3-7.1 mm wide; leaves undivided; basal pinna angle with rachis 9-25°; apical pinna 14.5-23 cm long; rachilla 9-13 cm long. *Lowland rainforest*. P (*de Nevers et al. 6326*, MO). 783-930 m. (Endemic). (Panama).

13b. *Calyptrogyne panamensis* subsp. *centralis* A.J.Hend., *Syst. Bot.* 30: 79 (2005). Holotype: Panama, *de Nevers et al. 6376* (NY!).

Rachises 19.5-51.8 cm long, 1.8-4.2 mm wide; pinnae to 4 per side of rachis, or leaves undivided; basal pinna angle with rachis 15-60°; apical pinna 14.5-36 cm long;

rachilla 6.9-19 cm long. *Lowland rainforest*. P (*de Nevers et al.* 6712, MO). 300-930 m. (Endemic). (Panama).

13c. *Calypstrogyne panamensis* subsp. *tutensis* A.J.Hend., *Syst. Bot.* 30: 79 (2005). Holotype: Panama, *de Nevers & McPherson 8984* (CAS!).

Rachises 51.8-64.5 cm long, 2.4-2.5 mm wide; leaves undivided; basal pinna angle with rachis 16-21°; apical pinna 22-22.5 cm long; rachilla 13.5-16.8 cm long. *Montane rainforest*. P (*Hammel 4618*, MO). 1050-1166 m. (Endemic). (Panama).

13d. *Calypstrogyne panamensis* subsp. *occidentalis* A.J.Hend., *Syst. Bot.* 30: 79 (2005). Holotype: Panama, *de Nevers et al.* 8741 (NY!).

Rachises 38.4-76.7 cm long, 3.8-9.1 mm wide; pinnae 2-4 per side of rachis; basal pinna angle with rachis 15-51°; apical pinna 28.5-44 cm long; rachilla 18-32 cm long. *Lowland to montane rainforest*. P (*de Nevers 8821*, NY). 250-1450 m. (Endemic). (Panama).

14. *Calypstrogyne pubescens* de Nevers, *Proc. Calif. Acad. Sci.* 48: 336. 1995. Holotype: Panama, *de Nevers et al.* 8825 (CAS!).

Stems length not recorded, 5 cm diameter. Leaves 7-11 per stem; sheaths and petioles 63.5-87 cm long; rachises 87.5 cm long, 3.1-5.3 mm wide; hastulas absent; proximal pinna laminar, not reduced; pinnae 29 per side of rachis; basal pinna angle with rachis 57-65°; apical pinna angle with rachis 14-18°; apical pinna 14-30 cm long. Inflorescence peduncles 229 cm long, 3.1-4.4 mm wide, elongate, erect, with woolly

tomentum to 0.7 mm thick; prophylls 33.5 cm long; peduncular bracts 28-35 cm long, tomentose, plicate, persistent, the scars obscured; distance between peduncular bracts scar and first bracteole 2.2-3.8 cm; rachilla 1, 15.4-21 cm long, 3.4-4.7 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 2.7-4 mm; fruits 10.2-14.2 × 7-7.8 mm diameter, black. *Lowland rainforest*. P (*Hammel et al. 14857*, MO). 17-250 m. (Endemic). (Panama).

15. *Calyptrogyne sanblasensis* A.J.Hend., *Syst. Bot.* 30: 76 (2005). Holotype: Panama, *de Nevers & Charnley 5892* (NY!).

Stems 0.2-1.7 m long, 6 cm diameter. Leaves 8-16 per stem; sheaths and petioles 18-39 cm long; rachises 72.5-152 cm long, 5.3-15 mm wide; hastulas present, inserted 39-97.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae to 4 per side of rachis, or leaves undivided; basal pinna angle with rachis 3-13°; apical pinna angle with rachis 10-22°; apical pinna 28-49 cm long. Inflorescence peduncles 57-86.5 cm long, 3.6-5.8 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 22.5-30 cm long; peduncular bracts 24.5-31.5 cm long, glabrous, with a flat surface, deciduous, the scars with shoulders; distance between peduncular bracts scar and first bracteole 0.6-2.1 cm; rachilla 1, 15.5-30 cm long, 3.7-5.1 mm wide, glabrous, red in fruit; pits with proximal lips remaining erect and without distal lips; inter-pit distance 2.3-3.5 mm; fruits 9-12.6 × 5.8-7.2 mm, yellow. *Lowland rainforest*. P (*de Nevers et al. 6449*, MO). 16-450 m. (Endemic). (Panama).

16. *Calypstrogyne trichostachys* Burret, *Bot. Jahrb. Syst.* 63: 135 (1930).

Neotype (designated by Henderson, 2005): Costa Rica, *de Nevers et al.* 7777 (NY!).

Stems 0.1-1 m long, diameter not recorded. Leaves 10-12 per stem; sheaths and petioles 32-45 cm long; rachises 30-78 cm long, 2.9-5.8 mm wide; hastulas present, inserted 7.3-11.5 cm above base of blade; proximal pinna laminar, not reduced; pinnae 3-13 per side of rachis; basal pinna angle with rachis 23-70°; apical pinna angle with rachis 10-24°; apical pinna 22.5-42 cm long. Inflorescence peduncles 110-155 cm long, 2.8-4.7 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 23.5-36 cm long; peduncular bracts 25.5-50 cm long, tomentose, plicate, deciduous the scars without shoulders; distance between peduncular bracts scar and first bracteole 2.3-9 cm; rachilla 1, 16-34.5 cm long, 5.1-9.5 mm wide, tomentose, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 1.4-6 mm; fruits 8.3-11.8 × 5.5-8 mm, black. *Lowland to montane rainforest.* CR (*de Nevers et al.* 7806, MO). 90-1500 m. (Endemic). (Costa Rica).

17. *Calypstrogyne tutensis* A.J.Hend., *Syst. Bot.* 30: 71 (2005). Holotype:

Panama, *de Nevers et al.* 10582 (NY!).

Stems 0.1-0.7 m long, diameter not recorded. Leaves 12 per stem; sheaths and petioles length not recorded; rachises 48-77 cm long, 4.8-9.5 mm wide; hastulas present, inserted 18-46.2 cm above base of blade; proximal pinna vestigial; pinnae 13-20 per side of rachis; basal pinna angle with rachis 5-40°; apical pinna angle with rachis 15-31°; apical pinna 14-18 cm long. Inflorescence peduncles 74-95.7 cm long, 3.2-4.5 mm wide, elongate, erect, with flat tomentum to 0.1 mm thick; prophylls 25.2-28.7 cm long;

peduncular bracts 14.6-19.6 cm long, tomentose, plicate, deciduous, the scars with swollen shoulders; distance between peduncular bracts scar and first bracteole 0.6-1.6 cm; rachilla 1, 9.4-16.8 cm long, 5.1-7.3 mm wide, tomentose, red in fruit; pits with proximal lips remaining erect and with distal lips; inter-pit distance 1-2.7 mm; fruits 12.8-14 × 5.7-6.5 mm, color not recorded. *Lowland to montane rainforest*. P (Knapp & Sytsma 2501, MO). 730-1125 m. (Endemic). (Panama).

10. Chamaedorea

Chamaedorea Willd. *nom. cons.*

By D. R. Hodel

Small to dwarf, infrequently medium, mostly solitary, infrequently clustered, pinnately leaved, sometimes simple- and bifid-leaved and then pinnately ribbed, mostly glabrous, unarmed, dioecious, pleoanthic, mostly understory palms. Stems mostly erect, sometimes decumbent and then often rooting at the nodes, rarely climbing, rarely aerially branching, sometimes rhizomatous, rarely stoloniferous, slender, bamboo-like, green, rarely with white-waxy indument, ringed, sometimes covered with persistent leaf sheaths distally, frequently with adventitious prop roots near the base, rarely acaulescent and then typically short and compact and buried in the leaf litter or slightly below ground with nodes densely congested. Leaves several to many, initially erect to ascending, becoming spreading to drooping, pinnate or simple and apically bifid, reduplicate; sheath short or elongate, tubular and briefly obliquely open apically or tubular basally and long-open apically, infrequently with a ligule or auricle apically opposite petiole, not forming a true crownshaft, mostly briefly persistent but sometimes falling away cleanly at senescence,

green but sometimes white along the distal margins, longitudinally striate-nerved, thin to thick and leathery or nearly woody, often with a pale green or yellow band or ridge extending from petiole, glabrous, rarely with white-waxy or -powdery indument; petiole short to elongate, flat or grooved, rarely channeled and green adaxially, rounded and green and often with a pale green or yellow band abaxially, spreading, slender, attenuate, glabrous, rarely with white-waxy or -powdery indument; rachis angled and green adaxially, rounded and green and often with a pale green or yellow band abaxially, attenuate, glabrous, rarely with white-waxy or -powdery indument; pinnae few to many per side, regularly arranged, infrequently clustered in groups, narrowly linear to broadly lanceolate or rhomboid, straight to sigmoid or falcate, acuminate to long-acuminate, green adaxially, paler abaxially, infrequently grayish green, thin-papery, sometimes thick and nearly coriaceous, glabrous, rarely with indument, 1- to several-nerved, these prominent and raised adaxially, infrequently flat and smooth adaxially and then prominently raised abaxially, 1 to several secondaries between each pair of primaries, tertiaries inconspicuous. Inflorescences interfoliar, sometimes infrafoliar in fruit, solitary, infrequently multiple at a node, often gender dimorphic with the staminate typically with more rachillae and these lax to pendulous while the pistillate typically with much fewer rachillae and these stiffly spreading, branched to 1 order, rarely branched to 2 orders, mostly with several to numerous rachillae, less frequently spicate, bifurcate, or few-branched, mostly shorter than leaves, sometimes longer than leaves, ascending to spreading, sometimes drooping in fruit; peduncles very short to elongate, rarely exceeding the leaves, greenish where exposed in flower, orange to red-orange in fruit; bracts few to many, prophyll shortest, peduncular bracts typically progressively

increasing in length distally, the most distal typically the largest and often concealing 1 or 2 small rudimentary bracts and sometimes exceeding the peduncle and extending on to rachis, tubular, bifid and obliquely open apically, membranous to coriaceous and thick, persistent, tightly to loosely sheathing, green or brown in flower, brown and sometimes tattered in fruit, striate nerved; rachis lacking to elongate, greenish in flower, orange to red-orange in fruit (at least in Mesoamérica); rachillae simple, rarely proximal ones branched, short or elongate, slender or fleshy, often thickened in fruit, greenish and spreading to pendulous in flower, orange to red-orange (at least in Mesoamérica) and stiffly ascending to spreading in fruit, infrequently drooping when heavily laden with fruit. Flowers spirally arranged, mostly in shallow pits, rarely deeply sunken, solitary (at least in Mesoamérica) and not clustered in few-flowered groups or acervuli, staminate flowers typically more densely placed, sometimes contiguous in bud, symmetrical, frequently aromatic, rarely fragrant, pistillate flowers more remotely placed, rarely contiguous in bud; calyx typically low and cupular or ringlike, rarely well developed and prominent, greenish or pale, scarcely to deeply 3-lobed, sepals 3, entire, connate and/or imbricate basally, sometimes nerved especially when dry; staminate petals 3, valvate, variously ovate, acute, mostly free and spreading or erect, less frequently connate apically and there adnate to pistillode and corolla opening by lateral apertures, rarely connate in their entirety and corolla opening by apical pore, mostly yellow, infrequently red, green, or white; stamens 6, rarely 3, filaments short, broad, awl-shaped, anthers dorsifixed, included, didymous, or oblong; pistillode well developed, mostly columnar, sometimes fluted, sometimes expanded basally and apically and there sometimes truncate or lobed; pistillate petals 3, mostly variously imbricate basally, rarely valvate or connate,

rounded, truncate, or acute apically, yellow or greenish, rarely orange, red, or white; staminodes present and toothlike or absent; ovary ovoid or globose, green, yellow, or pale, style typically lacking or short, stigma lobes sessile or nearly so, small, blunt to pointed, erect to recurved. Fruits small, globose to ellipsoid, rarely angled from mutual pressure or curved, mostly black, sometimes yellow, orange or red, mostly smooth, rarely rough; mesocarp sometimes with irritating calcium oxylate crystals; stigmatic remains basal, mesocarps mostly fleshy and endocarps thin; perianth sometimes persistent and then typically strongly nerved; seeds globose to ellipsoid, rarely angled from mutual pressure or curved, endosperm cartilaginous, embryo basal to sub-apical. Flowering and fruiting are nearly year-round, especially in wet forests, but with a preponderance of flowering from January through June and fruiting July through December, especially in seasonally moist forests. Germination adjacent-ligular, eophylls bifid, rarely pinnate. $2n = 26, 32$. Approx. 108 spp., northeastern central and western central Mexico to western northern South America; 88 spp. in Mesoamerica.

In Mesoamerica *Chamaedorea* has two centers of diversity, one in southern Mexico and Guatemala and the other in Costa Rica and Panama. The species occur in moist to wet, mostly undisturbed rain and cloud forests, rarely in seasonally dry forests, sometimes on limestone, and are most diverse from 800-1500 m but occur from sea level to nearly 3000 m.

Based strictly on morphological data, I had divided this large genus into eight subgenera (Hodel 1992), of which five occur in Mesoamerica (*Chamaedorea*, *Chamaedoropsis*, *Collinia*, *Eleutheropetalum*, and *Stephanostachys*) while the other three are found outside of this region (subgenera *Morenia* and *Moreniopsis* in South America and *Moreniella* in

north-central and northeastern Mexico). Several recent molecular-based phylogenies (Cano 2018, Cuenca and Asmussen-Lange 2007, Thomas et al. 2006) do not fully support the morphological basis for all subgenera. While *Eleutheropetalum* and *Stephanostachys* appear mostly monophyletic, the two most species-rich subgenera, *Chamaedorea* and *Chamaedoropsis* are not so, having component species widely distributed through several proposed trees; indeed, two distinct clades can be identified with moderate to strong support that contain species of both *Chamaedorea* and *Chamaedoropsis*. I (Hodel 1992a) had alluded to the difficulty defining these two subgenera, noting several species that seemed to be intermediate between the two, some in subgenus *Chamaedorea* having staminate flowers with petals that were initially connate apically and adnate to the pistillode and the corolla opening by lateral slits but later became free and spreading while a few species in subgenus *Chamaedoropsis* had staminate flowers with the petals spreading apically but only slight so, the tips remaining incurved over the stamens and nearly adnate to the pistillode.

Some interesting molecular findings among Mesoamerican species show that *Chamaedorea robertii* might be best placed in subgenus *Stepahnostachys*, not *Chamaedoropsis* where I had placed it (Hodel 1992a); *C. geonomiformis* and *C. tenella* appear in separate and distinct clades, supporting the notion that they are distinct species despite their morphological similarity; the distinctive *C. tuerckheimii* could appear in subgenus *Eleutheropetalum* or *Stephanostachys*, not *Chamaedoropsis* where I had placed it (Hodel 1992a); and *C. elegans* could appear in subgenus *Eleutheropetalum* or with some members of *Chamaedoropsis*, not as the sole member of *Collinia* that I had proposed (Hodel 1992a). Thus, a more highly detailed molecular analysis is needed to

distinguish or delineate the subgenera better, especially the two most species rich subgenera, *Chamaedorea* and *Chamaedoropsis*. From a morphological perspective, other characters, such as staminate flower petal color, scent, and perhaps most importantly, petal and fruiting perianth nervation, might be more illuminating.

Despite the recent molecular data not supporting all subgenera of *Chamaedorea*, the first level of keys (to the subgenera), based on my original interpretation of the subgenera (Hodel 1992a), and keys to the species of each subgenus, are still useful and workable, especially if fertile staminate material is at hand.

Little work has been done on the conservation status of *Chamaedorea* but, because they are mostly denizens of undisturbed, primary forests, their survival is inextricably linked to the health of these forests, which, in many cases, are severely damaged and/or disappearing at an alarming rate. Indeed, a few species listed in this account might now be extinct, for example *C. piscifolia* in Costa Rica. Global warming due to climate change is a factor that will undoubtedly hasten habitat degradation. In a few instances, overzealous collectors have decimated populations of desirable species for the national and international horticultural trade.

Bibliography: Bernal et al. 2004, Cascante-Marin and Muller 2020, Grayum 1998, Hodel 1992a, b, 1995, 1996, 1997, 2020, Hodel et al. 1995a, 1995b, 1997; Pérez-Farrera et al. 2021 .

Chamaedorea sect. *Collinia* Liebm. in Mart., *Chamaedorea* sect. *Stachyophorbe* Liebm. ex Mart., *Chamaedorea* subgenus *Stephanostachys* Klotzsch, *Collinia* (Liebm.) Liebm. ex Oerst., *Dasystachys* Oerst., *Eleutheropetalum* H. Wendl. ex Oerst., *Kinetostigma* Dammer; *Morenia* Ruiz & Pavon, *Nunnezharia* Ruiz & Pavon, *Nunnezia* Willd., *Kunthia*

Humb. & Bonpl., *Spathoscaphe* Oerst., *Stachyphorbe* (Liebm. ex Mart.) Liebm. ex
Klotzsch, *Stephanostachys* (Klotzsch) Klotzsch ex Oerst.

Key to the Subgenera of *Chamaedorea* in Mesoamerica

1. Petals of both genders connate in their entirety, corolla opening by apical aperture

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. . . . **III. Collinia**

1. Petals of both genders not connate in their entirety, corolla not opening by apical
aperture

2. Flowers of both genders orange to red, petals thick and fleshy, cucullate and
hooded over internal organs

IV. Eleutheropetalum

2. Flowers of both genders yellow to greenish or white, petals not thick and fleshy
and not cucullate and hooded over internal organs

3. Staminate flowers with petals connate apically and there adnate to pistillode
and corolla opening by lateral apertures; perianth typically strongly nerved
when dry

. . . . **I. Chamaedorea**

3. Staminate flowers with petals free and spreading apically; perianth typically not
nerved when dry.

4. Staminate flowers borne singly **II.**

Chamaedoropsis

4. Staminate flowers contiguous, even in bud **V.**

Stephanostachys

I. Key to the Species of Subgenus *Chamaedorea* in Mesoamerica

1. Habit vine-like and climbing; distal pinnae typically reflexed, downward-pointing, hook-like.
2. Pinnae 10-35 per side, lanceolate 20.

C. elatior

2. Pinnae 42-60 per side, linear 75. **C.**

tacanensis

1. Habit not vine-like and climbing; distal pinnae not typically reflexed, downward pointing, hook-like.
3. Leaf blades simple, bifid apically.
4. Habit cespitose 68.

C. serpens

4. Habit solitary.
5. Leaf blades conspicuously toothed on outer margins; staminate rachillae erect-spreading.
6. Leaf blades thick, bifid apically 1/5-1/4 their length, dark bluish to grayish green

. 26. **C. frondosa**

6. Leaf blades thin-papery or papery, bifid apically 1/4 or more their length, emerald green.

7. Leaf blades bifid apically 1/4 their length, c. 25 primary nerves on each side of rachis

3. C. amabilis

7. Leaf blades bifid apically 1/2 or more their length, 10-14 primary nerves on each side of rachis

. 48. C. palmeriana

5. Leaf blades not conspicuously toothed on outer margins; staminate rachillae drooping to pendulous.

8. Leaf blades obscurely nerved.

9. Leaf blades typically more than 15 cm long, bifid apically more than 1/3 their length; inflorescences typically with 3 or more branches

27. C. geonomiformis

9. Leaf blades typically less than 15 cm long; bifid apically less than 1/3 their length; inflorescences typically spicate or bifurcate

. 76. C. tenella

8. Leaf blades conspicuously nerved.

10. Leaf blades 25 cm or less long, 7 or fewer primary nerves on each side of rachis.

11. Leaf blade not glossy green, primary nerves low and smooth, 3 secondaries conspicuous between each pair of primaries

61. C. rojasiana

11. Leaf blade glossy green, primary nerves elevated and sharply keeled, 2 secondaries conspicuous between each pair of primaries

. **69. C. simplex**

10. Leaf blades 35 cm or more long, 7 or more primary nerves on each side of rachis.

12. Leaf blade bifid apically 1/3 their length; inflorescences shorter than leaves; rachillae 9-38 **56.**

C. ponderosa

12. Leaf blade bifid apically 3/8-1/2 their length; inflorescences exceeding leaves; rachillae 3-7

63. C. rossteniorum

3. leaf blades pinnate.

13. Habit caespitose.

14. Stems erect; pinnae straight, drying plicate, terminal pinnae 2.5 cm wide

. . **66. C. schippii**

14. Stems decumbent; pinnae sigmoid, not drying plicate, terminal pinnae 8-12 cm wide

. **68. C. serpens**

13. Habit solitary.

15. Pinnae aggregated in groups along rachis **28. C.**

glaucifolia

15. Pinnae regularly spaced along rachis.

16. Pinnae straight or only slightly falcate.

17. Pinnae thin, drying falcate; proximal rachillae branched

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36. *C. liebmanni*

17. Pinnae thick, not drying falcate; proximal rachillae unbranched . . .

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38. *C. macrospadix*

16. Pinnae sigmoid.

18. Terminal pinnae wide, typically as wide or wider than others
combined.

19. Leaf sheaths long-open, splitting deeply opposite petiole

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82. *C. verapazensis*

19. Leaf sheaths tubular.

20. Pistillate rachillae pendulous **39.**

C. matae

20. Pistillate rachillae erect or spreading (sometimes
downward-pointing when heavily laden with fruits).

21. Rachillae 3 or fewer; fruits round, black when soft ripe .

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61. *C. rojasiana*

21. Rachillae rarely 3, typically more.

22. Leaf blade less than 45 cm long; fruits sickle-shaped, red, yellow, or orange when soft ripe
- . . . **23. C. falcifera**
22. Leaf blade 80 cm or more long; fruits subglobose, orange when immature but likely black when soft ripe
- **56. C. ponderosa**
18. All pinnae c. the same size or terminal pair only slightly larger.
23. Fruits red, yellow, or orange when soft ripe.
24. Fruits globose or only slightly elongated **51. C. pinnatifrons**
24. Fruits strongly elongated and reniform, bilobed, or sickle-shaped.
25. Fruits reniform or bilobed **44. C. neurochalmys**
25. Fruits sickle-shaped **23. C. falcifera**
23. Fruits black when soft ripe.
26. Pinnae with primary nerves prominently elevated abaxially, not raised adaxially **86. C. warscewiczii**
26. Pinnae with primary nerves elevated adaxially.

27. Plants appearing stemless; pinnae 4-6 on each side of rachis, gray-green, less than 5 cm wide

49. *C. parvifolia*

27. Plants with visible, elongate stem; pinnae 7-10 on each side of rachis, green, typically more than 10 cm wide

... **38. *C. macrospadix***

II. Key to the Species of Subgenus *Chamaedoropsis* in Mesoamerica

1. Leaf blades simple and bifid apically or entire.

2. Habit caespitose.

3. Stems wide-spreading by rhizomes **9. *C.***

brachypoda

3. Stems spreading by short, tight, basal, lateral shoots **45. *C.***

nubium

2. Habit solitary.

4. Leaf blades entire, with only a small notch at apex **79. *C.***

tuercheimii

4. Leaf blades conspicuously bifid apically.

5. Tips of leaf blade lobes drawn out into long, narrow, close, barely

diverging, nearly parallel lobes

... **52. *C. piscifolia***

5. Tips of leaf blade lobes broadly diverging.

6. Stem short, nearly lacking, often appearing stemless; leaf sheaths long-open, tubular only near or at base.
7. Primary nerves prominently elevated adaxially, leaf blade corrugated.
8. Leaf blades leathery, pliable, iridescent and/or mottled blue-gray green.
9. Leaf blades 7 or fewer primary nerves on each side of rachis

 . **41. C. minima**
9. Leaf blades with 9 or more primary nerves on each side of rachis.
10. Leaf blades with 9-13 primary nerves on each side of rachis
 ... **57. C. pumila**
10. Leaf blades with 15 or more primary nerves on each side of rachis **74.**
C. sullivaniorum
8. Leaf blades not leathery or iridescent but green.
11. Calyxes of both genders well developed and prominent; staminate flowers cream-colored
11. C. castillo-montii

11. Calyxes of both genders low, ring-like, staminate flowers
whitish tinged with green

60. *C. robertii*

7. Primary nerves not prominently elevated adaxially, leaf blade flat.

12. Leaf blades with mostly 10 or fewer primary nerves on each
side of rachis

84. *C. volcanensis*

12. Leaf blades with mostly 12 or more primary nerves on each
side of rachis.

13. Leaves spreading; leaf blades thin-papery, light green

58. *C. pygmaea*

13. Leaves stiffly ascending; leaf blades thick, leathery, dark
green

..... **72. *C. stricta***

6. Stem elongate, well developed, visible, erect or decumbent; leaf sheaths
tubular in proximal 2/3 or more.

14. Leaf blades with mostly 12-14 primary nerves on each side of
rachis; fruits rough, orange-red; stamens 3

81. *C. vanninii*

14. Leaf blades with 20 or more or 10 or fewer primary nerves on each
side of rachis; fruits smooth, black; stamens 6.

15. Leaf blades with 20 or more primary nerves on each side of rachis

19. C. deneversiana

15. Leaf blades with 10 or fewer primary nerves on each side of rachis.

16. Petioles rugose **77. C.**

tenerrima

16. Petioles not rugose.

17. Petioles gray, densely white-spotted.

18. Leaf blades bifid apically 3/4 their length . . **14. C.**

correae

18. leaf blades bifid apically 1/2 their length.

19. Leaf blades leathery, pliable, velvet- textured;
inflorescences equaling or exceeding leaves;
staminate rachillae pendulous

1. C. adscendens

19. Leaf blades rigid, plastic-like; inflorescences
shorter than leaves; staminate rachillae stiffly
ascending

. . . . **30. C. guntheriana**

17. Petioles green or only sparsely white-spotted.

20. Leaf blades blue-gray, primary nerves prominently
elevated adaxially so that blades appear corrugated

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83. C. verecunda

20. Leaf blades green, primary nerves not prominently elevated adaxially, blades flat.

21. Stem mostly erect; 7-15 leaves; staminate rachillae pendulous; staminate flowers with prominent calyx; fruits ovoid, narrowed at both ends

..... **17. C. dammeriana**

21. Stem mostly decumbent; 4-5 leaves; staminate rachillae spreading; staminate flowers with low calyx; fruits globose **13.**

C. chazdoniae

1. Leaf blades pinnate.

22. Habit caespitose.

23. Leaf sheaths with ligules to 5 cm long at apex on either side of petiole

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15. C. costaricana

23. Leaf sheaths lacking ligules at apex.

24. Pinnae 20 or more on each side of rachis **55. C.**

pochutlensis

24. Pinnae 18 or fewer on each side of rachis.

25. Pinnae straight, only a midrib prominent; peduncles less than 9 cm long; rachillae sort, stiff, erect in fruit, not undulate

67. C. seifrizii

25. Pinnae sigmoid, a prominent midrib and conspicuous primary nerves; peduncles more than 10 cm long; fruiting rachillae downward-pointing, markedly undulate (especially when dry)

. 45. C. nubium

22. Habit solitary.

26. Stem mostly short, nearly lacking, often appearing stemless; leaf sheaths mostly long-open, tubular only near or at base.

27. Proximal pinnae margins decurrent on rachis; eophylls mostly pinnate.

28. Pinnae not decreasing markedly in length toward apex of rachis

58. C. pygmaea

28. Pinnae decreasing markedly in length toward apex of rachis.

29. Pinnae margins undulate; fruiting rachillae conspicuously curved, hook-like **80.**

C. undulatifolia

29. Pinnae margins not undulate; fruiting rachillae straight or only slightly curved.

30. Pistillate inflorescences spicate or bifurcate **70. C.**

stenocarpa

30. Pistillate inflorescences mostly with 3 or more rachillae.

31. Plants to 50 cm tall 7.

C. binderi

31. Plants 0.75-2.5 m tall.

32. Leaves erect-ascending, dark green; pinnae with
primary nerves elevated abaxially; pistillate
inflorescences branched to 2 orders; rachillae filiform .

..... **8. C. brachyclada**

32. Leaves spreading, green; pinnae with primary nerves
not elevated abaxially; pistillate inflorescences
branched to 1 order; rachillae not filiform

..... **65. C. scheryi**

27. Proximal pinnae margins not decurrent on rachis; eophylls simple and
bifid.

33. Pinnae 13 or more on each side of rachis.

34. Petiole and rachis combined less than 1 m long; petioles
glabrous; pinnae dark velvety nearly iridescent green, drying
strongly plicate

..... **32. C. ibarrae**

34. Petiole and rachis combined 2 m long or more; petioles densely
covered with white, waxy, finely powdered indument that ages
black; pinnae not drying plicate

10. C. carchensis

33. Pinnae 12 or fewer on each side of rachis.

34. Leaf sheaths thick, durable, collectively arranged to form 3-sided or triangular structure 35.

C. lehmannii

34. Leaf sheaths thin to medium, not arranged to form a 3-sided structure.

35. Pinnae 2-4 on each side of rachis, prominent nerves prominently elevated; inflorescences of both genders spicate

. **11. C. castillo-montii**

35. Pinnae more than 7 on each side of rachis; inflorescences of both genders not spicate (or only one gender spicate).

36. Pinnae 2 cm or less wide, obscurely nerved, terminal pair attached at right angles to rachis

47. C. pachecoana

36. Pinnae 3 cm or more wide, conspicuously nerved, terminal pair forward-pointing 84.

C. volcanensis

26. Stem mostly elongate, well developed, visible, erect or decumbent (except in *C. adscendens* and *C. pittieri*, then stem short and inflorescences exceeding the leaves); leaf sheaths tubular in proximal 1/2 or more.

37. Stem short; inflorescences typically longer than leaves.

38. Leaf sheath, petiole, and rachis conspicuously and densely white-spotted; pinnae obscurely nerved; inflorescence rachis to 16 cm long

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..... **1. C. adscendens**

38. Leaf sheath, petiole, and rachis grayish green but not conspicuously white spotted; pinnae with prominent midrib; inflorescence rachis 20-40 cm long

..... **53. C. pittieri**

37. Stem elongate; inflorescences typically shorter than or equal to leaves.

39. All pinnae linear to narrowly linear, to 1.4 cm wide.

40. Pinnae aggregated in groups along rachis, some spreading in different directions and planes; adaxially petiole deeply channeled

54. C. plumosa

40. Pinnae regularly arranged, not spreading in different directions and planes; adaxial petiole not deeply channeled

29. C.

graminifolia

39. Nearly all pinnae variously lanceolate (if linear then only proximal ones), mostly 2-10 cm wide.

41. Pinnae 12 or more on each side of rachis.

42. Petiole and leaf rachis densely covered with minute, irregular pits giving living material a rough texture.

43. Large, robust plant to 12 m tall; stem 5-10 cm diam.; pinnae with midrib and primary nerves conspicuously elevated abaxially, not adaxially

..... **87. C. woodsoniana**

43. Moderate plants to 2.5 m tall; stem 2.5-3 cm diam.; primary nerves elevated adaxially, not abaxially **24.**

C. foveata

42. Petiole and leaf rachis smooth, lacking pits.

44. Pinnae 35-60 cm long, thick, leathery; petiole with glaucous bloom; peduncle to 1.45 m long; staminate rachillae up to 75

. **6. C. benziei**

44. Pinnae 10-30 cm long; medium textured; petiole lacking glaucous bloom; peduncles to 62 cm long; staminate rachillae up to 40.

45. Pinnae 17-20 on each side of rachis; leaf rachis to 65 cm long; inflorescences branched to 1 order; rachillae to 8

. **42. C. molinana**

45. Pinnae 12-17 on each side of rachis; leaf rachis to 70 cm long; inflorescence branched to 2 orders; rachillae 8-40

. **34. C. keelerorum**

41. Pinnae 11 or fewer on each side of rachis.

46. Petioles rugose; pinnae distinctly auriculate basally, terminal pair broadly flared at right angles to rachis **77.**

C. tenerrima

46. Petioles not rugose but green or gray-green, rough, and/or conspicuously white-spotted; pinnae not auriculate basally, terminal pair not broadly flared at right angles to rachis.
47. Petioles green, not gray-green, rough, and/or conspicuously white-spotted.
48. Leaf rachis conspicuously attenuate and filiform distally; staminate rachis conspicuously flexuous; fruiting rachis and rachillae filiform
- **5. C. fractiflexa**
48. Leaf rachis not conspicuously attenuate and filiform distally; staminate rachis straight; fruiting rachis and rachillae not filiform.
49. Pinnae thin-papery.
50. Pinnae mostly 5 cm wide or more, with several prominent yellow nerves when dry; inflorescences borne well below the leaves
- . . . **37. C. lucidifrons**
50. Pinnae mostly less than 5 cm wide, lacking prominent yellow nerves when dry; inflorescences below but close to leaves
- **50. C. parvisecta**
49. Pinnae thick or medium textured.

51. Stem decumbent or creeping **13. C.**

chazdoniae

51. Stem erect.

52. Pinnae thick, leathery; 3-5 leaves in canopy;
inflorescences infrafoliar **46. C.**

oblongata

52. Pinnae medium-textured, 7 or more leaves
in canopy; inflorescences interfoliar

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17. C. dammeriana

47. Petioles gray-green, rough, and/or conspicuously white-
spotted.

53. Petioles with conspicuous, dense nodules extending on
to pinna nerves **62.**

C. rosibeliae

53. Petioles lacking nodules.

54. Pinnae 10-11 on each side of rachis.

55. Inflorescences branched to 2 orders; rachillae
10-48; rachis and rachillae with longitudinal
ridges spectacularly encrusted with thin, long,
irregular, sometimes wavy, plate-like, coral-like,
protuberances giving a conspicuously crusty or

roughly crinkled appearance and texture

. **33. C. incrustata**

55. Inflorescences branched to 1 order; rachillae up to 12; rachis and rachillae lacking protuberances giving crusty or crinkled appearance and texture

. . . . **85. C. vulgata**

54. Pinnae 2-9 on each side of rachis.

56. Plants 2.5-4 m tall; staminate rachillae pendulous.

57. Plants erect or decumbent; leaf sheath thick, durable; pinnae with callous at point of attachment abaxially

. **4. C. anemophila**

57. Plants erect; leaf sheath medium textured; pinnae lacking callous at point of attachment.

58. Pinnae thin-papery; inflorescences mostly spicate or bifurcate; rachillae strongly downward-curved

59. C. recurvata

58. Pinnae thick, leathery; inflorescences mostly with 2-5 rachillae, these straight .

.....

... **73. C. subjectifolia**

56. Plants to 1 m tall; staminate rachillae spreading
or ascending.

59. Stem 1.5 cm diam.; pinnae 7-9, thin-papery,
soft, dark green, terminal pair much smaller
than others combined

40. C. microphylla

59. Stem 1 cm diam. or less; pinnae 2-4, thick,
rigid, gray-green, terminal pair much larger
than others combined.

60. Pinnae with prominently elevated, pale
or white nerves; staminate flowers
maturing simultaneously throughout axis

14. C. correae

60. Pinnae obscurely nerved; staminate
flowers maturing markedly and
progressively proximally to distally on
axis

..... **30. C. guntheriana**

III. Key to the Species of Subgenus *Collinia* in Mesoamerica

Subgenus *Collinia* is monotypic; its sole species is 21.

C. elegans

IV. Key to the Species of Subgenus *Eleutheropetalum* in Mesoamerica

1. Leaves pinnate 64.

C. sartorii

1. Leaves simple and bifid.

2. Habit solitary 22. C.

ernesti-augustii

2. Habit stoloniferous 71. C.

stolonifera

V. Key to the Species of Subgenus *Stephanostachys* in Mesoamerica

1. Pistillate flowers contiguous in bud; staminate calyx well developed, even in bud.

2. Staminate inflorescence with 8-10 rachillae 5. C.

arenbergiana

2. Staminate inflorescences spicate or bifurcate.

3. Staminate inflorescences multiple at a node.

4. Flowers green 18. C.

deckeriana

4. Flowers not green 43. C.

nationsiana

3. Staminate inflorescences solitary at a node.

5. Staminate flowers yellow; sepals connate in a cupule half as high as petals;
mature fruits black, rough **2.**

C. allenii

5. Staminate flowers mostly white or cream-colored (perhaps sometimes green
or light yellow); sepals distinct, free nearly to base; mature fruits orange to
red or if black then smooth.

6. Mature fruits black, smooth **31.**

C. hodellii

6. Mature fruit orange to red.

7. Staminate flowers with stamens exceeding petals; pinnae 9-11 per
side, all c. equal in size

. **16. C. crucensis**

7. Staminate flowers with stamens equaling petals; pinnae 1-6 per side,
terminal pair much larger than others **88. C.**

zamorae

1. Pistillate flowers not contiguous in bud; staminate calyx not prominent in bud,
typically a low, membranous ring.

8. Stems short, creeping, dichotomously branched; pinnate decurrent on rachis; a
rheophyte **12. C.**

cataractarum

8. Stem(s) elongate, not creeping or dichotomously branched; pinnae not decurrent on
rachis; not a rheophyte **78. C.**

tepejilote

1. *Chamaedorea adscendens* (Dammer) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem*

11(107): 737 (1933). Lectotype (designated here): Guatemala, *Tuerckheim 8770* (US!).

Illustr.: Hodel, *Chamaedorea Palms*: pp. 123, 125; figs. 48A-D, 49A-C (1992a). N.v.: unknown.

Kinetostigma adscendens Dammer, *Tuerckheimia adscendens* Dammer ex Donn. Sm. *nom. illeg.*

Solitary, erect, infrequently decumbent, to 2.5 m tall, often flowering when appearing stemless. Stem c. 1 cm diameter, creeping and buried in leaf litter, covered with persistent leaf sheaths, internodes 2-2.5 cm. Leaves c. 6, pinnate, rarely simple and bifid, ascending to spreading; sheath to 6 cm, tubular basally, obliquely long-open apically, thick, durable, green, becoming brown, persistent, with a rounded ridge extending from petiole; petiole c. 7 cm or more, grayish; rachis to 16 cm, grayish; sheath, petiole, and rachis densely white spotted; pinnae 2-6 per side, to 16 × 2.5-3.5 cm, obovate-lanceolate, thick, leathery, velvety textured, gray- and/or metallic blue-green, regularly or unevenly arranged, long-acuminate, obscurely nerved with a scarcely elevated and pale midrib abaxially, other nerves inconspicuous, apical pair often broader, 2-9-nerved, if simple and bifid to 25-30 × 15-20 cm, bifid apically to 1/2 its length, 6-9-nerved. Inflorescences infrafoliar, penetrating persistent leaf sheaths, typically exceeding leaves, ascending in flower, ascending to spreading in fruit, sometimes appearing to arise from leaf litter, branched 1-2 orders; peduncles to 40-70 cm, ascending to spreading; bracts 8-9, most distal exceeding peduncle, brown; staminate with rachis to 10 cm; staminate rachillae 2-10, to 20 cm, pendulous, proximal ones sometimes forked; pistillate spicate or sometimes

bifurcate, rachis or flower-bearing portion to 15 cm, spreading. Flowers staminate in very dense spirals but not contiguous in bud, 2-2.5 × 2-2.5 mm, ovoid; calyx 0.5-1 × 2-2.5 mm, shallowly lobed, sepals connate nearly to apex and there truncate, membranous, nerveless, pale yellow; petals 2-3 × 1.5-2.5 mm, broadly ovate, free and erect-spreading apically, acute, nerveless, bright yellow aging to cream-colored or orange-brown; stamens 1-1.5 mm high, filaments short or nearly lacking, 0.25-0.5 mm, anthers 1-1.25 mm; pistillode c. 1.8 mm high, just exceeding stamens but shorter than petals, columnar, longitudinally angled, truncate apically; pistillate 2-2.5 × 1.5-1.75 mm, ovoid-globose; calyx 0.75-1 × 1.75-2.25 mm, deeply lobed, sepals connate and/or imbricate in basal 1/4-1/2, broadly rounded apically, pale greenish yellow; petals 2-2.5 × 2 mm, very broadly ovate, briefly connate basally, imbricate nearly to apex and there broadly rounded, acute, faintly nerved abaxially when dry, yellow; staminodes present or lacking; ovary 1.5-2 × 1.5-1.75 mm, ovoid-globose, pale yellow to clear-colored, stigma lobes very short, erect, blunt, rounded. Fruits c. 8 mm diameter, globose, black; seeds c. 6 mm diameter, globose.

Low-elevation, seasonally moist forest, on limestone, on the Atlantic slope. Ch (Martinez-Melendez 2338, HEM); B (Schipp 1223, F); G (Hodel & Castillo-Mont 1101A, AGUAT). 50-700 m. Mesoamérica.

Chamaedorea adscendens is distinctive in its thick, leathery, durable, velvety textured, blue-gray-green, short-pinnate leaves, long pedunculate inflorescences typically exceeding the leaves, and seasonally, sometimes severely dry, limestone habitat. It sometimes occurs with *C. schippii*. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. adscendens* in subg.

Chamaedoropsis.

2. *Chamaedorea allenii* L. H. Bailey, *Gentes Herbarum* 6(4): 241, f. 126 (1943).

Holotype: Panama, *Allen 1909* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 249, 251; figs. 111, 112A (1992a). N.v.: unknown.

Solitary, to 2 m tall although sometimes flowering when appearing stemless. Stem 1.5-2 cm diameter, prominently ringed, internodes 3-10 cm. Leaves 4-6, pinnate to sometimes simple and bifid, spreading; sheath c. 25 cm, tubular in basal half, obliquely open and white-margined apically; petiole 25-35 cm; rachis 30-45 cm; pinnae 7-9 per side, to 25-30 × 3-6 cm, narrowly lanceolate, thick-papery, slightly sigmoid or falcate, acute-acuminate, glossy, 8-10 primary nerves, these light green abaxially; if blade bifid then to 50 × 30 cm, apically bifid for c. 1/4, rachis to 30 cm, lobes to 25 cm, c. 50 prominent nerves on each side. Inflorescences interfoliar or infrafoliar in flower, staminate ascending-drooping, infrafoliar and spreading to drooping in fruit, spicate, infrequently bifurcate or with 3 rachillae, solitary; peduncles 15-25 cm, ascending to spreading; bracts c. 4, to 15 cm, most distal typically apically inflated and exceeding peduncle, green in flower, brown and disintegrating in fruit; staminate rachis or rachillae 10-20 cm, pendulous; pistillate rachis or rachillae c. 10 cm, stiff, straight in flower, drooping to curved when heavily laden with fruit. Flowers staminate contiguous, even in bud, 3.5 × 2.5 mm, ovoid, irregularly angled or shaped by mutual pressure; calyx prominent, c. 2 × 2.5 mm, ring-like, scarcely lobed, sepals connate nearly to apex, forming a sheathing hyaline tube, truncate apically, whitish; petals c. 3 × 2 mm, ovate, free in apical 1/2, spreading, rounded-acute and erect apically, thick, fleshy, lightly grooved adaxially, bright yellow; stamens c. 1.75 mm high, filaments c. 1.5 × 0.5 mm, stout, anthers c. 1 ×

0.5 mm, in a close ring around pistillode; pistillode c. 2×0.5 mm, extending just above anthers, swollen basally; pistillate contiguous, even in bud, c. $2. \times 3.5$ mm, strongly depressed-globose to dome-shaped; calyx prominent, c. 1.5×3.5 mm, shallowly undulate, sepals connate nearly to apex and forming a tight, hyaline sheath around base of flower, truncate apically, membranous, whitish; petals c. 2.5×2.5 mm, broadly triangular, cupped, imbricate nearly to apex and there truncate but with a short acute point, bright yellow; staminodes lacking; ovary c. 2×2 mm, conic, whitish, stigma lobes barely exceeding petals, spreading to erect. Fruits 7-10 mm in diameter, densely packed, obovoid-globose but angled from mutual pressure, echinulate, black; seeds 5-7 mm in diameter, obovoid to globose but angled from mutual pressure, brown.

Low- to middle-elevation, moist to wet forest, on the Atlantic and Pacific slopes. P (Hodel 742, PMA). 500-1000 m. Mesoamérica. Colombia.

Chamaedorea allenii is distinctive in its solitary, mostly spicate inflorescences; yellow, contiguous staminate and pistillate flowers; and echinulate, mature ripe, black fruits.

Similar species include *C. crucensis*, which differs in its distinct, staminate sepals and mature ripe, orange to red fruits; *C. hodelii*, which differs in its distinct staminate sepals and smooth, mature ripe, black fruits; and *C. zamorae*, which differs in its smooth, mature ripe, orange-red fruits. *Chamaedorea allenii* occurs throughout most of Panama and into northwestern Colombia. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. allenii* in subg. *Stephanostachys*.

3. *Chamaedorea amabilis* H. Wendl. ex Dammer, *Gard. Chron.*, ser. 3, 36: 245 (1904).

Holotype: Costa Rica. Alajuela, *Wendland s.n.* (K!). Illustr.: Hodel, *Chamaedorea Palms*, pp. 27, 59; figs. 6E, 17A-E (1992a). N.v.: unknown.

Chamaedorea coclensis L. H. Bailey, *Nunnezharia amabilis* (H. Wendl. ex Dammer) Kuntze.

Solitary, slender, erect, sometimes decumbent, to 2 m tall. Stem 7-10 mm diameter, internodes c. 5 cm, often with adventitious prop roots at base. Leaves 4-5, simple and bifid, spreading; sheath c. 12 cm, tubular; petiole 3-12 cm, adaxially with raised triangular knoblike appendage at base; rachis 15-20 cm; blade 30-50 × 15-30 cm, broadly obovate, bifid apically to 1/5-1/4 its length, thin-papery, shiny green, nearly corrugate, c. 25 prominent primary nerves per side, distal half of outer margin conspicuously serrate-dentate. Inflorescences infrafoliar, ascending, slender; peduncles 4-17 cm; bracts 4, most distal exceeding peduncle, papery-membranous; staminate with rachis 0.3-2.5 cm; rachillae 3-8, 8-25 cm, erect spreading; pistillate spicate or sometimes furcate, flower-bearing portion or rachillae 8-31 cm, erect. Flowers staminate 1.5-3 × 2.5-3 mm, subglobose, slightly angled, aromatic; calyx 0.5-0.75 × 2-2.5 mm, shallowly notched, sepals connate basally, broadly rounded apically, nerveless, green aging brown; petals c. 2.5 × 3 mm, triangular, connate apically and there adnate to the pistillode and corolla opening by small, basal, lateral apertures, green aging brown; stamens c. 1.5 mm high, filaments connate basally, anthers c. 0.75 mm; pistillode 2-2.5 mm high, obovoid, swollen apically, green; pistillate 1.5-2 × 3 mm, depressed-globose; calyx c. 0.5 × 3-4 mm, shallow lobed, sepals briefly connate basally, very broadly rounded apically, nerveless, green; petals c. 2 × 3-3.5 mm, cup-shaped, imbricate in basal 3/4, very broadly

truncate to acute and undulating apically, lime-green to greenish yellow, white-margined; staminodes not seen; ovary c. 1.5×2 mm, depressed-globose, dark green, stigma lobes sessile, short. Fruits $6-12 \times 6-9$ mm, globose to ellipsoid, black; seeds $5-10 \times 5-7$ mm, ellipsoid.

Middle-elevation, wet forest, on the Atlantic slope. CR (Hodel & Hodel 716A, CR); P (Hodel & Hodel 741A, PMA). 500-1100 m. Mesoamérica, Colombia.

Chamaedorea amabilis is a distinctive plant, readily identified by the shiny green, thin-papery, heavily nerved and nearly corrugate, simple and bifid leaf blades. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. amabilis* in subg. *Chamaedorea*.

4. *Chamaedorea anemophila* Hodel, *Principes (Palms)* 39(1): 14-16, figs. 1-4 (1995).

Holotype: Panama, *Hodel et al. 1200* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 173, 177; figs. 73F, 75B-D (as *C. pittieri*) (1992a). N.v.: unknown.

Solitary, erect, initially acaulescent but eventually with an elongated stem and then sometimes decumbent and then leaning on or snaking through adjacent vegetation, to 4 m tall or long. Stem 6-18 mm diameter, initially short-creeping, curved, and buried in leaf litter and densely ringed with internodes to 3 mm, later elongate, internodes to 10 cm, covered with persistent leaf sheaths distally. Leaves 3-6, pinnate, erect-spreading; sheath to 19 cm, tubular, briefly obliquely open apically, thick, durable, prominently longitudinally with a rounded ridge extending from petiole; petiole (2-)10-38 cm, scarcely white-spotted; rachis 15-30 cm; pinnae 4-8 per side, $7-23 \times 1.5-4$ cm, lanceolate, straight, slightly falcate, thick, stiff, leathery, cupped downward, long-acuminate, a

callous at basal attachment abaxially, dark bluish gray-green, a prominent midrib and 2-4 primaries on either side, secondaries present but inconspicuous, drying strongly plicate. Inflorescences mostly infrafoliar, arising from behind dry, persistent sheath, rarely briefly interfoliar, shorter than leaves, ascending-spreading to arching; peduncles 16-35 cm, slender, ascending to spreading to arching; bracts 4-5(-7), to 19 cm, most distal exceeding peduncle, green in flower, brown in fruit; staminate rachis 1.5-7 cm; pistillate rachis 0-2.5 cm; staminate rachillae 4-11, 14-30 cm, very slender, pendulous; pistillate rachillae 1-4(-8), 13-18 cm, slender, straight or slightly curved, downward-pointing in fruit. Flowers staminate of very fragile and delicate appearance, c. $3 \times 4-4.5$ mm, ovoid-globose; calyx c. 1×2.5 mm, shallowly lobed or only slightly notched, sepals connate nearly to apex, truncate or slightly rounded apically, thin, transparent; petals $3-4 \times 2-3$ mm, ovate, free nearly to base, spreading apically, acute, thin, lightly nerved adaxially; stamens 2-2.5 mm high, conspicuously shorter than pistillode, filaments c. 0.75 mm, very slender, anthers c. 1 mm, oblong, dorsifixed; pistillode 2.5-3.5 mm high, longitudinally fluted; pistillate of very fragile and delicate appearance, $2.5-3 \times 2.5$ mm, ovoid-globose; calyx $0.5-1 \times 1.5-2$ mm, crown-like, moderately to deeply lobed, sepals imbricate in basal $1/3-1/2$, broadly rounded to truncate apically, thin, membranous, green; petals c. 2.5×2.5 mm, broadly triangular, imbricate in basal $2/3-3/4$, erect and acute apically, thin, membranous, transparent when dry, faintly nerved, yellow; low, deeply lobed, sepals connate only briefly basally; ovary $1.5-2 \times 1.2$ mm, ovoid, green, stigma lobes short, shorter than petals, blunt, recurved. Fruits $6-11 \times 5-7$ mm, ellipsoid to obovoid, black.

Low- to mostly middle-elevation, windswept, moist to wet cloud forest along ridgetops at or near the Continental Divide. CR (Herrera 3366, INB); P (Hodel et al. 1125, PMA).

700-2100 m Mesoamerica.

Chamaedorea anemophila is somewhat intermediate between *C. dammeriana* and *C. pittieri*. *Chamaedorea dammeriana* differs in its thicker, stiff, fruiting rachillae and smaller, densely placed staminate flowers with deeply lobed calyx, thicker, less fragile petals, and stamens equaling the pistillode. *Chamaedorea pittieri* can be distinguished by its generally smaller habit; shorter, thicker stem; long-open, thick, prominently striate-nerved leaf sheaths; inflorescences exceeding the leaves; thicker, less fragile petals; and rigid fruiting rachillae. Inflorescences, rachillae, and especially the flowers of *Chamaedorea anemophila* are among the most delicate and fragile in the genus. This species appears to have two growth phases, each of which is sufficiently different that they could be interpreted as two distinct species. In the first phase plants appear acaulescent although they possess a short, curved, rooting stem with densely congested nodes, normal full-sized, adult leaves, and much reduced, spicate or few branched inflorescences. Later the plants produce a visible, elongated stem to several meters in length, still normal full-sized, adult leaves, and normal-sized, much branched inflorescences. In this latter stage the plants snake through dense vegetation and even penetrate and emerge above the canopy of their low, windswept, cloud forest ridge habitat. It is more frequently collected in Panama than in Costa Rica. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. anemophila* in subg. *Chamaedoropsis*.

5. *Chamaedorea arenbergiana* H. Wendland, *Index Palm.* 11, 66-67 (1854). Holotype:

Cultivated in Europe from material collected in Guatemala, *Wendland s.n.* (GOET!).

Illustr.: Hodel, *Chamaedorea Palms*: pp. 9, 31, 253; figs. 1D, 8H, 113. N.v.: chim, G; pacaya H.

Chamaedorea densiflora Hort. in Guillaum., *Chamaedorea gracilis* Hort. in H. Wendl., *Chamaedorea latifolia* Hort. in Nicholson, *Chamaedorea latifrons* Hort. in H. Wendl., *Chamaedorea oblongata* Hort. in H. Wendl. Not. Mart., *Nunnezharia arenbergiana* (H. Wendl.) Kuntze, *Nunnezharia latifrons* (H. Wendl.) Kuntze, *Spathoscaphe arenbergiana* (H. Wendl.) Oerst.

Solitary, to 4 m tall, although sometimes flowering when appearing stemless, rarely decumbent. Stem 2-3 cm diameter, prominently ringed, internodes 5-15 cm. Leaves 4-6, pinnate, erect-spreading; sheath 30-45 cm, tubular in basal half, obliquely open apically, auriculate; petiole 35-45 cm; rachis 1-1.25 m; pinnae 8-10 per side, to 60 × 15 cm, elongate-oblong or oblong-lanceolate, sigmoid, falcate, long-acuminate, 5-8 prominent primary nerves, these keeled adaxially, shiny yellow abaxially. Inflorescences infrafoliar, staminate many-branched and ascending-drooping, pistillate spicate or bifurcate and ascending in flower, spreading in fruit, solitary; peduncles 15-20 cm, stout, ascending to spreading; bracts 5-6, to 20 cm, most distal typically exceeding peduncle, brown in flower, brown and disintegrating in fruit; staminate rachis 3 cm; pistillate lacking; staminate rachillae 8-10, 12-15 cm, pendulous; pistillate flower-bearing portion or rachillae 6-15 cm, spreading, sometimes curved. Flowers staminate contiguous, even in bud, c. 3 × 3.5-4 mm, depressed-globose, irregularly angled or shaped by mutual pressure; calyx prominent, exceeding petals and enclosing them in bud, c. 1.5 × 4 mm,

shallowly lobed, sepals connate nearly to apex, rounded to truncate apically, thin, whitish; petals 3.5-4 × 3 mm, broadly ovate, imbricate in basal 1/3-1/2, free and spreading apically, rounded-acute and erect apically, thick, fleshy, cream-colored to white; stamens c. 3.75 mm high, c. equaling petals, cream-colored, filaments prominent, distinct, anthers divaricate basally; pistillode 3.5-4 mm high, equaling stamens and petals, columnar, 3-lobed apically, cream-colored; pistillate contiguous, even in bud; calyx prominent, nearly as high as petals, shallowly lobed, sepals connate nearly to apex, membranous, rounded to truncate apically; petals imbricate nearly to apex, short-pointed, whitish; staminodes lacking; ovary ovoid, 3-lobed, whitish, stigma lobes short, recurved. Fruits c. 12 × 19 mm, densely packed, subglobose to transverse oblong but densely packed and angled from mutual pressure, smooth, black; seeds 10-12 × 9-10 mm, obovoid-oblong but angled from mutual pressure, brown.

Low- to middle-elevation, moist to wet forest, on the Atlantic and Pacific slopes. Ch (Hodel 929A, MEXU); G (Hodel & Castillo-Mont 1104, AGUAT); H (Standley 54156, F). 100-1500 m. Mesoamérica.

Chamaedorea arenbergiana is distinctive in its solitary, few-branched inflorescences; whitish, contiguous staminate and pistillate flowers; and smooth, mature ripe, black fruits. Similar species, all from farther south in Mesoamerica and distinguished by their generally smaller habit and mostly spicate inflorescences, include *C. allenii*, which also differs in its bright yellow flowers; *C. crucensis*, and *C. zamorae*, which also differ in their mature ripe, orange to red fruits; and *C. hodelii*, which also differs in its light green to yellowish flowers. In Hodel (1992a), I was uncertain if *C. arenbergiana* extended into central and southern Mesoamerica and northern South America. I suspected that some or

all the collections tentatively identified as *C. arenbergiana*, which had extended its range south to Colombia, were perhaps *C. allenii*, *C. crucensis*, *C. zamorae*, or as of then an unnamed species. The difficulty in distinguishing between *C. arenbergiana* and these related taxa from farther south in Mesoamerica is that good, staminate material is critical for diagnosis but is seldom, if rarely collected because of its fragile and short-lived nature. When only fruiting material is at hand, diagnosis is more difficult. Fortunately, Grayum (1998) admirably sorted out these similar, southern Mesoamerican taxa and now we have a better understanding of this complex group of species. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. arenbergiana* in subg. *Stephanostachys*.

6. *Chamaedorea benziei* Hodel, *Principes (Palms)* 36: 188-191, figs. 1-4. (1992).

Holotype: Cultivated in California, U. S. A. from Chiapas, Mexico, *Hodel et al.* 1143 (BH!). Illustr.: Hodel, *Palms* 57: 163-164, figs. 3-4 (2013). N.v.: unknown.

Solitary, erect, to 5 m tall but often flowering with a very short stem. Stem 2.5-3.5 cm diameter, internodes 3-10 cm, often covered with persistent leaf sheaths. Leaves c. 6, pinnate, spreading; sheath c. 47 cm, obliquely long-open in distal half, tubular in proximal half, thick, leathery, green, becoming brown, persistent; petiole c. 33 cm, very lightly covered with a white, waxy, powdery, glaucous bloom; rachis 1.25 m, with similar indument as petiole; pinnae 20-22 per side, 35-60 × 2.5-5.5 cm, lanceolate, straight, sometimes slightly falcate, thick and leathery, dark nearly bluish green with a slight glaucous bloom, hard raised swollen knot at point of attachment, prominent midrib, 1-2 much less conspicuous primary nerves on either side. Inflorescences interfoliar, perhaps

infrequently infrafoliar in fruit, erect to spreading, branched to 2 orders; peduncles to 1.45 m, ascending to spreading; bracts 10-11, to 48 cm, most distal not exceeding peduncle, green in flower, brown in fruit; staminate rachis to 40 cm, spiraled-s downward- or horizontally pointing; pistillate to 28 cm; staminate rachillae c. 75, to 25 cm, perpendicular to a radiating from rachis in whorls, stiffly spreading but drooping distally, proximal ones branched; pistillate 15-50, to 15 cm, stiffly ascending, curved, parallel, proximal ones branched. Flowers staminate, c. 4×5 mm, obovoid; calyx c. 1×1.75 -2 mm, deeply lobed, sepals connate in basal $1/4$, broadly to narrowly rounded apically, green; petals c. 4×3.5 mm, ovate, free, cupped so tips nearly connate, acute, fleshy, yellow; stamens 3.5-3.75 mm high, c. equaling pistillode and petals, filaments 1.5-2 mm, cleared colored, anthers 2-3 mm, held c. as high as pistillode; pistillode 3.5-3.8 mm high, columnar, yellow; pistillate c. 2×3 mm, depressed-globose; calyx 0.75-1 \times 2-2.5 mm, moderately to deeply lobed, sepals connate and/or imbricate in basal $1/4$ - $1/2$, broadly rounded to nearly truncate apically, green; petals 1.5-2.5 \times 2-2.5 mm, broadly triangular, cupped, imbricate in basal $1/2$ - $3/4$, broadly rounded apically and there free and incurved, acute, a prominent costa abaxially, yellowish; staminodes short to long, toothlike; ovary 1-2 \times 1.5-2.5 mm, globose, stigma lobes short, recurved, broad. Fruits not seen.

Middle-elevation, moist to wet forest and cloud forest, mostly on the Atlantic slope. Ch (Breedlove 21731, CAS). 1500-1600 m. Mesoamérica.

Endemic to Chiapas, Mexico, *Chamaedorea benziei* is characterized by its well developed, above-ground stem; more numerous leaves with thick, leathery, durable sheaths open in distal half and tubular in proximal half; petiole and rachis with only a

light white, waxy, powdery glaucous bloom; mostly interfoliar inflorescences branched to two orders; and the moderately to deeply lobed staminate calyx. A case might be made to include *C. benziei* with *C. carchensis* from adjacent Guatemala, as some have done, but it seems to differ in its mostly acaulescent habit; fewer but longer leaves, among the longest in the genus, with only moderately thick pinnae; petiole and rachis with a dense, thick, white, waxy, powdery indument that quickly turns black; leaf sheaths long-open and tubular only near the base; infrafoliar inflorescences branched to one order; substantially fewer staminate rachillae; and the shallowly lobed staminate calyx. While the distribution of the two species might be close in Chiapas, *C. carchensis* appears to be restricted to the wet Atlantic slope in the eastern part of the state while *C. benziei* appears to come from slightly drier areas farther to the west closer to the border with Oaxaca and even slightly wrapping around on to the Pacific slope. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. benziei* in subg. *Chamaedoropsis*.

7. *Chamaedorea binderi* Hodel, *Principes (Palms)* 40(4): 215, figs. 4-6 (1996).

Holotype: Costa Rica, *Hodel & Binder 1340* (BH!). Illustr.: unknown. N.v.: unknown.

Solitary, acaulescent, erect, to 50 cm tall. Stem short, nearly lacking, creeping and buried in leaf litter, to 1.2 cm diameter, densely ringed, internodes 3-5 mm. Leaves 3-4, pinnate, ascending; sheath c. 8 cm, obliquely long-open apically, tubular only briefly basally; petiole 10-15(-40) cm; rachis 25-30(-47) cm; pinnae 15-25(-30) per side, 4.5-13 × 0.7-1.8 cm, decreasing in size progressively toward apex of blade, lanceolate, straight, acuminate to long-acuminate, proximal margin decurrent on rachis, a prominent midrib and 1

submarginal primary nerve on either side adaxially, a midrib and 2 submarginal primaries on either side abaxially, 1 secondary between midrib and primaries. Inflorescences infrafoliar, arcuate, long-pedunculate, arising from the base or frequently the leaf litter; peduncles 11-31 cm, arcuate-ascending; bracts c. 8, to 7 cm, thin-papery, brown; rachises 3-8 cm, slender; staminate rachillae up to 60, to 5 cm, filiform, undulating distally, perpendicular to rachis; pistillate rachillae 15-30(-60), 1-5 cm, filiform, perpendicular to rachis. Flowers staminate not seen; pistillate remotely arranged, 2-3 × 1.5-2 mm, ovoid-globose; calyx 0.5-0.75 × 1.5-2 mm, cupular, shallowly lobed, sepals connate nearly to apex, acute, membranous; petals c. 2 × 2 mm, imbricate nearly to apex, acute; staminodes conspicuous, toothlike; ovary c. 1.9 × 1 mm, ovoid, dark green, stigma lobes c. 0.5 mm long, slender, only slightly recurved, pointed. Fruits 5-8 × 6-7 mm, globose, black.

Eophyll pinnate.

Low- to middle-elevation, wet forest and cloud forest, on the Pacific slope. CR (Hodel & Binder 1339, CR). 1140(-1900) m. Mesoamerica.

Rare and seldom collected, *Chamaedorea binderi* was long confused with *C.*

brachyclada with which it grows sympatrically in forest remnants not too far from the Jardín Botánico Robert y Catherine Wilson near San Vito in southeastern Costa Rica. No intermediate forms exist, and the latter species differs in its much larger (2-4 times) habit, leaves, and inflorescences; more numerous, larger, dark green, conspicuously falcate pinnae; and more compact pistillate inflorescences with more numerous, thicker, close-set rachillae and smaller fruits. In some respects, *C. binderi* appears intermediate between *C. brachyclada* and *C. stenocarpa*, which also grows in the area, raising the remote possibility that it is a hybrid of the latter two species. The solitary, non-contiguous

staminate flowers with apically free petals and solitary inflorescences place *C. binderi* in subg. *Chamaedoropsis*. *Chamaedorea binderi*, *C. brachyclada*, *C. pygmaea*, *C. scheryi*, *C. stenocarpa*, and *C. undulatifolia* form a rather distinctive and natural subgroup within subgenus *Chamaedoropsis* characterized by their virtually stemless habit, decurrent pinnae, long-pedunculate inflorescences arising from or below ground level, and mostly pinnate eophylls.

8. *Chamaedorea brachyclada* H. Wendl., *Gartenflora* 29: 101-102 (1880). Neotype (designated by Grayum, *Principes* 32: 102-104 [1988]): Cultivated in Europe from Panama, *Wendland s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*: p. 127; figs. 48A-D, 49A-C (1992a). N.v.: unknown.

Nunnezharia brachyclada (H. Wendl.) Kuntze.

Solitary, acaulescent, erect to ascending, to 2.5 m tall. Stem to c. 25 cm tall, 2-3 cm diameter, creeping and buried in leaf litter, densely ringed, internodes 5-10 mm. Leaves 3-4, pinnate, erect to ascending; sheath to 35 cm, tubular only briefly basally, obliquely long-open, dark green; petiole 40-110 cm, dark green; rachis 58-110 cm, dark green; pinnae 20-30 per side, to 16-45 × 0.8-3.1 cm, linear-lanceolate, straight, falcate, dark green, long-acuminate, proximal margin decurrent on rachis, 5 prominent nerves, smooth adaxially, elevated abaxially. Inflorescences infrafoliar, arcuate, long-pedunculate, arising from the base or frequently the leaf litter, pistillate appearing like a bottle brush, branched to 2 orders; peduncles to 80 cm, arcuate-ascending; bracts 5-9, to 20 cm, most distal exceeding peduncle, brown; staminate with rachis 10-17(-30) cm; rachillae 40-100, 5-15 cm, spreading, filiform, perpendicular to rachis; pistillate rachis 5-20 cm; rachillae

35-200 or more, 3-6 cm, densely placed, stiffly spreading, filiform, flexuous, most proximal sometimes forked. Flowers staminate 2-3.5 × 2-3 mm, ovoid; calyx c. 1 × 1.5 mm, shallowly lobed, sepals connate nearly in basal 2/3, broadly rounded apically; petals c. 3 × 1.5-2 mm, ovate, connate in basal 1/2, free and erect to slightly recurved apically, acute, nerveless, greenish yellow; stamens c. 2 mm high, filaments yellowish, anthers c. 1.5 mm; pistillode c. 2 mm high, yellowish; pistillate c. 3 × 2 mm, ovoid-globose; calyx c. 1 × 1.5-2 mm, deeply lobed, sepals connate basally, sharply rounded apically; petals 3-3.5 × 2 mm, very broadly ovate, imbricate nearly to apex and there free, erect, acute, yellow-green; staminodes not seen; ovary c. 2 × 2 mm, globose, slightly 3-angled, dark green, stigma lobes slender, recurved, pointed, whitish, well below the petal tips. Fruits 3-6 × 2.5-5 mm, globose, black; seeds c. 2-5 mm diameter, globose. Eophyll pinnate.

Low-to middle-elevation, moist to wet forest and cloud forest, on the Pacific slope. CR (Hodel & Hodel 705A, CR); P (Croat 15904, MO). (200-)500-1600 m. Mesoamérica.

Chamaedorea brachyclada is distinctive in its acaulescent habit, few erect to ascending, long-pinnate leaves with long petioles and pinnae with the proximal margins decurrent on the rachis, and the long-pedunculate, arcuate inflorescences with short, stiff rachillae, the pistillate especially appearing like a bottle brush. It forms a natural group with *C. scheryi*, *C. pygmaea*, *C. stenocarpa*, and *C. undulatifolia*, which share the acaulescent habit, pinnae with decurrent proximal margins, long-pedunculate inflorescences, and pinnate eophylls. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. brachyclada* in subg. *Chamaedoropsis*.

9. *Chamaedorea brachypoda* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 198 (1947). Holotype: Guatemala, *Steyermark 39185* (F!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 129, 131; figs. 51A-C, 52A-B (1992a). N.v.: pacaya (Guatemala).

Cespitose, erect, colonial with very slender rhizomes forming dense clumps 1-2 × 3-4 m. Stems slender, reed-like, 3-5(-7) mm diameter, internodes 5-8 cm. Leaves 5-8, simple and bifid, spreading; sheath to 15 cm, tubular, green, becoming brown, persistent; petiole 5-10 cm; rachis to 10-12 cm; blade to 30 × 22 cm, bifid apically to 1/2 its length, lobes 15-30 × 10-12 cm, short-acuminate, thin-papery, 11-13 primary nerves per side, prominent and keeled adaxially, 1 secondary between each pair of primaries.

Inflorescences infrafoliar, penetrating persistent leaf sheaths, ascending in flower, ascending to spreading in fruit; peduncles to 3-10 cm, ascending; bracts c. 6, to 5 cm, most distal exceeding peduncle, brown; rachises 1-10 cm; rachillae 4-8, stiffly ascending; staminate rachillae 8-15 cm; pistillate c. 6 cm. Flowers staminate in dense spirals but not contiguous in bud, c. 3.5 × 3 mm, obovoid-subglobose; calyx c. 1.5 × 2 mm, lobed, sepals connate in basal 1/2-2/3, broadly rounded-acute apically, nerveless, green; petals c. 3 × 3 mm, broadly ovate to obovate, free and incurved slightly apically, acute, fleshy, nerveless, pale yellow; stamens 1-1.5 mm high, appressed around pistillode, filaments 0.5-0.75 mm, connate basally, anthers 0.5-0.75 mm; pistillode 2.5-3 mm high, just shorter than petals, obovoid-columnar, mostly yellow but truncate apically and there greenish; pistillate c. 3 × 2-2.5 mm, obovoid-globose; calyx 1-1.5 × 2.5 mm, deeply lobed, sepals connate and/or imbricate in basal 1/3-1/2, broadly rounded apically, green; petals 3 × 2-2.5 mm, broadly ovate, imbricate in basal 1/2-2/3, broadly rounded apically and there

free and incurved slightly, acute, fleshy, nerveless, pale yellow; staminodes toothlike; ovary c. 2×2 -2.5 mm, depressed-globose, green, stigma lobes short, recurved, blunt, rounded, clear-colored. Fruits 5-10 mm, curved-ellipsoid, nearly sickle-shaped, black; seeds 4-8 mm, curved-ellipsoid.

Low-elevation, moist to wet forest, on the Atlantic slope. G (Hodel & Castillo-Mont 881, AGUAT); H (Hodel 1487, EAP). 10-150 m. Mesoamérica.

Chamaedorea brachypoda is distinctive in its simple and bifid leaves and rhizomatous habit. It might be confused with *C. stolonifera*, which differs in its stoloniferous as well as rhizomatous habit, thick-textured leaves, flowers with orange, cucullate petals, globose fruits, and higher elevation, limestone habitat. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. brachypoda* in subg. *Chamaedoropsis*.

10. *Chamaedorea carchensis* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 199 (1947). Holotype: Guatemala, *Steyermark 90160* (F!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 131, 133; figs. 52C-E, 53 (1992a) N.v.: unknown.

Solitary, nearly acaulescent, erect or briefly decumbent, to 3 m tall but often flowering when appearing stemless. Stem to 40 cm, 3-5 cm diameter, internodes 1-5 cm, often covered with persistent leaf sheaths, proximal part often very densely ringed, curved, and at or below leaf litter. Leaves 3-4, pinnate, ascending to spreading; sheath 10-30 cm, obliquely long-open, tubular only near base, green, becoming brown, persistent; petiole to 1 m or slightly more, densely and thickly covered with white, waxy, finely powdered, glaucous indument that tends to blacken in wet conditions and weathers away in ragged

patches; rachis 1-1.7 m, with similar indument as petiole; pinnae 15-20 per side, to 50 × 3.5-4 cm, linear-lanceolate, straight, long-acuminate, moderately textured, prominent midrib, 2 primary nerves toward the margin on either side. Inflorescences infrafoliar, penetrating persistent leaf sheaths, erect to ascending in flower, ascending to spreading in fruit; peduncles 35-100 cm, ascending to spreading; bracts 6-8, to 30 cm, most distal not exceeding peduncle, green in flower, brown in fruit; rachises to 25 cm; rachillae 15-40, staminate to 15 cm, attached perpendicularly to rachis drooping distally; pistillate 6-25 cm, stiffly erect, parallel. Flowers staminate seen only in bud, globose, calyx shallowly lobed, sepals membranous, green, petals green; pistillate c. 2 × 2 mm, globose, scarcely sunken; calyx c. 2 mm wide, deeply lobed, thickened in age, sepals imbricate and/or connate in basal 1/4-1/2, rounded apically, obtuse; petals c. 4 mm, round-ovate, imbricate, obtuse, thickened in age. Fruits c. 10 × 9 mm, globose, black.

Middle-elevation, wet forest and cloud forest, on the Atlantic slope. Ch (Breedlove 56205, CAS), G (Hodel & Castillo-Mont 888B, AGUAT). 800-1350 m. Mesoamérica.

Chamaedorea carchensis is distinctive in its nearly acaulescent habit; long, arching to spreading leaves, among the largest in the genus; long-open leaf sheaths tubular only near the base and with a prominently raised costa extending from petiole; petiole and rachis with dense, thick, white, waxy, powdery glaucous indument that quickly turns black; infrafoliar inflorescences branched to one order; and the shallowly lobed staminate calyx. Its large, deeply bifid, V-shaped seedling leaves seem distinctive. A case might be made to include *C. benziei* from adjacent Chiapas, Mexico here, as some have done, but it seems to differ in its well developed, above-ground stem; more numerous and shorter leaves with thick, nearly leathery pinnae; petiole and rachis with only a light, glaucous

bloom; more tubular leaf sheaths; interfoliar inflorescences branched to two orders; substantially more staminate rachillae; and deeply lobed staminate calyx. While the distribution of the two species might be close in Chiapas, *C. carchensis* appears to be restricted to the wet Atlantic slope in the eastern part of the state while *C. benziei* appears to come from slightly drier areas farther to the west closer to the border with Oaxaca and even slightly wrapping around on to the Pacific slope. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. carchensis* in subg. *Chamaedoropsis*.

11. *Chamaedorea castillo-montii* Hodel, *Phytologia* 68(5): 397-400, fig. 1 (1990).

Holotype: Guatemala, *Hodel & Castillo-Mont 868A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 135; figs. 54A-D (1992a). N.v.: unknown.

Solitary, briefly decumbent then erect, to 1 m tall, often flowering when appearing stemless. Stem 1.5-2.5 cm diameter, creeping and rooting along its length, often covered with persistent leaf sheaths proximally, internodes 1.5-2 cm. Leaves 12-15, simple and bifid, infrequently various pinnate, spreading; sheath 10-15 cm, obliquely long-open apically, tubular only in basal 1/4, minutely white-spotted, margins becoming rough and brown; petiole to 30 cm, minutely white-spotted; rachis to 20 cm, grayish; blade to 38 × 27 cm, simple, bifid apically to more than 1/2 its length, lobes acute-acuminate, with 11-13 prominent primary nerves per side, conspicuously elevated, 2 less prominent secondaries between each pair of primaries, outer margins toothed, if pinnate with 2-5 pinnae per side, all except apical pair to 20 × 1.5 cm, linear-lanceolate, falcate, acuminate, a prominent midrib with less prominent secondaries on either side, apical pair

more than twice as broad as others combined, 9-10-nerved. Inflorescences interfoliar, spicate, shorter than leaves; peduncles to 25 cm, ascending in flower, spreading in fruit; bracts c. 5, to 18 cm, most distal exceeding peduncle, green in flower, brown in fruit; staminate with rachis or flower-bearing portion to 30 cm, pendulous; pistillate with rachis or flower-bearing portion to 10 cm, spreading. Flowers staminate in very dense spirals but not contiguous in bud, attaining anthesis first at rachis apex then progressing proximally, 1.5-1.75 × 2 mm, subglobose; calyx 1.25-1.5 × 2-2.5 mm, shallowly lobed, sepals connate in basal 3/4, rounded to truncate apically, tips inflexed forming a flat rim, membranous; petals 2.5-3 × 2.5 mm, ovate, free nearly to base and there briefly connate, rounded apically, fleshy, nerveless, whitish to cream-colored; stamens equaling to slightly exceeding petals, 1.75-2 mm high, filaments large, 1.5-2 × 0.5 mm, broadly columnar, flared basally, anthers 0.5-0.75 mm, ellipsoid, exerted and crowded in a cluster above free petal tips dorsifixed near middle, versatile, sagittate basally; pistillode 1.5-1.75 × 0.75 mm, broadly columnar, flared basally, truncate apically; pistillate c. 1 × 1.75 mm, depressed-globose, sunken about 1/2 in prominent depressions; calyx c. 0.5 × 2 mm, shallowly lobed, sepals connate in basal 3/4, rounded apically, thin, membranous; petals c. 1 × 1.75 mm, deltoid, imbricate in basal 1/2, rounded to acute apically, thin, membranous, whitish; staminodes not seen; ovary 0.75-1 × 0.75-1.5 mm, ovoid-pyramidal, stigma lobes large, fleshy, triangular with a distal longitudinal groove. Fruits c. 13 × 7 mm diameter, ellipsoid but narrowed at both ends, black.

Low- to middle-elevation, wet forest, often on limestone, on the Atlantic slope. G (Hodel & Castillo-Mont 868B, AGUAT). 600-1000 m. Mesoamérica.

Endemic to Guatemala, the rarely collected *Chamaedorea castillo-montii* is distinctive in its mostly simple and bifid leaves with prominently elevated nerves, spicate inflorescences, and densely crowded but not contiguous staminate flowers with apically free and spreading petals. It shares these features with *C. robertii* from Costa Rica and Panama but this latter species can be distinguished by its narrower and longer leaf blade bifid apically to no more than half its length with more narrowly divergent lobes, green-tinted staminate flowers, and ring-like calyxes. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. castillo-montii* in subg. *Chamaedoropsis*.

12. *Chamaedorea cataractarum* Mart., *Hist. Nat. Palm.* 3(9): 309 (1849). Holotype: Mexico, *Lienmann s.n.* (some sheets later renumbered *10808*) (C!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 23, 255; figs. 5A, 114A-E. N.v.: guayita de los arroyos (Ch). *Chamaedorea atrovirens* Hort. in Kerch., *Chamaedorea flexuosa* Hort. in H. Wendl., *Chamaedorea lindeniana* Hort. in H. Wendl., *Chamaedorea martiana* H. Wendl., *Encheila transversa* O. F. Cook, *Nunnezharia cataractarum* Kuntze, *Nunnezharia flexuosa* (Hort.) Kuntze, *Nunnezharia martiana* (H. Wendl.) Kuntze, *Stachyophorbe cataractarum* (Mart.) Klotzsch, *Stephanostachys martiana* (H. Wendl.) Oerst., *Vadia atrovirens* (Hort.) O. F. Cook, *Vadia jotolana* O. F. Cook.

Cespitose, creeping, appearing stemless, forming dense clumps to 2 × 3 m. Stems 2-4 cm diameter, short-creeping, dichotomously branched, prominently ringed, internodes short, less than 1 cm. Leaves 4-5, pinnate, erect-arching; sheath c. 20 cm, briefly tubular only at base, obliquely long-open apically; petiole to 45 cm, flexible; rachis c. 1 m, flexible;

pinnae 13-20 per side, to 30×2.5 cm, linear-lanceolate, straight, briefly decurrent at base, tilted off rachis, long-acuminate, flexible, prominent midrib and 1 prominent primary nerve on either side. Inflorescences interfoliar, sometimes infrafoliar in fruit, arising from base, erect in flower to ascending in fruit; staminate many-branched and ascending-drooping, pistillate spicate or bifurcate and ascending in flower, spreading in fruit, solitary; peduncles 50-70 cm, erect to ascending; bracts 6-7, to 28 cm, most distal typically exceeding peduncle, green in flower, brown and disintegrating in fruit; staminate rachis 3-8 cm; pistillate rachis to 7 cm; staminate rachillae 6-15, 7-12 cm, drooping; pistillate rachillae up to 10, rarely spicate, to 15 cm, erect in flower, spreading in fruit. Flowers staminate contiguous, even in bud, c. 2×2.5 -3 mm, depressed-globose, irregularly angled or shaped by mutual pressure; calyx low, ring-like, scarcely lobed, sepals connate nearly to apex, rounded, pale yellow nearly white; petals c. 2×2.5 mm, broadly ovate, slightly cupped, connate basally, free and spreading and rounded to truncate apically, yellowish tinged with green apically; stamens c. 2 mm high, just shorter than petals, filaments prominent, anthers c. 0.5 mm; pistillode c. 2 mm high, c. equaling stamens and petals, columnar, briefly 3-lobed apically; pistillate close but not contiguous, c. 2.5×3 mm, hemispherical or strongly depressed-globose; calyx 0.3 - 0.5×3 mm, ring-like, scarcely lobed, sepals connate nearly to apex and there rounded; petals 2 - 3×4 mm, triangular, imbricate nearly to apex, cupped, yellowish; staminodes not seen; ovary c. 2×3 mm, depressed-globose, light yellow, stigma lobes short but exerted well beyond petals, pointed, recurved. Fruits c. 10×6 -8 mm, ovoid-oblong, black with slight glaucous bloom.

Low- to middle-elevation, moist to wet forest, on the Atlantic slope, in rivers and streams.

Ch (*Hodel & Hodel 923*, MEXU); T (*Schulz s. n.*, BH). 300-1000 m. Mesoamérica, Mexico (Oaxaca).

Endemic to Mexico and the only known rheophyte in the genus, *Chamaedorea cataractarum* is restricted to rivers and streams where it inhabits rocky banks and cataracts and is occasionally wholly or partially or submerged with strongly flowing water during periods of heavy rain. Its low, mostly stemless, shrubby, clumping habit; flexible, dark green leaves; contiguous staminate flowers; and rheophytic habitat easily distinguish this species. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. cataractarum* in subg. *Stephanostachys*.

13. *Chamaedorea chazdoniae* Hodel *Principes (Palms)* 35: 73-75, figs. 6-7 (1991)

‘*chazdonii*’. Holotype: Costa Rica, *Chazdon 205* (CR!). Illustr.: unknown. N.v.: unknown.

Solitary, decumbent then briefly erect, to 1 m tall. Stem 7 mm diameter, internodes to 4 cm, rooting along its length. Leaves 4-5, pinnate, less frequently simple and bifid, spreading; sheath to 7 cm, tubular, green; petiole to 7 cm; rachis to 7 cm; pinnae 2 per side, apical pair largest, to 18 × 5 cm, broadly lanceolate, slightly sigmoid, acuminate, 5-6 prominent primary nerves, 1 secondary between each pair of primaries, basal pair to 13 × 2.5 cm, 1-2 prominent primary nerves, 1-2 secondaries between each pair of primaries, if blade simple to 20 × 16 cm, deeply bifid apically to 3/4 its length, lobes c. 18 × 5 cm, broadly diverging, 5-7 prominent nerves per side. Inflorescences interfoliar, perhaps infrafoliar in fruit; peduncles to 15 cm, erect; bracts 4-5, to 7 cm, thin, green becoming

brown and tattered; rachises short or nearly lacking; staminate rachillae 5-10, to 11 cm, spreading; pistillate furcate or with 3 rachillae, to 8 cm, erect. Flowers staminate c. 2×2 mm, ovoid, narrowing to 1 mm wide at apex; calyx c. 0.5×2 mm, lobed, sepals connate in basal $1/2$ - $3/4$, broadly rounded apically, membranous; petals c. 2×2 - 2.5 mm, deltoid, free to base, erect, acute to slightly rounded, cream-colored; stamens short, filaments short or nearly lacking, anthers ellipsoid; pistillode 1.25-1.75 mm high, columnar, reddish and slightly lobed apically; pistillate c. 2×1.5 mm, ovoid; calyx c. 0.5×1.5 mm, scarcely lobed, sepals connate nearly to apex and there truncate; petals c. 1.75×2 mm, imbricate basally, acute to rounded apically; staminodes present; ovary 1.75 - 2×1.5 mm, ovoid, green, stigma lobes short, recurved, flat, darkened. Fruits 8-10 mm diameter, globose, black.

Low- to middle-elevation, wet forest, on the Atlantic slope. CR (Chazdon 200, CR). 700-1100 m. Mesoamérica.

Endemic to Costa Rica, some have treated *Chamaedorea chazdoniae* as a form of the unusually variable *C. dammeriana* but the latter species can be distinguished by its larger, erect habit; more numerous leaves with more nerves; pendulous staminate rachillae; densely placed and globose staminate flowers with a prominent calyx and stamens equaling the pistillode; and ovoid fruits distinctly narrowed at both ends. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. chazdoniae* in subg. *Chamaedoropsis*.

14. *Chamaedorea correae* Hodel & N. W. Uhl, *Principes (Palms)* 34: 125-126, figs. 6-7 (1990). Holotype: Panama, *Knapp & Dressler 3801* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: p. 137; figs. 55A-F (1992a). N.v.: unknown.

Solitary, decumbent then briefly erect, the prostrate portion longer than the erect portion, to 1 m tall. Stem 2-3 m long, 5-10 mm diameter, internodes to 5-10 cm, rooting along its length. Leaves 4-5, simple and bifid, less frequently pinnate, erect-spreading; sheath to 15 cm, tubular; petiole to 10 cm, gray-green; rachis 5-15 cm, gray-green adaxially; rachis, petiole and distal part of sheath minutely white-spotted; blade 15-25 × 20-30 cm, bifid apically to 3/4 its length, lobes broadly divergent, 15-25 × 4-12 cm, lanceolate, sigmoid, thick and leathery, acuminate, grayish green, outer margins toothed distally, 8-10 primary nerves per side, sometimes a pair of small basal pinnae present, these 8-12 × 1.5-3 cm, lanceolate, sigmoid, acuminate, 2-3 prominent primary nerves. Inflorescences infrafoliar, held well below the leaves on bare stem; peduncles 10-15 cm, erect, spreading when heavily laden with fruit; bracts 5-6, to 10 cm, abruptly flared apically, most distal not exceeding peduncle; staminate with 2-3 rachillae, rarely spicate, 15-20 cm; pistillate spicate, less often furcate, 15-20 cm. Flowers staminate densely arranged but not contiguous, c. 2.5 × 2.5 mm, subglobose; calyx 2.5-3 mm wide, shallowly to moderately lobed, sepals connate in basal 1/2-3/4, broadly rounded apically, membranous; petals 2-2.5 × 2.5 mm, rounded-triangular, free nearly to base and there briefly connate, spreading apically, acute, obscurely nerved, greenish yellow to yellow; stamens short, filaments short or nearly lacking, anthers 0.75-1.25 mm, appressed against base of pistillode; pistillode 1.5-2 mm high, columnar, broadly lobed apically, flared basally and there adnate to filaments, green or yellowish; pistillate densely arranged but not contiguous, c.

2 × 2 mm, ovoid-globose; calyx 1-1.25 × 2.5 mm, deeply lobed, sepals connate in basal 1/4, fleshy, green; petals 2-2.5 × 2 mm, long-triangular, imbricate basally, spreading apically and there acute; staminodes not seen; ovary 2-2.5 × 2 mm, ovoid, globose, pale or greenish, stigma lobes short, recurved, flat, pointed. Fruits 5-8 mm, ellipsoid-globose, black.

Low- and middle-elevation, moist to wet forest and cloud forest, on the Atlantic slope, often at or near the Continental divide. P (Hodel et al. 1113, PMA). (30-)400-1400 m.

Mesoamérica.

Endemic to Panama and somewhat variable in leaf dissection, *Chamaedorea correae* is still distinctive in its decumbent stem rooting at the nodes, thick, more or less leathery, gray-green leaves, and inflorescences held well below the leaves on bare stem. It sometimes inhabits wind-swept, elfin cloud forest at or near the Continental Divide. It is similar to *C. guntheriana*, another Panamanian endemic, which shares the decumbent habit, gray-green leaves, inflorescences held well below the leaves on bare stem, and wind-swept, elfin cloud forest habitat. However, this latter species differs in its smaller leaves with more narrowly diverging lobes or pinnae, shorter peduncles, and the flowers attaining anthesis in a markedly progressive manner proximally to distally along the rachis or rachilla. Another similar species is *C. chazdoniae* but it can be distinguished by its thinner textured, green leaves with fewer nerves, green petioles, and spreading staminate rachillae with cream-colored flowers. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. correae* in subg. *Chamaedoropsis*.

15. *Chamaedorea costaricana* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren.*

Kjobenhavn 1858(1-4): 19 (1859) '*costaricanas*'. Holotype: Costa Rica, *Oersted s.n.*

(later numbered 6543) (C!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 27, 139, 141, 143,

187, 189; figs. 6D, 56A-B, 57A-D, 58A-B; and 80, 81 A-D (as *C. quezalteca*) (1992a).

N.v.: tenera, chicuilote (Guatemala), pacaya (Costa Rica).

Chamaedorea biolleyi Guillaum., *Chamaedorea linearia* L. H. Bailey, *Chamaedorea*

inaequilateralis H. Wendl. ex Dammer, *Chamaedorea seibertii* L. H. Bailey,

Chamaedorea quezalteca Standl. & Steyerl., *Legnea lacianata* O. F. Cook *nom. illeg.*,

Nunnezharia costaricana (Oerst.) Kuntze, *Omanthe costaricana* O. F. Cook *nom. illeg.*

Cespitose by means of short, creeping horizontal stems with congested nodes at or near ground level, forming erect to leaning and sometimes decumbent clumps 3-8 × 2-9 m.

Stems 1-6 cm diameter, internodes 5-30 cm, sometimes with a slight glaucous bloom.

Leaves 3-6 pinnate, ascending to spreading; sheath 20-50(-100) cm, tubular, persistent,

with a triangular to lanceolate, fibrous ligule 2-10 cm at the apex on either side of petiole;

petiole (3.5-)8.5-44 cm; rachis (35-)45-125(-170) cm; pinnae 16-20(-33) per side, (10-

)19-45(-63) × 1.1-5 cm, linear-lanceolate to lanceolate, straight or slightly sigmoid or

falcate, long-acuminate, a prominent midrib with 2 prominent primary nerves on either

side, 2 secondaries between each pair of primaries. Inflorescences infrafoliar, erect-

spreading; peduncles 7.5-45(-57) cm, erect-spreading; bracts 5-8, brown, tattered, and

shredded, most distal exceeding peduncle; rachises 2-25(-35) cm; rachillae 4-30(-65),

staminate 6-30 cm, pendulous; pistillate 5-32 cm, spreading. Flowers staminate 2.5-4 ×

2.5-4 mm, ellipsoid to depressed- or ovoid-globose, aromatic; calyx 0.5-1 × 2-2.5 mm,

deeply lobed, sepals connate and/or imbricate briefly at base, broadly rounded to truncate

apically, yellowish to creamy-yellow to orange-yellow aging to brownish orange; petals 2-4 × 2.5-4 mm, ovate to broadly ovate or triangular, free nearly to base, spreading apically but slightly incurved, acute, fleshy, indistinctly nerved, greenish yellow to yellow aging brownish orange; stamens 1-1.5 mm high, filaments short or lacking, anthers 1-1.5 mm; pistillode to 2-3 mm high, columnar to barrel-shaped, tapered apically, pale yellow to yellow with a 3-grooved greenish cap; pistillate 2-3.5 × 2-4 mm, ovoid-globose to depressed-globose; calyx c. 1 × 2-3 mm, variable, shallowly to deeply lobed, sepals connate and/or imbricate briefly basally or in basal 3/4, broadly rounded to truncate apically, light green; petals c. 3 × 2.5-4 mm, broadly triangular to triangular, imbricate nearly to apex and there free, erect, acute, yellow; staminodes short, whitish; ovary to 2-3 × 2-2.5 mm, depressed-obovoid, green apically, stigma lobes short, recurved, thickened. Fruits 7-10 mm diameter, globose to subglobose, black; seeds 6-8 mm diameter, globose, brownish, endocarp with distinctive s-shaped grooves.

Low- to high-elevation, moist to wet forest and cloud forest, sometimes on limestone, on the Atlantic and Pacific slopes. Ch (Matuda 1929, MEXU); G (Hodel & Castillo-Mont 895, AGUAT); H (Hodel et al. 1268, EAP); ES (Standley 20137, F); N (Standley 8384, F); CR (Hodel & Hodel 693A, CR); P (Hodel & Hodel 736A, PMA). 500-2350 m.

Mesoamérica.

Although a variable species across its wide range, especially in overall size and size of various organs, including flowers, *Chamaedorea costaricana* is, nonetheless, rather distinctive in its cespitose habit, long-pinnate leaves, pinnae with a midrib and two prominent primary nerves on either side, and especially the leaf sheath with a typically conspicuous auricle-like appendage or ligule at the apex on either side of the petiole.

Indeed, the ligule at the apex of the leaf sheath is by itself diagnostic for this species. The ligules range from one to ten cm long and are lanceolate and somewhat membranous in their distal parts, which sometimes disintegrates, leaving only a short, triangular base. Ligules on plants from Panama to Honduras tend to range from one to five cm long while those on plants from El Salvador to Mexico tend to range from five to 10 cm long; the latter plants with exceptionally long ligules from the northern range of Mesoamerica were once referred to as *C. quezalteca*. *Chamaedorea pochutlensis*, a Mexican endemic ranging from Chiapas north to Durango and Sinaloa is of similar habit and leaf but differs in the lack of ligules at the apex of the leaf sheath and the pinnae with only a midrib conspicuous and one submarginal primary nerve on either side. Large forms of *C. costaricana* with robust stems from Costa Rica and Panama have been confused with *C. woodsoniana*, which ranges from Mexico to Panama yet is apparently absent from Costa Rica; this latter species differs in its solitary habit and lack of ligules at the leaf sheath apex. *Chamaedorea costaricana* is strangely absent from Belize but it would not be surprising to find it there. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. costaricana* in subg. *Chamaedoropsis*.

16. *Chamaedorea crucensis* Hodel, *Principes (Palms)* 34(4): 166-168, f. 7 (1990).

Holotype: Costa Rica, *Hodel & Hodel 706A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 257; fig. 115A (1992a). N.v.: unknown.

Chamaedorea coralliformis Hodel.

Solitary, 0.75-3 m tall, rarely decumbent. Stem 1-2.5 cm diameter, prominently ringed, internodes 4-8 cm, often with prominent brown prop roots 10-15 cm high basally. Leaves

4-8, pinnate, erect-spreading; sheath to 30 cm, tubular in basal half, obliquely open and distinctly pale-margined apically; petiole (15-)28-65 cm; rachis 35-95 cm, with a distinct yellow band abaxially extending on to petiole and sheath; pinnae 6-13 per side, to 19-37 × 1.5-6.5 cm, lanceolate, mostly straight, only slightly sigmoid or falcate, long-acuminate, glossy, 7-9 prominent primary nerves, apical pair of pinnae often wider and with more nerves. Inflorescences interfoliar but often infrafoliar in fruit, staminate ascending-drooping, pistillate spreading to drooping in fruit, spicate, solitary; peduncles (11-)18-43 cm, ascending to spreading; bracts 4-6, to 15 cm, most distal typically exceeding peduncle, green to brown in flower, brown and disintegrating in fruit; staminate rachis or rachilla 10-35 cm, pendulous; pistillate rachis or rachilla (4.5-)6-15 cm, stiff, straight in flower, drooping when heavily laden with fruit. Flowers staminate contiguous, even in bud, 3-5 × 2.5-3 mm, ovoid, irregularly angled or shaped by mutual pressure; calyx prominent, c. 3 × 2.5-3 mm, deeply lobed, sepals distinct, more than 2× as long as wide, c. 3/4 as long as petals, narrowly ligulate to oblanceolate, connate in basal 1/3, rounded to truncate apically and margins thickened; petals c. 3.5 × 2.25 mm, ovate, free to base, spreading, rounded-acute and erect apically and slightly inflexed, nerveless, cream-colored to faintly yellow; stamens prominent, c. 4.5 mm high, filaments c. 4 × 0.75 mm, stout, curved apically, anthers c. 1 × 0.5 mm, borne at tips of filaments and exerted above petals and forming a stellate pattern on flower; pistillode c. 2.5 × 0.5 mm, shorter than anthers, columnar; pistillate contiguous, even in bud, 2.5-3.5 × 2.5 mm, depressed-globose to dome-shaped; calyx prominent, c. 1.5 × 2.5 mm, ring-like sheath, unlobed or only slightly notched, sepals connate to apex, truncate apically, membranous; petals not seen at anthesis, imbricate, hooded, faintly yellow; staminodes lacking; ovary c. 2 × 2

mm, globose. Fruits 7-13 × 5-9 mm, densely packed, obovoid-obpyramidal but angled from mutual pressure, rounded apically, coarsely echinulate, orange-red; seeds 5-7 mm in diameter, obovoid to globose but angled from mutual pressure, brown.

Middle- to high-elevation, moist to wet forest, on the Pacific slope. CR (Hodel & Hodel 706B, CR). (1150-)1500-2300 m. Mesoamérica.

Endemic to Costa Rica, *Chamaedorea crucensis* is distinctive in its solitary, mostly spicate inflorescences; cream-colored to faintly yellow, contiguous staminate and pistillate flowers; and coarsely echinulate, mature ripe orange-red fruits. Similar species include *C. allenii*, which differs in its bright yellow staminate and pistillate flowers and echinulate, mature ripe black fruits; *C. hodelii*, which differs in its smooth, mature ripe black fruits; and *C. zamorae*, which differs in its smooth, mature ripe fruits. In Hodel (1992a), I captioned figures 115A-E as *C. crucensis* because I had a broad concept of this species. Since then, another species, *C. hodelii*, was named from material that I had included in *C. crucensis* (Grayum 1998) and figures 115B-E in Hodel (1992a) depict *C. hodelii* (which see). *Chamaedorea crucensis* appears restricted to southwestern Costa Rica but strangely has not yet been collected in adjacent Panama. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. crucensis* in subg. *Stephanostachys*.

17. *Chamaedorea dammeriana* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 737-738 (1933). Lectotype (designated here): Costa Rica, *Koschny s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*: p. 143; figs. 58C-D (1992a). N.v.: sirik, palma bonita (Costa Rica).

Chamaedorea variabilis H. Wendl. ex Burret, *Chamaedorea wedeliana* L. H. Bailey.

Solitary, erect, infrequently decumbent, to 2(-3.5) m tall. Stem 0.7-1(-2) cm diameter, internodes to 10 cm. Leaves 10-15, variously pinnate to less frequently simple and bifid, spreading; sheath to 15 cm, tubular; petiole (2-)10-20 cm; rachis (2.5-)4-30 cm; pinnae 2-7 per side, 7.5-23 × 0.8-5.3 cm, oblong-lanceolate, sigmoid, acuminate, a midrib and 2-3 prominent primary nerves on either side, sometimes apical pair of pinnae unusually broad, to 15 cm wide, if simple and bifid 14-39(-44) × 8-24 cm, bifid apically to 1/2-2/3 its length, obovate to deltate, outer margins toothed distally, 5-10-nerved. Inflorescences interfoliar, sometimes infrafoliar in fruit, erect in flower to spreading in fruit; peduncles 15-38 cm, ascending in flower, nodding in fruit; bracts 5, to 10 cm long, most distal not exceeding peduncle, green in flower, brown in fruit; staminate with rachis 1-5(-7.5) cm; rachillae 2-10, 12-33 cm, pendulous; pistillate rachis (0-)1.5-3.2 cm; rachillae or flower-bearing portion 1-3(-5), 8-26 cm, erect, straight, spreading to nodding in fruit. Flowers staminate in very dense spirals but not contiguous, 1.5-2 × 2-2.5 mm, depressed-globose; calyx c. 0.5 × 2-2.5 mm, prominent, deeply lobed, sepals connate in basal ¼, rounded apically, membranous; petals 1.75 × 1.75 mm, ovate, free nearly to base, acute, nerveless or indistinctly nerved, cream-colored to greenish yellow; stamens c. 1 mm high, equaling pistillode, filaments short, flared basally, anthers oval; pistillode 1-1.25 mm high, broadly columnar; pistillate 1.75-2.5 mm high; calyx lobed; petals imbricate, rounded apically, cream-colored. Fruits 7-18 × 4-9 mm, subglobose to ovoid or fusiform, sometimes narrowed at both ends.

Low- to middle-elevation, moist to wet forest, on the Atlantic and Pacific slopes. CR

(Hodel 954B, CR); P (von Wedel 719, MO). 0-1400 m. Mesoamérica.

Widespread in Costa Rica but much less so in Panama, *Chamaedorea dammeriana* is extremely variable in leaf dissection, from simple and bid to pinnate with up to seven pinnae per side (even in the same population), and quantity of rachilla, from spicate up to six rachillae. The remarkably leaf crown can hold up to 15 green, living leaves. A combination of characters, including the small, solitary habit; unusually leaf crown; spicate or few-branched inflorescences, the pistillate with erect rachillae; smallish staminate flowers; and ellipsoid fruits, can distinguish *C. dammeriana*. As some have done, the poorly known *C. chazdoniae* might be considered a form of *C. dammeriana* but the former species can be distinguished by its smaller, always decumbent habit; much less numerous leaves with fewer nerves; spreading staminate rachillae; laxly placed, ovoid staminate flowers with a low, membranous calyx and stamens shorter than the pistillode; and globose fruits. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. dammeriana* in subg.

Chamaedoropsis.

18. *Chamaedorea deckeriana* (Klotzsch) Hemsl., *Biol. Cent.-Amer.*, Bot. 3(18): 404 (1885). *Stachyphorbe deckeriana* Klotzsch, Allg. Gartenzeitung 20(46): 364 (1852). Holotype: Cultivated in Europe from material collected in "Guatemala," *Klotzsch s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 259, 261, 270; figs. 111, 112A-D, 122B-C (as *C. zamorae*) (1992a). N.v.: unknown.

Dasystachys deckeriana (Klotzsch) Oerst., *Morenia deckeriana* (Klotzsch) hort.,

Nunnezharia deckeriana (Klotzsch) Kuntze.

Solitary, to 2 m tall although sometimes flowering when appearing stemless, sometimes decumbent. Stem 1-3 cm diameter, prominently ringed, internodes 2-5 cm. Leaves 3-8, mostly simple and bifid, infrequently variously pinnate, spreading; sheath 15-25 cm, tubular in basal 1/2-2/3, obliquely long-open apically; petiole 7-32 cm; rachis 25-40 cm; blade 36-86 × 18-36 cm, obovate, bifid apically 1/2-3/5 its length, lobes broadly lanceolate, lower margins of blade narrowly decurrent on to petiole, (11-)15-26 prominent primary nerves per lobe, outer margins toothed, if pinnate then pinnae 5-9 per side, to 25-35 × 2-3 cm, lanceolate, slightly sigmoid or falcate, acuminate, glossy, prominent midrib and 1 primary nerve on either side, apical pair typically much wider, 10-15 cm wide, 20-35 prominent nerves on each side. Inflorescences interfoliar or sometimes infrafoliar in fruit, spicate, staminate 4-10 per node, ascending-drooping, pistillate solitary, ascending in flower, spreading to drooping in fruit; peduncles 7.5-50 cm, ascending to spreading; bracts 4-5, to 20 cm, most distal typically apically inflated and exceeding peduncle, green in flower, brown and disintegrating in fruit; staminate rachis or rachilla 5-10 cm, ascending to spreading; pistillate rachis or rachillae 5-15 cm, stiff, straight, ascending in flower, curved to drooping when heavily laden with fruit. Flowers staminate contiguous, even in bud, 1.5-2 × 2.5-3 mm, depressed-globose, 6-angled by mutual pressure, distinct spicy-anise aroma or fragrance; calyx well developed, 1-1.5 × 3 mm, lobed, sepals connate basally, rounded apically, membranous; petals variable in width, 1-2 mm wide, from mutual packing, typically 2 wider and 1 narrower per flower and then sometimes slightly imbricate apically, erect for 1.5 mm then abruptly inflexed and tapering to flat pointed tips, tips of adjacent petals closely appressed in bud, opening as slits through which anthers are exerted at anthesis, thick, fleshy, green;

stamens with filaments c. 1×0.75 mm, flattened, fleshy, tapering abruptly apically, anthers c. 0.75×0.3 mm, exerted between petal slits on distal flat top of flower; pistillode c. 1.5 mm, high, columnar, fleshy, distinctly 3-lobed, rounded tip exposed in center of floral orifice at anthesis; pistillate contiguous, even in bud, c. 3×3 mm, depressed-globose, angled by mutual pressure of close packing; calyx c. $1 \times 2.5-3$ mm, shallowly lobed, sepals connate nearly to apex, broadly rounded apically; petals c. 2×2.5 mm, subreniform, imbricate, tips inflexed to 1 mm, rounded to truncate apically, green at anthesis aging to greenish yellow; staminodes unknown; ovary c. 3×2.5 mm, ovoid, 3-sided, greenish, stigma lobes 1 mm, exerted well beyond petals, erect, pale green to light yellow. Fruits $6-15 \times 5-10$ mm, densely packed, obovoid-globose but angled from mutual pressure, smooth, red-orange; seeds c. 10×7 mm, obovoid, angled from mutual pressure, brown.

Low-elevation, moist to wet forest, on the Atlantic slope. N (Neil 3415, MO); CR (Hodel & Hodel 717, CR); P (Croat & Grayum 60097A, MO). 0-1300 m. Mesoamérica.

Chamaedorea deckeriana is distinctive in its mostly simple and bifid leaves; spicate inflorescences, the staminate in multiples at a node; green, contiguous staminate and pistillate flowers; and smooth, mature ripe red fruits. Similar species, all with solitary staminate inflorescences, include *C. allenii*, which differs in its bright yellow flowers and echinulate fruits; *C. crucensis*, which differs in its cream-colored to yellow flowers and coarsely echinulate fruits; *C. hodelii*, which differs in its yellow to whitish flowers and mature ripe, black fruits; and *C. zamorae*, which differs in its cream-colored to yellow flowers. Flowers of *C. deckeriana* emit a distinctive fragrance best described as spicy-anise, conjuring up images of a deep, dark, primeval rain forest, just the sort of habitat in

which it occurs. In Hodel (1992a) I captioned figures 122B-C as *C. zamorae* but they depict a rare, pinnate-leaved form of *C. deckeriana*. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. deckeriana* in subg. *Stephanostachys*.

19. *Chamaedorea deneversiana* Grayum & Hodel, *Principes (Palms)* 35: 133, figs. 1-2 (1991). Holotype: Panama, *de Nevers et al.* 5553A (MO!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 145, 147; figs. 59, 60A-D (1992a). N.v.: unknown.

Solitary, erect to decumbent, to 3 m tall or long. Stem 1.3-1.6 cm diameter, often creeping and through adjacent vegetation, internodes 5-12 cm, rooting along its length. Leaves c. 4, simple and bifid, spreading; sheath 19-26 cm, tubular, briefly obliquely open apically; petiole 15-45 cm, rough and gray-green abaxially; rachis 35-60 cm, gray-green, rough abaxially; blade to 50-80 × 12-25 cm, oblong, bifid apically 1/5-1/4 its length, lobes acuminate, bright glossy green, 20-24 prominent primary nerves per side, outer margin coarsely toothed toward apex. Inflorescences infrafoliar, borne well below the leaves on bare stem, erect-ascending; staminate peduncle c. 40 cm, erect-ascending; pistillate peduncle 18-60 cm erect-ascending; bracts 5-6; staminate rachis to 2.5 cm; pistillate rachis 2-3 cm; staminate rachillae c. 10, 25-33 cm, drooping; pistillate rachillae 3-6, 10-30 cm, drooping. Flowers staminate prior to anthesis, 1.1-1.3 × 1.8-1.9 mm; calyx 0.3-0.4 mm high, moderately lobed, sepals connate in basal 1/2; petals apparently free at anthesis, nerveless or nearly so; stamens with anthers 0.6 mm, reniform; pistillode 0.4 mm high, stout, anvil-shaped; pistillate 2.2-2.5 mm, suburceolate; calyx 0.5-0.6 × 2.5-2.8 mm, lobed, sepals connate and/or imbricate basally, nerved; obscurely nerved abaxially,

15-nerved adaxially, constricted basally where connate in a tube 0.2-0.3 mm high; staminodes not seen; ovary 1.5-1.9 mm high, stigma lobes short, distinct. Fruits 6.8-7.5 × 5.6-5.8 mm, broadly ellipsoid, green to yellow (presumably immature, likely black when mature).

Low- to middle-elevation, wet forest, on the Atlantic slope. P (Hodel et al. 1114, PMA).

600-1800 m. Mesoamérica. Ecuador.

Rarely collected, *Chamaedorea deneversiana* is distinctive in its large, simple and bifid leaves with rough, grayish green petioles and grayish green rachis and erect to ascending, long-pedunculate inflorescences borne well below the leaves on bare stem. In habit and inflorescences, it is much like a simple-leaved form of *C. lucidifrons*. However, in addition to its pinnate leaves, the latter species can be distinguished its smooth, green petioles and green leaf rachis. By virtue of its large, mostly simple and bifid leaves, *C. deckeriana* might also be confused with *C. deneversiana* but it differs in its green petiole and leaf rachis and spicate inflorescences. Further study might show that *C. deneversiana* extends into Costa Rica and that the Ecuadorian population might be a different species, such as simple-leaved form of *C. pinnatifrons*. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. deneversiana* in subg. *Chamaedoropsis*.

20. *Chamaedorea elatior* Mart., *Linnaea* 5: 205 (1830. Holotype: Mexico. Veracruz, *Schiede s.n.* (M!). Illustr.: Hodel, *Chamaedorea Palms*: p. 63; figs. 18A-F (1992a). N.v.: cola de gullo, junco, junco de bejuco, tepejilote, tepejilotillo (Mexico).

Anothea scandens O. F. Cook *nom. illeg.*, *Chamaedorea affinis* Liebm., *Chamaedorea bambusoides* Gerome, *Chamaedorea bambusoides* var. *graminifolia* Gerome, *Chamaedorea bambusoides* var. *juncea* Gerome, *Chamaedorea desmoncoides* H. Wendl., *Chamaedorea elatior* var. *bambusoides* H. Wendl. ex Dammer, *Chamaedorea elatior* var. *desmoncoides* (H. Wendl. ex Dammer, *Chamaedorea galeottiana* H. Wendl. ex Dammer, *Chamaedorea montana* Liebm., *Chamaedorea regia* hort. in H. Wendl., *Chamaedorea repens* hort. in Wendl., *Chamaedorea resimpia* hort., *Chamaedorea resinifera* H. Wendl., *Chamaedorea robusta* hort. in H. Wendl., *Chamaedorea scandens* Liebm. Not hort., *Chamaedorea scandens* var. *bambusoides* (H. Wendl.) ex Dammer, *Chamaedorea scandens* var. *desmoncoides* H. Wendl. ex Dammer, *Nunnezharia affinis* (Liebm.) Kuntze, *Nunnezharia elatior* (Mart.) Kuntze, *Nunnezharia desmoncoides* (H. Wendl.) Kuntze, *Nunnezharia oaxacensis* Kuntze, *Nunnezharia regia* (hort.) Kuntze, *Nunnezharia repens* (hort.) Kuntze, *Nunnezharia resinifera* (H. Wendl.) Kuntze, *Nunnezharia robusta* (hort.) Kuntze, *Platythea graminea* O. F. Cook *nom. illeg.*

Solitary or infrequently cespitose and then often branching up to a meter or more above ground, sprawling on ground or scandent on adjacent vegetation, to 20 m or more. Stems 0.8-2 cm diameter, internodes 10-30 cm. Leaves 5-15, often initially simple and bifid when young then becoming pinnate but infrequently flowering and fruiting when simple and bifid, ascending, spreading, arching; sheath to 60 cm, tubular, thick, durable, initially green but aging brown, persistent; petiole 0-30 cm; rachis 0.5-1.5 m; pinnae 10-35 per side, 20-45 × 2-5 cm, mostly lanceolate, sometimes linear-lanceolate, narrowed markedly at base and apex so margins not parallel, alternate proximally, opposite and progressively more downward-pointing and reflexed and hooklike distally and there strongly indurate-

calloused at the very narrow base, prominent midrib and numerous but inconspicuous nerves of lesser orders on either side; if blade simple and bifid $1-1.5 \times 0.35$ m, narrowly long-obovate, cuneate, deeply bifid apically to $1/4-1/2$ its length, thick, dark green, tips of lobes caudate, c. 20 prominent primary nerves per side. Inflorescences interfoliar, often breaking through subtending sheath, erect-spreading; peduncles 10-20 cm; bracts 3-7, to 15 cm, most concealed by subtending sheath, most distal exceeding peduncle, loosely sheathing, thick-papery, durable, green but rapidly becoming brown in flower; rachis 5-25 cm; rachillae up to 35, to 30 cm, spreading. Flowers staminate c. $4 \times 3.5-4$ mm, globose but depressed apically, strongly and nearly overpoweringly aromatic; calyx c. 1×2.5 mm, shallowly lobed, sepals connate nearly to apex and there broadly truncate, nerveless, green; petals $3.5-4 \times 2.5-3.5$ mm, obovate, connate apically and there adnate to the pistillode and corolla opening by lateral slits, slightly fleshy, nerveless, bright yellow; stamens c. 3 mm high, slightly exceeding pistillode, filaments c. 1.5 mm, anthers 1.5-2 mm, white; pistillode 2.5-3 mm high, columnar, swollen and truncate apically, greenish; pistillate $2.5-3 \times 2.5-3$ mm, globose; calyx $1-1.25 \times 2.5$ mm, deeply lobed, sepals connate and/or slight imbricate basally, broadly rounded apically, lightly nerved adaxially, green; petals c. 2.5×2.5 mm, bowl-shaped, imbricate in basal $3/4$, acute apically, fleshy, nerveless, yellow; staminodes not seen; ovary c. $1.5 \times 1.5-1.75$ mm, globose, green, stigma distinct, recurved. Fruits 8-11 mm diameter, globose, black; seeds 6-7 mm diameter, globose.

Low- to middle-elevation, moist to wet forest, sometimes on limestone, on the Atlantic slope. Ch (Breedlove 21860, RSA); G (Cook 167, F); H (Hodel et al. 1470, MO). 100-1900 m. Mexico (Oaxaca, Puebla, Veracruz), Mesoamérica.

As one of only two climbing, vinelike member of the genus, *Chamaedorea elatior* is unusually variable but distinctive and readily and easily identified by its climbing habit and mostly lanceolate pinnae, the latter character distinguishing it from the other climbing species, *C. tacanensis*. *Chamaedorea tacanensis* also differs in its larger stems (5.2-8.4 cm diam. vs. 1.5-2 cm diam.), pinnate seedlings and juveniles, glaucous emerging petiole, longer leaf rachis (1.6-2.5 m vs. 0.5-1.5 m), more numerous pinnae (42-60 vs. 10-35 per side) with mostly parallel margins, longer peduncle (20-50 cm vs. 10-20 cm), shorter prophyll (1.5-3 cm vs. to 10 cm), and generally longer inflorescence rachis (20-50 cm vs. 5-25 cm). Despite its unusual and distinctive nature, I (Hodel 1992a) had discussed the possibility that the name *C. elatior* is misapplied, and might refer to *C. pochutlensis*, which, if proven, would leave the oldest and most aptly named synonym, *C. scandens*, as the best name for this species. Further work might show that some of the forms of *C. elatior*, such as the one with cespitose and aerially branching habit or the one with simple and bifid leaves into maturity, might represent new, undescribed species. I (Hodel 1992a) had included material with linear pinnae from the Pacific slope of Guatemala and adjacent Chiapas, Mexico as *C. elatior* although here it is identified as *C. tacanensis*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. elatior* in subg. *Chamaedorea*.

21. *Chamaedorea elegans* Mart., *Linnaea* 5: 204 (1830). Holotype: Mexico. Veracruz. *Schiede s.n. (1015)* (M!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 31, 39, 277; figs. 8A, 10A-F, 125D-E (1992a). N.v.: parlor palm, neanthe bella; pacayito, xate, kiik, G; palma

camedor, pesmilla, pamilla de hojas, angostas, palmita camedor, palma fina, tutchast, Mexico.

Chamaedorea deppeana Klotzsch, *Chamaedorea elegans* var. *angustifolia* M. Martens & Galeotti, *Chamaedorea elegantissima* hort. in O.C.E.de Kerchove de Denterghem, *Chamaedorea helleriana* Klotzsch, *Chamaedorea humilis* Liebm. ex Mart., *Chamaedorea lindeniana* hort. in H. Wendl., *Chamaedorea martiana* hort. in H. Wendl., *Chamaedorea pulchella* Linden ex Hemsl., *Collinia deppeana* (Klotzsch) Klotzsch, *Collinia elegans* (Mart.) Liebm., *Collinia elegans* (Mart.) Oerst. *nom illeg.*, *Collinia elegans* var. *angustifolia* (M. Martens & Galeotti) M. Martens & Galeotti, *Collinia humilis* Liebm. *nom. illeg.*, *Collinia humilis* (Liebm. ex Mart.) Oerst. *nom. illeg.*, *Kunthia deppei* hort. in Zucc., *Neanthe bella* O. F. Cook *nom. Illeg.*, *Neanthe elegans* (Mart.) O. F. Cook *nom. Illeg.*, *Neanthe neesiana* O. F. Cook *nom. illeg.*, *Nunnezharia elegans* (Mart.) Kuntze, *Nunnezharia humilis* (Liebm. ex Mart.) Kuntze.

Solitary, erect or infrequently decumbent, to 2 m tall. Stem 0.8-1.5 cm diameter, internodes 0.5-3 cm. Leaves 5-8, pinnate, ascending-spreading; sheath 8-20 cm, obliquely open nearly to base, margins brownish and ragged, light green to whitish just inside margin; petiole 10-40 cm; rachis 15-60 cm; pinnae 11-21 per side, 15-30 × 1-3 cm, linear to narrowly lanceolate, long-acuminate, midrib prominent and elevated adaxially, 1-2 less prominent primary nerves per side. Inflorescences interfoliar, erect, shorter than to greatly exceeding leaves, branched 1-2 orders; peduncles 15-90 cm; staminate with 4-7 bracts, pistillate with 6-10 bracts, to 35 cm, most distal exceeding peduncle, papery, brown; rachis 1.5-20 cm; rachillae 5-35, staminate to c. 15 cm, stiff, erect-spreading, pistillate to c. 10 cm, stiff, erect-spreading. Flowers staminate and pistillate similar,

globose to depressed-globose; petals connate, corolla opening by apical 3-angled pore; staminate c. 3×4 mm, aromatic; calyx $0.75-1 \times 2-2.5$ mm, moderately lobed, green, sepals connate in basal $1/2$; petals c. 2.5×2 mm, fleshy, nerved when dry, yellow; stamens 1.5-2 mm high, filaments connate, whitish, anthers 0.75-1 mm; pistillode prominent, equal to or slightly exceeding corolla, 6-angled, flared slightly apically, pale yellow-green; pistillate c. 3×2.75 mm; calyx c. 1×2 mm, deeply lobed, green, sepals connate in basal $1/3$, petals $2-2.5 \times 1.5-2$ mm, fleshy, nerved when dry, yellow; staminodes not seen; ovary c. $2 \times 1-1.5$ mm, depressed-globose, green, stigma lobes separated, sessile, blunt. Fruits 4-7 mm diameter, globose, black; seeds 3-6 mm diameter, globose. Eophyll pinnate.

Low- to middle-elevation, moist to wet forest, often on limestone, nearly always on the Atlantic slope. Ch (Breedlove 15678, F); T (Matuda 3275, MEXU); G (Hodel & Hodel 845, BH). 100-1400 m. Mesoamérica, Mexico (Hidalgo, Oaxaca, Puebla, San Luis Potosi, Veracruz).

Chamaedorea elegans is highly variable, especially in the length of the inflorescences in relation to the length of the leaves and in pinnae size and shape. Staminate and pistillate flowers are very similar in petal and corolla morphology and color, and the prominent, well developed pistillode of the former is easily mistaken for the ovary of the latter. The petals being fully connate and the corolla opening by a three-angled, apical pore, are unique in the genus and were the basis for placing this species in its own subg., *Collinia* (Hodel 1992a). Mostly a plant of the Atlantic slope, it has been found a few times on the Pacific slope of Oaxaca, Mexico. It is expected to occur in Belize and perhaps Honduras. It is commonly cultivated worldwide as an indoor decorative plant. In eastern central

Mexico, its leaves and seeds are harvested from mostly cultivated plants for the international cut foliage and nursery trades. In northern Guatemala leaves from wild plants are also harvested for the international cut foliage trade and are a significant source of income for indigenous peoples, called *xateros*, who engage in this activity.

22. *Chamaedorea ernesti-augustii* H. Wendl., *Allg. Gartenzeitung* 20: 73 (1852).

Holotype: Cultivated in Europe from Guatemala, *Wendland s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*, pp. 11, 29, 41; figs. 2B, 7B, 11A-E (1992a). N.v.: guaya de abajo, guayita, cola de pescado, rabo de bobo, nesheshiptmil, Mexico.

Chamaedorea glazioviana Drude ex Guillaum., *Chamaedorea latifrons* hort. in H. Wendl., *Chamaedorea simplicifrons* hort. in Heynh., *Eleutheropetalum ernesti-augustii* (H. Wendl.) Oerst., *Geonoma coralliflora* hort. in Chabaud, *Geonoma latifrons* hort. in H. Wendl., *Hyospathe elegans* hort. in H. Wendl., *Morenia corallifera* hort. in Ruffo, *Morenia ernesti-augustii* (H. Wendl.) H. Wendl., *Nunnezharia ernesti-augustii* (H. Wendl.) Kuntze.

Solitary, slender, erect, to 2.5 m tall. Stem 1-1.5 cm diameter, internodes 0.5-3 cm. Leaves 5-8, simple and bifid, rarely pinnate, spreading; sheath 5-15 cm, obliquely open in apical 1/2; petiole 10-25 cm; rachis 20-30 cm; blade 25-60 × 20-30 cm, broadly cuneate-obovate, deeply bifid apically, 12-18 primary nerves per side with 2 secondaries between each pair of primaries, 20-30 teeth per side on distal margin; if pinnate, 3-7 pinnae per side, the apical pair confluent basally and very broad, 20-35 × 20-30 cm, proximal pinnae 25-35 × 1-2.5 cm, lanceolate, falcate, long-acuminate, 1-2 primary nerves. Inflorescences interfoliar, sometimes infrafoliar in fruit, gender dimorphic; staminate spreading, shorter

than leaves, branched 1-2 orders; peduncle to 30 cm, erect; bracts 4-7, most distal shorter than to exceeding peduncle, tightly sheathing, brown; rachis 15-20 cm, spreading, straight; rachillae 15-25, to 17 cm, slender, diverging from rachis at right angle, drooping, simple or rarely 1-branched; pistillate furcate, or sometimes with 3-4 rachillae, erect; peduncle to 70 cm, shorter than to exceeding leaves; bracts c. 5, most distal about equaling peduncle; flower-bearing portion or rachillae to 30 cm, erect, thick. Flowers staminate and pistillate similar, depressed-globose, aromatic, petals cup-shaped, cucullate, "hooded" over internal organs, thick, fleshy, yellow to orange or brick red; staminate c. 2.5×3 mm; calyx c. $1.25 \times 2-2.5$ mm, deeply lobed, sepals connate in basal 1/2, membranous, nerveless, clear-colored; petals c. $2 \times 2-2.5$ mm, briefly connate basally, free apically, nerveless; stamens 1.5-1.75 mm high, filaments 0.5-0.75 mm, clear-colored, anthers 0.5-1 mm, yellow; pistillode prominent, equaling petals, expanded apically into a truncate 6-angled cap, flared basally, clear-colored; pistillate $2.5-3.5 \times 2.5-3.5$ mm; calyx $1.5-2 \times 2.5-3$ mm, deeply lobed, sepals imbricate in basal 1/3, acute, nerveless, whitish; petals c. $3.5 \times 1.5-2$ mm, very briefly imbricate basally, free apically; staminodes prominent; ovary not exceeding petals, depressed-globose, deeply 3-parted, whitish, stigma lobes sessile, recurved, whitish. Fruits c. $15 \times 8-10$ mm, subglobose to ellipsoid, black, mesocarp fleshy, mucilaginous, aromatic; seeds c. 10×7 mm, ellipsoid.

Low- to middle-elevation, moist to wet forest, often on limestone, on the Atlantic slope.

Ch (*Hodel 931*, MEXU); T (*Matuda 3443*, MEXU); B (*Hodel & Hodel 840*, BH); G (*Hodel & Castillo-Mont 879*, AGUAT); H (*Molina 3561*, F). 0-1500 m. Mexico (Hidalgo, Oaxaca, Veracruz), Mesoamérica.

Because of its relatively large, simple and bifid leaves, *Chamaedorea ernesti-augustii* is rather distinct and unlikely to be confused with other members of the genus. Indeed, it is more likely to be confused with species of other genera, like *Bactris* or *Geonoma*, from which it readily differs in its dioecious nature and leaf and floral details. The fleshy, cup-shaped, orange to brick red petals of both genders “hooded” over the internal floral organs are shared with four other species, *C. metallica* and *C. rhizomatosa* from Mexico but north of Mesoamerica and *C. sartorii* and *C. stolonifera* included in this treatment. Because of this unique floral structure, together these five species comprise the subg. *Eleutheropetalum* (Hodel 1992a).

23. *Chamaedorea falcifera* H. E. Moore, *Principes* (Palms) 2: 68 (1958). Holotype: Guatemala, *Steyermark 41640* (F!). Illustr.: Moore, *Principes*, p. 69, fig. 45 (1958). N.v.: unknown.

Solitary, erect or infrequently decumbent, to 3 m tall. Stem 5-7 mm diameter, internodes 1.5-3.5 cm. Leaves 3-5, pinnate, spreading; sheath 6-9 cm, tubular; petiole 6-15 cm or more; rachis 10-25 cm; pinnae 3-4 per side, apical pair conspicuously the largest, 14-21 × 5-12 cm, other pinnae progressively smaller proximally, 7-20 × 1-5 cm, lanceolate, sigmoid, acute to acuminate, shiny green adaxially, pale and dull abaxially, apical pair with 4-7 prominent primary nerves and 2-4 inconspicuous secondaries between each primary, basal pinnae with prominent midrib and 1-3 secondaries on either side.

Inflorescences inter- or infrafoliar, arching, nodding, erect, shorter than to greatly exceeding leaves; peduncles 15-21 cm; bracts 3-4, most distal of staminate exceeding peduncle, brown; rachis 1-2 cm; rachillae 4-8, 6-15 cm, staminate pendulous, pistillate

stiff. Flowers staminate c. 1.5×2 mm; calyx c. 0.75×2 mm, deeply lobed, sepals connate and/or imbricate nearly to apex, rounded or truncate apically, strongly nerved when dry; petals c. 1.5×1 mm, ovate, connate apically and there adnate to the pistillode and corolla opening by lateral slits, strongly nerved when dry, yellowish green; stamens c. 1 mm high, equaling pistillode, filaments c. 0.25 mm, anthers c. 1.3 mm; pistillode c. 1 mm high, columnar, truncate apically; pistillate flowers not seen; fruiting perianth with calyx c. 0.7 mm high, shallowly lobed, strongly nerved; petals c. 2 mm high, imbricate, strongly nerved; staminodes not seen; ovary not seen. Fruits 10-14 \times 3-4 mm sickle-shaped, orange to red, mesocarp fibrous; seeds c. 9×2 mm; perianth persistent at base of fruit.

Low-elevation, wet forest, often on limestone, on the Atlantic slope. G (Hodel & Castillo-Mont 1260, AGUAT). 40-650 m. Mesoamérica.

An elusive species, *Chamaedorea falcifera* has rarely been collected. Its strongly sickle-shaped fruits are distinctive but somewhat like those of *C. neurochlamys*, of which it might be a diminutive form. In the nursery trade *C. falcifera* is often misapplied to plants of *C. neurochlamys*, *C. oblongata*, and *C. pinnatifrons*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. falcifera* in subg. *Chamaedorea*.

24. *Chamaedorea foveata* Hodel, *Phytologia* 68(5): 403-406, fig. 1 (1990). Holotype: Mexico, *Hodel & Hodel 939A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 149; figs. 61A-C (1992a). N.v.: unknown.

Solitary, erect, to 2.5 m tall, sometimes flowering when appearing stemless. Stem 2.5-3 cm diameter, sometimes basal portion subterranean, curved, internodes 2-4 cm. Leaves 3-5, pinnate, spreading; sheath to 30 cm, obliquely long-open apically 1/2, tubular in basal 1/2, thick, durable, minutely white-spotted; petiole 20-40 cm, densely covered with contiguous, minute, irregularly shaped pits giving living material a rough textured and drying to narrow, nearly elliptic contiguous fissures; rachis to 60 cm; pinnae 12-16 per side, 20-35 × 3.5-5 cm, lanceolate, nearly straight, only slightly sigmoid, falcate, acuminate, 5 prominent primary adaxially, 1 secondary between each pair of primaries. Inflorescences interfoliar but occasionally infrafoliar in fruit, erect; peduncles to 85 cm, erect to ascending; bracts c. 6, to 38 cm, most distal slightly exceeding peduncle, long-open, green and minutely white-spotted in flower, brown in fruit; staminate with rachis c. 3 cm; pistillate with rachis 4-6 cm; staminate rachillae 8-10, to 25 cm, drooping; pistillate rachillae 3-7, to 25 cm, stiffly erect. Flowers staminate 2.5-3 × 2.5-2.75 mm, ovoid-globose; calyx 0.5-1 × 2.5-3 mm, moderately lobed, sepals connate in basal 1/2, rounded apically, greenish; petals 2-3 × 2-2.75 mm, ovate, free to base, spreading slightly apically, rounded-acute, thin, membranous, nerveless or obscurely nerved, margins thickened, greenish to yellow; stamens 1-1.5 mm high, appressed against pistillode, filaments 0.5-1 mm, anthers 1-2 mm, ellipsoid, dorsifixed, spreading apically and basally, yellowish; pistillode 1.5-3 mm high, equaling or slightly exceeding petals, columnar, fusiform to barrel-shaped, rounded to 3-lobed and truncate apically, very pale yellow; pistillate 3-3.5 × 2.75-3 mm, globose to ovoid; calyx 0.5- 0.75 × 2.5-3 mm, moderately lobed, sepals connate in basal 1/2-3/4, rounded apically, membranous, pale; petals 2-2.5 × 2.5 mm, rounded-triangular, imbricate in basal 1/2-3/4, rounded-acute apically, fleshy,

faintly nerved when dry, yellow; staminodes 1-3; ovary 2.5-3 × 2.5-3 mm, globose to ovoid, stigma lobes short, erect to slightly recurved, thick, fleshy, white. Fruits c. 10 × 8-9 mm, ovoid-globose, brownish orange turning black.

Middle to high-elevation, moist pine-oak forest, on the Atlantic and Pacific slopes. Ch (Breedlove 33677, CAS). 1400-1900 m. Mesoamérica. Mexico (Oaxaca).

Endemic to Mexico but expected in adjacent portions of Guatemala, the little-collected *Chamaedorea foveata* is distinctive in its petioles densely punctuated with small, irregularly shaped pits giving living material a rough texture. Only *C. woodsoniana*, widespread from Mexico to Panama, shares this feature but it is amply distinct in its larger habit, leaves, and inflorescences; much more numerous pinnae with prominently elevated nerves abaxially; and much more numerous rachillae, the staminate with up to 100. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. foveata* in subg. *Chamaedoropsis*.

25. *Chamaedorea fractiflexa* Hodel & Cast. Mont, *Principes (Palms)* 35: 6-8, figs. 5-7 (1991). Holotype: Guatemala, *Hodel & Castillo-Mont 912A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 151; figs. 62A-C (1992a). N.v.: unknown.

Solitary, erect to decumbent, to 2 m tall. Stem 5-8 mm diameter, internodes 3-7 cm, often covered with persistent leaf sheaths. Leaves 3-8, pinnate, spreading; sheath to 12 cm, tubular; petiole to 5 cm; rachis to 20 cm; pinnae 5-8 per side, to 13 × 3.5 cm, lanceolate to broadly lanceolate, sigmoid, long-acuminate, a prominent midrib and 2 primary nerves on either side, a secondary between each pair of primaries, apical pair sometimes broader, to 6 cm wide, 4-5-nerved. Inflorescences interfoliar, slender, spreading in flower,

pendulous in fruit; peduncles to 30 cm, extremely slender, filiform proximally, spreading in flower, pendulous in fruit, typically with an “elbow” proximally; bracts 5-6, to 7 cm long, most distal exceeding peduncle, loosely sheathing, long-open apically, green in flower, brown in fruit; staminate with rachis c. 3 cm, strongly flexuous; rachillae c. 5, to 7 cm, each attached at an “elbow” of rachis, drooping; pistillate rachis 1 cm; rachillae 3, to 7 cm, downward-pointing in fruit. Flowers staminate in dense spirals but not contiguous, c. 2.5×2.5 mm, obovate; calyx to 0.75×1.5 -2 mm, shallowly lobed, sepals connate and/or slightly imbricate nearly to apex, broadly rounded to truncate apically; petals c. 3×1 mm, long-ovate, free nearly to base, erect apically, acute, lightly nerved adaxially; stamens 1.5-1.75 mm high, filaments 0.5-1 mm, anthers 1 mm, oblong, spreading apically and basally, dorsifixed, yellowish; pistillode 1.5-2.5 mm high, columnar, slightly lobed and widened apically, finely longitudinally striated; pistillate c. 1×1 -1.75 mm, globose; calyx c. 0.75×2 mm, deeply lobed, sepals connate in basal 1/4, acute, obscurely nerved; petals c. 1.5×1.5 -2 mm, triangular, briefly imbricate basally, erect apically, acute, obscurely nerved; ovary c. 1.5×1.5 mm, ovoid. Fruits c. 8×7 mm, globose, black.

Middle- to high elevation, moist to wet forest and cloud forest, on the Pacific slope. Ch (Breedlove 41648, CAS); G (Hodel & Castillo-Mont 912B, AGUAT). 2000-2900 m. Mesoamérica.

Chamaedorea fractiflexa is rare, known only from a few collections in southwestern Guatemala and adjacent Chiapas, Mexico. It is distinctive in its slender, nearly thread-like peduncles and zig-zag staminate inflorescence rachis and sometimes zig-zag peduncles. It is similar to *C. parvisecta* but this latter species differs in its straight

staminate rachis; thicker, straight, ascending pistillate peduncle; densely flowered rachillae; and ascending fruiting rachillae. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. fractiflexa* in subg.

Chamaedoropsis.

26. *Chamaedorea frondosa* Hodel, Cast. Mont. & Zúñiga, *Principes (Palms)*: 39(4): 186-189, f. 5-8 (1995). Holotype: Honduras, *Hodel et al. 1274* (BH!). Illustr.: Hodel, *Principes*, pp. 165-166; f. 6-7 (2013). N.v.: unknown.

Solitary, erect or briefly decumbent then erect, to 70 cm tall. Stem short, 1.2-1.5 cm diameter, prominently and densely ringed, internodes c. 1.8 cm. Leaves 12-15(-20), simple and bifid, erect to spreading; sheath to 10 cm, long-open apically, tubular in basal 1/3; petiole to 11 cm; rachis to 32 cm; blade to 42 × 12 cm, oblong, bifid apically 1/4-1/5 its length, thick, coriaceous, dark, rich blue- to gray-green, sometimes slightly mottled, lobes acute-acuminate, conspicuously but remotely toothed on the outer margin distally, 10-12 primary nerves per side, 1 secondary between each pair of primaries; tertiaries numerous, faint, all nerves obscure adaxially but raised, pale, and more conspicuous abaxially. Inflorescences interfoliar, erect to spreading, spicate or few-branched; peduncles to 40 cm, erect to spreading; bracts c. 5, to 14 cm, most distal exceeding peduncle, green in flower, brown in fruit; staminate rachis 0-2.5 cm; staminate rachillae 1-5, to 23 cm long, ascending to spreading; pistillate spicate rachis or flower-bearing portion to 14 cm, spreading. Flowers staminate in moderately dense spirals, scarcely sunken, c. 4 × 2.5-3 mm, obovoid; calyx 0.75-1 × 3 mm, cup-like, shallowly lobed, sepals connate nearly to apex, truncate or briefly acute apically, yellow; petals 4-4.5 × 2.5 mm,

ovate, connate apically and there adnate to the pistillode and corolla opening by basal, lateral apertures (perhaps later free and spreading apically), yellow; stamens 2.5-3 mm high, just shorter than pistillode, filaments c. 1×0.25 mm, flattened, anthers c. 1.75 mm, elliptic, bilobed, dorsifixed near base; pistillode c. 3 mm high, columnar, stout, yellow; pistillate flowers in moderate spirals, scarcely to slightly sunken, c. 2×2 mm, broadly ovoid to globose; calyx c. 1×2 mm, moderately to deeply lobed, sepals imbricate and/or connate in basal $1/3-1/2$, rounded apically, yellow; petals c. 2×2 mm, cup-shaped, broadly ovate, imbricate in basal $3/4$, acute or slightly mucronate and erect apically, faintly nerved abaxially when dry, yellow; staminodes not seen; ovary c. 1.75×0.75 mm, ovoid-globose, clear-colored, stigma lobes just exceeding petals, narrow, erect to slightly recurved, clear-colored. Fruits $6-7 \times 6-7$ mm globose, black; seeds $5-6 \times 5-6$ mm.

Middle-elevation, wet forest, on the Atlantic slope. H (Hodel et al. 1275, EAP). 1650-1700 m., Mesoamérica.

Apparently endemic to Honduras and rarely collected, *Chamaedorea frondosa* is distinctive in its small, even dwarf, unusually leafy habit; numerous, thick, sometimes mottled, dark blue- to gray- green, simple and bifid leaves; spicate or few-branched inflorescences; and staminate flowers with the petals connate apically and there adnate to the tip of the pistillode, the corolla opening by lateral apertures. The plant is unusually leafy, holding up to 20, green, living leaves. Vegetatively, *C. frondosa* is similar to *C. pumila* and *C. sullivaniorum* from Costa Rica and Panama but these latter two species differ in their much fewer leaves, conspicuously nerved and corrugated leaf blades, pendulous staminate rachillae, and staminate flowers with apically free and spreading petals. When originally named and described, Hodel et al. (1995a) placed *C. frondosa* in

subgenus *Chamaedoropsis* because they had access only to dried flowers on an herbarium sheet; however, fresh staminate flowers from cultivated plants show that the petals are connate apically and there adnate to the pistillode and the corral opening by lateral apertures, placing it in subgenus *Chamaedorea*.

27. *Chamaedorea geonomiformis* H. Wendl., *Allg. Gartenzeitung* 20: 1 (1852).

Holotype: Cultivated in Europe from Guatemala, *Wendland s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*, pp. 9, 29, 65, 67; figs. 1B, 7A, 19A-D, 20A-C (1992a). N.v.: necklace *Chamaedorea*; capucacapocha G; pacaya H.

Chamaedorea fenestrata hort. in H. Wendl., *Chamaedorea humilis* hort. in H.

Wendl., *Geonoma fenestrata* hort. in Dammer, *Geonoma humilis* hort. in Dammer,

Migandra O. F. Cook *nom. illeg.*, *Nunnezharia fenestrata* (H. Wendl.) Kuntze,

Nunnezharia geonomiformis (H. Wendl.) Hook. f.

Solitary, erect, sometimes decumbent, to 1.5 m tall. Stem 5-10 mm diameter, internodes 1-5 cm, often with adventitious prop roots at base. Leaves 5-10, simple and bifid, spreading; sheath to 10 cm, tubular; petiole 2-15 cm; rachis 11-22 cm; blade 15-30 × 10-15 cm, oblanceolate or oblong-elliptic, bifid apically to 1/3-1/2 its length, lobes acute, obscurely toothed on the outer margin distally, 9-12 primary nerves per side, these obscure adaxially, prominent and yellowish abaxially, 2 secondaries between each pair of primaries. Inflorescences interfoliar but often infrafoliar in fruit, ascending-pendulous, typically branched but sometimes spicate especially in pistillate plants; peduncles 10-20 cm, ascending; bracts c. 5, most distal shorter than to exceeding peduncle, tightly sheathing, papery, brown; rachis c. 2 cm; staminate rachillae 3-6, to 20 cm, pendulous;

pistillate (1-)2-3, 5-15 cm, erect-spreading. Flowers staminate c. 4×3.5 -4 mm, globose-ovoid, slightly aromatic; calyx 0.5×3 mm, ring-like, shallowly lobed, membranous, sepals connate nearly to apex, broadly rounded apically, nerveless, yellowish; petals 3-4 \times 4 mm, ovate, connate apically and there adnate to the pistillode and corolla opening by basal, lateral apertures, yellow; stamens 2-2.5 mm high, filaments c. 1.5 mm, anthers c. 1.5 mm; pistillode c. 3 mm high, columnar, slightly narrowed apically; pistillate 1-2 \times 2.5 mm, dome-shaped; calyx c. 0.75×2.5 mm, shallow lobed, membranous, sepals imbricate and/or connate in basal 3/4, broadly rounded apically, strongly nerved when dry, yellow; petals c. 2×3 mm, cup-shaped, imbricate nearly to apex, short-acute, nerved especially when dry, yellow; staminodes not seen; ovary c. 2.5×2 -2.5 mm, dome-shaped, yellowish, stigma lobes short, recurved, clear-colored. Fruits 8-12 mm diameter, globose, black; perianth and abortive carpels adherent to fruit; seeds 6-9 mm diameter, globose.

Low- and middle-elevation, wet forest, often on limestone, on the Atlantic slope. Ch (Martinez 6444, MEXU); B (Boutin 5070, HNT); G (Hodel & Castillo-Mont 1023A, AGUAT); H (Standley 53878, F). 100-900 m. Mexico, Mesoamérica.

If *Chamaedorea tenella* is included here, as some have done, then the range of *C. geonomiformis* would include Costa Rica. While the two species are close, the consistently smaller habit, smaller leaf blades bifid apically only 1/5-1/4 their length, and spicate inflorescences distinguish *C. tenella*. Spicate inflorescences are rarely observed in *C. geonomiformis* and then typically only on pistillate plants and then frequently when flowering for one of the first times. Galeano and Bernal (1987) reported *C. geonomiformis* from Colombia but I have not confirmed this finding. The petals connate

apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. geonomiformis* in subg. *Chamaedorea*.

28. *Chamaedorea glaucifolia* H. Wendl., *Index Palm* 12: 64 (1854). Holotype:

Cultivated in Europe from Mexico, *Wendland s.n.* (GOET!). Illustr.: Hodel,

Chamaedorea Palms: pp. 27, 29, 67; figs. 6F, 7C, 20D-E (1992a). N.v.: unknown.

Chamaedorea crucifolia hort. in Crouch, *Chamaedorea glaucophylla* hort. in Siebert &

Voss, *Discoma glaucifolia* (H. Wendl.) O. F. Cook *nom. illeg.*, *Nunnezharia*

elegantissima hort. in O.C.E.de Kerchove de Denterghem, *Nunnezharia glaucifolia* (H.

Wendl.) Kuntze.

Solitary, erect, to 5 m tall. Stems 2-3.5 cm diameter, internodes 15-35 cm. Leaves 3-5, pinnate, spreading; sheath 25-40 cm, tubular but becoming obliquely open apically and there pale with a ragged margin and a slight glaucous bloom, leathery, drying brown and nearly woody, persistent, with a ridge extending from petiole; petiole 15-40 cm, abaxially densely covered with a deciduous, thick, waxy, glaucous, powdery bloom; rachis 1-2 m, abaxially with the same glaucous, powdery bloom as petiole; pinnae 50-70 per side, 30-35 × 0.5-1.2 cm, narrowly linear to linear-lanceolate, clustered in groups of 2-4 and borne in different planes and directions, long-acuminate, grayish green, prominent midrib and several inconspicuous primaries and secondaries on either side. Inflorescences infrafoliar, typically among the persistent leaf sheaths, ascending-spreading to nodding when heavily laden with fruit; peduncles to 50 cm, stout; bracts c. 6, to 25 cm, most distal exceeding peduncle, tightly sheathing, brown; rachis 10-20 cm; rachillae 12-30, staminate 25-30 cm, drooping; pistillate to 15 cm, stiffly spreading. Flowers staminate c. 2.5 × 3 mm,

depressed-globose, slightly aromatic; calyx c. 1×1.75 mm, lobed, sepals imbricate in basal 1/2, acute apically, green; petals c. 2.5×2.5 mm, ovate, connate apically and there adnate to the pistillode and corolla opening by lateral slits, nerved adaxially, yellow; stamens c. 2 mm high, filaments 0.75-1 mm, anthers c. 1.5 mm; pistillode c. 2.5 mm high, columnar, green; pistillate c. 2×2 mm, globose; calyx c. 1×2 mm, deeply lobed, sepals imbricate in basal 1/3, rounded apically, nerveless, green; petals c. 2×3 mm, imbricate nearly to apex, acute, nerveless, light yellow; staminodes not seen; ovary c. 2×2 mm, globose, greenish, stigma lobes short, slightly recurved. Fruits 7-10 mm diameter, globose, black; seeds 6-9 mm diameter, globose.

Middle-elevation, moist forest and cloud forest, on limestone, on the Atlantic slope. Ch (Hodel & Hodel 928, MEXU). 500-1400 m. Mesoamérica.

Chamaedorea glaucifolia is distinctive in its numerous, linear pinnae borne in several planes and clustered in groups and the conspicuous, waxy, glaucous, powdery bloom on the petioles, the latter of which tends to weather away and is most conspicuous on the newest leaf. The nearly sympatric *C. plumosa* is eerily similar but differs in its more strongly plumose pinnae, deeply channeled petioles lacking the glaucous, powdery bloom, and the apically free staminate petals. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures places *C. glaucifolia* in subg. *Chamaedorea*.

29. *Chamaedorea graminifolia* H. Wendl., *Index Palmarum* 62 (1854). Holotype: Cultivated in Europe likely from Costa Rica, *Wendland s.n.* (GOET!). Hodel, *Palms* 57: 171, fig. 16 (2013). N.v.: unknown.

Solitary, erect, to 2.5 m tall. Stem 2-2.5 cm diameter, internodes 5-8 cm. Leaves 3-5, pinnate, erect-spreading; sheath to 19 cm, tubular, briefly obliquely open apically; petiole 21-30 cm, with a basal callous adaxially; rachis 66-88 cm; pinnae 32-36 per side, 25-31 × 0.3-1.3 cm, linear to narrowly lanceolate, straight, thin-textured, acuminate, bright green, a midrib present, other nerves inconspicuous. Inflorescences infrafoliar, ascending; peduncles 34-50 cm, ascending; bracts c. 5, most distal equaling or exceeding peduncle, brown; staminate rachis 2-7 cm; rachillae 5-15, 21-35 cm, pendulous; pistillate rachis c. 4.5 cm; rachillae c. 7, 20-25 cm, spreading to slightly drooping. Flowers staminate densely placed but not contiguous in bud, c. 2 × 2-2.5 mm, depressed-globose; calyx c. 0.3 × 2.5 mm, lobed, sepals connate briefly basally, broadly rounded apically, whitish; petals 2-2.5 × 2 mm, ovate, free nearly to base, spreading apically and there rounded, yellow abaxially, pale yellow adaxially; stamens c. 1 mm high, conspicuously shorter than pistillode, filaments c. 0.5 mm, whitish, anthers c. 0.5 mm, bilobed, dorsifixed; pistillode 2-2.5 mm high, just shorter than petals, columnar, robust, truncate apically, white; pistillate flowers not seen. Fruits c. 7 × 3.5 mm, ellipsoid, likely black.

Low-elevation, wet forest, on the Atlantic slope. CR (Cook & Doyle 78, US). 0-650 m. Mesoamerica.

One of the rarest and perhaps least known species in the genus, *Chamaedorea graminifolia* is distinctive in its solitary, caulescent habit; pinnate leaves with numerous, unusually narrow, linear, thin-textured, obscurely nerved pinnae arranged all in the same plane; solitary inflorescences; and solitary, non-contiguous staminate flowers with apically free petals; these fertile characters place it in subg. *Chamaedoropsis*. It possible could be confused with *C. glaucifolia* and *C. plumosa* from northern Mesoamerica but

both differ in their grayish green leaves arranged in several planes; also, the former differs in its petioles with a heavy cover of glaucous indument and staminate flowers with the petals connate apically while the latter has a deeply channeled petiole basally. It might also be confused with *C. schippii* and *C. seifrizii* from northern Mesoamerica and the widespread *C. costaricana* but these species differ in their cespitose habit. I (Hodel 1992a) had included and illustrated the much better known *C. schippii* here but Grayum (1998) persuasively showed that *C. graminifolia* was distinct. A relatively recent collection, *Cascante ex Herrera 1410* (CR) from cultivated material originally from 650 m on the Atlantic slope of the eastern Cordillera de Talamanca was revealing in that it offered the first glimpse of staminate flowers.

30. *Chamaedorea guntheriana* Hodel & N. W. Uhl, *Principes (Palms)* 34: 126-128, figs. 8-9, 11 (1990). Holotype: Panama, *Hodel & Hodel 746* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 155, 157, 159; figs. 64, 65, 66C-C (1992a). N.v.: unknown. Solitary, decumbent then briefly erect, the prostrate portion longer than the erect portion, to 1 m tall. Stem to 3 m long, 5-7 mm diameter, distinctly white-spotted, internodes to 2-4 cm, rooting along its length. Leaves 4-5, pinnate, less frequently simple and bifid, erect-spreading; sheath to 9 cm, tubular; petiole to 9 cm, gray-green; rachis to 12 cm; rachis, petiole and distal part of sheath minutely white-spotted; pinnae 2-4 per side, apical pair largest of if simple and bifid, to 19 × 3.5 cm, lanceolate, falcate, thick, leathery, stiff, acuminate, with 5 conspicuous primary nerves per side, proximal pinnae smaller, to 12 × 2.5 cm, with 2-3 prominent primary nerves per side. Inflorescences infrafoliar, held well below the leaves on bare stem, stiffly ascending; peduncles 5-6 cm; bracts c. 4, to 4 cm,

green in flower, brown in fruit; staminate with 2-3 rachillae or infrequently spicate; rachis 0-2 cm; rachillae or flower-bearing portion to 12 cm, stiffly ascending; pistillate spicate; flower-bearing portion or rachilla to 6 cm, erect. Flowers staminate markedly maturing proximally initially then attaining anthesis progressively distally along rachilla, 2.5-3 × 2-2.5 mm, ovoid to oblong; calyx c. 1 × 2.5 mm, shallowly lobed, ring-like, sepals connate and/or imbricate nearly to apex, broadly rounded apically, pale green or yellowish; petals 2-2.5 × 2 mm, triangular, free nearly to base, spreading apically, thick, acute; stamens 1-1.5 mm high, filaments short, clear-colored, anthers 0.5 mm, brownish; pistillode 2-2.5 mm high, columnar, yellow to reddish apically, flared basally and there whitish; pistillate 2.5-3 × 1.5-2 mm, ovoid-globose; calyx c. 0.75 × 2.5-3 mm, shallowly lobed, ring-like, sepals connate in basal 2/3, rounded apically, thick, pale green; petals c. 3 × 2.5-3 mm, long-triangular, imbricate nearly to apex, acute to mucronate, yellow; staminodes not seen; ovary c. 3 × 2 mm, exceeding petals, ovoid, yellow-green, stigma lobes short, recurved, clear-colored. Fruits c. 6 mm diameter, globose, black.

Low-elevation, wind-swept, moist, elfin-dwarf cloud forest, at or near the Continental Divide. P (Hodel et al. 1127, PMA). 900-1100 m. Mesoamérica.

Endemic to Panama and known with certainty only from Cerro Jefe in the central part of the country where it occurs in peculiar, wind-swept, elfin-dwarf cloud forest, the rarely collected *Chamaedorea guntheriana* is distinctive in its decumbent stem rooting at the nodes, thick, more or less leathery, gray-green leaves, and inflorescences held well below the leaves on bare stem. In these features it is like *C. correae*, another Panamanian endemic from similar habitat, which differs in its larger leaves with more broadly diverging lobes or pinnae, longer peduncles, and the flowers attaining anthesis uniformly

along the rachilla. Another similar species is *C. chazdoniae* but it can be distinguished by its thinner textured, green leaves with fewer nerves, green petioles, and spreading staminate rachillae with cream-colored flowers. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. guntheriana* in subg. *Chamaedoropsis*.

31. *Chamaedorea hodelii* Grayum, *Phytologia* 84(4): 312-317. (1998 [1999]). Holotype: Costa Rica, *Lépiz et al.* 485 (INB). Illustr.: Hodel, *Chamaedorea Palms*: pp. 257; figs. 115B-E (as *C. crucensis*) (1992a). N.v.: unknown.

Solitary, 0.7-2 m tall, rarely decumbent. Stem 0.9-2 cm diameter, prominently ringed, internodes 4-8 cm, often with prominent brown prop roots 10-15 cm high basally. Leaves 3-6, pinnate, erect-spreading; sheath to 30 cm, mostly tubular, obliquely open apically; petiole 6-32 cm; rachis 14-54 cm, with a distinct yellow band abaxially extending on to petiole and sheath; pinnae 2-10 per side, to 10-34 × 1.7-7.5 cm, lanceolate, sigmoid, acuminate, glossy, 8-9 prominent primary nerves, apical pair of pinnae often wider and with more nerves. Inflorescences interfoliar but often infrafoliar in fruit, staminate ascending-drooping, pistillate ascending to drooping in fruit, spicate, solitary; peduncles 17-45 cm, ascending-curving; bracts 4-5, to 15 cm, most distal typically exceeding peduncle, green to brown in flower, brown and disintegrating in fruit; staminate rachis or rachilla 20-22 cm, pendulous; pistillate rachis or rachilla (3.5-)7-12(-17.5) cm, stiff, straight but downward-pointing when heavily laden with fruit. Flowers staminate contiguous, even in bud, 6.5-7 mm high; calyx with distinct sepals; petals connate for 1/2-3/4 their length, erect, lightly nerved, light green to yellow; pistillate contiguous,

even in bud, 2-3 mm high, greenish white. Fruits 10-11 × 8-10 mm, densely packed, obovoid-obpyramidal but angled from mutual pressure, smooth, dark purple to black.

Middle- to high-elevation, moist to wet forest, on the Atlantic slope. CR (Hodel & Grayum 982, CR). (400-)1100-2000 m. Mesoamérica.

Endemic to Costa Rica, *Chamaedorea hodelii* is distinctive in its solitary, spicate inflorescences; light green to yellow, contiguous staminate and pistillate flowers; and smooth, mature ripe dark purple to black fruits. Similar species include *C. allenii*, which differs in its bright yellow staminate and pistillate flowers and echinulate, mature ripe black fruits; *C. crucensis*, which differs in its coarsely echinulate, mature ripe orange-red fruits; and *C. zamorae*, which differs in its smooth, mature ripe fruits. In Hodel (1992a), I captioned figures 115A-E as *C. crucensis* because I had a broad concept of this species but since then Grayum (1998) showed that much of the material included in this species represented an undescribed species, which, over my vehement protestations, he named *C. hodelii*; thus, figures 115B-E in Hodel (1992a) depict *C. hodelii*. *Chamaedorea hodelii* inhabits middle- and high-elevation forests near the continental divide mostly in the Cordilleras Central and Talamanca but also in the Tilirán where it is rare. The ascending, then downward-curving peduncles holding the straight, pendulous but stiff fruiting rachilla seems distinctive. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. hodelii* in subg. *Stephanostachys*.

32. *Chamaedorea ibarrae* Hodel, *Principes (Palms)* 6: 191-194, figs. 5-7 (1992b).

Holotype: Guatemala, *Breedlove 11706* (CAS!). Illustr.: Hodel, *Palms* 57: 164, fig. 5 (2013); N.v.: cib Mexico (Chiapas).

Solitary, mostly acaulescent, erect, to 1.5 m tall, often flowering when appearing stemless. Stem to 30 cm tall, densely ringed, often covered by persistent leaf sheaths. Leaves c. 3, pinnate, ascending to spreading in a compact rosette, often appearing to arise from leaf litter; sheath obliquely long-open, tubular only in proximal 1/2, thick, durable, persistent, brown; petiole to 26 cm; rachis c. 50 cm; pinnae 13-17 or more per side, 15-24 × 1-3 cm, lanceolate, straight, slightly falcate, acuminate, dark velvety nearly iridescent green, strongly plicate when dry, a prominent midrib elevated adaxially and abaxially, a prominent primary nerve on either side placed toward margin, 4 secondaries between midrib and each primary. Inflorescences interfoliar, erect to ascending, equaling or exceeding leaves; peduncles 50-80 cm, erect to ascending; bracts 11-12, to 19 cm, most distal not exceeding peduncle, green in flower, brown in fruit; rachises 2-6 cm; rachillae 3-6, to 15 cm, stiffly erect to ascending, parallel, perhaps spreading when heavily laden with fruit, pistillate strongly undulate when dry. Flowers staminate densely placed but not contiguous in bud, c. 3 × 3-4 mm, obovoid to ellipsoid, sunken in prominent depressions with lip-like margins; calyx 0.5-0.75 × 12-32 mm, shallowly lobed, sepals connate in basal 1/2-3/4, rounded apically, membranous; petals 1.75-3 × 1.5-2 mm, ovate, free nearly to base, spreading, erect, acute, nerveless; stamens 31.75-2 mm high, filaments 0.5-1 mm, whitish, anthers to 1 mm, tightly appressed around pistillode, dorsifixed; pistillode c. equaling stamens, 2-2.5 mm high, columnar; pistillate very densely placed but not contiguous in bud, 1.25-2 × 2.5-4 mm, subglobose to depressed-globose, deeply sunken in prominent pits with lip-like margins; calyx 0.5-1 × 2.5-4 mm, very shallowly lobed, sepals connate and/or imbricate in basal 3/4, broadly rounded to nearly truncate apically; petals c. 1.5 × 2.5-3 mm, broadly triangular, imbricate nearly to apex and there

acute to rounded or nearly truncate, faintly nerved adaxially; staminodes not seen; ovary c. 1.5×2.5 mm, depressed-globose, stigma lobes short, recurved. Fruits $8-10 \times 5-7$ mm, obovoid, black.

Middle- to high-elevation, moist to wet forest and cloud forest, often on limestone, mostly on the Atlantic slope. Ch (Ton 398, CAS), G (Steyersmark 49018, F). 1600-2600m.

Mesoamérica.

An elusive and rarely collected species, *Chamaedorea ibarrae* is distinctive in its mostly acaulescent habit, rosette of few, stiffly ascending to spreading leaves with dark, velvety, nearly iridescent green pinnae, and long-pedunculate inflorescences often exceeding the leaves. In general appearance, *C. ibarrae* is rather similar to *C. radicalis* from northeastern Mexico and excluded from this treatment; this latter species is amply distinct, though, in its staminate flowers arranged in short acervuli of three to four flowers each, deeply lobed calyx, outwardly spreading stamens equaling or exceeding the petals, and red fruits. As of 2015, a cultivated pistillate plant of *C. ibarrae* was in the garden of well known Na Balom, a non-profit association dedicated to promoting and preserving the cultural heritage and natural resources of the surrounding indigenous communities, in San Cristóbal de las Casas, Chiapas. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. ibarrae* in subg. *Chamaedoropsis*.

33. *Chamaedorea incrustata* Hodel, G. Herrera & Cascante, *Palm J.* 137: 40-43, figs. 7-9 (1997). Holotype: Costa Rica, *Hodel et al. 1532* (BH!). Illustr.: Hodel, *Palms* 57: 169; figs. 13 (2013). N.v.: unknown.

Solitary, erect, to 6 m tall. Stem 2-3 cm diameter, covered with brown, tattered, shredded persistent leaf sheaths distally, internodes to 20 cm, often with conspicuous prop roots proximally. Leaves 3-5, pinnate, ascending to spreading; sheath to 35 cm, tubular in basal 4/5, obliquely briefly open apically, thick, leathery, prominently longitudinally striated, grayish lime-green becoming brown and persistent, with a rounded ridge extending from petiole; petiole 6-28 cm, grayish lime-green, densely minute-spotted when fresh, minutely rough-pebbled when dry; rachis to 85 cm, similar color and texture to that of petiole; pinnae 10-11 per side, 12-41 × 2-10.5 cm, narrowly to broadly lanceolate to oblong-lanceolate, straight, slightly falcate, thick, cupped downward, long-acuminate, caudate, iridescent grayish blue-green, a midrib and 4-5 primary nerves on either side, 2-3 faint secondaries between each pair of primaries, drying prominently wrinkled and plicate, a poorly developed abaxial callous at pinna base. Inflorescences infrafoliar, breaking through old, persistent sheaths, ascending-spreading to arching, branched to 2 orders; peduncles 38-68 long, ascending-spreading to arching; bracts 10-11, to 25 cm, most distal exceeding peduncle, green to brown in flower, brown in fruit; staminate rachis to 24 cm, longitudinally ridged, the ridges conspicuously crusty or roughly crinkled; staminate rachillae up to 58, to 16 cm, drooping, proximal ones branched; pistillate rachis 6.5-18.5 cm, longitudinally ridged, the ridges spectacularly encrusted with thin, long, irregular, sometimes wavy, plate-like, coral-like, protuberances giving a conspicuously crusty or roughly crinkled appearance and texture, the protuberances to 1.5 mm high and bearing on their margins and apices concrescent clusters of slender, stellate, white, simple hairs to 0.5 mm; pistillate rachillae 10-43, 7.5-17.5 cm, ascending to spreading, proximal ones branched. Flowers staminate and pistillate not seen. Fruits 9-

12 × 7-9 mm, ovoid to ellipsoid, black; fruiting perianth c. 3 × 4 mm; sepals 1, c. 1.25 × 1-1.5 mm, connate and/or imbricate in basal 1/2, broadly rounded apically, thin, faintly nerved; petals 3-4 × 3-4 mm, broadly ovate, imbricate in basal 1/2-3/4, thin, transparent, pale, with central costa, margins and area near central costa thickened.

Middle-elevation, moist to wet forest and cloud forest, on the Pacific slope. CR (Hodel et. 1531, CR). 1400-1600 m. Mesoamérica.

Chamaedorea incrustata is unique in the genus in its infructescences with a prominently rough, crusty rachis and rachillae. The rough, crusty, and wrinkled appearance and feel are the result of incredible and spectacular encrustations arranged along the longitudinal ridges and resemble miniature versions of some types of plate and fan-like tropical corals. This species is also unusual in its strongly cupped, boat-like pinnae and inflorescences branched to two orders. A somewhat similar species in foliage, *C. pittieri*, differs in its smaller habit, leaves, and stem and inflorescences branched to only one order and with only one-fourth the quantity of rachillae. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. incrustata* in subg.

Chamaedoropsis.

34. *Chamaedorea keelerorum* Hodel & Cast. Mont, *Principes (Palms)* 36: 194-197, figs. 8-10 (1992b) '*keeleriorum*'. Holotype: Guatemala, *Hodel & Castillo-Mont 911* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 235; figs. 104A-C (as *C. whitelockiana*) (1992a). N.v.: unknown.

Solitary, erect, to 5 m tall. Stem 1.5-2.5 cm diameter, internodes to 15 cm, often covered with persistent leaf sheaths. Leaves 3-4, pinnate, ascending to arching or spreading;

sheath to 35 cm, tubular, briefly obliquely open apically, green, becoming brown, persistent; petiole c. 40 cm; rachis to 70 cm; pinnae 12-17 per side, 10-30 × 1-4 cm, lanceolate, straight but proximal margin falcate, long-acuminate, prominent midrib, 3-5 much less prominent primary nerves on either side, 1-2 secondaries between each primary, drying plicate. Inflorescences infrafoliar, penetrating persistent leaf sheaths well below the leaves, ascending to spreading, branched to 2 orders; peduncles 20-48 cm, ascending to spreading, nodding when heavily laden with fruits; bracts 6-7, to 17 cm, most distal not exceeding peduncle, brown; rachises to 10 cm; rachillae 8-40, to 15 cm, proximal ones typically branched, spreading, sometimes downward pointing in fruit. Flowers staminate, c. 3 × 4 mm, obovoid; calyx c. 1.25 × 1.5-2 mm, deeply lobed, sepals imbricate in basal 1/4-1/3, rounded or truncate apically, acute, not or only very faintly nerved when dry; petals c. 3 × 2.5 mm, ovate, free nearly to base, acute, spreading, apically cupped inward, lightly nerved when dry, yellow; stamens c. 2 mm high, just shorter than pistillode, filaments 1-1.5 mm, anthers 1 mm, oblong, dorsifixed toward base; pistillode c. 2.5 mm high, just shorter than petals, columnar; pistillate not seen at anthesis, in fruit calyx c. 1.25 × 2.5 mm, deeply lobed, sepals imbricate and/or briefly connate in basal 1/2, acute, very faintly nerved adaxially; corolla c. 3 × 4-5 mm; petals c. 3 × 2-3 mm, broadly ovate, imbricate in basal 1/2-2/3, broadly rounded to acute apically and there with a small "beak," faintly nerved abaxially, more prominently nerved adaxially; staminodes not seen; ovary not seen. Fruits 8-10 × 6-8 mm, obovoid-globose, black; seeds c. 8 × 5 mm.

Middle- and high-elevation, moist to wet forest and cloud forest, on the Pacific slope. Ch (Matuda 18281, MEXU), G (Hodel & Castillo-Mont 988, AGUAT). (750-)1500-2500 m. Mesoamérica.

Chamaedorea keelerorum is somewhat distinctive in its solitary habit; few, ascending to arching, long-pinnate leaves; and infrafoliar inflorescences branched to 2 orders and produced on the stem well below the living leaves, bursting through brown, persistent leaf sheaths. In Hodel (1992a) the description and concept here of *C. keelerorum* had been included with *C. whitelockiana*. Further work showed that they were two separate entities. The latter species differs in its smaller habit, stem, and leaves; smaller and fewer pinnae and rachillae; inflorescences branched to one order; and the shallowly lobed staminate calyx. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. keelerorum* in subg. *Chamaedoropsis*.

35. *Chamaedorea lehmannii* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(109): 857-858 (1933). Neotype (designated by Hodel, *Chamaedorea Palms*, p. 156 [1992a]): Guatemala, *Hodel & Castillo-Mont 897* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 159; figs. 66D-F (1992a). N.v.: chiquilote, guite (Guatemala).

Solitary, erect, to 2 m tall, often flowering when appearing stemless. Stem 1-2 cm diameter, often covered with persistent leaf sheaths, internodes to 5 cm. Leaves 5-7, pinnate, erect-spreading; sheath c. 12 cm, tubular in basal half, obliquely open in apical half, thick, durable, strongly striate-nerved, arranged in 3 planes in a triangular fashion, persistent, with a rounded ridge extending from petiole; petiole 15-20 cm; rachis to 45 cm; pinnae 8-12 per side, to 20 × 2-3.5 cm, apical pair wider, narrowly lanceolate to

lanceolate, straight, scarcely sigmoid, contracted conspicuously basally and apically, a prominent midrib and 1-2 prominent primary nerves on either side. Inflorescences interfoliar, exceeding leaves, erect to ascending; peduncles to 40 cm or more, straight, erect to ascending; bracts 5-7, to 17 cm; most distal c. equaling peduncle; rachises to 3 cm; staminate rachillae c. 6, to 18 cm, ascending; pistillate rachillae 2-5, 8-11 cm, ascending. Flowers staminate in remote spirals, 3.5 mm high; calyx short, ring-like, shallowly lobed, sepals connate in basal 3/4, rounded apically; petals oblong or obovate-oblong, free and spreading apically, connate basally, moderately thick, green; stamens with robust filaments, anthers as long as filaments, short-oblong, lobes connate apically; pistillode columnar; pistillate in remote spirals, subglobose; calyx short, deeply lobed, sepals connate and/or imbricate in basal 1/4-1/3, rounded apically; petals broadly elliptic, imbricate, obtuse, dull green; staminodes present; ovary ovoid, stigma lobes short, recurved. Fruits 7-9 mm diameter, globose, black; seeds 6-7 mm diameter, globose; abortive carpel adnate to perianth.

Middle- to high-elevation, rain forest and cloud forest, on the Atlantic slope. G (Hodel & Castillo-Mont 1013, AGUAT). 1400-2600 m. Mesoamérica.

Chamaedorea lehmannii is distinctive in its thick, leathery, durable leaf sheaths arranged in a triangular fashion, much like those of *Dypsis decaryi*, the famous triangle palm from Madagascar. Similar to *C. pittieri* from Costa Rica and Panama in habit as well as habitat, this latter species can be distinguished by conspicuously and basally contracted, thick, stiff, leathery, velvety green pinnae with a bluish gray cast; leaf sheaths not arranged in a triangular manner; drooping staminate rachillae; densely placed staminate flowers; and

large pistillate petals. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. lehmannii* in subg. *Chamaedoropsis*.

36. *Chamaedorea liebmannii* Mart., *Hist. Nat. Palm.* 3: 308 (1849). Holotype: Mexico. Oaxaca, *Liebmann s.n.* (some sheets later numbered 6582) (C!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 77, 79; figs. 25A-D, 26A (1992a). N.v.: unknown. *Chamaedorea aequalis* Standl. & Steyerl., *Chamaedorea ferruginea* H. E. Moore, *Chamaedorea lepidota* H. Wendl., *Chamaedorea liebmannii* var. *lepidota* H. Wendl. ex Dammer, *Chamaedorea velutina* hort. in H. Wendl., *Collinia elatior* Liebm. *nom. illeg.*, *Collinia elatior* Liebm. ex Oerst., *Lophothele ramea* O. F. Cook *nom. illeg.*, *Nunnezharia lepidota* (H. Wendl.) Kuntze, *Nunnezharia liebmannii* (Mart.) Kuntze.

Solitary, erect, infrequently decumbent, to 4 m tall, sometimes flowering when stemless. Stems c. 2 cm diameter, internodes to 10 cm. Leaves 4-9, pinnate, ascending-spreading, sometimes with minute, whitish lepidia; sheath to 13 cm, tubular, subauriculate apically; petiole 12-27 cm; rachis 30-45 cm; pinnae 13-18 per side, 15-30 × 1.5-3 cm, linear to narrowly lanceolate, straight, long-acuminate, gleaming velutinous green, prominent midrib and 2-4 primaries on either side. Inflorescences inter- or infrafoliar, spreading, branched to 2 orders; peduncles to 20-45 cm; bracts 5-7, to 25 cm, most distal not exceeding peduncle, green or brown; rachis 2-9 cm; staminate rachillae c. 26, to 25 cm, drooping apically, proximal ones furcate or branched; pistillate 18-24, to 20 cm, stiffly spreading, proximal ones sometimes furcate. Flowers staminate c. 3 × 2.5 mm, globose; calyx c. 1 × 1.5 mm, shallowly lobed, sepals connate in basal 3/4, rounded or truncate apically, membranous, nerveless, pale green; petals 2.5-3.5 × 1.5-2.5 mm, broadly ovate,

connate apically and there adnate to the pistillode and corolla opening by lateral slits, nerved especially so when dry, yellow; stamens c. 2.5 mm high, filaments 1.5-2 mm, briefly connate basally, orange, anthers c. 1.5 mm; pistillode c. 2.5 mm high, columnar, rounded apically; pistillate c. 3×1.5 mm, ovoid; calyx c. 1.25×1.5 mm, deeply lobed, sepals connate in basal 1/3, acute apically, green, membranous, nerved adaxially; petals c. 3×1.25 mm, long-ovate, connate briefly basally and then imbricate nearly to apex, long-ovate, erect, slightly recurved apically, prominently nerved, yellow; staminodes absent or 3-6; ovary c. 1.75×1 mm, ovoid-globose, green, stigma lobes short, rounded, erect. Fruits c. 10 mm diameter, globose, black, mesocarp thin, green, mucilaginous; seeds c. 6.5 mm diameter, globose.

Middle- and high-elevation, wet forest and cloud forest, on the Atlantic slope. Ch (Hodel & Hodel 926, MEXU); G (Hodel & Castillo-Mont 1004A, AGUAT). 1100-2000 m.

Mexico (Oaxaca, Puebla, Veracruz), Mesoamérica.

Chamaedorea liebmannii might be confused with some forms of the highly variable *C. elegans*; however, if flowers are present, they can be easily distinguished because the latter has petals connate to the tip and the corolla opening by an apical, 3-angled pore. Inflorescences of *C. elegans* are typically interfoliar and erect to ascending while those of *C. liebmannii* are infrafoliar and spreading. Vegetatively, leaf bases of *C. elegans* are open nearly to the base while those of *C. liebmannii* are tubular. Ranges of the two species do not greatly overlap; *C. elegans* occurs mostly below 1200 m elevation while *C. liebmannii* occurs mostly above 1200 m elevation. *Chamaedorea liebmannii* often flowers for the first time without a well developed stem. When doing so, inflorescences arise nearly from the leaf litter and are branched to one order. Later, as it develops more,

inflorescences clearly emerge from above-ground stem and are branched to two orders. Hodel (2020) lectotypified the staminate inflorescence of the mixed holotype of the synonym *C. ferruginea*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. liebmannii* in subg. *Chamaedorea*.

37. *Chamaedorea lucidifrons* L. H. Bailey, *Gentes Herb.* 6: 244, fig. 127 (1943).

Holotype: Panama. *Allen 1814* (MO!). Illustr. Hodel, *Chamaedorea Palms*, p. 79, fig. 26B (1992a). N.v.: unknown.

Chamaedorea selvae Hodel

Solitary, erect, to 4 m tall. Stem 1.5-3 cm diameter, internodes to 10 cm. Leaves 3-5, pinnate, less commonly simple and bifid, spreading; sheath to 30 cm, tubular; petiole 19-52 cm; rachis to 75 cm; pinnae 3-8 per side, 20-48 × (1.9-)5-12 cm, broadly oblong-lanceolate, sigmoid, falcate, long-acuminate, glossy green, thin-papery, 6-10 prominent primary nerves, 1 secondary between each pair of primaries, distal pinnae sometimes confluent into a few large pinnae or the blade simple and bifid, then 45-65 × 20-35 cm, cuneate-oblong, bifid apically for 15 cm, 30 or more prominent primary nerves per side, outer margin remotely toothed distally. Inflorescences infrafoliar, attached well below the leaves on bare stem, ascending-spreading; peduncle 20-90 cm; bracts 5-8, to 40 cm, tightly sheathing, brownish in fruit; rachis 2-11 cm; staminate rachillae 6-17, 11-30 cm, pendulous; pistillate 4-13, 9-31 cm, slender, flexuous, upward-curved to drooping. Flowers staminate 1-2.5 × 1.5-2.5 mm, dome-shaped; calyx c. 0.5 × 1.5 mm, deeply lobed, thick, sepals connate and/or imbricate in basal 1/4, rounded apically; petals c. 1 ×

1.5 mm, free, spreading, acute, nerveless; stamens c. 0.75 mm high, tightly appressed around pistillode; pistillode c. 0.75 mm high, columnar, apically lobed; pistillate 1.5-2 × 2 mm, globose, whitish; sepals of fruiting perianth c. 0.75 × 1.75 mm, imbricate basally, acute, lightly nerved adaxially; staminodes not seen; ovary c. 1.35 mm high, ovoid; stigma lobes nearly sessile, pointed, erect. Fruits 5-8 × 4-5 mm, ellipsoid to oblong, black.

Low- to middle-elevation, wet forest, on the Atlantic slope. N (Bunting 873, F); CR (Grayum 9625, CR); P (Hodel & Hodel 743, PMA). 10-1500 m. Mesoamérica, Colombia.

Chamaedorea lucidifrons is rather distinctive in its unusually broad, heavily nerved pinnae and ascending, infrafoliar inflorescences with long peduncles. Simple-leaved forms might be confused with *C. deckeriana*, which differs in its spicate inflorescences while pinnate-leaved forms could be confused with the widespread *C. tepejilote*, which differs in its more numerous, narrower pinnae and inflorescences with very short peduncles. Flowers were lacking but based on the heavily nerved fruiting perianth, Hodel (1992a) tentatively included *C. lucidifrons* in subgenus *Chamaedorea*. Earlier, Hodel (1991) had named *C. selvae* from Costa Rica and Nicaragua and, based on the solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences, placed it in subg. *Chamaedoropsis*. Grayum (2003) synonymized *C. selvae* with *C. lucidifrons*; thus, the latter is now placed in subg. *Chamaedoropsis*.

38. *Chamaedorea macrospadix* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren.*

Kjobenhavn 1858: 20 (1859). Holotype: Costa Rica, *Oersted s.n.* (later numbered 6568)

(C!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 27, 79, 81, 93; figs. 6B, 26C, 27A-B, 33A-C (as *C. pedunculata*) (1992a). N.v.: unknown.

Chamaedorea pedunculata Hodel & N. W. Uhl., *Nunnezharia macrospadix* (Oerst.) Kuntze.

Solitary, erect, sometimes decumbent, to 4 m tall. Stem 1-2.5 cm diameter, internodes to 6 cm. Leaves 3-8 pinnate, ascending to spreading; sheath 15-20 cm, splitting deeply opposite petiole and tubular only at base, thick, durable, leathery, pinkish adaxially at the base; petiole 20-75 cm; rachis to c. 60 cm; pinnae 3-17 per side, 15-45 × (1.5-)5-13 cm, lanceolate to broadly rhombic, straight or slightly falcate, acuminate, thick and more or less leathery, satiny-glossy green abaxially, prominent midrib with 2 much less prominent primaries on either side. Inflorescences interfoliar, erect to ascending, sometimes spreading when heavily laden with fruits, rarely branched to 2 orders; peduncles 20-125 cm, equaling or greatly exceeding leaves, straight; bracts 6-9, to 30 cm, tightly sheathing, brown; staminate rachis 0-15 cm; staminate rachillae 5-30, 15-35 cm, simple but most proximal sometimes furcate, pendulous; pistillate 2-30, 3-25 cm, stiffly spreading. Flowers staminate 2-3 × 1.5-3 mm, ovoid to rhombic; calyx low, lobed, sepals connate basally, rounded apically, green; petals connate apically and there adnate to the pistillode and corolla opening by lateral slits, nerved, greenish; pistillate c. 2.5 mm diameter, light yellow to greenish yellow; calyx lobed, sepals imbricate nearly to apex; staminodes not seen; ovary 2 × 2 mm, globose, greenish yellow, stigma lobes short. Fruits 8-13 × 6-8 mm, subglobose to ellipsoid or obovoid, black.

Low- to middle-elevation, moist to wet forest, sometimes on limestone, on the Atlantic and Pacific slopes. CR (Hodel & Hodel 701A, CR); P (Croat 22301, MO). 10-2200 m. Mesoamérica.

Although somewhat variable, *Chamaedorea macrospadix* is distinctive in its long-pedunculate, ascending inflorescences that often greatly exceed the leaves, deeply opened leaf sheaths, mostly straight pinnae with a satiny-glossy sheen abaxially, and staminate flowers with strongly nerved petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits (which place it in subg. *Chamaedorea*). The distribution of *C. macrospadix* might extend into Colombia because it has been collected in the Darien in far eastern Panama. Plants on limestone seem to remain virtually stemless for some time before, if ever, forming a visible stem and have fewer pinnae and rachillae. Other species related to *C. macrospadix* include *C. matae*, *C. rossteniorum*, and *C. warscewiczii*. These four species have mostly thick and more or less leathery leaf blades or pinnae and leaf sheaths pinkish adaxially at the base, which dry conspicuously rosy pink to reddish. Hodel (1992a) distinguished *C. pedunculata* on its broadly rhombic pinnae and rhombic- or diamond-shaped staminate flowers, characters that can be encompassed in *C. macrospadix*. Some have suggested that *C. rossteniorum* might be a simple-leaved form of *C. macrospadix* but this latter species differs in its acaulescent habit, simple and bifid leaves, and generally longer inflorescences with more bracts and fewer rachillae (about one-third as many staminate and one-half as many pistillate).

39. *Chamaedorea matae* Hodel, *Principes (Palms)* 35: 75 (1991). Holotype: Costa Rica, *Mata 497* (CR!). Illustr.: Hodel, *Chamaedorea Palms*: p. 83; figs. 28A-B (1992a). N.v.: unknown.

Solitary, erect, to 3.5 m tall. Stem 1.5-2 cm diameter, internodes 5-12 cm. Leaves 4-9 pinnate, spreading; sheath to 20 cm, tubular; petiole 15-65 cm; rachis 33-80 cm, pinkish adaxially at the base; pinnae 3-8 per side, 20-35 × 3.5-11 cm, broadly lanceolate, strongly sigmoid, acuminate, thick, leathery, 5-6 prominent primary nerves per side, these elevated adaxially, apical pair often confluent and conspicuously wider, to c. 15 cm wide and 10-12 nerved. Inflorescences interfoliar or infrafoliar in fruit, erect to nodding or arching; peduncles 25-75 cm, ascending; bracts c. 5, to 25 cm, loosely sheathing, becoming brown and tattered; rachis 2-8 cm; rachillae 5-16, staminate 20-32 cm, pendulous; pistillate 9-21 cm, pendulous. Flowers staminate 2-3 × 2.5-3 mm, ovoid to barrel-shaped; calyx 2.5 × 0.75 mm, scarcely lobed, sepals connate nearly to apex, rounded or truncate apically, strongly nerved when dry; petals 3.5 × 2.5-3 mm, connate apically and there adnate to the pistillode and corolla opening by lateral slits, strongly nerved when dry, white to greenish yellow; stamens shorter than pistillode, anthers c. 1.5 mm; pistillode 2.5-2.75 mm high, columnar; flowers pistillate c. 2 mm diameter; calyx c. 0.75 mm high in fruit, scarcely lobed, strongly nerved; petals c. 2 × 3 mm in fruit, imbricate basally, broadly rounded apically, dark-centered, brown-margined, strongly nerved, cream-colored; staminodes not seen; ovary not seen. Fruits 7-12 × 5-10 mm, subglobose to obovoid, black.

Low-elevation, wet forest, on the Pacific slope. CR (Hodel & Hodel 715, CR); P (Hammel 4225, MO). 0-1000 m. Mesoamérica.

Chamaedorea matae is close to *C. warscewiczii*, which differs in having twice as many pinnae with unelevated, smooth nerves adaxially and, although downward-pointing, curved rather than pendulous pistillate rachillae. Other species related to *C. matae* and *warscewiczii* include *C. macrospadix* and *rossteniorum*. These four species have mostly thick and more or less leathery leaf blades or pinnae and leaf sheaths pinkish adaxially at the base, which dry conspicuously rosy pink to reddish. A case might be made to include *C. matae* in the extremely variable and widespread *C. pinnatifrons* but this latter species is consistent in its stiffish, erect-spreading pistillate rachillae. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits place *C. matae* in subg. *Chamaedorea*.

40. *Chamaedorea microphylla* H. Wendl., *Bot. Zeitung (Berlin)* 17(11): 102-103

(1859). Holotype: Cultivated in Europe from Panama, *Wendland s.n.* (GOET!). Illustr.: Hodel, *Chamaedorea Palms*: p. 161; figs. 67A-C (1992a). N.v.: unknown.

Nunnezharia microphylla (H. Wendl.) Kuntze

Solitary, erect, to 1 m tall. Stem c. 1.5 cm diameter, densely white-spotted and glaucous and appearing nearly white, internodes 4-7 cm. Leaves 3-5, pinnate, erect-spreading; sheath to 7-9 cm, tubular; petiole c. 10 cm; rachis to 25 cm; rachis, petiole, and apical portion of sheath minutely white-spotted; pinnae 7-9 per side, 9-17 × 1-4 cm, narrowly lanceolate to oblong-lanceolate or long-trapezoid, thin, sigmoid, falcate, downward-cupped and drying wrinkled, acuminate, conspicuously contracted basally, a prominent midrib and 2 less conspicuous primary nerves on either side, secondaries faint, apical pair with 3 prominent nerves. Inflorescences infrafoliar, erect-spreading, rarely branched to 2

orders; peduncles 15-40 cm, ascending; bracts 4-7, to 12 cm long, most distal equaling or exceeding peduncle, shredded or fallen away in fruit, brown; staminate with rachis 5-10 cm, flexuous; rachillae 8-15, 10-18 cm, stiffly spreading or slightly drooping distally; pistillate rachis 3-7 cm, flexuous; rachillae 7-12, 4-8 cm, stiffly erect to ascending, narrowly diverging and parallel, flexuous, strongly undulate when dry. Flowers staminate in remote spirals, 2.5-3.5 × 2-2.5 mm, ovoid, deeply sunken in elliptic pits with a swollen green lip; calyx c. 0.5-0.8 × 2-2.5 mm, moderately lobed, sepals connate and/or slightly imbricate in basal 1/2, acute apically, membranous, pale green to clear-colored; petals 3-3.5 × 1.5-2.5 mm, ovate to long-ovate, free nearly to base, erect apically, acute, thin, lightly nerved when dry, yellow to orange-yellow; stamens 1.5-1.75 mm high, filaments 0.5-1 mm, flared basally and forming ring around pistillode, anthers 0.75-1.5 mm, oblong, spreading apically, dorsifixed toward base, brownish; pistillode 2.5-3.5 mm high, ovoid to broadly columnar, shortly 3-lobed apically, pale yellow; pistillate 2-2.5 × 2 mm, globose-ovoid; calyx 0.5-0.75 × 2 mm, deeply lobed, sepals connate in basal 1/4, broadly rounded to rounded-acute apically, membranous, green with clear-colored margins; petals 1.75-2.5 × 1.5-2 mm, ovate, imbricate in basal 3/4, erect apically, acute, thin, nerved when dry, yellow; staminodes 6, small; ovary 1-2 × 1-1.75 mm, ovoid, stigma lobes distinct, c. equaling petals, erect or slightly recurved, greenish. Fruits c. 6 × 4 mm, oblong-globose, black.

Middle-elevation, moist cloud forest, on the Pacific slope. P (Hodel et al. 1126A, PMA).

1300-1400 m. Mesoamérica.

Endemic to western Panama and rarely collected, *Chamaedorea microphylla* is distinctive in its thin, downward-cupped, sigmoid, dark green pinnae markedly contracted

basally; fragile, thin petals nearly transparent when dry; and stem so densely white spotted as to appear nearly white. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. microphylla* in subg.

Chamaedoropsis.

41. *Chamaedorea minima* Hodel, *Principes (Palms)* 35(2): 72-73, figs. 1-2 (1991).

Holotype: Cultivated in Costa Rica from Costa Rica, *Hodel 622A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 163; figs. 68A-B (1992a). N.v.: unknown.

Solitary, erect or decumbent, to 25 cm tall, often appearing stemless. Stem 1-2 cm diameter, often creeping and buried in leaf litter, densely and prominently ringed, internodes 2-3 mm, often rooting along its length. Leaves 7-10, simple and bifid, spreading; sheath c. 2.5 cm, long-open, tubular only briefly at base; petiole 5-7 cm, gray-green; rachis to 7 cm; rachis, petiole and distal part of sheath minutely white-spotted; blade c. 15 × 6 cm, V-shaped, bifid apically to 2/3-3/4 its length, lobes 4-5 cm wide at tips, acute-acuminate, stiff, dark grayish or bluish green, outer margins coarsely toothed, 6-7 prominent primary nerves per side. Inflorescences interfoliar, enclosed in distal rolled margins of leaf sheath, erect-spreading; peduncles to 12 cm; bracts 6-8, to 5 cm, brown; staminate with rachis to 2 cm; rachillae c. 6, to 7 cm, spreading but drooping distally; pistillate spicate, flower-bearing portion or rachilla to 7 cm, ascending to spreading, curved. Flowers staminate in immature bud c. 1.5 × 0.75 mm, fusiform or barrel-shaped; calyx low, lobed, sepals connate basally, broadly rounded to truncate apically; petals free, spreading apically; pistillate in immature bud c. 1 × 1 mm, subglobose; calyx lobed,

sepals imbricate basally, rounded apically, thick, pale green; petals tightly imbricate nearly to apex, acute. Fruits 8-10 mm diameter, globose, purple-black.

Low- to middle-elevation, very wet forest, on the Pacific slope. CR (Hodel et al. 1540, CR). 1200 m. Mesoamérica.

Endemic to Costa Rica and rarely collected, *Chamaedorea minima* is distinctive in its low, dwarf habit and simple and bifid leaves with V-shaped, bluish green blades. It is similar to *C. pumila* and *C. sullivaniorum*, which some treat all three as *C. pumila*; however, *C. pumila* and *C. sullivaniorum* can be distinguished by their slightly mottled, iridescent and larger leaf blades with 9-13 and 15-16 prominent primary nerves per side, respectively. Although *C. minima* was originally known only from cultivated plants at the Jardín Botánico Robert y Catherine Wilson in southeastern Costa Rica, purportedly collected in nearby forests (and thought to be extinct there now), it was documented in the wild from farther west in the central part of the country where it grew side by side with *C. sullivaniorum* with no intermediate forms, suggesting that the two are distinct. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. minima* in subg. *Chamaedoropsis*.

42. *Chamaedorea molinana* Hodel, Cast. Mont. & Zúñiga, *Principes (Palms)*: 39(4): 183-186, f. 1-4 (1995) '*moliniana*'. Holotype: Honduras, *Hodel et al. 1273* (BH!).

Illustr.: Hodel, *Palm J.* 182; p. 7; f. 13-14 (2005). N.v.: unknown.

Solitary, erect, to 3 m tall, often flowering when appearing stemless. Stem to 1.75 cm diameter, often covered distally with persistent leaf sheaths, internodes to 15 cm, if appearing acaulescent then stem below leaf litter, to 15 cm long, slightly curved, densely

and prominently ringed, internodes 3-15 mm. Leaves 3-5, pinnate, ascending-spreading; sheath to 20 cm, obliquely open in apical 1/4, tubular in basal 3/4, persistent; petiole to 50 cm; rachis to 65 cm; pinnae 17-20 per side, 10-26 × 0.75-3 cm, lanceolate, straight but slightly falcate, long-acuminate, contracted basally, proximal margin briefly decurrent on rachis, bright green, sometimes with a light bluish or grayish cast adaxially, a prominent midrib, and 2-4 primary nerves on either side of this, secondaries numerous, faint.

Inflorescences infrafoliar, ascending, penetrating persistent leaf sheaths, often arising from leaf litter in nearly stemless plants when flowering for the first times; peduncles to 62 cm, straight, ascending; bracts 8-9, to 19 cm, most distal shorter than to exceeding peduncle, brown; rachises 0-3 cm; staminate rachillae up to 8, to 15 cm, dropping, drying with fine, thin, transparent, longitudinal ridges; pistillate rachillae up to 4, to 8 cm, ascending to spreading, straight, strongly flexuose and with when dry. Flowers staminate, scarcely sunken, c. 2.5 × 2.5 mm, globose; calyx c. 0.5 × 2 mm, cupular, moderately to shallowly lobed, sepals connate in basal 1/2-2/3, broadly rounded apically; petals c. 2.5 × 2.5 mm, broadly-ovate, spreading, erect, thin, exceeding pistillode, yellowish; stamens c. 1.5 mm high, shorter than pistillode, filaments c. 0.75, very slender, anthers 0.5-0.75 mm, oblong, dorsifixed near base; pistillode 1.75-2 mm, columnar, truncate apically; pistillate flowers c. 1 × 2 mm, depressed-globose; calyx c. 0.5 × 2 mm, low cupular, scarcely lobed, sepals connate and/or imbricate nearly to apex and there truncate; petals c. 1 × 1.25-1.5 mm, triangular, imbricate in basal 1/2, erect, acute, faintly nerved adaxially when dry; staminodes not seen; ovary c. 0.8 × 1.75 mm, depressed- to sub-globose, stigma lobes long, recurved, thick, pointed, just shorter than petals. Fruits c. 10 × 10 mm, globose, black; seeds c. 8 × 7 mm, globose.

Middle-elevation, wet forest, on the Atlantic slope. H (Hodel et al 1272, EAP). 1400-1700 m. Mesoamérica.

Apparently endemic to Honduras and rarely collected, *Chamaedorea molinana* is similar to *C. parvisecta* from Guatemala and Chiapas, Mexico, and the two might not be distinct, but this latter species can be distinguished by its much fewer pinnae, shorter petioles, and thicker, pistillate rachillae. *Chamaedorea molinana* tends to initiate flowering when stemless or nearly so and with much reduced inflorescences. With time the plants produce visible stem and more typical inflorescences but it would be easy to confuse the two stages as different species. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. molinana* in subg.

Chamaedoropsis.

43. *Chamaedorea nationsiana* Hodel & Cast. Mont., *Principes (Palms)* 35: 4, figs. 1-4 (1991). Holotype: Guatemala, Hodel & Castillo Mont 1021A (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 261, 263; figs. 117E, 118A-B. N.v.: unknown.

Solitary, to 2.5 m tall. Stem 2-3 cm diameter, prominently ringed, internodes to 10 cm. Leaves 5-6, pinnate, erect-spreading; sheath to 30 cm, tubular in basal half, obliquely open apically, with a raised, yellow central costa; petiole to 75 cm; rachis 1-1.25 m; pinnae to 11 per side, to 53 × 9 cm, lanceolate, sigmoid, falcate, long-acuminate, 8-9 prominent primary nerves, these pale and keeled abaxially, 1 secondary between each pair of primaries. Inflorescences inter- or infrafoliar in flower, infrafoliar in fruit, spicate, ascending in flower, ascending to spreading in fruit; staminate c. 8 per node, each with separate prophyll and peduncular bracts but with a common hypopodium, center one

developing first followed sequentially by others on either side; pistillate solitary at a node; peduncles 25-30 cm, ascending in flower, nodding in fruit; bracts 4-5, to 25 cm, most distal typically exceeding peduncle, greenish in flower, brown and disintegrating in fruit; rachises or flower-bearing portions 15-20 cm, staminate pendulous, pistillate ascending in flower, spreading to slightly recurved in fruit. Flowers staminate contiguous, even in bud, c. $2 \times 1-1.5$ mm, globose, irregularly angled or shaped by mutual pressure; calyx prominent, c. 1×1.5 mm, scarcely lobed, sepals connate to apex and there broadly rounded to truncate, membranous; petals $1-1.5 \times 1.5$ mm, triangular, free and spreading apically, acute; stamens c. 0.8 mm high, shorter than petals and in a tight ring around pistillode, filaments short, anthers c. 0.8 mm, oblong, bilobed, sessile; pistillode c. 1 mm high, columnar, flared basally; pistillate contiguous, even in bud, $1.5-1.75 \times 2.5-3$ mm, depressed-globose, shaped by mutual pressure; calyx prominent, c. $1.5 \times 2.5-3.5$ mm, scarcely lobed, sepals connate nearly to apex and there truncate, membranous; petals c. 1.5×2.5 mm, imbricate nearly to apex, inflexed, rounded apically; staminodes not seen; ovary c. 2 mm high, columnar, broadly swollen basally to 1.5 mm wide, terminal cap broadly flared, stigma lobes short, recurved, sessile. Fruits 10-15 mm diameter, subglobose to transverse oblong or obovoid but densely packed and angled from mutual pressure, smooth, black; seeds 6-9 mm diameter, angled, brown.

Low-elevation, wet forest, on the Atlantic slope, typically on limestone. G (Hodel & Castillo Mont 1021B, AGUAT). 200-900 m. Mesoamérica.

Chamaedorea nationsiana is similar to *C. arenbergiana*, which with it has been confused; however, the solitary, branched staminate inflorescences with up to 10 pendulous rachillae distinguish the latter species. Apparently endemic to Guatemala, *C.*

nationsiana is distinctive in its spicate inflorescences, the staminate in multiples at a node; large, broad pinnae; and contiguous, even in bud, staminate flowers with apically free and spreading petals, the latter of which place it in subg. *Stephanostachys*. Although all the known specimens of *C. nationsiana* are from one locality in Guatemala, this highly localized distribution might be more apparent than real. Nearly all collections labeled as *C. arenbergiana* from the Atlantic slope of Guatemala and Honduras are in fruit. Some of these might be *C. nationsiana* because the two species are nearly impossible to distinguish when only fruiting material is at hand.

44. *Chamaedorea neurochlamys* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 744-745 (1933). Lectotype (designated here): Guatemala, *von Tuerckheim 4045* (US!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 83, 85; figs. 28C, 29A-D (1992a). N.v.: monkey-tail, B; chilac, pacaya, pacayo, G.

Docanthe alba O. F. Cook *nom. illeg.*

Solitary, erect, to 4.5 m tall. Stem 1.5-2.5 cm diameter, internodes to 5-15 cm. Leaves 3-5, pinnate, spreading; sheath to 18 cm, tubular basally, obliquely open apically and there with white margins and green nerves; petiole 15-29 cm; rachis 45-65 cm; pinnae 6-8 per side, 23-33 × 5-6.5 cm, narrowly rhombic, sigmoid, acuminate, dull dark green adaxially, glossy green abaxially, prominent midrib and 1 submarginal primary on either side, 4-5 secondaries on either side, distal pair sometimes wider, to c. 9 cm wide and 5-nerved. Inflorescences inter- or infrafoliar, erect to spreading in flower, arching to nodding when heavily laden with fruits; peduncles to 40-60 cm; bracts 5-6, most distal exceeding peduncle, brown in flower, often fallen away in fruit; staminate rachis 4-7 cm; rachillae

15-20 or more, 15-20 cm, pendulous; pistillate rachis 6-10 cm; rachillae 10-25, 9-14 cm, ascending or drooping in fruit. Flowers staminate c. 2 mm high; calyx c. 0.5 mm high, shallowly lobed; petals connate apically and there adnate to the pistillode and corolla opening by lateral slits, prominently nerved when dry, yellowish; stamens with short filaments, anthers not bifid apically; pistillode longitudinally 3-angled, truncate apically; pistillate 2-3 × 2.5 mm, globose; calyx 0.75-1 × 2-2.5 mm, lobed, sepals connate in basal 1/2-2/3, broadly rounded apically, yellowish; petals 2.5 × 2.5 mm, imbricate nearly to apex, acute, strongly nerved when dry, greenish yellow; staminodes not seen; ovary 2-3 × 2 mm, subglobose, yellow, stigma lobes short, recurved, yellow. Fruits c. 10 × 5 mm, subreniform, bilobed, or even nearly sickle-shaped, bright orange-red; seeds c. 8 × 4 mm, shape as in fruit.

Low-elevation, wet forest, sometimes on limestone, on the Atlantic slope. C (Shepherd 113, WIS); Ch (Carlson 2101, F); QR (Cabrero 5575, MEXU); T (Novelo et al. 134, MO); B (Hodel & Hodel 842A, BH); G (Hodel & Castillo-Mont 1006, AGUAT); H (Hodel et al. 1469, MO). 40-750 m. Mexico (Oaxaca), Mesoamérica.

Chamaedorea neurochlamys is close to the extremely variable *C. pinnatifrons* but can be distinguished by the white leaf sheath margins with green veins and the red, subreniform fruits. *Chamaedorea falcifera* is similar to *C. neurochlamys* and might be an unusual, diminutive form of the latter but can be distinguished by the leaves with only three to four pinnae per side, pale or only briefly white leaf sheath margins, and falciform fruits.

Chamaedorea neurochlamys is expected in Nicaragua. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. neurochlamys* in subg. *Chamaedorea*.

45. *Chamaedorea nubium* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 202 (1947). Holotype: Guatemala, *Steyermark 43583A* (F!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 33, 165, 167; figs. 9A, 69A-F, 70 (1992a). N.v.: pacaya (Guatemala).

Chamaedorea skutchii Standl. & Steyerl.

Cespitose, erect or decumbent, forming dense to loose and wide-ranging colonies on one gender to 5 × 10 m. Stems 8-10 mm diameter, internodes to 12 cm, often covered with persistent brown leaf sheaths. Leaves 4-7, simple and bifid, rarely pinnate, spreading; sheath to 30 cm, tubular, green, becoming brown, persistent; petiole 8-22 cm; rachis 8-27 cm; blade to 45 × 35 cm, bifid apically to 2/3 its length, lobes narrowly long-acuminate, interior margins to 33 cm, exterior margins entire or slightly toothed, thin-papery to papery, green or sometimes distinctly glaucous gray abaxially, 12-17 prominent primary nerves per side, prominent and keeled adaxially, 2 secondaries between each pair of primaries, if blades pinnate then rachis to 33 cm long, pinnae 6-13 per side, 15-31 × 1.3-2 cm, linear-lanceolate, falcate, acuminate, prominent primary nerves 1-3 per pinna, 1 secondary between each pair of primaries, sometimes apical pair much broader, to 7-nerved. Inflorescences infrafoliar, sometimes penetrating persistent leaf sheaths, erect-spreading; peduncles 10-27 cm, ascending to spreading in flower, nodding in fruit; bracts 4-5, to 9.5 cm, most distal equaling to exceeding peduncle, brown; rachises 1-4 cm; staminate rachillae to 15, 6-15 cm, spreading but drooping distally or pendulous, frequently drying strongly undulate, yellow; pistillate to 10, 8-15 cm, ascending-spreading and greenish yellow in flower, downward-pointing and red-orange when

heavily laden with fruit, typically drying strongly undulate. Flowers staminate 1.5-2 × 3-3.5 mm, depressed-globose, sunken in narrowly elliptic depressions in curves of rachilla; calyx 0.5-0.75 × 2.5-3 mm, lobed, sepals connate in basal 1/2, broadly rounded to truncate apically, membranous, yellow; petals c. 2 × 2 mm, broadly ovate connate in basal 1/3, free apically and slightly incurved but tips acute and erect or slightly recurved, slightly fleshy, golden yellow; stamens 1-1.5 mm high, filaments very short, 0.5 mm, connate basally, anthers 0.7-0.75 mm, bifid apically; pistillode 1.5-2 × 0.75 mm, just shorter than petals, broadly columnar, slightly pointed apically, pale yellow; pistillate 1.5-2 × 4 mm, shield-like, sunken in depressions with lip-like margin proximally; calyx c. 1 × 3-4 mm, shallowly lobed, sepals imbricate in basal 3/4, broadly rounded to truncate apically, pale yellow; petals 1.5-2.5 × 3.5 mm, broadly triangular, imbricate nearly to apex and corolla opening only slightly apically, rounded-acute, yellow; staminodes present or absent; ovary 1.5-2 mm high, shield-like, yellowish, stigma lobes short, c. equaling petals or only slightly exserted, bluntly pointed. Fruits to 10-14 × 8-11 mm, ovoid-globose to globose, black, sometimes with a slight glaucous bloom; seeds 8-12 × 7-10 mm ovoid-globose.

Middle- to high-elevation, moist to wet forest and cloud forest, on the Atlantic and Pacific slopes. Ch (Hodel & Hodel 925, MEXU); G (Hodel & Castillo-Mont 899, AGUAT); H (Evans 1196, MO); ES (Tucker 1099, F). 1500-2550 m. Mesoamérica. Mexico (Guerrero, Oaxaca).

Chamaedorea nubium is distinctive in its cespitose habit and mostly simple and bifid leaves. Although typically a large plant, forming colonies of one gender up to 5 m tall and 10 m wide, small forms less than 1 m tall are sometimes encountered. These small

forms could be confused with *C. brachypoda* but the latter's lowland habitat; rhizomatous, generally smaller habit, leaves, and inflorescences; exceedingly slender, reed-like stems; greenish flowers; and curved-ellipsoid fruits easily distinguish it. Although once maintained as a separate species, *C. skutchii* is included here; it is simply a pinnate-leaved form of *C. nubium*. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. nubium* in subg. *Chamaedoropsis*.

46. *Chamaedorea oblongata* Mart., *Hist. Nat. Palm.* 3(7): 160 (1838). Holotype: Mexico. Veracruz, *Schiede s.n.* (M!). Illustr.: Hodel, *Chamaedorea Palms*: p. 169; figs. 71A-E (1992a). N.v.: chate, brillosa, palmella, palmita, tepejilote (Mexico); caquib, xate macho (Guatemala).

Chamaedorea aurantiaca hort. in H. Wendl., *Chamaedorea biloba* hort. in H. Wendl., *Chamaedorea corallina* hort. not (H. Karst.) Hook, *Chamaedorea corallocarpa* hort. in Dammer, *Chamaedorea fusca* Standl. & Steyerl., *Chamaedorea lindeniana* hort. in H. Wendl., *Chamaedorea lunata* Liebm. ex Mart., *Chamaedorea oblongata* var. *conferta* H. Wendl., *Chamaedorea paradoxa* H. Wendl., *Chamaedorea scandens* hort. in H. Wendl. not Liebm., *Chamaedorea schiedeana* hort. in H. Wendl. not Mart., *Mauranthe lunata* (Liebm. ex Mart.) O. F. Cook, *Morenia corallocarpa* hort. in H. Wendl., *Nunnezharia biloba* (hort.) Kuntze, *Nunnezharia corallocarpa* (hort.) Kuntze, *Nunnezharia lunata* (Liebm. ex Mart.) Kuntze, *Nunnezharia oblongata* (Mart.) Kuntze.

Solitary, erect, infrequently decumbent, to 4 m tall. Stem 1-1.25 cm diameter, internodes 4-15 cm. Leaves 3-8, pinnate, erect-spreading; sheath 15-20 cm, tubular, with a prominent costa extending from petiole; petiole 15-30 cm; rachis 30-60 cm; pinnae 5-9

per side, to 17-40 × 3.5-10 cm, lanceolate to rhombic lanceolate to oblong-trapezoid, sigmoid, often cupped downward, thick, leathery, long-acuminate, glossy dark green adaxially, pale abaxially, prominent midrib and obscure submarginal nerve on either side adaxially, infrequently apical pair very broad, to 20 cm wide, 5-8 nerved. Inflorescences infrafoliar, ascending-spreading; peduncles 10-40 cm; bracts 5-7, to 20 cm, most distal equaling peduncle, green aging to brown in flower; rachises 2-12 cm; staminate rachillae 9-25, to 30 cm, pendulous, green; pistillate 6-20, 9-16 cm, stiffly ascending-spreading. Flowers staminate 3-4 × 3-4.5 mm, ovoid to obovoid; calyx 0.5-1 × 2 mm, lobed, sepals connate in basal 1/2, broadly rounded-acute apically, green; petals 3-4 × 1.5-2 mm, broadly ovate, cupped inward, free nearly to base and there connate briefly, spreading apically, rounded-acute, green drying black; stamens 1.5-2 mm high, filaments 0.5-0.75 mm, adnate basally with petals, green, anthers c. 1 mm, long-oblong, briefly bifid apically, yellow to whitish; pistillode 2.5-3 mm high, columnar, truncate apically, pale green; pistillate c. 2 × 2.5-3 mm, depressed-globose; calyx 0.5-1 × 2-2.5 mm, deeply lobed, sepals connate in basal 1/3, broadly rounded to acute apically, green; petals c. 2.5 × 2-2.5 mm, broadly ovate, imbricate nearly to apex, connate briefly basally, broadly rounded to truncate apically, thin and transparent distally, slightly fleshy proximally, greenish yellow; staminodes 3, triangular; ovary 1.75-2 × 2 mm, depressed-globose, green, stigma lobes short, angular, recurved, exerted above petals. Fruits 8-14 × 6-8 mm, variable, ovoid or sometimes falciform to slightly lunate and narrowed at both ends or globose, glossy black, epicarp thin, mesocarp fleshy, mucilaginous, aromatic, fibrous, green; seeds 7-11 × 5-6 mm, ellipsoid to nearly globose.

Low- and middle-elevation, moist to wet forest, often on limestone, on the Atlantic slope.
 T (Matuda 3232, MEXU), Ch (Hodel & Hodel 926, MEXU); C (Lundell 1235, F), QR
 (Tellez 3410, MEXU), B (Hodel 841, BH); G (Hodel & Castillo-Mont 876A, AGUAT);
 H (Hodel et al. 1289, EAP); N (Molina 20455, F). 10-1200(-1800) m. Mexico (Oaxaca,
 Veracruz), Mesoamérica.

The extremely variable and widespread *Chamaedorea oblongata* might be confused with *C. pinnatifrons* or *C. neurochalmys* in Mesoamerica. However, these latter two species differ in their thin-textured pinnae with three or more prominent primary nerves; apically whitish leaf sheaths; staminate flowers with petals connate apically and the corolla opening by lateral apertures; and reddish to red-orange fruits. Another similar species, *C. schiedeana*, from eastern central Mexico and outside of Mesoamerica, is also similar but differs in its more numerous, thin-textured pinnae with five to seven prominent nerves and staminate flowers with petals connate apically and the corolla opening by lateral apertures. The poorly known *C. paradoxa* is only tentatively included here. Because of their thick, durable texture and lustrous green color, leaves of *C. oblongata* in Mexico and Guatemala are sometimes harvested for the international cut foliage trade. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. oblongata* in subg. *Chamaedoropsis*.

47. *Chamaedorea pachecoana* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 203 (1947). Holotype: Cultivated in Guatemala from Guatemala, Standley 63104 (F!). Illustr.: Hodel, *Chamaedorea Palms*: p. 171; figs. 71A-E (1992a). N.v.: pacaya (Guatemala).

Chamaedorea digitata Standl. & Steyerl., *Chamaedorea pulchra* Burret, *Paranthe violacea* O. F. Cook *nom. illeg.*

Solitary, erect or decumbent, to 75 cm tall, flowering when appearing acaulescent. Stem 7-10 mm diameter, proximal portion curved and subterranean or buried in leaf litter with only the distal 30 cm exposed, densely and prominently ringed, internodes 5-10 mm, often covered with persistent leaf sheaths. Leaves 6-12, pinnate, briefly ascending then spreading in a mostly flat rosette; sheath to 5 cm, long-open nearly to base, green becoming brown, persistent; petiole 7-20 cm; pinnae 7-11 per side, 4.5-12 × 1.5-2 cm, broadly rhombic-lanceolate to oblong-lanceolate, sigmoid, falcate, thin-textured, long-acuminate, sometimes minutely auriculate with very narrow attachment at base, attached mostly at right angles to rachis or the proximal ones even reflexed, apical pair sometimes larger, margins shallow toothed distally, 3 prominent primary nerves. Inflorescences inter- or infrequently infrafoliar, erect-spreading; peduncles 11-30 cm, ascending to spreading; bracts 5-7, to 12 cm, most distal exceeding peduncle, brown; staminate rachis c. 1.5 cm; staminate rachillae 2-6, to 12 cm, spreading; pistillate spicate or bifurcate, rachillae or flower-bearing portion to 12 cm, straight, ascending to spreading. Flowers staminate c. 3 × 2 mm, ovoid to bullet-shaped; calyx 0.5-0.75 × 2-2.5 mm, lobed, sepals connate in basal 1/2-3/4, acute apically; petals c. 3 × 1.5-2 mm, ovate, free nearly to base, incurved obtuse apically but not connate, greenish yellow; stamens 2-2.5 mm high, filaments 0.5-1 mm, anthers 1-1.5 mm, oblong-ovate, obtuse; pistillode c. 2 mm high, columnar; pistillate c. 3 × 2.75 mm, ovoid; calyx c. 1.5 × 2.75 mm, shallowly lobed, sepals imbricate in basal 2/3, broadly rounded apically, pale yellow; petals c. 3 × 2.5 mm, ovate, cupped, imbricate in basal 1/2, acute and slightly incurved apically, yellow;

staminodes tooth-like; ovary c. 3×2 mm, c. equaling petals, ovoid, pale green stigma lobes short, recurved, clear-colored. Fruits 6-8 mm diameter, globose to ovoid-globose, black.

Middle-elevation, wet forest and cloud forest, on the Pacific slope. G (Hodel & Castillo-Mont 908A, AGUAT). 1200-1500 m. Mesoamérica. Mexico (Chiapas?).

An unusually handsome plant, *Chamaedorea pachecoana* is distinctive in its dwarf, nearly acaulescent habit with leaves spread mostly in a flat rosette and pinnae at right angles to the rachis. It has been compared to *C. elegans* and *C. parvisecta*, which differ in their larger habit with a well developed, above-ground stem, pinnae attached mostly at an angle to the rachis, and pistillate inflorescences with many more rachillae. It is to be expected on the Pacific slope of adjacent Chiapas, Mexico. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C.*

pachecoana in subg. *Chamaedoropsis*.

48. *Chamaedorea palmeriana* Hodel & Uhl, *Principes (Palms)* 34: 122-125, f. 4-5 (1990). Holotype: Panama, *Hodel & Hodel 726A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 87, 89, 91; figs. 30, 32A-B (1992a). N.v.: unknown.

Solitary, slender, erect but often creeping or decumbent, to 1.25 m tall. Stem 5-10 mm diameter, internodes 5-10 cm, often with adventitious roots at base and, if decumbent, rooting along its length. Leaves 6-12, simple and bifid, spreading; sheath 5-7 cm, tubular; petiole 2.5-15 cm; rachis 8-12 cm; blade 11-30 \times 9-21 cm, broadly obovate, bifid apically 1/2-2/3 its length, thin-papery, nearly corrugate, bright emerald green, 10-14 prominent primary nerves per side, outer margins conspicuously toothed. Inflorescences interfoliar,

erect; peduncles 10-50 cm; bracts 4-5, to 15 cm, most distal not exceeding peduncle, tightly sheathing, green in flower; staminate with rachis 0-5.5 cm; rachillae 2-8, 8-2 cm, erect-spreading; pistillate spicate or with 2-3 rachillae, flower-bearing portion or rachillae 8-25 cm, erect. Flowers staminate 2-3 × 2-3 mm, angular-globose; calyx c. 0.5 × 1.75 mm, deeply lobed, sepals connate only briefly basally, broadly rounded apically, brownish; petals c. 2.5 × 2-2.5 mm, rounded-triangular, acute, connate apically and there adnate to the pistillode and corolla opening by small basal lateral apertures c. 0.5 mm long with orange-brown margins, greenish apically, yellowish basally; stamens included; pistillode c. 2.5 mm high, columnar; pistillate 1.5-2 mm diameter, depressed-globose; calyx c. 0.5 × 2 mm, shallow lobed, sepals very briefly imbricate or connate basally, broadly rounded apically; petals 2-2.5 × 3 mm, imbricate basally, spreading and broadly rounded to acute apically, faintly nerved adaxially, pale greenish or yellowish; ovary globose-subglobose, green. Fruits 9-12 × 5-10 mm, ovoid to globose or ellipsoid, black.

Middle-elevation, wet forest and cloud forest, mostly on the Atlantic slope, rarely on the Pacific slope. CR (Hodel et al. 972, CR); P (Hodel & Hodel 726B, PMA). 450-2000 m. Mesoamérica.

Chamaedorea palmeriana is similar to *C. amabilis* but the latter species differs in its leaf blades bifid apically to no more than 1/4 their length with 20-25 primary nerves per side and the globose staminate flowers. *Chamaedorea palmeriana* has only been found on the Pacific slope in western Panama where the Continental Divide is at a lower elevation; then it occurs just over it on the Pacific side. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. palmeriana* in subg. *Chamaedorea*.

49. *Chamaedorea parvifolia* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 746-747 (1933). Neotype (designated by Hodel, *Chamaedorea Palms*, p. 96 [1992a]): Costa Rica, *Hodel & Grayum 965A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 91; fig. 32C (1992a). N.v.: unknown.

Solitary, erect, to 2 m tall but often flowering when appearing stemless. Stem 1-1.5 cm diameter, wholly or partially submerged in leaf litter, densely ringed, internodes to 3 cm but often covered with persistent leaf sheaths. Leaves 4-10, pinnate, erect-spreading; sheath to 15 cm, tubular basally, obliquely open apically, thick, durable, persistent; petiole 3-50 cm; rachis 9-36 cm; pinnae 3-7 per side, 9-24 × 1.5-5 cm, lanceolate, slightly sigmoid, thick, long-acuminate, grayish green with a slight bluish cast adaxially, paler abaxially, 2-3 prominent primary nerves, apical pair wider, c. 8 cm wide, 3-nerved.

Inflorescences interfoliar, erect to spreading; peduncles to 16-80 cm; bracts c. 4, most distal exceeding or equaling peduncle, tightly sheathing, brown in flower; rachis 0-3 cm; rachillae 2-10, staminate 7-20 cm, slightly drooping; pistillate 3.5-15 cm, erect-spreading. Flowers staminate 2-2.5 × 1.8-2.5 mm high, globose; calyx 0.8-1 × 1.8-2 mm, deeply lobed, sepals connate briefly basally, rounded to acute apically, lightly nerved; petals c. 2.5 × 2 mm, connate apically and there adnate to the pistillode and corolla opening by lateral slits, acute, thin, lightly nerved, greenish yellow; stamens 1.25-2 mm high, anthers c. 2 mm, sessile, bilobed; pistillode 2-2.5 mm high, columnar, slender, slightly flared apically; pistillate 1-1.25 × 2-2.5 mm, subconic, nearly shield-like; calyx 0.75-1 × 2-2.5 mm, lobed, sepals imbricate in basal 1/2, truncate to broadly rounded apically; petals 1.5-2 × 1.5-2 mm, imbricate nearly to apex, truncate or acute, yellowish to yellowish

green; staminodes not seen; ovary 1-1.5 × 1-1.5 mm, depressed-ovoid to globose, stigma lobes short, recurved, not exceeding petals. Fruits 7-9 × 6-8 mm, subglobose to ellipsoid, black.

Middle- and high-elevation, moist and wet forest and oak cloud forest, on the Pacific slope. CR (Grayum & Schatz 5139, CR). 1200-2400 m. Mesoamérica.

Endemic to Costa Rica, *Chamaedorea parvifolia* is similar vegetatively to *C. pittieri*.

Both are solitary and have short, closely and prominently ringed stems, thick, durable leaf sheaths, small leaf blades with thick grayish green pinnae with a nearly bluish cast, and long-pedunculate, few-branched, stiffly erect to spreading inflorescences. The staminate flowers with free petals distinguish *C. pittieri*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures places *C.*

parvifolia in subg. *Chamaedorea*.

50. *Chamaedorea parvisecta* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 742-743 (1933). Neotype (designated by Hodel, *Chamaedorea Palms*, p. 170 [1992a]): Guatemala, *Hodel & Castillo-Mont 1102A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 173; figs. 73A-E (1992a). N.v.: unknown.

Solitary, erect, to 3 m tall, often flowering when appearing stemless. Stem 5-10 mm diameter, often covered distally with persistent leaf sheaths, internodes to 10 cm. Leaves 3-5, pinnate, ascending-spreading; sheath to 20 cm, tubular, persistent; petiole c. 30 cm; rachis c. 40 cm; pinnae 8-10 per side, to 20 × 4.5 cm, apical pair wider, lanceolate to broadly lanceolate, straight, long-acuminate, thin-papery, contracted conspicuously basally, dull green with a light bluish or grayish cast adaxially, paler abaxially, a

prominent midrib, other nerves obscure. Inflorescences infrafoliar, ascending to spreading, penetrating persistent leaf sheaths, often arising from leaf litter in nearly stemless plants when flowering for the first times; peduncles 18-40 cm, straight, ascending; bracts 6-8, to 15 cm, brown, most distal not exceeding peduncle; rachises very short to lacking in first flowerings to 10 cm; staminate rachillae 4-18, to 12 cm, dropping; pistillate rachillae 3-10, 5-12 cm, erect to ascending in flower, spreading in fruit. Flowers staminate 1.75-2 × 2-2.5 mm, globose; calyx 0.25-0.4 × 1.75-2 mm, deeply lobed, sepals connate in basal 1/4 to nearly free, broadly rounded apically; petals c. 2 × 1.25-1.5 mm, long-ovate, free nearly to base, acute apically, faintly nerved when dry, cream-colored aging brown; stamens c. 1.5 mm high, filaments 0.5-0.75, very slender, anthers 0.75 mm, oval to oblong, basifixed; pistillode 1.75-2 mm, columnar, flared slightly basally; pistillate c. 2-2.5 × 2.5 mm, depressed-globose; calyx c. 0.5 × 2.5 mm, lobed, sepals connate and/or imbricate basally, broadly rounded apically; petals c. 2 × 3 mm, broadly ovate, imbricate basally; staminodes present; ovary with stigma lobes short. Fruits c. 10 × 9 mm, globose to broadly ovoid, black.

Middle- to high-elevation, rain forest and cloud forest, on the Atlantic slope. Ch (Croat 46631, MO); G (Hodel & Castillo-Mont 891, AGUAT). 1400-2500 m. Mesoamérica.

Chamaedorea parvisecta is similar to *C. molinana* from Honduras, and the two might not be distinct, but this latter species can be distinguished by its much more numerous pinnae, longer petioles, and more slender pistillate rachillae. *Chamaedorea parvisecta* tends to initiate flowering when stemless or nearly so and with much reduced inflorescences. With time the plants produce visible stem and more typical inflorescences but it would be easy to confuse the two stages as different species. The solitary, non-

contiguous staminate flowers with apically free petals and solitary inflorescences place *C. parvisecta* in subg. *Chamaedoropsis*.

51. *Chamaedorea pinnatifrons* (Jacq.) Oerst., *Vidensk. Meddel. Dansk Naturhist.*

Foren. Kjobenhavn 1858: 14(1859). Holotype: Venezuela, *Bredemeyer s. n.* (photo F! ex W). Illustr.: Hodel, *Chamaedorea Palms*: pp. 19, 31, 95, 97, 99; figs. 4B, 8C, 34A-D, 35A-F, 36A-E (1992a). N.v.: chilak, molinillo, pacaya, G; cola de pescado, palmar abo de bobo, tepejilotillo, Mexico.

Borassus pinnatifrons Jacq., *Chamaedorea aguilariana* Standl. & Steyerl.,
Chamaedorea bartlingiana H. Wendl., *Chamaedorea bifurcata* Oerst., *Chamaedorea boliviensis* Dammer, *Chamaedorea bracteata* H. Wendl., *Chamaedorea brevifrons* H. Wendl., *Chamaedorea concinna* Burret, *Chamaedorea concolor* hort. in H. Wendl.,
Chamaedorea concolor Mart., *Chamaedorea conocarpa* Mart., *Chamaedorea depauperata* Dammer, *Chamaedorea dryanderæ* Burret, *Chamaedorea flavovirens* H. Wendl., *Chamaedorea geomoides* (Spruce) Drude, *Chamaedorea gracilis* Willd.,
Chamaedorea heilbornii Burret, *Chamaedorea herrerae* Burret, *Chamaedorea holmgrenii* Burret, *Chamaedorea hoppii* Burret, *Chamaedorea kalbreyeriana* H. Wendl. ex Burret, *Chamaedorea lanceolata* (Ruiz & Pav.) Kunth, *Chamaedorea lanceolata* var. *littoralis* Drude, *Chamaedorea lindeniana* hort. in H. Wendl., *Chamaedorea lindeniana* H. Wendl., *Chamaedorea macroloba* Burret, *Chamaedorea membranacea* Oerst.,
Chamaedorea micrantha Burret, *Chamaedorea minor* Burret, *Chamaedorea oerstedii* O. F. Cook & Doyle *nom. illeg.*, *Chamaedorea pacaya* Oerst., *Chamaedorea rhombea* Burret, *Chamaedorea scandens* hort. in H. Wendl., *Chamaedorea weberbaueri* Dammer

ex Burret, *nom. illeg.*, *Docanthe alba* O. F. Coe, *nom. illeg.*, *Hyospathe montana* Mart.,
Martinezia lanceolata Ruiz & Pav., *Nunnezharia bartlingiana* (H. Wendl.) Kuntze,
Nunnezharia bifurcata (Oerst.) Kuntze, *Nunnezharia bracteata* (H. Wendl.) Kuntze,
Nunnezharia brevifrons (H. Wendl.) Kuntze; *Nunnezharia concolor* (Mart.) Kuntze,
Nunnezharia conocarpa (Mart.) Kuntze, *Nunnezharia flavovirens* (H. Wendl.) Kuntze,
Nunnezharia geonomoides Spruce, *Nunnezharia lanceolata* (Ruiz & Pav.) Kuntze,
Nunnezharia membranacea (Oerst.) Kuntze, *Nunnezharia pacaya* (Oerst.) Kuntze,
Nunnezharia pinnatifrons (Jacq.) Kuntze.

Solitary, erect, sometimes decumbent, to 4 m tall. Stem 0.5-3 cm diameter, internodes to 18 cm, often with orange-brown adventitious roots at base. Leaves 3-10, pinnate, erect-spreading; sheath to 40 cm, tubular, briefly obliquely open apically and there often with a whitish margin; petiole 3-55 cm; rachis 4-70 cm; pinnae 2-9 per side, 6.5-40 × 1.5-9 cm, elliptic to lanceolate or rhombic-lanceolate, sigmoid, falcate, acuminate, a prominent midrib and 2-3 on either side or 3-7 prominent primary nerves, apical pair sometimes wider, to 15 cm wide, 8-nerved. Inflorescences inter- or infrafoliar, erect to spreading but nodding when heavily laden with fruits; peduncles 6-70 cm, erect in flower, erect to spreading or nodding in fruit; bracts 3-7, to 50 cm, most distal exceeding peduncle, tightly to loosely sheathing, brown; rachis to 15 cm; staminate rachillae 3-21, 5-33 cm, pendulous; pistillate 1-16(-40), 3.5-25 cm, erect-spreading in flower, drooping to pendulous when heavily laden with fruits. Flowers staminate 1.5-3.5 × 1.5-3.5 mm high, globose to depressed-globose, aromatic; calyx 0.5-1 × 1.8-3.5 mm, shallowly lobed, sepals imbricate and/or connate in basal 2/3, connate briefly basally, rounded apically, lightly nerved, green to yellow-orange; petals 2-3 × 2-3 mm, connate apically and there

adnate to the pistillode and corolla opening by lateral apertures, acute, densely and strongly nerved, greenish yellow; stamens to 2 mm high, filaments to 1.5 mm, anthers to 1.25 mm, oblong; pistillode 2-2.5 mm high, columnar, longitudinally angled; pistillate 1-2 × 3-4 mm, ovoid to subconic or even shield-like; calyx c. 1 × 4 mm, lobed, sepals imbricate and/or connate in basal 1/2, truncate to broadly obtuse apically, nerved; petals 1-1.75 × 1.5-2.5 mm, connate basally, imbricate nearly to apex, acute to rounded apically, nerved when dry, greenish to yellowish; staminodes 3, 6, or absent; ovary 1.5-2 × 1.25-1.75 mm, globose to ovoid, stigma lobes short, recurved. Fruits 4-13(-20) × 4-10 mm, globose to ellipsoid, yellow, orange, or red.

*Low- to high-elevation, moist to wet forest, cloud forest, and oak forest, on the Atlantic and Pacific slopes. Ch (Hodel & Hodel 932, MEXU); G (Hodel & Castillo-Mont 889, AGUAT); H (Nelson 7988, UNAH); ES (Standley 20165, GH); N (Salick 8055, MO); CR (Hodel & Hodel 723, CR); P (Hodel & Hodel 728, PMA). 0-2750 m. Mexico (Oaxaca, Puebla, Veracruz), Mesoamérica, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil. Perhaps most appropriately referred to as a species complex, *Chamaedorea pinnatifrons* is the most widespread and variable species in the genus. This variability shows in the size, shape, and/or quantity of parts of the various organs, including stems, leaves, pinnae, inflorescences, flowers, and fruits. While one can pick out apparently distinctive segregates from different regions, the variation seems insignificant when considered over its entire range. The complex is fraught with countless intermediate forms that defy classification into known taxa. Simple, bifid-leaved forms are known in South America. In Mesoamerica, the combination of leaves typically with four to eight pinnae per side, inflorescences with five to twenty rachillae, petals of staminate flowers connate apically*

and their adnate to the pistillode and the corolla opening by lateral apertures, nerved sepals and petals of both genders, and fruits soft ripening to yellow, orange, or red usually distinguishes *C. pinnatifrons*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. pinnatifrons* in subg. *Chamaedorea*.

52. *Chamaedorea piscifolia* Hodel, G. Herrera & Cascante, *Palm J.* 137: 32-34, figs. 1-2 (1997). Holotype: Costa Rica, *Hodel et al. 1540* (BH!). Illustr.: Hodel, *Palms* 57: 167-168; figs. 9-10 (2013). N.v.: unknown.

Solitary, decumbent, to 1.5 m tall. Stem 5-7 mm diameter, long-creeping and visible or buried in leaf litter, to 3 m, internodes to 7 cm, often rooting along its length. Leaves 7-14, simple and bifid, spreading; sheath to 10 cm, tubular; petiole 2-7 cm; rachis 6-15 cm; blade 15.5-26 × 5-8 cm, elliptic to oblanceolate, bifid apically to at 1/2 its length, lobes caudate apically with long-acuminate attenuate tips to 5 cm long, 10-13 primary nerves per side, these diverging distally, 1 secondary between each pair of primaries, outer margins slightly toothed. Inflorescences infrafoliar, borne 40 to 150 cm proximal of leaves on prostrate and rooting bare stem, spicate, erect; peduncles 9-18 cm, erect; bracts 8-9, to 7 cm, most distal exceeding peduncle, tightly sheathing, green aging brown; staminate with rachis or flower-bearing portion 8-18 cm; pistillate with rachis or flower-bearing portion 4-5.5 cm. Flowers staminate in bud just prior to anthesis 1.5-2 × 2-2.5 mm, dome-shaped; calyx 0.75-1 × 2-2.5 mm, cupular, deeply lobed, sepals connate in basal 1/4-1/2, broadly rounded apically, thin, membranous, unnerved, olive-green; petals 1.5-2 × 1.5-2 mm, broadly ovate to triangular, free nearly to base and there briefly

connate, thin, nerved adaxially when dry, olive-green; stamens 1-1.25 mm high, in a tight circle around pistillode and curving inwards towards its tip, filaments short, nearly lacking to 0.5 mm, anthers c. 1 mm, ellipsoid, dorsifixed near base; pistillode 1-1.25 mm high, slightly exceeding stamens, shorter than petals, columnar, slightly fluted, truncate apically; pistillate c. 2 × 3 mm, globular to dome-shaped; calyx c. 0.75 × 2-3 mm, cupular, deeply lobed, sepals connate and/or slightly imbricate in basal 1/4-1/2, broadly rounded apically, thin, transparent, prominently nerved adaxially and keeled abaxially when dry; petals c. 2.5 × 2-2.5 mm, broadly ovate to triangular, cupped or bowl-like, imbricate in basal 3/4, rounded-acute to slightly mucronate apically, , nerved and thickened medially, margins thin and transparent when dry, green; staminodes not seen; ovary c. 2.25 × 2.25, globular to globose, stigma lobes short, just exceeding petals, blunt. Fruits 11-13 × 0.6-0.8 mm, oblong-ellipsoid, black; 9-11 × 6-7 mm; fruiting perianth nerved when dry.

Low- to middle-elevation, wet forest, on the Pacific slope. CR (Hodel et al. 1539, CR). 700-1200 m. Mesoamérica.

Chamaedorea piscifolia is unique and remarkable in its small, corrugated, simple and bifid leaf blades with the tips of each lobe attenuated into conspicuous extensions, making the blade appear in the shape of a fish. The spicate inflorescences held well proximal of the leaves on creeping, prostrate, often buried stems are typically difficult to associate with any given plant and are easily overlooked or escape attention. Only after careful tracing of a buried stem, often for a meter or more, does one find the associated, leafy crown. Only *C. tuerckheimii* from southern Mexico, Guatemala, and Honduras has a leaf like that of *C. piscifolia* but it lacks the long, distinctive, drawn out, bifid, caudate

tips and has many branched staminate inflorescences. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. piscifolia* in subg. *Chamaedoropsis*.

53. *Chamaedorea pittieri* L. H. Bailey, *Gentes Herbarum* 6(4): 252, fig. 132 (1943).

Holotype: Panama, *Pittieri 3169* (US!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 175, 177; figs. 74A-B, 75A (1992a). N.v.: unknown.

Chamaedorea hageniorum L. H. Bailey.

Solitary, erect, sometimes decumbent, to 1(-2.5) m tall, typically first flowering when appearing stemless. Stem 1-2 cm diameter, initially creeping and buried in leaf litter, covered with durable persistent leaf sheaths distally, densely and prominently ringed, internodes 2-3 cm. Leaves 7-9, pinnate, erect-spreading, stiff; sheath 6-15 cm, tubular in basal 3/4, obliquely open apically, thick, durable, nearly woody, prominently longitudinally striated, grayish green to whitish becoming brown and persistent, with a rounded ridge extending from petiole; petiole 3-15 cm, grayish green to whitish; rachis 20-40 cm, grayish green to whitish; pinnae 5-8 per side, 10-20 × 2-3 cm, narrowly lanceolate to oblong-lanceolate, slightly sigmoid or falcate, thick, leathery, cupped downward, acuminate, velvety textured, gray- and/or metallic dark blue-green, a prominent midrib and 2-3 less conspicuous primaries on either side, drying heavily striated. Inflorescences interfoliar, sometimes infrafoliar in fruit, long-pedunculate, typically exceeding leaves, ascending-spreading to arching; peduncles to 70 cm, ascending to spreading to arching; bracts c. 4, most distal exceeding peduncle, green to brown in flower, brown in fruit; rachises 2-3 cm; staminate rachillae 4-6, 10-20 cm,

flexuous, drooping; pistillate rachillae 2-3, 8-15 cm, ascending to spreading. Flowers staminate 2.5-3 × 2.5 mm, globose-ovoid, slightly aromatic; calyx 0.5-0.75 × 1.5-3 mm, shallowly lobed, sepals connate and/or imbricate nearly to apex and there broadly rounded; petals 2.5-4 × 2-3 mm, elliptic-oblong, cupped, free nearly to base, spreading apically and slightly recurved, acute, lightly nerved, greenish yellow; stamens c. 1.5 mm high, filaments short, 0.5-0.75 mm, whitish, anthers c. 1.5 mm, flattened, forming a ring around pistillode; pistillode 2-2.5 mm high, shorter than petals, columnar, slightly lobed apically, yellow-green; pistillate with calyx low, deeply lobed, sepals connate only briefly basally; petals imbricate basally, spreading apically, chaff-like, nerved, yellowish; ovary short-oblong, obtuse. Fruits 11 × 6 mm, globose-ellipsoid, black.

Middle- to high-elevation, moist forest and cloud forest, on the Pacific slope near the Continental Divide. CR (Hodel & Binder 1332, CR); P (Hodel & Hodel 729, PMA).

1100-2300(-3200) m. Mesoamérica.

Chamaedorea pittieri is an unusually variable species, particularly in its leaves.

Individuals in dense shade have longer petioles, expanded leaf blades, and longer more remotely spaced, thin, light green pinnae while individuals just a few meters away in more exposed situations have very short or nearly lacking petioles, compact leaf blades, and closely spaced, dark green, thick, nearly puckered pinnae. The Panamanian endemic *C. anemophila* is similar to *C. pittieri* but differs in its larger habit, elongate stem, more tubular leaf sheaths, inflorescences not exceeding the leaves, and unusually delicate and fragile flowers. Hodel (1992a, pp. 172, 177, figs. 73F, 75B-D) illustrated *C. anemophila* as *C. pittieri*. Another species similar to *C. pittieri* in its habitat, often nearly stemless habit, and mostly dark grayish green leaves, *C. parvisecta* differs in its staminate flowers

with petal connate apically and the corolla opening by lateral apertures and the pinnae drying flat. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. pittieri* in subg. *Chamaedoropsis*.

54. *Chamaedorea plumosa* Hodel, *Principes (Palms)* 36: 197-201, figs. 11-19 (1992b).

Holotype: Cultivated in California, U. S. A. from Chiapas, Mexico, *Hodel 1141* (BH!).

Illustr.: Hodel, *Palms* 57: 161, 163, figs. 1-2 (2013). N.v.: unknown.

Solitary, erect, robust, to 5 m or more tall. Stem 4-6.5 cm diameter, internodes 10-23 cm, often covered with persistent leaf sheaths distally. Leaves 7-9, pinnate, erect-spreading, plumose; sheath to 50 cm, tubular in basal 3/4, obliquely open in apical 1/4, a raised central costa extending from petiole, green becoming brown, persistent; petiole 20-30 cm, deeply and narrowly channeled adaxially, light grayish green; rachis to 110 cm, light grayish green; pinnae to 85 per side, to 54 × 0.6-1.4 cm, narrowly linear, straight, long-acuminate, clustered in groups and borne in different planes and directions, a hard whitish bump at point of attachment, prominent midrib, 1-3 much less prominent primary nerves on either side. Inflorescences infrafoliar, penetrating persistent leaf sheaths, erect-spreading, staminate sometimes branched to 2 orders; peduncles to 54 cm long, ascending in flower, nodding when heavily laden with fruits; bracts 8-9, to 30 cm, most distal exceeding peduncle, loosely sheathing, brown; rachises to 32 cm, staminate downward-pointing, pistillate spreading; staminate rachillae to 100, to 30 cm, spreading to drooping, most proximal ones sometimes branched; pistillate rachillae 30-45, to 22 cm, stiffly erect in flower, downward-pointing when heavily laden with fruit. Flowers staminate, 4.5-5 × 4-5 mm, globose to obovoid; calyx c. 2 × 3 mm, cupular, moderately lobed, sepals

connate in basal 1/2, broadly rounded to truncate and thin apically, green; petals $4.5-5 \times 3$ mm, long-ovate, free nearly to base, acute, spreading apically, slightly recurved, thick, fleshy with faint ridges adaxially, margins thickened, rounded or revolute, yellow; stamens 2-2.5 mm high, c. 1/2 as high as pistillode and in a tight ring around it, filaments $1.5 \times 0.3-0.4$ mm, connate basally in ring and there adnate to pistillode, clear-colored, anthers 1 mm, dorsifixed, brownish; pistillode $3-3.5 \times 1$ mm high, exceeding stamens but shorter than petals, broadly columnar, yellow; pistillate c. 5×3.5 mm, ovoid; calyx c. 2.5×3.5 mm, deeply lobed, sepals connate in basal 1/3, broadly rounded to truncate apically, green; petals c. $5 \times 3.5-5$ mm, broadly triangular, tightly imbricate in basal 2/3, slight recurved apically, acute, fleshy but margins thin and membranous, yellow; staminodes 0.8 mm high, tooth-like, clear-colored; ovary c. $3 \times 2.5-3$ mm, globose, 3-lobed, green, stigma lobes short, separated, recurved, clear-colored. Fruits c. 11×11 mm, globose, black; fruiting perianth with sepals orange basally, brown apically and there rounded, petals 4 mm long, triangular, brown.

Middle-elevation, seasonally moist, semi-deciduous forest, on limestone, on the Atlantic slope. Ch (Hodel & Castillo-Mont 1158, BH). 600-1200 m. Mesoamérica.

Endemic to Chiapas, Mexico, *Chamaedorea plumosa* is one of the most distinctive species in the genus and is readily distinguished by its solitary habit and leaves with numerous, linear to narrowly linear, grass-like pinnae borne in several planes and clustered in groups, giving the leaf a decidedly plumose appearance. The nearly sympatric *C. glaucifolia* is eerily similar but differs in its less conspicuous plumose leaves, petioles densely covered with a waxy, powdery, glaucous indument but not deeply channeled, and the apically connate staminate petals. The latter's habitat also

differs; it is mostly found in moist forest and cloud forest. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. plumosa* in subg. *Chamaedoropsis*. It is widely cultivated in Las Rosas east of San Cristobal de las Casas in Chiapas, Mexico and other towns and villages in the area for its leaves, which are used for Christian religious services, and has become popular as an ornamental in the nursery and landscape trades in southern California and Florida in the U. S. A.

55. *Chamaedorea pochutlensis* Liebm. in Mart., *Hist. Nat. Palm.* 3: 308 (1849).

Holotype: Mexico, *Liebmann s.n.* (some sheets later numbered 6579) (C!). Illustr.: Hodel, *Chamaedorea Palms*: p. 179; figs. 76A-D (1992a). N.v.: unknown.

Chamaedorea elatior hort., not Mart., *Chamaedorea karwinskyana* H. Wendl.,

Chamaedorea robusta hort.(?), *Nunnezharia karwinskyana* (H. Wendl.) Kuntze,

Nunnezharia pochutlensis (Liebm.) Kuntze

Cespitose by means of short, creeping horizontal stems with congested nodes at or near ground level, forming erect to leaning and sometimes decumbent, dense clumps 3-6 × 2-8 m. Stems 2-3 cm diameter, internodes 10-25 cm, often covered with persistent leaf sheaths. Leaves 3-5 pinnate, rarely simple and bifid, erect-spreading; sheath to 45 cm, tubular, persistent, green drying pale or nearly whitish; petiole to 30 cm; rachis to 1 m or more; rachis, petiole, and sheath slightly glaucous; if pinnate, pinnae 20-33 per side, to 40 × 2-3 cm, long-lanceolate to lanceolate, straight or slightly falcate, long-acuminate, a hard whitish swollen gland basally at point of attachment, a prominent midrib with 1 submarginal primary nerve on either side. Inflorescences infrafoliar, erect-spreading; peduncles 30-40 cm, ascending-spreading; bracts 5-7, to 20 cm long, brown, most distal

exceeding peduncle; rachises to 10 cm; staminate rachillae 12-25, 15-20 cm, drooping; pistillate 12-18, to 15 cm, stiffly spreading in flower drooping to pendulous in fruit. Flowers staminate 4-4.5 × 3-3.5 mm, ovoid-globose, strongly aromatic; calyx c. 1 × 2.5-3 mm, shallowly lobed, sepals connate in basal 2/3, rounded to acute apically, pale green; petals 3.5-4 × 3 mm, ovate, free nearly to base, spreading apically but slightly incurved, acute, thick, fleshy, yellow; stamens c. 2.5 mm high, filaments 1-1.5 mm, pale, anthers 1.5-2 mm, not deeply bilobed; pistillode c. 4 mm high, equaling petals, columnar, 3-lobed apically, yellowish; pistillate 4-5 × 3 mm, ovoid; calyx 1-1.5 × 3 mm, shallowly to deeply lobed, sepals briefly connate and/or imbricate basally, broadly rounded apically, green; petals c. 3 × 3 mm, deltoid, imbricate nearly to apex and there free, erect, acute, yellow; staminodes not seen; ovary c. 3.5 × 2.5-3 mm, ovoid-globose, green apically, stigma lobes short, equaling petals, recurved to erect. Fruits 12-13 × 8-10 mm, globose-ellipsoid, black with glaucous bloom.

Low- to middle-elevation, moist forest and cloud forest, on the Pacific slope. Ch (Perez-Farrera 2754, HEM). 50-2000 m. Mesoamérica, Mexico (Colima, Durango, Guerrero, Jalisco, Michoacan, Nayarit, Oaxaca, Sinaloa).

Chamaedorea pochutlensis is similar to *C. costaricana*, and they both share the cespitose habit and long-pinnate leaves; however, the latter species differs in the leaf sheaths with conspicuous triangular to lanceolate ligules at the apex on either side of the petiole attachment and the pinnae with a prominent midrib and two prominent primary nerves on either side. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. pochutlensis* in subg. *Chamaedoropsis*.

56. *Chamaedorea ponderosa* Hodel, *Novon* 7(1): 35-36 (1997). Holotype: Panama, *Hartman 8529* (MO!). Illustr.: Hodel and Cano, *PalmArbor* 2021-10, pp. 1-14, figs. 1-9 (2021). N.v.: unknown.

Solitary, erect, to 4 m tall. Stem 2-2.5 cm diameter, internodes 2.5-5 cm, with adventitious prop roots at base to 1 m long. Leaves c. 5, simple and bifid, sometimes pinnate and then with unusually large terminal pinnae and smaller basal pinnae, spreading; sheath 25-40 cm, tubular in basal 4/5, obliquely open apically, pale green to nearly whitish especially along distal margins; petiole 18-35 cm, proximally channeled from extensions of distal margins of sheath, nearly whitish; rachis 40-60 cm, green adaxially, nearly whitish abaxially; if simple blade 65-85 × 45-50 cm, oblong, bifid apically c. 1/3 its length, lobes acute-acuminate, drying dark olive-green with a heavy, thick, bulky appearance, c. 20 prominent, elevated, sharply angled primary nerves per side, 2-3 secondaries between each pair of primaries, 1-2 tertiaries between each pair of secondaries or a secondary and a primary, if pinnate blade 80-90 × 45-50 cm, pinnae 2-8(-16) per side, terminal pair typically largest, 30-45 × 10-15 cm, basal pinnae 30-45 × 2.5-5.5 cm, sigmoid, falcate, long-acuminate. Inflorescences interfoliar, shorter than the leaves, ascending to spreading in flower, spreading in fruit, pistillate branched 1-2 orders; peduncles 40-55 cm, ascending in flower, ascending to spreading in fruit; bracts 5-7, to 35 cm long, most distal shorter than to exceeding peduncle, brown, tattered in fruit; rachises 12-17 cm; staminate rachillae 9-31, 25-40 cm, drooping; pistillate rachillae 13-28, 18-25 cm, spreading, basal one sometimes bifurcate. Flowers staminate in dense spirals, superficial, c. 2 × 2-2.75 mm; calyx c. 1 × 2-2.75, deeply lobes, sepals connate in basal 1/3, broadly rounded to acute apically; petals c. 2 × 1.75 mm, broadly ovate, acute,

connate apically and there adnate to pistillode and corolla opening by lateral apertures, prominently nerved; stamens c. 1.25 mm high, filaments c. 0.5 mm, anthers c. 1 mm, dorsifixed near base; pistillode c. 1.5 mm high, columnar; pistillate in remote spirals, superficial, c. 2 × 3 mm, broadly ovoid; calyx c. 1 × 3 mm, cup-shaped, moderately lobed, sepals connate in basal 1/2, broadly rounded apically yellow; petals c. 2.5 × 3 mm, broadly obovate-spathulate, imbricate in basal 3/4, rounded apically, prominently nerved, yellow; staminodes not seen; ovary c. 2 × 2.5 mm, globose, stigma lobes exceeding petals, short, angled, recurved, pale to clear-colored. Fruits c. 8 × 7 mm, subglobose, orange (perhaps aging black).

Low- to middle-elevation, wet forest, on the Pacific slope. P (Hartman et al. 4801, MO). 675-1550 m. Mesoamérica. Colombia.

Known mostly from Cerro Pirre in Darién Province near the Colombian border,

Chamaedorea ponderosa is distinctive in its thick, bulky, heavy-looking inflorescences and unusually large, simple and bifid leaves. Indeed, it likely has the largest simple and bifid leaves of any species in the genus. It is similar to *C. murriensis* from Colombia but this latter species differs in its smaller habit, smaller leaves with fewer primary nerves, shorter and smaller inflorescences rachises, remotely placed staminate flowers, mostly nerveless sepals and petals, and brown fruits. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits place *C. ponderosa* in subg. *Chamaedorea*.

57. *Chamaedorea pumila* H. Wendl. ex Dammer, *Gard. Chron.* ser. 3 36: 246 (1904).

Holotype: Costa Rica, *Wendl. s.n.* (K!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 11, 181, 183; figs. 2A, 77A-B, 78A-B (1992a). N.v.: unknown.

Chamaedorea nana N. E. Brown, *Kinetostigma nana* (N. E. Brown) Burret, *Nunnezharia pumila* (H. Wendl. ex Dammer) Kuntze.

Solitary, erect to decumbent, to 50 cm tall, often appearing stemless. Stem 8-20 mm diameter, often creeping and buried in leaf litter, densely and prominently ringed, internodes 3-10 mm, often rooting along its length. Leaves 6-10, simple and bifid, spreading; sheath to 10 cm, long-open, tubular only briefly at base; petiole 2-5 cm, margins extended upwards on either side especially basally to form a channel, gray-green; rachis 6-15 cm; rachis, petiole and sheath minutely white-spotted; blade to 30 × 10-20 cm, obovate to subobovate-elliptic, bifid apically to at least half its length, lobes 8-10 cm wide, acute-acuminate, thick, leathery, plicate, slightly mottled velvety iridescent dark grayish green, basal margins decurrent on petiole, 9-13 prominent primary nerves per side, outer margin coarsely toothed toward apex. Inflorescences interfoliar, enclosed in channeled margins of leaf sheath basally, erect-spreading, equaling to slightly exceeding leaves; peduncles 15-20 cm, typically enclosed in channel margins of leaf sheath; bracts 5-6, to 12 cm, membranous, green aging brown but typically disintegrating by anthesis; staminate with rachis to 2.5 cm; rachillae 4-10, 8-15 cm, spreading but drooping distally; pistillate spicate or bifurcate, flower-bearing portion or rachilla 8-15 cm, ascending to spreading, stiff, curved. Flowers staminate 4-5 × 4 mm, globose; calyx c. 1 × 2.5 mm, moderately lobed, sepals connate basal 1/2, rounded to acute apically, green; petals 3-4 × 3 mm, ovate, free nearly to base and there briefly connate, thick,

fleshy, acute and incurved apically, greenish yellow; stamens c. 2 mm high, filaments to 1 mm, adnate basally to pistillode in a buttress-like manner, anthers c. 0.75 mm, bilobed, yellow or pale; pistillode 2.5-3.5 mm high, shorter than petals, columnar with a broad 3-angled cam, buttressed basally, light greenish yellow; pistillate 2.5-3 × 2-2.5 mm, conic to subglobose; calyx c. 1 × 2.5 mm, deeply lobed, sepals connate in basal 1/3, broadly acute apically, green; petals c. 3 × 3 mm, cup-shaped, imbricate nearly to apex, thick, fleshy, acute and slightly erect apically; staminodes not seen; ovary 1.5-2 × 2 mm, globose or subglobose, flattened apically, stigma lobes very short, slightly separated, whitish. Fruits 6-10 mm diameter, globose, black.

Low- to middle-elevation, moist to wet forest, on the Atlantic and Pacific slopes. CR (Hodel et al. 974, CR). 200-1200 m. Mesoamérica.

Chamaedorea pumila is distinctive in its low, dwarf habit, simple and bifid leaves with iridescent grayish green, plicate blades incised apically to more than half their length. As interpreted here, *C. pumila* is endemic to Costa Rica; collections from Panama referred to *C. pumila* are likely *C. sullivaniorum*. Some consider *C. pumila*, *C. minima*, and *C. sullivaniorum* to be one variable species and referred to *C. pumila* because it is the oldest name and has priority. However, *C. minima* is distinctive in its V-shaped, bluish green blades while *C. sullivaniorum* has consistently larger leaf blades incised apically one-fourth to one-third their length with 15-16 prominent primary nerves per side. On the Pacific slope of central Costa Rica in an exceptionally wet and rich forest, *C. minima* grows side by side with *C. sullivaniorum* with no intermediate forms present, which suggests that at least these two taxa are distinct. The solitary, non-contiguous staminate

flowers with apically free petals and solitary inflorescences place *C. pumila* in subg. *Chamaedoropsis*.

58. *Chamaedorea pygmaea* H. Wendl., *Allg. Gartenzeitung* 20(28): 217-218, 249 (1852). Lectotype (designated here): Cultivated in Europe apparently from Colombia, *Wendland s.n.* (GOET!). Illustr.: Hodel, *Principes (Palms)* 40(4): 188, fig. 11 (Hodel & Binder 1996). N.v.: unknown.

Chamaedorea terryorum Standl., *Cladandra pygmaea* (H. Wendl.) O. F. Cook, nom. illeg., *Nunnezharia pygmaea* (H. Wendl.) Kuntze, *Stachyophorbe pygmaea* H. Wendl.) Oerst.

Solitary, erect to decumbent, typically appearing stemless, to 60 cm tall. Stem 0.5-2 cm diameter, sometimes initially appearing bulbous but eventually creeping at or below leaf litter to 40 cm long, densely ringed, internodes to 5 mm, rooting along its length, often covered with persistent leaf sheaths. Leaves 3-8, variously pinnate or occasionally simple and bifid, erect-spreading; sheath 5-10 cm, long-open, deeply splitting opposite petiole, tubular only at base, persistent; petiole 3.5-28(52) cm; rachis 6.5-32.5(-51) cm; pinnae 2-12 per side, 5.5-17.5 × 0.7-2.8(-4.1) cm, pinnae not decreasing noticeably in length toward blade apex, lanceolate to long-lanceolate, falcate, sigmoid, long-acuminate, thin, most proximal pinnae decurrent on along petiole to sheath, 1 prominent midrib and 1 primary nerve on either side of this, if simple and bifid blade 12-25.5 × 7.7-21 cm, cuneate-obovate to oblong, bifid apically to 1/2 its length, outer margins coarsely toothed, 10-14 primary nerves per side, 2 secondaries conspicuous between each pair of primaries. Inflorescences inter- or infraxillary, arising from base, erect-ascending, shorter

than to about equaling leaves; peduncles 11-51(-94) cm, erect-ascending; bracts 4-8, to 15 cm, most distal not exceeding peduncle, membranous, brown; staminate with rachis 2.5-12(-18.5) cm, rachillae 5-25(-38), widely spreading, slightly drooping or recurved distally; pistillate spicate or with rachis 2-11.5 cm; rachillae 1-6(-19), flower-bearing portion or rachillae 3.5-7(-9), stiffly ascending. Flowers staminate remotely arranged, 2-2.5 × 2-2.5 mm, subglobose; calyx 0.5-1 × 1.5-2 mm, lobed, sepals connate in basal 1,2, broadly acute apically, yellowish green; petals 2.5-3 × 2-1.5 mm, ovate, cupped, free nearly to base and there briefly connate, spreading apically and incurved, acute, greenish yellow to yellow; stamens 1-1.25 mm high, filaments short or nearly lacking, anthers 0.75-1 mm; pistillode 1.75-2 mm high, broadly columnar, broadly lobed apically, yellowish; pistillate densely arranged but not contiguous; calyx lobed, sepals bluntly rounded apically; petals elongate, imbricate basally, spreading apically and there acute; staminodes 6; ovary depressed-globose, 3-lobed, stigma lobes short, slightly recurved. Fruits 5-8 × 4.5-8 mm, ellipsoid to sub-globose, purplish to black.

Low- and middle-elevation, wet forest and cloud forest, mostly on the Pacific slope. CR (Hodel & Binder 1343, CR); P (Croat 48854, MO). (70-)1500-2300 m. Mesoamérica, Colombia.

A dwarf species unusually variable in leaf dissection, both simple and bifid to pinnate leaves with up to 12 pinnae per side can occur in the same small population. Some have included *C. stenocarpa* from Guatemala and Costa Rica here but this latter species differs rather dramatically in its pinnae progressively decreasing in size and length toward the blade apex. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. pygmaea* in subg. *Chamaedoropsis*. *Chamaedorea*

pygmaea and *C. binderi*, *C. brachyclada*, *C. scheryi*, *C. stenocarpa*, and *C. undulatifolia* form a rather distinctive and natural subgroup characterized by their virtually stemless habit, decurrent pinnae, long-pedunculate inflorescences arising from or below ground level, and mostly pinnate eophylls.

59. *Chamaedorea recurvata* Hodel, *Principes (Palms)* 39(1): 16-18, f. 5-6 (1995).

Holotype: Panama, *Hodel et al. 1209* (BH!). Illustr.: Hodel, *Palm J.*: p. 5; f. 9 (2005).

N.v.: unknown.

Solitary, erect, to 2.5 m tall. Stem c. 1 cm diameter, white-spotted, internodes 3-8 cm.

Leaves 3-4, pinnate, spreading; sheath to 15 cm, tubular; petiole 10-15 cm; rachis c. 35 cm; sheath, petiole, and rachis white-spotted; pinnae 4-7 per side, 12-21 × 3-7 cm,

lanceolate, sigmoid, thin-papery, long-acuminate, glossy dark green, obscurely nerved in life but when dry with prominent midrib and 3 primary nerves on each either side, 3

secondaries between primaries, apical pair sometimes 3-5-nerved, all nerves more

conspicuous abaxially. Inflorescences infrafoliar, held well below the leaves on bare stem, ascending to spreading, spicate or few-branched; peduncles to 23 cm, ascending to spreading; bracts 5-6, to 12 cm, most distal exceeding peduncle, green to brown in

flower, brown in fruit; rachises 0-2 cm; flower-bearing portion or rachillae to 16 cm,

strongly recurved downward. Flowers staminate in dense spirals, appearing contiguous at

anthesis but spaced 1-1.5 mm and slightly raised, c. 2 × 2.25 mm, obovoid; calyx 1-1.2 × 2.2 mm, broadly cup-shaped, moderately to deeply lobed, sepals connate in basal 1/4-1/2,

broadly rounded apically, thin, drying membranous and nearly transparent; petals 1.8-2 × 1 mm, long-ovate, boat-shaped, free nearly to base and their connate briefly, spreading

apically and acute, lightly nerved when dry; stamens 1.5-1.75 mm high, c. equaling pistillode, filaments short, c. 0.25 mm, anthers c. 1.25 mm, long-oblong, bilobed, dorsifixed at base; pistillode c. 1.8 mm high, columnar; pistillate in dense spirals but not contiguous, superficial, slightly post-anthesis c. 2×3 -4.5 mm, obovoid; calyx c. 1.25×2.5 mm, broadly cup-shaped, deeply lobed, sepals briefly connate and/or imbricate basally, broadly rounded apically; petals c. 2.5×2.5 -3 mm, broadly ovate to triangular, imbricate in basal 1/2, slightly cupped, acute, when dry faintly nerved abaxially, conspicuously nerved adaxially, thin; staminodes not seen; ovary c. 2×1.5 mm, long-ovoid, stigma lobes short, angular, recurved. Fruits c. 8×6 mm, ellipsoid, black.

Low- to middle-elevation, wet forest, on the Atlantic slope, at or near the Continental divide. P (Hodel et l 1210, PMA). 1100-1700 m. Mesoamérica.

Apparently endemic to Panama and rarely collected, *Chamaedorea recurvata* is similar to the highly variable *C. dammeriana* but this latter species differs in its more numerous leaves, straight rachillae, remotely place pistillate flowers, and staminate flowers with a much less prominent calyx and broader petals. When only fruiting material is at hand, *C. recurvata* might be confused with some members of subgenus *Stephanostachys* with few-branched or spicate inflorescences with rachillae that tend to curve, such as *C. allenii* from Panama and *C. crucensis* from Costa Rica. However, these two species differ in their contiguous pistillate flowers with much more prominent calyxes and straight but drooping or pendulous staminate rachillae with contiguous flowers having prominent calyxes. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. recurvata* in subg. *Chamaedoropsis*.

60. *Chamaedorea robertii* Hodel & N. W. Uhl, *Principes (Palms)* 34(3): 120-122, figs. 1-3 (1990). Holotype: Panama, *Hodel & Hodel 737* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 193, 195; figs. 83A-E, 84A-F (1992a). N.v.: unknown.

Solitary, briefly decumbent then erect, to 1 m tall, often flowering when appearing stemless. Stem 0.8-2.5 cm diameter, creeping at or slightly below leaf litter, rooting along its length, internodes c. 1.5 cm. Leaves 4-10, simple and bifid, erect-spreading; sheath to 12 cm, obliquely long-open apically, tubular only in basal 1/3, margins becoming rough and brown; petiole to 30 cm, slightly channeled adaxially from proximal margins of blade extending to sheath; blade 20-47 × 13-24 cm, simple, bifid apically to c. 1/2 its length, narrowly to broadly cuneate-obovate, lobes acuminate, 9-16 prominent primary nerves per side, elevated, secondaries numerous and faint. Inflorescences inter or infrafoliar, spicate, arising from base, often appearing to arise from leaf litter, shorter than leaves; peduncles 10-30 cm, erect-ascending in flower, spreading in fruit; bracts c. 5, to 15 cm, most distal equaling or exceeding peduncle, inflated, leathery, staminate green, pistillate emerging burgundy colored and browning only slightly in flower and brown in fruit; staminate with rachis or flower-bearing portion 10-21 cm, whitish, pendulous; pistillate with rachis or flower-bearing portion 3-10 cm, stiffly erect to spreading or curving, pale yellow or whitish in flower, orange in fruit. Flowers staminate in 3, very dense spirals but not contiguous in bud, c. 5 × 3.5 mm, ovate; calyx 1-1.25 × 3.5 mm, shallowly lobed, sepals connate in basal 3/4, broadly rounded apically, whitish; petals c. 4 × 3 mm, ovate, free more than 1/2 to base and there connate, erect, acute, mostly whitish basally and green apically or sometimes yellowish; stamens exerted beyond petals, 5-5.5 mm high, filaments large, c. 4 × 0.6 mm, columnar, clear-colored, anthers c. 1.25 mm, ellipsoid,

exserted and crowded in a cluster above petal tips; pistillode c. 4×0.75 mm, columnar, clear-colored, 3-lobed apically; pistillate densely arranged, some contiguous but most not, c. 2.5×3.5 mm, sub-hemispherical, sunken in circular depressions c. 4 mm wide; calyx c. 15×3.5 mm, very shallowly and inconspicuously lobed, sepals imbricate nearly to apex, yellowish to whitish; petals c. 2.5×4.5 -5 mm, broadly triangular, imbricate nearly to apex, erect, truncate, and mucronate apically, greenish to yellow; staminodes not seen; ovary c. 2.5×3 -3.5 mm, strongly depressed-globose, pale yellowish, stigma lobes erect, pointed, exserted above petals. Fruits 7 -9 \times 6-9 mm, subglobose, black.

Low- and middle-elevation, wet forest, mostly on the Atlantic slope and near the Continental Divide. CR (Hodel et al. 975, CR); P (Hodel et al. 1120A, PMA). (70-)1500-2300 m. Mesoamérica.

In life the pistillate inflorescence of *Chamaedorea robertii* with its inflated, leathery, burgundy-colored bracts is unique. *Chamaedorea robertii* is close to *C. castillo-montii* from Guatemala but this latter species differs in its cream-colored staminate flowers and prominent, well developed calyxes of both genders. In Costa Rica and Panama, it is similar to *C. pumila* and *C. sullivaniorum* but these latter two species differ in their iridescent bluish or grayish green leaves and branched staminate inflorescences with greenish yellow flowers. Sometimes *C. robertii* occurs with *C. deckeriana*, and the two are similar in habit and easily confused vegetatively, but the latter species is amply distinct in its larger leaf blades with many more primary nerves, multiple staminate inflorescences with contiguous flowers, contiguous pistillate flowers, and orange fruit. The solitary, non-contiguous staminate flowers with apically free petals and solitary

inflorescences place *C. robertii* in subg. *Chamaedoropsis* although recent molecular data suggest it would be better placed in subg. *Stephanostachys*.

61. *Chamaedorea rojasiana* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.*

23(5): 205 (1947). Holotype: Guatemala, *Steyermark 33479* (F!). Illustr.: Hodel,

Chamaedorea Palms: pp. 101, 103; figs. 37A-B, 38A-B (1992a). N.v.: molinillo, G.

Solitary, erect, to 1.5 m tall. Stem 6-8 mm diameter, internodes 5.5-7 cm, often with adventitious prop roots basally. Leaves 3-6, pinnate, rarely simple and bifid, spreading; sheath 7-12 cm, tubular basally, obliquely open apically; petiole 2.5-5 cm; rachis 12-18 cm when pinnate, 7.5-8.5 cm when simple and bifid; pinnae 2-4 per side, apical pair largest, these 13-17 cm long on upper margin and 4-6 cm along rachis, 4-6 primary nerves per side with 1-3 secondaries between each pair of primaries, basal pinnae c. 13×2.5 , each with a midrib and 2 primary nerves on either side, sigmoid, falcate, acuminate, thin, if simple and bifid then blade to 20×20 cm, apically incised to more than half its length, lobes broadly diverging, 7-nerved. Inflorescences interfoliar, erect to spreading or nodding; peduncles 11-20 cm, erect to spreading in flower, spreading in fruit; bracts 3-4, to 12 cm, most distal not exceeding peduncle, tightly sheathing, green in flower, green or brown in fruit; rachis 0-2 cm; rachillae 1-3, staminate to 20 cm, pendulous; pistillate to 9 cm, erect in flower, spreading to nodding in fruit. Flowers staminate $3-3.5 \times 1.75-2$ mm, ovoid; calyx $0.5-1 \times 2$ mm, sepals connate and/or imbricate in basal 1/2, rounded apically; petals $3.5-4 \times 1.5-2$ mm, connate apically and there adnate to the pistillode and corolla opening by lateral apertures, acute, strongly nerved when dry, yellowish; stamens shorter than pistillode, 1.75-2 mm high, filaments short, c. 1 mm, anthers 1-1.5 mm,

entire apically; pistillode 2.25-3.5 mm high, columnar, truncate; pistillate 2-2.25 × 3-4 mm, shield-like, deeply sunken; calyx c. 0.25 × 2.5 mm, ring-like, obscurely lobed, membranous, sepals connate and/or imbricate nearly to apex, truncate apically; petals 2.5 × 2.5-3.5 mm, imbricate nearly to apex, irregularly rounded apically, strongly nerved when dry, yellow; ovary 2-2.25 × 3-3.5 mm, depressed-globose, yellow, stigma lobes, short, thick, blunt, erect-spreading. Fruits 7-9 × 5-9 mm, subglobose to ovoid-ellipsoid, orange maturing black when soft ripe.

Middle- and high-elevation, wet forest and cloud forest, on the Pacific and Atlantic slopes. Ch (Hodel & Hodel 925, MEXU); G (Hodel and Castillo-Mont 984A, AGUAT); H (Evans 2562, MO). 1200-2600 m. Mesoamérica.

Chamaedorea rojasiana is similar to *C. verapazensis* but this latter species differs in its larger habit, mostly open leaf sheaths, staminate inflorescences exceeding the leaves, and more numerous rachillae. It is also similar to *C. geonomiformis*, *C. simplex*, and *C. tenella* in habit and inflorescences, and simple-, bifid-leaved forms of *C. rojasiana* have been confused with these latter three species; however, *C. geonomiformis* and *C. tenella* differ in their thicker leaf blades incised apically for less than half their length while *C. simplex* lacks conspicuous secondary nerves between the primaries, the latter of which are keeled adaxially. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits place *C. rojasiana* in subg.

Chamaedorea.

62. *Chamaedorea rosibeliae* Hodel, G. Herrera & Cascante, *Palm J.* 137: 43-44, fig. 10 (1997). Holotype: Costa Rica, *Herrera 3386* (INB!). Illustr.: unknown. N.v.: unknown.

Solitary, creeping, decumbent to briefly erect, to 1.5 m long. Stem c. 6 mm diameter, prostrate, long-creeping, internodes 5-6 cm, rooting along its length. Leaves c. 6, pinnate, spreading; sheath c. 11 cm, tubular; petiole c. 3 cm; rachis c. 13.5 cm, attenuate distally; abaxial surface of rachis and petiole with conspicuous, dense nodules extending on to abaxial and proximal portion of pinna nerves; pinnae c. 4 per side, to 10×3.5 cm, lanceolate, cupped downward, thin-papery, strongly sigmoid, long-acuminate, a prominent midrib and 2-3 primary nerves on either side, secondaries variable, faint. Inflorescences (only staminate seen), infrafoliar, spicate, ascending; peduncle c. 4 cm; bracts 4, mostly weathered away and only base remaining, to more than 9 mm long, most distal exceeding peduncle; rachis or flower-bearing portion c. 13 cm. Flowers staminate in 3 very dense spirals but not contiguous in bud, c. 2.5×2.5 mm, obovate conspicuously maturing acropetally (progressively proximally to distally along rachis); calyx c. 1×2.5 mm, shallowly lobed, sepals connate in basal $1/2$ - $2/3$, broadly rounded-acute apically, thin, transparent, whitish; petals c. 2×2 mm, triangular, free nearly to base, spreading, acute, transparent, lightly nerved, green maturing yellow; stamens c. 1 mm high, filaments c. 0.5 mm, anthers c. 0.75 mm, elliptic, bilobed, opening longitudinally and laterally, dorsifixed above base; pistillode c. 1.5 mm high, columnar, truncate apically; pistillate flowers not seen. Fruits not seen.

Middle-elevation, wet forest, on the Atlantic slope. CR (known only from the type). 1190 m. Mesoamérica.

Known only from the type, *Chamaedorea rosibeliae* is rather distinctive in its densely nodulose petiole, rachis, and proximal portion of pinnae, a feature unknown in any other species of the genus. It shares with *C. anemophila* the staminate flowers with thin,

fragile, delicate petals and with *C. guntheriana* the spicate inflorescences with flowers maturing conspicuously acropetally along the rachis (progressively proximally to distally). The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. rosibeliae* in subg. *Chamaedoropsis*.

63. *Chamaedorea rossteniorum* Hodel, G. Herrera & Cascante, *Palm J.* 137: 34-40, figs. 3-6, back cover (1997). Holotype: Costa Rica, *Hodel et al. 1525* (BH!). Illustr.: unknown. N.v.: unknown.

Solitary, mostly acaulescent, to 1.75 m tall. Stems 1.5-3 cm diameter, short-creeping to briefly erect and to 50 cm tall or long, typically buried in leaf litter, densely and prominently ringed, internodes 0.5-5 cm. Leaves 4-8 pinnate, ascending to spreading, simple and bifid; sheath 12-48 cm, splitting deeply opposite petiole and tubular only near base, thick, durable, leathery, pinkish adaxially at the base; petiole 12-48 cm; rachis to 70 cm; blade 37-110 × 14.5-27 cm, bifid apically for 3/8-1/2 its length, mostly thick and leather, infrequently thin-papery, 7-20 prominent primary nerves per side, 2-4(-6) secondaries between each pair of primaries, outer margins inconspicuously toothed distally. Inflorescences mostly interfoliar, infrequently infrafoliar, ascending to spreading; peduncles (30-)70-180 cm, slightly shorter than to mostly greatly exceeding leaves, erect to spreading, straight; bracts c. 14, to 34 cm, most distal about equaling peduncle, tightly sheathing, brown; rachises 1-6 cm; staminate rachillae 3-7, 15-27 cm, pendulous; pistillate 2-7, 6-22 cm, erect-ascending in flower, spreading or ascending in fruit. Flowers staminate 3.5-4 × 2.5-3.5 mm, obovoid-globose; calyx 0.6-1 × 1.5-2 mm, cupular, lobed, sepals connate in basal half, acute-rounded apically, prominently nerved

when dry; petals connate apically and there adnate to the pistillode and corolla opening by lateral and basal slits, nerved, greenish yellow; stamens c. 1.75 mm high, filaments c. 1 mm, leaning outward, anthers 1-1.75 × 0.75-1.25 mm, leaning inward and touching pistillode just below tip; pistillode c. 2.5 mm high, columnar, longitudinally fluted, truncate and expanded apically; pistillate 2.75-3 × 2.5-3 mm, bullet- to dome-shaped; calyx c. 1 × 2.5 mm, cupular, moderately to deeply lobed, sepals connate and/or imbricate in basal 1/2-3/4, broadly rounded-acute apically, prominently nerved when dry; petals c. 2.75 × 2.5 mm, broadly ovate, imbricate nearly to apex, erect, exceeding stigma lobes, prominently nerved when dry, greenish yellow; ovary 2.5-3 × 1.5-2 mm, ovoid, truncate apically, stigma lobes short, erect. Fruits 8-14 × 7-9 mm, subglobose to ellipsoid, black; seeds 7-13 × 6-8 mm, obovoid, brown.

Low- to middle-elevation, wet forest, on the Atlantic and Pacific slopes. CR (Hodel et al. 1541 CR); P (Hodel et al. 1189, PMA). 600-1900 m. Mesoamérica.

Chamaedorea rossteniorum is distinctive in its acaulescent habit, large simple and bifid leaves, and long inflorescences often exceeding the leaves. It is much like a simple- and bifid-leaved form of *C. macrospadix*, which some have suggested it is, but this latter species differs in its usually well developed above-ground stem, pinnate leaves, and shorter inflorescences with fewer bracts and more rachillae (up to three times as many staminate and two times as many pistillate). Other species related to *C. rossteniorum* and *C. macrospadix* include *C. matae* and *C. warscewiczii*. These four species have mostly thick and more or less leathery leaf blades or pinnae and leaf sheaths pinkish adaxially at the base, which dry conspicuously rosy pink to reddish. Hodel (1992a) initially referred material from Costa Rica and Panama now included in *C. rossteniorum* to *C. stricta*, a

species with staminate petals free and spreading and restricted to Guatemala and Mexico. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits place *C. rossteniorum* in subg. *Chamaedorea*.

64. *Chamaedorea sartorii* Liebm. in Mart., *Hist. Nat. Palm.* 3: 308 (1849). Holotype: Mexico. Veracruz, *Liebmann s.n.* (sheets later renumbered 10801, 10802, 10803) (C!). Illustr.: Hodel, *Chamaedorea Palms*, p. 49; figs. 14A-C (1992a). N.v.: tepejilote cimarron, tepejilote, tepejilotillo, tepejilote chipaneco, Mexico.

Chamaedorea aurantiaca Brongn., *Chamaedorea hartwegii* hort. in Anon., *Chamaedorea mexicana* hort. in Heynh., *Chamaedorea oblongata* (H. Wendl.) H. Wendl. *nom. illeg.* Not Mart., *Chamaedorea oblongata* var. *conferta* H. Wendl., *Chamaedorea wobstiana* hort. in Linden, *Eleutheropetalum sartorii* (Liebm.) Oerst., *Eleutheropetalum sartorii* var. *conferta* H. Wendl. ex Burret, *Morenia oblongata* H. Wendl., *Morenia sartorii* (Liebm.) hort. in Ruffo, *Nunnezharia aurantiaca* (Brongn.) Kuntze, *Nunnezharia sartorii* (Liebm.) Kuntze.

Solitary, erect, to 4 m tall. Stem 0.8-1.6 cm diameter, internodes 3-30 cm. Leaves 3-6, pinnate, spreading; sheath 11-23 cm, obliquely open in apical 1/2; petiole 17-45 cm; rachis 30-50 cm; pinnae 5-10 per side, 20-40 × 4-7 cm, lanceolate to long-lanceolate, long-acuminate, sigmoid, falcate, long-acuminate, midrib and 2 marginal primary nerves, 3 secondaries on either side. Inflorescences interfoliar but frequently infraxillary in fruit, gender dimorphic; peduncles 20-50 cm; bracts 4-6, to 25 cm, tightly sheathing, brown; staminate spreading, shorter than leaves, branched 1-2 orders; rachis to 15 cm, spreading, straight; rachillae to 30, 15-25 cm, slender, diverging from rachis at right angle, drooping,

simple or rarely 1-branched; pistillate erect in flower becoming nodding or drooping to pendulous in fruit; rachillae 4-8, 15-20 cm, sharply angled in flower, rounded, thick, fleshy in fruit. Flowers staminate and pistillate similar, depressed-globose, yellow to orange or brick red, petals cup-shaped, “hooded” over internal organs, thick, slightly fleshy; staminate 2.5×2.5 -3 mm; calyx c. 1.25×2 mm, deeply lobed, sepals connate in basal 1/2, rounded to acute apically, membranous, nerveless, white; petals c. 2×2 mm, briefly connate basally, free apically, nerved adaxially; stamens shorter than petals but equaling pistillode, filaments 0.75-1 mm, briefly connate basally, clear-colored, anthers 1-1.25 mm, yellow; pistillode shorter than petals, abruptly flared apically, flared basally, whitish; pistillate c. 2.5×3 mm, slightly aromatic; calyx c. 1.5×2.5 mm, deeply lobed, sepals briefly connate and/or imbricate basally, rounded to acute, nerveless, pale green to white; petals c. 2.5×1.5 -2 mm, connate and/or imbricate in basal 1/2, free apically, acute, lightly nerved adaxially; staminodes 6, prominent, large, membranous, free; ovary c. 1.5×1.25 -1.5 mm, subglobose, pale green to white, stigma lobes separated, recurved, rounded. Fruits 9.5 - 12.5×7 -8 mm, ellipsoid-ovoid, black, mesocarp slightly fleshy, mucilaginous, aromatic; seeds 7 - 10×5 -6 mm, ellipsoid.

Low- to middle-elevation, moist to wet forest, often on limestone, on the Atlantic slope. H

(Hodel et al. 1488, MO). 0-1300 m. Mexico (Oaxaca, Puebla, Veracruz), Mesoamérica.

Chamaedorea sartorii is much like a pinnate-leaved version of *C. ernesti-augustii* but differs in its taller habit, fully pinnate leaf blade with more numerous pinnae, and infraxillary, drooping to pendulous infructescences. The fleshy, cup-shaped, orange to brick red petals of both genders “hooded” over the internal floral organs are shared with four other species, *C. metallica* and *C. rhizomatosa* from Mexico but north of

Mesoamerica and *C. ernesti-augustii* and *C. stolonifera* included in this treatment.

Because of this unique floral structure, together these five species comprise the subg.

Eleutheropetalum (Hodel 1992a).

65. *Chamaedorea scheryi* L. H. Bailey, *Gentes Herbarum* 60(4): 252, fig. 133 (1943).

Holotype: Panama, *Woodson & Schery 680* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: p. 197; figs. 85A-D (1992a). N.v.: unknown.

Solitary, acaulescent, erect, to 1.5 m tall. Stem short, nearly lacking, creeping and buried in leaf litter, 1.5-4 cm diameter, densely ringed, internodes 3-5 mm. Leaves 3-6(-9), pinnate, erect-spreading; sheath to 30 cm, obliquely long-open apically, tubular only briefly basally; petiole (14-)22-61 cm; rachis (30-)40-100 cm; pinnae (4-)14-22 per side, 12.5-40 × 1.2-5.1 cm, decreasing in size progressively toward apex of blade, linear-lanceolate to lanceolate, falcate or slightly sigmoid or sometimes nearly straight, acuminate to long-acuminate, proximal margin decurrent on rachis, a prominent midrib and 2 primary nerves on either side, secondaries indistinct. Inflorescences inter- or less frequently infrafoliar, erect-ascending, long-pedunculate, arising from the base or frequently the leaf litter; peduncles 24-102 cm, erect-ascending; bracts 5-10, to 13 cm, most distal equaling peduncle, thin-papery, brown; staminate rachis 5.5-26 cm; staminate rachillae 15-65, 3-17 cm, perpendicular to rachis, drooping distally; pistillate rachis 0-8(-13) cm, rachillae (2-)3-18(-30), 4-17 cm, stiff, erect, parallel or slightly curving. Flowers staminate c. 3 × 2.5-3 mm, globose, short-pointed; calyx 0.5-1 × 2 mm, deeply lobed, sepals connate in basal 1/3, broadly rounded apically and slightly flared, green with brown margins; petals 2.5-3 × 1.5 mm, narrowly ovate, free nearly to base, erect-

spreading, acute, greenish to greenish yellow; stamens c. 2 mm high, leaning away from and not exceeding pistillode, filaments c. 1 mm, anthers 0.5-0.75 mm, bilobed; pistillode 2-2.5 mm high, columnar, pale but greenish apically and there sharply 3-lobed and enlarged; pistillate c. $2.5 \times 2-2.5$ mm, globose; calyx c. 0.5×2 mm, deeply lobed, sepals free to base, triangular, rounded to acute apically, green with brown margins; petals c. 2.5×2.5 mm, cupped, imbricate nearly to apex and there acute and slightly recurved, thick, green; staminodes c. 1 mm high, toothlike, whitish; ovary $2-2.5 \times 1.5-1.75$ mm, obovoid, green, stigma lobes short, shorter than petals, scarcely separated and forming a pyramid-like structure, pale. Fruits $7-8 \times 4-5$ mm, ellipsoid-globose, black. Eophyll pinnate.

Low- to middle-elevation, wet forest and cloud forest, on the Atlantic and Pacific slopes.

CR (*Hodel & Hodel 720B*, CR). (65-)600-2050 m. Mesoamerica.

Chamaedorea scheryi is characterized by its acaulescent habit, pinnae decreasing in size progressively toward the apex and with the proximal margin decurrent on the rachis, ascending and long-pedunculate inflorescences arising from the base, and the pistillate rachillae mostly stiffly spreading and parallel. It could be confused with *C. undulatifolia* but this latter species is distinct in its pinnae with conspicuously undulate margins and the pistillate rachillae conspicuously curved and hook-like in fruit. Historically, the name *C. microphylla* was misapplied to *C. scheryi* because of the tendency of the latter species to flower when very small and with much-reduced leaves. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. scheryi* in subg. *Chamaedoropsis*. *Chamaedorea binderi*, *C. brachyclada*, *C. pygmaea*, *C. scheryi*, *C. stenocarpa*, and *C. undulatifolia* form a rather distinctive and natural subgroup

characterized by their virtually stemless habit, decurrent pinnae, long-pedunculate inflorescences arising from or below ground level, and mostly pinnate eophylls.

66. *Chamaedorea schippii* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(110): 1038 (1934). Lectotype (designated here): Belize, *Schipp S-569* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: p. 69; figs. 21A-F (1992a) (as *C. graminifolia*). N.v.: chapai, Belize.

Cespitose, to 4 m tall, forming open clusters and colonies 1-5 m wide by wide-spreading rhizomes. Stems 2-3 cm diameter, erect to leaning, green with dense glaucous bloom, internodes to 30 cm. Leaves 4-6, pinnate, ascending to spreading; sheath 20-40 cm, tubular in basal 3/4, obliquely open apically and there with a slight glaucous bloom, thick, durable, green, becoming brown, persistent; petiole 15-25 cm, gray-green adaxially, with a slight glaucous bloom abaxially; rachis 70-110 cm, gray-green abaxially with a slight glaucous bloom; pinnae 22-42 per side, to 40 × 1.5-2.5 cm, linear to linear-lanceolate, straight, drooping apically, grayish green, regularly arranged except proximal ones sometimes irregularly clustered, long-acuminate, prominent midrib and one primary on either side, drying plicate. Inflorescences infrafoliar, typically among the persistent leaf sheaths, ascending-spreading; peduncles to 15-35 cm, ascending to spreading; bracts 5-7, to 20 cm, most distal exceeding peduncle, brown; rachis 5-10 cm; staminate rachillae 12-35, to 25 cm, drooping; pistillate 10-22, to 15 cm, stiffly ascending to spreading or curved. Flowers staminate c. 2 × 2-2.5 mm, depressed-globose, flat apically, aromatic; calyx 0.5-0.75 × 1.5 mm, deeply lobed, sepals connate in basal 1/4-1/2, rounded apically, nerveless, green; petals 2.5-3 × 1.75 mm, broadly oblong, acute, connate apically and

there adnate to the pistillode and corolla opening by lateral slits, faintly nerved, more so when dry, yellow; stamens 1.5-1.75 mm high, filaments 1 mm, anthers 0.75-1 mm; pistillode 2 mm high, columnar, 3-angled, yellowish; pistillate c. 2×1.5 -2 mm, ovoid to globose; calyx 0.5-0.75 \times 1.75 mm, deeply lobed, sepals imbricate in basal 1/2, broadly rounded apically; petals 1.75 \times 2.5 mm, imbricate nearly to apex, acute, faintly nerved when dry, yellowish; staminodes not seen; ovary c. 2×1.75 mm, globose to ovoid, green, stigma lobes very short. Fruits 6-10 mm diameter, globose, black; seeds 5-8 mm diameter, globose.

Low-elevation, seasonally moist and moist forest, on limestone, on the Atlantic slope. B (Hodel & Thomas 1132A, BH); G (Steyermark 45612, F). 50-900 m. Mesoamérica.

Chamaedorea schippii is distinctive in its ascending-spreading leaves with numerous, narrow pinnae, cespitose habit by means of wide-spreading rhizomes, and limestone habitat. Hodel (1992a) treated it as a synonym of the then little-known *C. graminifolia*. Grayum (1998), based on new discoveries in Costa Rica, separated these two species and, in doing so, revised and augmented the description of *C. graminifolia*, documenting it as a Costa Rican and Nicaraguan species of solitary habit and free staminate petals while noting that *C. schippii* was a Belizean and Guatemala species of cespitose habit and apically connate staminate petals. The description of *C. graminifolia* in Hodel (1992a) is completely based upon and applies only to *C. schippii*. *Chamaedorea schippii* is to be expected in Mexico because a specimen from cultivation, *Bailey 9125* (BH), was noted as originally from Tehuantepec. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. schippii* in subg. *Chamaedorea*.

67. *Chamaedorea seifrizii* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 14(123): 268-269 (1938). *nom. cons.* Neotype (designated by Hodel, *Chamaedorea Palms* 192 [1992a]): Mexico, *Moore 8096* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 33, 199-200, 277; figs. 9C, 86A-D, 87A-B, 125A-F (1992a). N.v.: xate, xiat, chiat (Belize, Guatemala). *Chamaedorea donnell-smithii* Dammer *nom. rej.*, *Chamaedorea erumpens* H. E. Moore, *Meiota campechana* O. F. Cook *nom. illeg.*

Cespitose by means of basal offshoots, erect to leaning, forming rather dense and tight clumps of up to 40 stems to c. 3 × 1-2 m. Stems 1-2 cm diameter, minutely white-spotted, internodes 5-20 cm, typically covered with persistent, brown leaf sheaths especially distally. Leaves 4-5 pinnate, erect-spreading; sheath to 30 cm, tubular, persistent, durable, grayish green aging brown; petiole to 10 cm, grayish green; rachis 30-45 cm or more; pinnae 5-18 per side, 8-35 × 0.5-3(-9) cm, lanceolate to narrowly lanceolate or linear, straight, only slightly falcate, short-acuminate to acute, drooping to stiffly ascending off rachis, mostly with a prominent midrib 2-3 less conspicuous primary nerves on either side, secondaries inconspicuous or if apical pinnae broad then with 3-9 prominent nerves. Inflorescences infrafoliar, bursting through base of dried, persistent sheaths, short, stiffly erect to ascending, often against stem, sometimes branched to 2 orders; peduncles 3.5-8 cm, erect to ascending; bracts c. 5, to 6 cm long, brown, most distal exceeding peduncle; rachises 1-4.5 cm; staminate rachillae 5-12, 7.5-15 cm, stiffly erect, most proximal sometimes branched; pistillate 4-6, to 105 cm, stiffly erect. Flowers staminate c. 3 × 3 mm, subglobose, strongly aromatic; calyx 1-1.5 × 3 mm, deeply lobed, sepals free nearly to base and there very briefly connate and/or imbricate, rounded to acute apically, pale

green; petals c. 3×3 mm, broadly ovate, free nearly to base and there briefly connate, spreading apically but slightly incurved, acute, thick, fleshy, yellow; stamens c. 2 mm high, tightly fixed around pistillode, filaments 1-1.5 mm, connate basally, pale, anthers c. 1 mm, dorsifixed at middle; pistillode c. 3 mm high, slightly shorter than petals, broadly columnar, broadly 3-lobed apically, light yellow; pistillate $2-2.5 \times 2.5-3$ mm, depressed-globose; calyx $1-2 \times 3-3.5$ mm, moderately to shallowly lobed, sepals imbricate in basal $1/2-2/3$, broadly rounded apically, green; petals c. $2.5 \times 2.5-3$ mm, ovate, cupped, imbricate nearly to apex and there free, erect, acute, yellow; staminodes 6, minute, scale-like, bilobed; ovary c. $2 \times 2-2.5$ mm, subglobose, green, stigma lobes short, slight recurved, blunt. Fruits c. 8 mm diameter, globose, black with a slight glaucous bloom; epicarp thin, finely reticulate; mesocarp thin, yellow, pulpy with few slender fibers adherent to thin endocarp; seeds c. 6 mm diameter, globose.

Low-elevation, moist to seasonally dry forest, often on limestone, on the Atlantic slope. T (Matuda 3153, MEXU), Y (Gaumer 24083, F), C (Cabrera 6990, MEXU), QR (Cabrera 1165, MEXU), B (Hodel & Thomas 1131A, BH), G (Hodel & Hodel 847, BH), H (Hodel et al. 1279, EAP). 10-550 m. Mesoamérica.

Variable in pinnae size and shape, *Chamaedorea seifrizii* is, nonetheless, distinctive in its tightly caespitose habit, relatively small, pinnate leaves, and short, branched inflorescences that erupt through the old persistent leaf sheaths. It is one of the few species of the genus that sometimes inhabits seasonally dry forest where at the height of the rainless season adjacent vegetation can be wilting from lack of moisture. Known as the bamboo palm, it is a common plant in the international indoor and outdoor landscape trade. Hodel et al. (1995b) successfully proposed rejection of an earlier but obscure, little used, and poorly

known name, *C. donnell-smithii*, threatening the well known name *C. seifrizii*. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. seifrizii* in subg. *Chamaedoropsis*.

68. *Chamaedorea serpens* Hodel, *Principes (Palms)* 35: 77 (1991). Holotype: Panama, Hodel & Hodel 745 (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 107; figs. 40A-C (1992a). N.v.: unknown.

Cespitose, branching up to 1 m up stem, erect to decumbent, forming sprawling, tangled clumps to 4 m across. Stems 5-10 mm diameter, twisting, snaking, and creeping along ground and through adjacent vegetation, to 3 m, internodes 5-10 cm. Leaves 4-5, pinnate, rarely simple and bifid, erect-spreading; sheath to 20 cm, tubular; petiole c. 20 cm; rachis to 25 cm; pinnae (1-)2-5 per side, 12-18 × 2.5-4 cm, lanceolate, sigmoid, acuminate, 4-5 prominent primary nerves, 1 secondary between each pair of primaries, apical pair or if simple and bifid 27-30 × 8-12 cm, 9-12 nerved. Inflorescences inter- or infrafoliar, often emerging from persistent sheaths, erect; peduncles 15-25 cm, ascending; bracts 4-5, to 15 cm, most distal exceeding peduncle, papery, greenish to brown; rachis to 3 cm; rachillae 6-10, staminate to 10 cm, drooping; pistillate to 15 cm, erect-spreading. Flowers staminate 2-2.5 × 1.8-2.5 mm, globose; calyx 0.8-1 × 1.8-2 mm, deeply lobed, faintly nerved, sepals connate only briefly at base, rounded to acute apically; petals c. 2.5 × 2 mm, connate apically and there adnate to the pistillode and corolla opening by lateral apertures, acute, thin, nerved, greenish yellow; stamens 1.5-2 mm high, filaments very short, anthers 2 mm, sessile or nearly so; pistillode 2-2.5 mm high, columnar, very slender, slightly flared apically; pistillate 1-1.25 × 2 mm, subconic to nearly shield-like;

calyx 0.75-1 × 2 mm, lobed, nerved when dry, sepals imbricate in basal 1/2, truncate to broadly rounded apically; petals 1.5 × 1.5 mm, imbricate nearly to apex, truncate to acute, yellowish; staminodes not seen; ovary c. 1 × 1 mm, depressed-ovoid to globose, stigma lobes short, recurved, not exceeding petals. Fruits not seen.

Middle-elevation, moist and wet forest, on the Pacific slope near the Continental Divide.

P (Croat 37353, MO). 0-1000 m. Mesoamérica.

Chamaedorea serpens is one of the most unusual members of the genus and unique in its non-climbing, sprawling, decumbent, slender stems rooting and sprouting at the nodes along their length. Some forms of *C. elatior* have similar stems but they are climbing and have leaves with many more pinnae. A case might be made to include *C. serpens* in the extremely variable and widespread *C. pinnatifrons*, as some have done, but this latter species is consistent in its solitary habit. A species with an unusually restricted distribution, *C. serpens* is endemic to Panama and has only been found near Cerro Campana and El Valle. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral slits place *C. serpens* in subg. *Chamaedorea*.

69. *Chamaedorea simplex* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 758-760 (1933). Lectotype (designated here): Guatemala, *von Tuerckheim 2487* (US!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 109, 111, 113; figs. 41-42, 43A-C (1992a). N.v.: unknown.

Solitary, erect, sometime decumbent, to 2.5 m tall or long. Stem 5-12 mm diameter, internodes 2.5-7 cm, with adventitious prop roots basally. Leaves 4-6, simple and bifid,

spreading; sheath to 9 cm, tubular, briefly and obliquely open apically; petiole 2.5-14 cm; rachis 2-5 cm; blade c. 25×25 cm, V-shaped, bifid apically to $3/4$ its length or more, lobes 5-8 cm wide, broadly-spreading, lanceolate, sigmoid, short-acuminate, thick, glossy dark green adaxially, paler abaxially, 6-7 prominent primary nerves per side, keeled adaxially, 2 secondaries between each pair of primaries. Inflorescences interfoliar, ascending in flower, spreading or nodding in fruit, mostly spicate, sometimes few-branched; peduncles 15-35 cm, erect to ascending in flower, spreading to nodding in fruit; bracts 2-3 and likely more, most distal exceeding peduncle, tightly sheathing, papery, green in flower, brown in fruit; rachis 0-2 cm; staminate rachillae 1-3, to 25 cm, pendulous; pistillate 1, to 9 cm, erect-spreading in flower, spreading to nodding in fruit. Flowers staminate densely arranged but not contiguous in bud, $2-2.5 \times 2.5$ mm, globose-ovoid; calyx 1.5×2.5 mm, shallowly lobed, sepals connate in basal $2/3$, broadly rounded apically, densely nerved when dry; petals $2-3 \times 2-2.5$ mm, broadly ovate, connate apically and there adnate to the pistillode and corolla opening by lateral slits, densely nerved when dry, yellowish; stamens 1.5 mm high, filaments c. 0.75 mm, anthers c. 1 mm; pistillode 1.5-1.75 mm high, columnar; pistillate $2.5-3 \times 3-3.5$ mm, globose; calyx $1-1.5 \times 3.5$ mm, shallow lobed, sepals connate in basal $3/4-5/6$, broadly rounded apically, densely nerved when dry; petals suborbicular, imbricate nearly to apex; staminodes absent; ovary ovoid, stigma lobes pointed, slightly recurved. Fruits $9-12 \times 7.5-9$ mm diameter, ellipsoid, black; perianth prominently nerved when dry, abortive carpels adherent to fruit; seeds 5-7 mm diameter, subglobose.

Middle-elevation, wet forest and cloud forest, on the Atlantic slope. Ch (Breedlove 35112, MO); G (Hodel & Castillo-Mont 887, AGUAT). 1300-1600 m. Mesoamérica.

Chamaedorea simplex is distinctive in its small, solitary habit, simple and deeply bifid leaves with wide-spreading, glossy green, conspicuously nerved lobes, and mostly spicate inflorescences. Simple- and bifid-leaved forms of *C. rojasiana* are similar but differ in the conspicuous secondary nerves between the primaries, the latter of which are not keeled adaxially. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. simplex* in subg. *Chamaedorea*.

70. *Chamaedorea stenocarpa* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 206 (1947). Holotype: Guatemala, *Steyermark 41893* (F!). Illustr.: Hodel, *Chamaedorea Palms*: p. 203; figs. 88A-E (1992a). N.v.: unknown.

Solitary, acaulescent, erect, to 75 cm tall. Stem short, nearly lacking, creeping and buried in leaf litter, 0.5-2 cm diameter, densely ringed, internodes 2-10 mm. Leaves 3-6, pinnate, erect-spreading; sheath 3-10 cm, obliquely long-open apically, tubular only briefly basally; petiole 5-30 cm, green; rachis 13-32 cm, green, minutely verrucose; pinnae 10-20 per side, 4.5-18 × 0.4-2.5 cm, decreasing in size progressively toward apex of blade, narrowly oblong-lanceolate to lanceolate, straight or slightly sigmoid, thin, acuminate, often puckered distally, proximal margin decurrent on rachis, a prominent midrib and 1 marginal primary nerve on either side, 1 secondary between midrib and primary, apical pair 2-3-nerved. Inflorescences interfoliar, ascending-spreading, arising from the base or frequently the leaf litter, gender dimorphic; peduncles 8-29 cm, ascending to spreading, straight to slightly arcuate; bracts 4-5, most distal not exceeding peduncle, brown; staminate rachis (0.8-)3.5-7(-15) cm; rachillae (4-)8-25(-47), 2-10.5 cm, filiform, perpendicular to rachis, drooping distally; pistillate spicate or bifurcate, flower-bearing

portion or rachillae 4-15 cm, straight or slightly curving. Flowers staminate 3.5-4.5 × 2.5-2.75 mm, obovoid; calyx 0.3-0.75 × 1.75-2 mm, moderately lobed, sepals connate in basal 1/2, broadly rounded to acute apically, pale green; petals 3.5-4.5 × 1.5-2 mm, narrowly ovate, adaxially thickened medially, free in apical 3/5-4/5 and there, erect, acute, connate and/or imbricate in basal 1/5-2/5, whitish to pale green apically, whitish basally; stamens 1.75-2.5 mm high, leaning away from and not exceeding pistillode, filaments 1.5- 2 mm, anthers c. 0.5 mm, bilobed; pistillode 2.5-2.75 mm high, columnar, pointed apically, pale to green; pistillate 2.5-3 × 2.5-3 mm, ovoid- to depressed-globose; calyx 0.5-1.5 × 2-3 mm, moderately to deeply lobed, sepals connate and/or imbricate in basal 1/4-1/2, broadly rounded apically, pale green to green; petals 2.5-3 × 2.5-3 mm, cupped, imbricate nearly to apex and there erect and acute, thick, yellowish green to yellow to dark green at apex; staminodes not seen; ovary 1.5-2.5 × 2-2.5 mm, ovoid to depressed-globose, green, stigma lobes short, shorter than petals, erect, pointed, clear-colored. Fruits 6-10 × 6-10 mm, ellipsoid and narrowed at both ends to globose, black. Eophyll pinnate.

Low- to middle-elevation, wet forest, often on limestone, on the Atlantic and Pacific slopes. G (Hodel & Castillo-Mont 1022A, AGUAT); CR (Hammel 19206, MO); P (Mori et al. 3843, MO). 400-1200 m. Mesoamérica.

Rather rare and seldom collected, *Chamaedorea stenocarpa* is rather distinctive in its solitary, acaulescent, dwarf habit; pinnate leaves with pinnae decreasing in size progressively toward the apex and with the proximal margin decurrent on the rachis; and the spreading, gender dimorphic inflorescences with the staminate branched and the pistillate spicate or sometimes bifurcate. It is similar to *C. pygmaea* but the latter species

can be distinguished by the variously pinnate leaf, the pinnae not decreasing in size progressively toward the apex of the blade, and branched inflorescences of both genders. In Guatemala *C. stenocarpa* occurs on the Atlantic slope, in Costa Rica it is found on the Pacific slope, and in Panama it occurs near the Continental Divide. The Guatemala population has ellipsoid fruits and ovoid pistillate flowers while those from Costa Rica and Panama have globose fruits and depressed-globose pistillate flowers; further work is needed to confirm that the Costa Rican and Panamanian populations are *C. stenocarpa* and not an undescribed species. The late Robert Wilson popularized this species, calling it “Las Cruces elfin dwarf” or “dwarf pinnate” and cultivated spectacular plantings of it in his garden, Las Cruces Tropical Botanical Garden (now Jardín Botánico Robert y Catherine Wilson) near San Vito de Java in southeastern Costa Rica. The plants that Wilson grew reportedly came from forest remnants not too distant from his garden. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. stenocarpa* in subg. *Chamaedoropsis*. *Chamaedorea binderi*, *C. brachyclada*, *C. pygmaea*, *C. scheryi*, *C. stenocarpa*, and *C. undulatifolia* form a rather distinctive and natural subgroup characterized by their virtually stemless habit, decurrent pinnae, primarily long-pedunculate inflorescences arising from or below ground level, and mostly pinnate eophylls.

71. *Chamaedorea stolonifera* H. Wendl. ex Hook. f., *Bot. Mag.* 118: t. 7265, figs. 1-4 (1892). Holotype: Cultivated in Europe from Mexico, *Hooker s.n.* (K!). Illustr.: Hodel, *Chamaedorea Palms*, pp. 9, 23, 51; figs. 1C, 5B, 15A-E (1992a). N.v.: unknown.

Stoloniferous and rhizomatous, erect, 1-2 m tall, forming rather dense colonies of the same gender to 10 m across. Stems erect, stolons and rhizomes long-creeping and producing stems up to 1.5 m distant, 5-8 mm diameter, internodes 3-6 cm, stolons and rhizomes tightly sheathed with green to brown bracts. Leaves 5-8, simple and bifid, spreading; sheath to 10 cm, mostly tubular but obliquely open apically; petiole c. 5 cm; rachis to 10 cm; blade c. 30 × 25 cm, bifid apically to 2/3 its length, lobes 25-30 × 9-10 cm, broadly lanceolate, thick-textured, diverging, 10 primary nerves per side, 2 secondaries between each pair of primaries, outer margin toothed along distal half. Inflorescences typically infrafoliar but sometimes initially interfoliar; peduncles to 20 cm; bracts 3-5, most distal often exceeding peduncle, tightly sheathing, green in flower, brown in fruit; rachis 1-2 cm; staminate rachillae 2-7, 7-13 cm, slender; pistillate 1-4, to 10 cm, spreading and flexuous, slender in flower, thick in fruit. Flowers staminate and pistillate similar, orange or brick red, petals cup-shaped, "hooded" over internal organs, thick, slightly fleshy; staminate 2.5-3 × 3.5-4.5 mm, strongly depressed-globose; calyx c. 1 × 2.5-3 mm, obscurely lobed, sepals imbricate in basal 1/2-3/4, rounded to acute apically, membranous, pale green to white; petals c. 2 × 3 mm, connate in basal 3/4, free apically, slightly bilobed; stamens 1.5 mm high, just shorter than pistillode, filaments 1 mm, connate in basal 1/2 in a fleshy, broad, 6-toothed ring, whitish tinged with orange apically, anthers 1 mm, strongly divaricate; pistillode equaling petals or barely exceeding them, columnar, truncate and abruptly flared apically, orange; pistillate c. 2 × 3.5-4 mm, broadly obconical; calyx 0.5 × 2.5-3 mm, deeply lobed, sepals imbricate in basal 1/4-1/2, rounded to acute, membranous, pale green; petals c. 2.5 × 2.5 mm, briefly imbricate basally, free apically, acute; staminodes not seen; ovary 1-1.5 mm high, depressed-

globose, whitish, stigma lobes sessile, recurved, clear-colored. Fruits 7-9 mm, globose, black; seeds 5-7 mm diameter, globose.

Middle-elevation, moist to wet forest, typically on limestone, on the Atlantic slope. Ch (Hodel & Hodel 933A, MEXU). 600-800 m. Mesoamérica.

Chamaedorea stolonifera is unique in its stoloniferous habit, the long, slender, bract-covered stems creeping over, around, and even under the limestone rocks of its typical habitat. This stoloniferous character and its simple and bifid leaves easily distinguish this species. It could be confused with *C. brachypoda*, which differs in its strictly rhizomatous habit, thin-papery leaves, greenish yellow, non-cucullate petals, curved fruits, and low-elevation, non-limestone habitat. The fleshy, cucullate, orange to brick red petals of both genders “hooded” over the internal floral organs are shared with four other species, *C. metallica* and *C. rhizomatosa* from Mexico but north of Mesoamerica and *C. ernesti-augustii* and *C. sartorii* included in this treatment. Because of this unique floral structure, together these five species comprise the subg. *Eleutheropetalum* (Hodel 1992a).

72. *Chamaedorea stricta* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 207 (1947). Holotype: Guatemala, *Steyermark 37381* (F!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 205, 207; figs. 89, 90A-E (1992a). N.v.: kum (Guatemala). Solitary, erect, acaulescent, to 1.5 m tall. Stem 2.5-3 cm, curved, short-creeping at or below leaf litter, densely ringed, internodes to 1 cm, often covered with old, brown, persistent leaf sheaths. Leaves 3-7, simple and bifid, erect to ascending; sheath 8-27 cm, long-open, tubular only near base, dark green, with a medial costa extending from petiole, thick, durable, becoming brown, persistent; petiole 25-60 cm, dark green; rachis

15-55 cm, dark green; blade to 20-75 × 13-28 cm, bifid apically to c. 1/4 its length, oblong, lobes long-acuminate, thick, dark bluish green, 12-17 primary nerves per side, these prominent abaxially, secondaries numerous, inconspicuous. Inflorescences inter- or infrafoliar, arising from base of plant or leaf litter, erect to ascending, shorter than leaves; peduncles 80-100 cm, not exceeding the leaves, erect to ascending; bracts 7-10, to 28 cm, most distal not exceeding to exceeding peduncle, green to brown in flower, brown in fruit; rachises 1.5-3.5 cm; staminate rachillae 5-15, to 15 cm, drooping; pistillate 2-4, 8-15 cm, erect to ascending. Flowers staminate in dense spirals, 4-4.5 × 3.5-3.75 mm, obovoid-globose, calyx c. 1 × 3 mm, shallowly lobed, sepals connate in basal 3/4-4/5, broadly rounded to truncate apically, yellow; petals 4-4.5 × 3.5 mm, broadly ovate, free nearly to base, slightly cupped, rounded-acute apically, thick, fleshy, yellow; stamens c. 2 mm high, leaning away from pistillode, filaments c. 1 mm, anthers c. 1.25 mm, bilobed, dorsifixed near base; pistillode 4-4.5 mm, just exceeding petals, columnar, slightly pointed apically, pale yellow to whitish; pistillate in remote spirals; calyx c. 3.5 mm, deeply lobed, sepals connate and/or imbricate in basal 1/4-1/3; petals c. 3 × 3 mm, nearly orbicular, imbricate; staminodes present and prominent in fruiting perianth; ovary not seen. Fruits c. 8 mm diameter, subglobose, black.

Low- to middle-elevation, moist to wet forest and cloud forest, on the Pacific slope. Ch (Matuda 15344, F); G (Hodel & Castillo-Mont 995, AGUAT. 850-1900 m. Mesoamérica. Chamaedorea stricta is distinctive in its solitary, acaulescent habit, erect to ascending, dark bluish green, simple and bifid leaves, and erect to ascending, long-pedunculate inflorescences arising from the base. *Chamaedorea rossteniorum* from Costa Rica and Panama is similar in habit, foliage, and inflorescences but this latter species can be

distinguished by its slightly more spreading leaves and staminate flowers with the petals connate apically and the corolla opening by lateral slits. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. stricta* in subg. *Chamaedoropsis*.

73. *Chamaedorea subjectifolia* Hodel, *Principes (Palms)* 39(1): 18-19, f. 7-8 (1995).

Holotype: Panama, *Hodel et al. 1238* (BH!). Illustr.: Hodel, *Palm J.*: p. 6; f. 10 (2005).

N.v.: bor (Panama).

Solitary, erect, to 3.5 m tall. Stem 1-2.5 cm diameter, internodes 1-15 cm. Leaves 5-8, pinnate, spreading; sheath to 17 cm, tubular; petiole to 8 cm; rachis to 32 cm; sheath, petiole, and rachis white-spotted; pinnae 4-5 per side, 14-21 × 3-8 cm, lanceolate, sigmoid, downward-cupped, thick, coriaceous, acuminate, glossy green, conspicuous midrib and 2-5 primary nerves on either side, 1-2 secondaries between primaries, apical pair sometimes 3-5-nerved. Inflorescences infrafoliar, held well below the leaves on bare stem or on stem with old, persistent, tattered leaf sheaths, ascending to spreading; peduncles to 20 cm, ascending to spreading; bracts c. 5, to 11 cm, most distal c. equaling peduncle, green to brown in flower, brown in fruit; rachises (0-)1-2 cm; rachillae 2-5, to 18 cm, staminate pendulous, pistillate ascending to spreading in flower, stiff, parallel, spreading to downward-pointing in fruit. Flowers staminate in dense spirals but not contiguous, superficial, c. 2 × 2 mm, obovoid; calyx c. 0.4 × 1-1.5 mm, low-cupular, moderately lobed, sepals connate in basal 1/2, acute apically; petals c. 2 × 1-1.25 mm, ovate, free nearly to base, spreading apically and acute; stamens c. 0.8 mm high, c. 1/2 as high as and forming a tight ring around pistillode, filaments short, c. 0.3 × 0.25 mm,

anthers c. 0.3 mm, oblong, bilobed, dorsifixed near base; pistillode c. 1.6 mm high, columnar, swollen basally, truncate apically; pistillate in dense spirals but not contiguous, superficial, unpollinated flowers persisting on rachillae through fruiting, c. 2×2.5 mm, globular; calyx c. 0.8×2.5 mm, cup-shaped, shallowly lobed, sepals connate in basal $2/3$, broadly to truncate apically; petals c. 2×2 mm, broadly rounded-triangular, imbricate nearly to apex and there short-acute to mucronate; staminodes not seen; ovary c. 2×2 mm, globose, stigma lobes short, recurved, acute. Fruits c. 9×6 mm, ellipsoid, black; seeds c. 7×5 mm, ellipsoid-ovoid.

Low- to middle elevation, moist to wet forest and cloud forest, on the Atlantic slope, sometimes at or near the Continental divide. P (de Nevers et al. 5040, MO). 50-700(-1000) m. Mesoamérica.

Apparently endemic to Panama, *Chamaedorea subjectifolia* is restricted to the central part of the country east of the Panama Canal and is distinctive in its inflorescences held well below the leaves on bare stem or stem with old, persistent, tattered leaf sheaths.

Florally, *C. subjectifolia* is similar to *C. correae* and *C. guntheriana* but these latter two species differ in their much smaller habit and various organs and commonly simple and bifid or few-pinnate leaves. In habit, *C. subjectifolia* might be confused with *C.*

dammeriana but this latter species differs in its interfoliar inflorescences and more remotely placed pistillate flowers that fall away if unpollinated. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. subjectifolia* in subg. *Chamaedoropsis*.

74. *Chamaedorea sullivaniorum* Hodel, *Principes (Palms)* 34(3): 128-131, figs. 10, 12 (1990). Holotype: Panama, *Hodel & Hodel 740A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 209, 211; figs. 91A-B, 92A-G (1992a). N.v.: unknown.

Solitary, erect to decumbent, to 50 cm tall, often appearing stemless. Stem 1-1.5 cm diameter, often creeping and buried in leaf litter, densely and prominently ringed, internodes 7-10 mm, often rooting along its length. Leaves 8-15, simple and bifid, spreading; sheath 3-10 cm, long-open, tubular only briefly at base; petiole 10-16 cm, margins extended upwards on either side especially basally to form a channel, dark green; rachis 15-25 cm, grayish green; blade 25-40 × 10-20 cm, oblong, bifid apically to one-third its length, lobes acute, thick, leathery, plicate, slightly mottled and velvety iridescent dark grayish green, basal margins decurrent on petiole, 15-16 prominent primary nerves per side, outer margin coarsely toothed toward apex. Inflorescences interfoliar, enclosed in channeled margins of leaf sheath basally, often appearing from leaf litter, ascending to spreading, shorter than leaves; peduncles 20-35 cm, typically enclosed in channel margins of leaf sheath; bracts 5-6, to 12 cm, membranous, green aging brown but typically disintegrating by anthesis; staminate with rachis to 2.5 cm; rachillae 4-8, 8-15 cm, spreading but drooping distally; pistillate spicate or bifurcate, flower-bearing portion or rachilla 15-20 cm, ascending to spreading, stiff, curved. Flowers staminate 3.5-4 × 2.5-3 mm, ovoid; calyx 0.75-1 × 2-2.5 mm, moderately lobed, sepals connate basal 1/2, rounded apically, pale green; petals c. 3.5 × 2 mm, ovate, free in apical 3/5, connate and/or imbricate in basal 2/5, thin, membranous, acute and incurved apically, pale green to light yellow tipped with green; stamens c. 2 mm high, filaments 1-1.5 mm, pale, anthers c. 0.5 mm; pistillode c. 2 mm high, globose basally, narrowly

attenuate apically, pale to light yellowish green; pistillate c. 3×3 - 3.5 mm, globose; calyx 0.75 - 1×2.5 - 2.75 mm, deeply lobed, sepals imbricate and/or connate in basal $1/8$, rounded apically, light green to yellowish green; petals c. 3.25×3 mm, broadly triangular, cupped, imbricate nearly to apex, thick, fleshy, acute and slightly erect apically, pale greenish yellow; staminodes not seen; ovary c. 2×2 mm, depressed-globose, a depression or pit at apex, green, stigma lobes very short, pointed, slightly recurved, not exceeding rim of depression, pale. Fruits 6 - 8 mm diameter, globose, black.

Low-elevation, moist to wet forest, on the Atlantic and Pacific slopes. CR (Hodel et al. 1536, CR); P (Hodel et al. 1116, PMA). 300-1200 m. Mesoamérica. Colombia.

Chamaedorea sullivaniorum is distinctive in its low, dwarf habit, simple and bifid leaves with iridescent grayish green, plicate blades incised apically to one-third their length.

Some consider *C. pumila*, *C. minima*, and *C. sullivaniorum* to be one variable species and referred to *C. pumila* because it is the oldest name and has priority. However, *C. minima* is distinctive in its V-shaped, bluish green blades while *C. pumila* has blades bifid apically to one-half their length or more and with 9 to 13 primary nerves per side. On the Pacific slope of central Costa Rica in an exceptionally wet and rich forest, *C. minima* grows side by side with *C. sullivaniorum* with no intermediate forms present, which suggests that at least these two taxa are distinct. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. sullivaniorum* in subg. *Chamaedoropsis*.

75. *Chamaedorea tacanensis* Pérez-Farrera, Villar-Morales & Hodel, *Phytotaxa* 522(2):

101. (2021). Holotype: Chiapas, Mexico, *Martínez-Meléndez 3450* (HEM). Illustr.:

unknown. N.v.: chimp, G.

Solitary, sprawling on ground or scandent on adjacent vegetation, 3.5-8 m. Stem 5.2-8 cm diameter. Leaves 6-14, pinnate when seedling and adult, spreading, arching; sheath to 60 cm, tubular, initially green but aging brown, persistent; petiole 13-70 cm; rachis 1.6-2.5 m; pinnae 42-60 per side, largest 26-48 × 1.8-3 cm, straight, mostly linear, sometimes linear-lanceolate, margins mostly parallel, alternate proximally, opposite and progressively more downward-pointing and reflexed and hooklike distally and there strongly indurate-calloused at the very narrow base, prominent midrib and numerous but inconspicuous nerves of lesser orders on either side. Inflorescences interfoliar, often breaking through subtending sheath, erect-spreading; peduncles 20-50 cm; bracts 5-7, to 19 cm, most distal exceeding pistillate peduncle, stout, brown in flower; staminate rachis 20-50 cm; rachillae up to 50, to 27 cm, spreading; pistillate rachis 5-11 cm; rachillae 10-28, 8-22 cm, green in flower, black in mature fruit. Flowers staminate 3.2-4 × 3-3.5 mm, globose but depressed apically, strongly aromatic; calyx 1-1.7 × 3/3.5 mm, moderately lobed, sepals connate in basal half, broadly deltate, nerveless, green; petals 3.5-4.3 × 2.2-2.5 mm, elliptic-obovate to obovate, connate basally and apically and there adnate to the pistillode and corolla opening by lateral slits, slightly nerved, yellow; stamens 2.3-3.3 mm high, slightly exceeding pistillode, equal to or slightly shorter than anthers; pistillode 2.2-2.7 mm high, columnar, swollen and truncate apically, greenish; pistillate 2.5-3 × 2.4-2.8 mm, globose-ovoid; calyx 1.3-1.6 × 2.4-2.8 mm, deeply lobed, sepals free or briefly connate basally, broadly rounded apically; petals 2-3 × 2-3 mm, broadly lanceolate to

ovate, imbricate in basal 3/4, acute apically, fleshy, nerveless, yellow; staminodes not seen; ovary c. 2.5 mm, stigma lobes recurved. Fruits 7-11 mm diameter, globose, black with a slight glaucous bloom; seeds 4-7 mm diameter, globose, brownish.

Middle- to high-elevation, moist to wet forest, on the Pacific slope. Ch (Martínez-Meléndez and M. Carlos Robles Molina 2517, HEM); G (Hodel and Castillo-Mont 914, BH). 1500-2600 m. Mesoamérica.

As one of only two climbing, vinelike member of the genus, *Chamaedorea tacanensis* is unusually distinctive and readily and easily identified by its climbing habit and numerous, straight, linear pinnae with mostly parallel margins, the latter character distinguishing it from the other climbing species, *C. elatior*. *Chamaedorea elatior* also differs in its more slender stem (1.5-2 cm vs. 5.2-8.4 cm diameter), bifid seedlings and juveniles, glabrous emerging petioles, shorter leaf rachis (0.5-1.5 m vs. 1.6-2.5 m), fewer pinnae (10-35 vs. 42-60 per side) with non-parallel margins, shorter peduncle (10-20 cm vs. 20-50 cm), longer prophyll (to 10 cm vs. 1.5-3 cm), and generally shorter inflorescence rachis (5-25 cm vs. 20-50 cm). I (Hodel 1992a) had included material with linear pinnae from the Pacific slope of Chiapas, Mexico and adjacent Guatemala in *C. elatior* although here it is identified as *C. tacanensis*. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. tacanensis* in subg. *Chamaedorea*.

76. *Chamaedorea tenella* H. Wendl., *Gartenflora* 29: 102-104 (1880). Neotype (designated by Grayum and de Nevers, *Principes* 32: 104-106 [1988]): provenance

unknown, *Kreuzpointner 1188* (M!). Illustr.: Hodel, *Chamaedorea Palms*, pp. 11, 27, 115, 117; figs. 2D, 6A, 44, 45A-C (1992a). N.v.: unknown.

Nunnezharia tenella (H. Wendl.) Hook. f.

Solitary, erect, sometimes decumbent, to 2 m tall. Stem 4-5 mm diameter, internodes 1-4 cm, often with adventitious prop roots at base. Leaves 5-10, simple and bifid, spreading; sheath to 5 cm, tubular; petiole 2-8 cm; rachis 13-15 cm; blade to 20 × 10 cm, narrowly oblanceolate or oblong-elliptic, bifid apically 1/5-1/4 its length, brilliant lustrous dark green, lobes acute, toothed on the outer margin distally, 10-12 primary nerves per side, these obscure adaxially, prominent and yellowish abaxially, 1 inconspicuous secondary between each pair of primaries. Inflorescences interfoliar but often infrafoliar in fruit, typically spicate, ascending-spreading in flower, spreading to pendulous in fruit; peduncles 15-20 cm, ascending to spreading; bracts c. 4, most distal exceeding peduncle, tightly sheathing, thin-papery, brown in flower, shredded and falling away in fruit; staminate rachilla 1, 10-20 cm, pendulous; pistillate 1, 4-10 cm, erect-spreading in flower, slightly swollen and downward-pointing in fruit. Flowers staminate densely arranged but not contiguous in bud, c. 4 × 3.5-4 mm, ovoid-globose; calyx 0.5-0.75 × 2 mm, shallowly lobed, membranous, sepals connate in basal 3/4, rounded apically, greenish yellow to yellow with brown margins; petals c. 4.5 × 4-4.5 mm, ovate, connate apically and there adnate to the pistillode and corolla opening by basal, lateral apertures, lightly nerved especially when dry, bright yellow to golden yellow; stamens 1.5-2 mm high, filaments 1.5-1.75 mm, yellowish, anthers 1.25-1.5 mm; pistillode 3.5-4 × 0.75 mm, columnar, truncate apically, yellow; pistillate c. 1.5 × 2-2.5 mm, subglobose or dome-shaped; calyx 0.75 × 2-2.5 mm, lobed, sepals connate briefly but mostly imbricate

in basal 1/2, broadly rounded apically, slightly fleshy, faintly nerved, greenish yellow to yellow; petals 1.5-2 × 4-4.5 mm, cup-shaped, imbricate nearly to apex, truncate apically, nerved, yellow; staminodes 6; ovary c. 1.5 × 1.5 mm, subglobose to dome-shaped, greenish yellow, stigma lobes short, recurved, pale. Fruits 6-12 mm diameter, globose, black; seeds 5-10 mm diameter, globose.

Low- and middle-elevation, moist to wet forest, sometimes on limestone, on the Atlantic and Pacific slopes. Ch (Hodel and Hodel 930, MEXU); CR (Hodel & Hodel 714, CR).

10-1000 m. Mexico (Veracruz), Mesoamérica.

Chamaedorea tenella is sometimes included in *C. geonomiformis* but this latter species differs in its consistently larger habit, larger leaf blades bifid apically for 1/3-1/2 their length, and the mostly branched inflorescences. *Chamaedorea tenella* has an unusual bicentric distribution; it occurs on the Atlantic slope of Veracruz and Chiapas in Mexico and on the Pacific slope of Costa Rica. In Chiapas it occurs on limestone. The petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. tenella* in subg. *Chamaedorea*.

77. *Chamaedorea tenerrima* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(109): 858

(1933). Neotype (designated by Hodel, *Chamaedorea Palms*, p. 206 [1992a]):

Guatemala, *Hodel & Castillo-Mont 894* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp.

213, 215, 217; figs. 93A-E, 94, 95A-B (1992a). N.v.: unknown.

Lobia erosa O. F. Cook *nom. illeg.*

Solitary, erect or decumbent, to 12.5 m tall. Stem 3-7 mm diameter, internodes 2-5 cm.

Leaves 4-5, pinnate, rarely simple and bifid, spreading; sheath to 15 cm, ligule to 1 cm

long at apex; petiole 4-12 cm, rugose, grayish; rachis 6-20 cm, rugose, pinnae 2-7 per side, to 15×2.5 -10 cm, lanceolate to broadly lanceolate, sigmoid, all except apical pair strongly reflexed, proximal margin near base with auricle abaxially extending across rachis, short-acuminate, outer margins minutely scarious-roughened and toothed, prominent white midrib and less conspicuous primary and secondary nerves on either side thick, broadened apical pair 3-8-nerved, if simple and bifid to c. 19×14 cm, trapezoid, bifid apically to 1/2 its length, lobes broadly flared, 9-10-nerved.

Inflorescences infrafoliar, held well below the leaves, ascending in flower, ascending to spreading in fruit; peduncles 8-30 cm, ascending; bracts 4-6, most distal shorter than to equaling peduncle, green becoming brown and disintegrated in fruit; rachises to 4 cm; staminate rachillae up to 10, to 15 cm, drooping; pistillate rachillae 2-4, 3-10 cm, downward-pointing. Flowers staminate 2.75 - 3×2.5 mm, broadly ovoid; calyx 0.5 - 0.75×1.75 mm, moderately lobed, sepals connate in basal 1/2, broadly rounded apically, greenish yellow; petals c. 2.75×2.5 mm, broadly ovate, connate basally, free apically and there slightly spreading, erect, acute, greenish; stamens c. 1.75 mm high, filaments 1-1.25 mm, anthers 0.5-0.75 mm; pistillode c. 2×0.75 mm, shorter than petals, columnar, stout, truncate apically, pale green to whitish; pistillate 2.5 - 3×2.25 - 2.5 mm, broadly ovoid to globose; calyx 0.75 - 1×2 mm, moderately lobed, sepals connate and/or imbricate in basal 1/2-2/3, broadly rounded apically, green; petals 2.5 - 3×2.5 - 3 mm, very broadly ovate to triangular, imbricate nearly to apex and there rounded-acute to obtuse, erect, green; staminodes present; ovary c. 1.75×2.25 mm, depressed-globose, green, stigma lobes very short, clear-colored. Fruits 6-7 mm diameter, globose, black; seeds 5-6 mm diameter, globose.

Middle-elevation, wet forest and cloud forest, on the Atlantic slope. G (Hodel & Castillo-Mont 1009, AGUAT). 1500 m. Mesoamérica.

Apparently endemic to Guatemala, *Chamaedorea tenerrima* has leaves among the most striking and unusual in the genus. They are distinctive and outstanding in the exceedingly enlarged and broad terminal pair of pinnae, widely flaring with prominent, white sigmoid nerves and toothed margins, and are suggestive of a butterfly's large anterior, flaring wings. Other pinnae are decidedly smaller and sharply reflexed. Another unusual and diagnostic feature of the pinnae is the auricle on the proximal margin near the base that extends across the rachis on the abaxial surface. Only *C. pachecoana* has a leaf that remotely resembles that of *C. tenerrima* but it differs in its mostly acaulescent habit, pinnae mostly the same size throughout the blade, long-open leaf sheaths, and smooth petioles. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. tenerrima* in subg. *Chamaedoropsis*.

78. *Chamaedorea tepejilote* Liebm, in *Hist. Nat. Palm.* 8(9): 308 (1849). Holotype: Mexico, *Liebmann s.n.* (C!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 9, 19, 267, 269, 271, 277, 279; figs. 1A, 4C, 120-121, 122A, 125G, 126 (1992a). N.v.: aila-te, bojon, cana verde, chem-chem, chib, chimp, guaya, ixquil-quib, pacaya, pacaya grande, ternero, tepejilote, Mexico, G; palmito dulce CR; boda, bola nuru, cana verde, P.

Chamaedorea anomospadix Burret., *Chamaedorea casperiana* Klotzsch, *Chamaedorea columbica* Burret, *Chamaedorea exorrhiza* H. Wendl. ex Dammer, *Chamaedorea exorrhiza* H. Wendl. ex Guillaum., *Chamaedorea sphaerocarpa* Burret, *Chamaedorea wendlandiana* (Oerst.) Hemsl., *Chamaedorea wendlandiana* (Oerst.) H. Wendl., *Edanthe*

veraepacis O. F. Cook & Doyle, *Nunnezharia casperiana* (Klotzsch) Kuntze,
Nunnezharia tepejilote (Liebm.) Kuntze, *Nunnezharia wendlandiana* (Oerst.) Kuntze,
Stephanostachys casperiana (Klotzsch) Oerst., *Stephanostachys tepejilote* (Liebm.)
 Oerst., *Stephanostachys wendlandiana* Oerst.

Solitary, 1-7 m tall, or sometimes cespitose by means of mostly tightly ascending basal sprouts at or near ground level, forming erect to leaning or decumbent clumps 2-7 × 3-4 m. Stems 2-10 cm diameter, prominently ringed, internodes 2-15 cm, adventitious prop roots from base to 70 cm up stem. Leaves 3-7, pinnate, spreading; sheath 20-40 cm, tubular, sometimes swollen, obliquely open apically, with a prominent yellow band extending on to petiole and rachis abaxially; petiole 10-60 cm; rachis 0.5-1.5 m; pinnae (6-)12-25 per side, to 16-70 × 2.2-10.5 cm, broadly linear lanceolate to long-lanceolate, papery, sigmoid, falcate, long-acuminate, 5-10 prominent primary nerves, 4-5 or more secondaries often nearly as prominent as primaries, all shiny yellowish abaxially.

Inflorescences infrafoliar, erect in bud, at anthesis staminate drooping, pistillate erect-spreading, mostly short-pedunculate, branched to 1 order, solitary; peduncles 6-27(-40) cm, stout, thick, staminate spreading to drooping, pistillate erect-spreading; bracts 4-5, to 30 cm, most distal typically prominently inflated and exceeding peduncle, green to brown in flower, thick, even woody, shredded and disintegrating in fruit; rachises 1-30 cm, staminate drooping, pistillate spreading; staminate rachillae 7-50, 6-19 cm, drooping to pendulous; pistillate rachillae (3-)5-40, 3-30 cm, thick, spreading in flower, drooping when heavily laden with fruit, straight or flexuous. Flowers staminate contiguous, even in bud, 2-2.5 × 3.5-5 mm, depressed-globose, irregularly shaped by mutual pressure, aromatic; calyx c. 0.5 × 3.5-5 mm, scarcely lobed, ring-like, sepals connate nearly to

apex, truncate apically, membranous, yellowish; petals 2-2.5 × 2.5-3.5 mm, deltoid, free nearly to base but there appearing connate due to crowding, spreading and broadly rounded apically, thick, fleshy, lightly nerved adaxially, whitish to yellow sometimes tinged with green apically; stamens 2.25-2.5 mm high, c. equaling petals, filaments 1.25-1.5 mm, green, anthers 0.5-0.75 mm, ellipsoid, separated basally, entire apically; pistillode 0.75-2.5 mm high, c. shorter than to equaling stamens, slender, truncate and 3-lobed apically; pistillate 2-2.5 × 4-5 mm, strongly depressed-globose to oblate; calyx c. 0.5 × 4-5 mm, scarcely lobed, sepals free to connate and/or imbricate briefly basally, broadly rounded apically, membranous, greenish; petals 2-2.5 × 4-5 mm, broadly ovate to triangular, imbricate nearly to apex and there rounded to, acute, thick, fleshy, whitish to greenish; staminodes lacking or up to 6, minute, sub-triangular; ovary 2-2.5 × 3-4.5 mm, depressed-globose to oblate, yellow-green, stigma lobes exceeding petals, erect, pointed, green. Fruits 8-16(-20) × 5-8 mm, ellipsoid to ovoid or nearly globose, bluish green ripening black; epicarp thin; mesocarp fleshy, green, aromatic; endocarp slightly membranous, fibrous; seeds 9-11 × 5-6.5 mm, ellipsoid to ovoid, brown.

Low- to middle-elevation, moist to wet forest, on the Atlantic and Pacific slopes, often on limestone. T (*Matuda 3466*, MEXU); Ch (*Hansen 1624*, MEXU); B (*Hodel 843*, BH); G (*Hodel 844*, BH); H (*Zuniga 843*, UNAH); ES (*Standley 19388*, GH); CR (*Hodel & Grayum 703A*, CR); P (*Hodel 724*, PMA). 0-1600 m. Mesoamérica. Mexico (Oaxaca, Veracruz), Colombia.

Chamaedorea tepejilote is widely distributed and unusually variable, and segregate taxa have been proposed based mostly on habit (solitary vs. caespitose) and size, quantity of parts, and nervation of pinnae, which seem insignificant when considered over the entire

range of this species. However, further study might show that some of these segregates might be distinct and worthy of species status. Generally, *C. tepejilote* can be distinguished by its rather large habit; large, long-pinnate leaves with prominently nerved pinnae; inflorescences solitary at a node; and contiguous staminate flowers, even in bud. Henderson et al (1995) considered *C. alternans* to be a synonym of *C. tepejilote* but the former is amply distinct in its multiple inflorescences at a node. *Chamaedorea tepejilote* is widely cultivated for food in southern Mexico, Guatemala, Honduras, and El Salvador, where the unopened staminate inflorescences, called pacaya and resembling ears of corn, are sold in markets and used as a cook vegetable. In Guatemala, especially, it is more intensely cultivated and exploited for market than elsewhere, and races or strains of the largest, most flavorful pacayas have been identified and selected over thousands of years. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. tepejilote* in subg. *Stephanostachys*.

79. *Chamaedorea tuerckheimii* (Dammer) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11(107): 766-767 (1933). Lectotype (designated here): Guatemala, *Tuerckheim* 8603 (US!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 19, 31, 219, 221; figs. 4D, 8E, 96A-B, 97A-B (1992a). N.v.: guonay (Mexico).

Kinetostigma tuerckheimii (Dammer) Burret, *Malortiea tuerckheimii* Dammer.

Solitary, dwarf, erect or briefly decumbent, to 1 m tall. Stem 3-7 mm diameter, creeping, buried in leaf litter, densely ringed, internodes 6-12 mm. Leaves 7-12, simple, entire, pinnately ribbed, ascending to spreading; sheath to 5 cm, long-open, tubular only near base, margin whitish to light green; petiole to 5 cm, grayish green, proximal margins of

leaf blade decurrent on petiole to sheath; rachis 12-20 cm, grayish green abaxially; blade 12-22 × 3.5-7.5 cm, cuneate-obovate to long-elliptic, only slightly to minutely notched at apex, plicate, stiff, dark velvety bluish green or mottled green adaxially, margins with 26-30 teeth, sometimes outlined in white, 13-20 primary nerves per side, 1 secondary between each pair of primaries. Inflorescences interfoliar, ascending to spreading; peduncles 6-10 cm; bracts 4-5, to 8 cm, most distal shorter than to exceeding peduncle, green becoming brown; rachises 2-9 cm; staminate rachillae 7-16, to 8 cm, spreading; pistillate spicate or bifurcate, flower-bearing portion or rachillae to 6 cm, spreading, slightly curved. Flowers staminate c. 2 × 2.5-3, conspicuously flattened-depressed-globose; calyx 0.75-1 × 1.5-2.5 mm, shallowly lobed, sepals connate in basal 2/3, broadly rounded to acute apically, light green to yellowish; petals c. 2 × 2 mm, strongly cupped, bilobed, connate basally, free apically, thick, fleshy, whitish; stamens c. 1.5 mm high, shorter than petals, paired, 1 in each of two petal lobes, filaments short, c. 0.5 mm, anthers 0.5 mm, yellow; pistillode 1.5-2 × 1.5 mm, pear-shaped, 3-lobed apically; pistillate 1.75-2 × 3.5 mm, conspicuously flattened-depressed-globose; calyx 0.75-1.5 × 2.5 mm, deeply lobed, sepals connate in basal 1/3, broadly rounded apically, green to yellowish; petals c. 2 × 2 mm, cupped-shaped, thick, fleshy, connate and/or imbricate basally, imbricate apically nearly to apex where briefly free and erect and corolla opening by triangular aperture, white; staminodes not seen; ovary 1.25-1.5 × 1.5 mm, globose, light yellowish or white, stigma lobes distinct, elevated, angled, strongly recurved. Fruits 8.5-12 × 6-8.5 mm, ovoid to ellipsoid, black; epicarp thin; mesocarp slightly fleshy, mucilaginous, green aromatic; endocarp membranous, nerved; seeds 7-9 × 4-5 mm, ovoid, brownish red.

Low- to middle-elevation, wet forest and cloud forest, on the Atlantic slope. Ch (Martinez 1209, HEM); G (Hodel & Castillo-Mont 1010, AGUAT); H (Hodel & Schleder 1476, MO). 900-1500 m. Mesoamérica. Mexico (Veracruz).

The small, simple and mostly entire, plicate leaves readily distinguish *Chamaedorea tuerckheimii*. In shape and form they have been likened to the well known ruffled potato chips, which has given it the common name potato-chip palm. Because of its highly unusual leaves, it is highly sought after by rare plant collectors. Leaves from the Guatemalan population are broader and slightly more rounded and white-margined while those of the Honduran population are more elongate and green-margined. The leaves of *C. piscifolia* from Costa Rica are like those of *C. tuerckheimii* but differ in their long, drawn out, bifid tips. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. tuerckheimii* in subg. *Chamaedoropsis*.

80. *Chamaedorea undulatifolia* Hodel and N. W. Uhl, *Principes (Palms)* 34(3): 116-119, figs. 10-13 (1990). Holotype: Panama, *Moore et al. 10179* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 223; fig. 98 (1992a). N.v.: unknown.

Solitary, acaulescent, erect to briefly decumbent, to 1.5 m tall. Stem short, nearly lacking, creeping and buried in leaf litter, 1-2 cm diameter, densely ringed, internodes to 5 mm. Leaves 3-6, pinnate, erect to spreading; sheath 10-15 cm, obliquely long-open apically, tubular only briefly basally; petiole 2-61 cm; rachis 19-75 cm; pinnae 14-22 per side, 5.5-24.5 × 0.8-3.8 cm, decreasing in size progressively toward apex of blade, lanceolate, slightly sigmoid, acuminate, margins undulate, proximal margin decurrent on rachis, a prominent midrib and 1-2 primary nerves on either side, secondaries indistinct.

Inflorescences interfoliar, rarely infrafoliar in fruit, erect-ascending, long-pedunculate, arising from the base or frequently the leaf litter, branched 1-2 orders; peduncles 14-56 cm, erect-ascending; bracts 6-8, to 15 cm, most distal equaling peduncle, thin-papery, brown; staminate rachis 5-24 cm; staminate rachillae 13-30, 2-15 cm, perpendicular to rachis, spreading, drooping distally, proximal ones sometimes bifurcate; pistillate rachis 0-6 cm; pistillate rachillae (1-)2-6(-11), 2.5-11 cm, stiff, strongly recurved, hook-like. Flowers staminate 1-2 mm high, globose; calyx c. 0.5 mm high, shallowly lobed, sepals connate in basal 2/3, broadly rounded apically, membranous; petals c. 1.5 mm, ovate, free nearly to base, erect-spreading, acute, nerveless, greenish to greenish yellow; stamens c. half the height of petals, slightly exceeding pistillode, filaments short, anthers sessile, not deeply bifid apically; pistillode slightly shorter than stamens, 3-angled, enlarged apically; pistillate c. 2.5 × 2.5 mm, globose; calyx c. 0.5 × 2.5 mm, deeply lobed, sepals connate and/or imbricate in basal 1/3, broadly rounded yellowish green to light green; petals c. 2.5 × 2.5 mm, cupped, imbricate nearly to apex and there acute and slightly incurved, thick, greenish to pale yellow; staminodes not seen; ovary c. 2 × 2.25 mm, depressed-globose, truncate apically, green, stigma lobes short, scarcely separated, pale. Fruits 5-9 × 4-8 mm, subglobose to ellipsoid or ellipsoid-globose, black. Eophyll pinnate.

Low- to middle-elevation, very wet forest and cloud forest, on the Atlantic slope. CR (Hodel & Hodel 695A, CR). 700-1900 m. Mesoamerica.

Apparently endemic to Costa Rica, *Chamaedorea undulatifolia* is characterized by its acaulescent habit, pinnae decreasing in size progressively toward the apex and with undulate margins (mostly only noticeable on living material), the proximal one decurrent on the rachis, ascending and long-pedunculate inflorescences arising from the base, and

the pistillate rachillae mostly stiffly curved and hook-like in fruit. It could be confused with the larger *C. scheryi* but this latter species is distinct in its pinnae with flat margins and the straight pistillate rachillae. Historically, the name *C. microphylla* was likely sometimes misapplied to *C. undulatifolia* because of the tendency of the latter species to flower when very small and with much-reduced leaves. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. scheryi* in subg. *Chamaedoropsis*. *Chamaedorea binderi*, *C. brachyclada*, *C. pygmaea*, *C. scheryi*, *C. stenocarpa*, and *C. undulatifolia* form a rather distinctive and natural subgroup characterized by their virtually stemless habit, decurrent pinnae, long-pedunculate inflorescences arising from or below ground level, and mostly pinnate eophylls.

81. *Chamaedorea vanninii* Cascante & Muller, *Phytotaxa* 436(1): 79-84, figs. 1A-F, 2A-F, 3A-B (2020). Holotype: Costa Rica, *Cascante-Marin et al.* 2761 (USJ!). Illustr.: unknown. N.v.: unknown.

Solitary, decumbent, then erect, to 2 m tall. Stem 6-9 mm diameter, internodes 1-2.5 cm, with adventitious roots proximally. Leaves 6-9, simple and bifid; sheath 7.5-10.5 cm, obliquely open apically, tubular only in basal 2/3; petiole 12-17.5 cm; blade 22.5-32.5 × 15.5-26, bifid apically 1/2-2/3 its length, lobes 14.5-19.5 × 16-23 cm, with (10-)12-14 prominent, raised primary nerves per side, outer margins toothed in distal half.

Inflorescences interfoliar, becoming infrafoliar in fruit, spicate, shorter than leaves; staminate peduncle to 6.5 cm, erect-ascending; bracts 3-4, , most distal exceeding peduncle, green; staminate with rachis or flower-bearing portion to 16.5 cm, pendulous; pistillate peduncle to 11.5 cm, erect-ascending in flower, ascending to spreading in fruit;

rachis or flower-bearing portion to 5.5 cm, erect-ascending to spreading in flower, spreading to downward-pointing in fruit. Flowers staminate in 5 very dense spirals but not contiguous in bud, attaining anthesis first at rachis apex then progressing proximally, 3-3.5 × 2-2.5, narrowly ovoid to ovoid or oblong; calyx 0.5-1 × 2-2.5 mm, shallowly lobed, sepals connate in basal 3/4-4/5, rounded-acute apically, laterally thickened, tips reflexed, yellowish; petals 3-5 × 2-2.5 mm, ovate, connate in basal 2/3, forming a 3-lobed campanulate corolla, acute apically, nerveless, yellow; stamens 3, slightly exceeding petals and pistillode, c. 3.75 mm high, filaments c. 3.5 mm, slender, connate in basal 1/4, anthers c. 0.7 mm, protruding or exerted above corolla lobes; pistillode 3-3.5 mm, slender, columnar, 3-lobed apically; pistillate in 5 very dense spirals, contiguous, c. 1.5 × 1.75 mm, depressed-globose, sunken in depressions; calyx c. 0.5 × 2 mm, ring-like, shallowly lobed, sepals connate in basal 3/4-4/5, truncate apically; petals c. 1.5 × 1.75-2 mm, connate in basal 3/4, truncate with a mucronate tip apically, yellow; staminodes not seen; ovary c. 1.5 × 1.75 mm, depressed-globose to very broadly ovoid, stigma lobes separated, recurved, pointed, exerted slight beyond petals. Fruits 8-9 × 8-9 mm, globose, orange-red, epicarp conspicuously echinulate-medusoid.

Low-elevation, moist to wet forest, on the Pacific slope. CR (Cascante-Marin 2827, USJA). 820 m. Mesoamérica.

Apparently endemic to Costa Rica, *Chamaedorea vanninii* is unique in its staminate flowers having only three stamens and is unusually distinctive its echinulate-medusoid fruits, this latter character heretofore known only in subgenus *Stephanostachys*; however, its solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. vanninii* in subg. *Chamaedoropsis*. Its fruits are like those of *C.*

allenii and *C. crucensis* in their rough texture, and, indeed, the three species have an uncanny resemblance to each other in habit, leaves, inflorescences, and flowers; however, these latter two species differ in their staminate flowers contiguous in bud (subgenus *Stephanostachys*) and having six stamens.

82. *Chamaedorea verapazensis* Hodel & Cast. Mont., *Phytologia* 68(5): 390-393, f. 1 (1990). Holotype: Guatemala, *Hodel & Castillo-Mont 898A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 119; figs. 46A-D (1992a). N.v.: unknown.

Solitary, decumbent then briefly erect, to 2 m tall. Stem 8-10 mm diameter, internodes 2-5 cm, rooting along its length. Leaves 5-6, pinnate, erect-spreading; sheath to 15 cm, tubular basally, obliquely long-open apically; petiole 5-18 cm; rachis 12-22 cm; pinnae 2-5 per side, apical pair largest, these to 15-22 × 5-9 cm, 7-10 primary nerves per side, 2 secondaries between each pair of primaries, exterior margin toothed distally, proximal pinnae to 17 × 4.5 cm, 4-6 prominent primary nerves adaxially, 1 secondary between each pair of primaries, lanceolate, sigmoid, acuminate. Inflorescences interfoliar, ascending to spreading; peduncles to 55 cm, straight, ascending to spreading in flower, spreading in fruit; bracts 4-5, to 35 cm, most distal exceeding peduncle, tightly sheathing, green in flower, green or brown in fruit; staminate exceeding leaves, rachis to 7 cm; rachillae 7-10, to 17 cm, pendulous; pistillate about equaling leaves, rachis c. 3 cm; rachillae 2-5, to 10 cm, rigid in flower. Flowers staminate 2.5-3 mm diameter, globose; calyx 1.5-2 × 2.5 mm, shallowly lobed, sepals connate in basal 3/4, truncate or broadly rounded apically, distinctly nerved when dry; petals 2.5-3 × 2.5 mm, connate apically and there adnate to the pistillode and corolla opening by lateral apertures, broadly ovate,

acute, thick, fleshy, strongly nerved when dry; stamens 1.5-2 mm high, filaments 1 mm, adnate basally to petals, anthers 0.75-1 mm; pistillode c. 2.5 mm high, broadly columnar, apex truncate; pistillate c. 2.5 mm diameter, globose; calyx c. 1.5×2.5 mm, deeply lobed, sepals connate in basal 1/2, rounded apically, prominently nerved when dry; petals $2-2.5 \times 2.5-3$ mm, briefly connate at base, imbricate nearly to apex, rounded apically, strongly nerved when dry; staminodes not seen; ovary 1.5-2 mm diameter, globose, stigma lobes, short, recurved. Fruits c. 11×9 mm, subglobose, black.

High-elevation, wet forest and cloud forest, on the Atlantic slope. G (Hodel & Castillo-Mont 999, AGUAT). 1650-2100 m. Mesoamérica.

Although so far known only from Guatemala, *Chamaedorea verapazensis* is to be expected in Chiapas, Mexico. Seldom collected, *C. verapazensis* is similar to *C. rojasiana* but this latter species differs in its smaller habit, mostly tubular leaf sheaths, staminate inflorescences not exceeding the leaves, and fewer rachillae. As some have done, *C. verapazensis* might be included in the extremely variable *C. pinnatifrons* but this latter species differs in its tubular leaf sheaths, staminate peduncles shorter than the leaves, and fruits maturing and soft ripening yellow to orange and red. The staminate flowers with petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. verapazensis* in subg. *Chamaedorea*.

83. *Chamaedorea verecunda* Grayum & Hodel, *Principes (Palms)* 35: 135, figs. 3-4 (1991). Holotype: Panama, *Hammel 6221* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 225, 227; figs. 99, 100A-B (1992a). N.v.: unknown.

Solitary, dwarf, decumbent then briefly erect, to 75 cm tall. Stem to 1 m long or more, 3.5-5 mm diameter, internodes to 1.5-4 cm, often covered with persistent leaf sheaths. Leaves 8-11, simple and bifid, spreading; sheath 2.2-5.3 cm, tubular; petiole 1.7-4.4 cm, densely white-spotted; rachis 2.75-5.4 cm, green; blade 9-16 × 7-10 cm, obovate, bifid apically to at least 1/2 its length, blue-gray nearly iridescent green, outer margins toothed especially toward apex, 6-9 prominent primary nerves per side, darker green than blade. Inflorescences infrafoliar, spicate, erect, erect to drooping in fruit; peduncles 13-22 cm, erect, filiform; bracts 2-3, to 10 cm, most distal not exceeding peduncle; staminate flower-bearing portion 6.5-9.7 cm; pistillate flower-bearing portion 4-5.5 cm. Flowers yellow, nodding, maturing in a markedly progressive manner from apex to base of axis; staminate 3.6-5.1 × 2.5 mm, oblong; calyx 0.5-1 × 1.75-2 mm, shallowly to moderately lobed, sepals connate in basal 1/2-3/4, broadly rounded to obtuse apically, membranous, green; petals 3-5 × 2-2.5 mm, long-ovate, connate nearly to apex and forming a narrowly tubular campanulate corolla 1.5-3 mm, briefly free apically and there acute to obtuse and erect or slightly recurved, nerveless, yellow; stamens 2-2.75 mm high, in a tight ring around pistillode, filaments short, to 0.5 mm but connate basally into a tube-like structure 1.25-2 mm and this adnate to pistillode, anthers 1-1.25 mm, appressed against pistillode, dorsifixed near base, narrowed apically, bilobed basally; pistillode 3-4.5 mm high, greatly exceeding stamens, c. equaling petals, broadly columnar, robust, truncate and lobed apically, yellow; pistillate 3-3.75 × 2.5-2.75 mm, ovoid; calyx c. 0.5 × 1.5-2 mm, scarcely lobed, sepals connate in basal 3/4, broadly rounded to truncate apically, membranous, yellow; petals 2.5-2.5 × 3-3.5 mm, broadly ovate, imbricate nearly to apex and there acute-obtuse, basally abruptly narrowed into a tube c. 0.5 mm and adnate to

ovary forming a broadly campanulate to suburceolate corolla, obscurely 5-7-nerved, yellow; staminodes not seen; ovary 3-4 × 2-2.5 mm, exceeding petals, ovoid, white, stigma lobes prominent, erect to slightly recurved, pointed. Fruits c. 8 × 10 mm, ellipsoid-globose, black.

Low- and middle-elevation, wet forest and cloud forest, on the Atlantic slope, often at or near the Continental Divide. P (Hodel et al. 1122, PMA). 1200-1900 m. Mesoamérica.

Apparently endemic to Panama and known from only a few collections, *Chamaedorea verecunda* is distinctive in its solitary, dwarf habit; small, simple, and deeply bifid, blue- and/or gray-green leaves; spicate inflorescences; and nodding, relatively large flowers with campanulate corollas that mature in a markedly progressive manner from apex to base of the axis. Somewhat similar species are *C. correae* and *C. guntheriana* from central Panama; the former differs in its larger size, thicker and coarser leaf blades, and staminate inflorescences with two to three rachillae and considerably smaller flowers while the latter differs in its thicker, typically pinnate leaves and branched staminate inflorescences with smaller flowers that mature in a markedly progressive manner from the base to the apex of the axis. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. verecunda* in subg.

Chamaedoropsis.

84. *Chamaedorea volcanensis* Hodel & Castillo, *Phytologia* 68(5): 393-396, fig. 23 (1990). Holotype: Guatemala, *Hodel & Castillo-Mont 913A* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: p. 229; figs. 101A-D (1992a). N.v.: unknown.

Solitary, erect, to 1.5 m tall, first flowering when appearing acaulescent. Stem 2-3 cm diameter, initially short, to 15 cm long, creeping at or below leaf litter, densely ringed, internodes to 5 mm, eventually above-ground stem developing with internodes to 5 cm. Leaves 4-5, mostly pinnate, spreading, sometimes initially flowering when small and with simple and bifid leaves; sheath to 30 cm, obliquely long-open apically, tubular only in basal 1/2; petiole to 70 cm; rachis to 75 cm; pinnae 8-12 per side, 25-35 × 4-8 cm, long-lanceolate, falcate to slightly sigmoid, acuminate, 5 prominent primary nerves, apical pair typically widest and with 7-8 prominent primary nerves, 1 secondary between each pair of primaries, if blade simple and bifid then to 30 × 25 cm, bifid apically for more than 1/2 its length, 7-9 prominent primary nerves, 2 secondaries between each pair of primaries. Inflorescences interfoliar, erect to ascending, long-pedunculate, arising from the base or frequently the leaf litter; peduncles to 65 cm, erect to ascending; bracts 6-7, to 25 cm, most distal exceeding peduncle, thin-papery, green to brown in flower, brown in fruit; rachises 5-6 cm; staminate rachillae 2-13, 10-15 cm, spreading to briefly erect basally then drooping distally; pistillate rachillae (1-)2-5, to 15 cm, stiff, erect. Flowers staminate densely arranged but not contiguous in bud, c. 4 × 4 mm, globose; calyx c. 1.5 × 3.5 mm, deeply lobed, sepals connate in basal 1/4, rounded-acute apically, thin, membranous, whitish; petals c. 1.5-2 × 2-2.5 mm, triangular, connate basally, free and spreading apically to give corolla vase-like shape, whitish; stamens equaling or exceeding petals, 2-3 mm high, filaments 2-2.5 mm, flared basally, fleshy, anthers c. 1 × 0.75-1 mm, oval; pistillode 1-1.5 mm high, columnar, flared basally, truncate and 3-lobed apically; pistillate densely arranged and nearly contiguous, c. 2 × 2.5 mm, depressed-globose; calyx 0.75-1 × 2-2.75 mm, moderately to deeply lobed, sepals connate in basal

1/3-1/2, broadly rounded to acute apically, thin, membranous, whitish; petals 1.5-2 × 2-2.5 mm, cupped, tightly imbricate nearly to apex and there truncate or rounded to briefly mucronate, connate briefly basally, whitish; staminodes not seen; ovary c. 2 × 2-2.5 mm, depressed-globose, whitish, stigma lobes large, pointed, recurved. Fruits c. 12 × 8 mm, ellipsoid to ovoid, black.

Low- to middle-elevation, wet forest and cloud forest, on the Pacific slope. G (Hodel & Castillo-Mont 907B, AGUAT). 1200-2000 m. Mesoamerica.

Chamaedorea volcanensis is distinctive in its mostly acaulescent habit; relatively large, mostly pinnate leaves; erect to ascending, long-pedunculate inflorescences arising from the base; and the drooping, densely flowered staminate rachillae. Its flowers are like those of *C. castillo-montii* from the Atlantic slope of eastern Guatemala but this latter species differs in its spicate staminate inflorescences and mostly simple and bifid leaves (or if pinnate then linear pinnae with a prominent midrib and less conspicuous primary nerves). It is reported from adjacent Chiapas, Mexico but these reports have not been confirmed. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. volcanensis* in subg. *Chamaedoropsis*.

85. *Chamaedorea vulgata* Standl. & Steyerl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 23(5): 208 (1947). Holotype: Guatemala, *Steyermark 37735* (F!). Illustr.: Hodel, *Chamaedorea Palms*: p. 231; figs. 102A-E (1992a). N.v.: pacaya, cum, kip (Guatemala). Solitary, erect, 3.5 m tall. Stem 2-3 cm diameter, densely and minutely white-spotted, prominently ringed, internodes to 10 cm or more. Leaves 3-5, pinnate, ascending to spreading; sheath to 45 cm, obliquely open apically, tubular in basal 3/4; petiole 50-75

cm, densely and minutely white-spotted; rachis to 70 cm, densely and minutely white-spotted abaxially; pinnae up to 10 per side, 13-50 × 3-9 cm, narrowly lanceolate to lanceolate, falcate to slightly sigmoid, long-acuminate, 5 primary nerves, these shiny yellowish and prominent abaxially, 1-3 secondaries between each pair of primaries. Inflorescences infrafoliar, erect to spreading in flower, spreading in fruit; peduncles 25-65 cm, erect to spreading, stout; bracts 5-6, to 45 cm, minutely white-spotted, most distal not exceeding peduncle in flower, equaling or slightly exceeding peduncle in fruit, green in flower, brown in fruit; rachises to 15 cm long; staminate rachillae 9-12, 15-25 cm, pendulous; pistillate rachillae 3-12, 15-27 cm, stiffly spreading. Flowers staminate 4-4.5 × 3-4.5 mm, ovoid becoming obovoid; calyx 1-1.25 × 3 mm, shallowly lobed, sepals connate in basal 2/3, broadly rounded apically, greenish yellow; petals c. 4 × 3 mm, broadly ovate, free nearly to base, rounded to obtuse apically, erect, yellow infused with green patches; stamens 2-2.5 mm high, slightly leaning away from much taller pistillode, filaments c. 1.5 mm, anthers 1-1.25 mm, dorsifixed near base; pistillode c. 4 × 0.8 mm, equaling petals, columnar, rounded apically, yellowish; pistillate c. 4.5 × 4 mm, broadly ovoid to ovoid-globose; calyx c. 2 × 3.5-4 mm, shallowly to moderately lobed, sepals connate and/or imbricate in basal 1/2-2/3, broadly rounded to obtuse apically, green; petals 4c. 4-4.5 × 4 mm, cupped, imbricate nearly to apex and there erect and rounded-acute, thick, yellow; staminodes not seen; ovary 3.75-4 × 3.75 mm, broadly ovoid, pale green, stigma lobes short, shorter than petals, erect, pointed, clear-colored. Fruits 8-9 × 7-8 mm, globose to ellipsoid-globose, black.

Middle- to high elevation, moist to wet forest and cloud forest, mostly on the Pacific slope but sometimes on the Atlantic slope. Ch (Breedlove 31683, CAS); G (Hodel & Castillo-Mont 904, AGUAT). 1300-2750 m. Mesoamérica.

Rather rare and seldom collected, *Chamaedorea vulgata* is unusually distinctive in the minutely but densely and conspicuously white-spotted stem; leaf sheaths, petioles, and rachises; and inflorescences bracts, a diagnostic feature that is readily apparent even on the dried type specimen. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. vulgata* in subg. *Chamaedoropsis*.

86. *Chamaedorea warscewiczii* H. Wendl., *Bonplandia* (Hannover) 10(3): 37-38 (1862).

Holotype: Cultivated in Europe purportedly from Guatemala, *Wendland s. n.* (GOET!).

Illustr.: Hodel, *Chamaedorea Palms*: pp. 27, 121; figs. 6C, 47A-D (1992a). N.v.: unknown.

Chamaedorea homomalla H. Wendl. ex Dammer, *Chamaedorea latipinna* L. H. Bailey, *Nunnezharia warscewiczii* (H. Wendl.) Kuntze.

Solitary, erect, infrequently decumbent, to 5 m tall. Stem 1.5-3.5 cm diameter, internodes 5-15 cm. Leaves 4-8, pinnate, erect to spreading; sheath 15-25 cm, tubular basally, obliquely open apically and there briefly with a whitish margins, pinkish adaxially at the base; petiole 10-53 cm; rachis 35-62 cm; pinnae 4-7 per side, 17-37 × 2-13 cm, broadly rhomboid, sigmoid, short-acuminate, thick and leathery, 5-9 primary nerves per side, smooth and not elevated adaxially, keeled and elevated abaxially, less distinct secondaries between each pair of primaries. Inflorescences interfoliar, sometimes infrafoliar in fruit, erect to spreading in flower, arching to nodding when heavily laden

with fruits; peduncles to 20-76 cm, erect-arching; bracts 5-6, most distal exceeding peduncle, fibrous, brown in flower, often fallen away in fruit; rachises 2-15 cm; staminate rachillae 7-25, 11-32 cm, pendulous; pistillate 5-18, 7-25 cm, spreading in flower, uniformly downward-curving in fruit. Flowers staminate 2-4 × 1.5-2 mm, ovoid-globose, flattened apically; calyx 0.5-1.5 × 1.5-2 mm, shallowly lobed, sepals imbricate basally, rounded apically, nerved; petals connate apically and there adnate to the pistillode and corolla opening by lateral slits, acute-acuminate, nerved, greenish yellow; pistillate 2-3.5 × 1.5-2.5 mm, ovoid-globose; calyx 0.5-0.75 × 1.5-2.25 mm, ring-like, shallowly lobed, sepals connate nearly to apex and there truncate; petals imbricate nearly to apex, acute-acuminate, nerved, greenish white; staminodes not seen; ovary 2-3 × 1.7-2 mm, ovoid-globose, stigma lobes short, recurved. Fruits 11-14 × 6-11 mm, ovoid-globose to ellipsoid, black.

Mostly low-elevation, moist to wet forest, on the Atlantic slope. CR (Hodel & Grayum 702A, CR); P (Hodel & Hodel 725A, PMA). 100-1200(-2200) m. Mesoamérica.

Chamaedorea warscewiczii is similar to *C. matae* and some forms of the extremely variable *C. pinnatifrons* but these latter two species differ in their pinnae with adaxially prominent and keeled nerves. Also, *C. warscewiczii* is distinctive in its slender fruiting rachillae all uniformly curving in the same direction. The pinnae with nerves not elevated and keeled adaxially is not easily discerned on dry material. Other species related to *C. warscewiczii* include *C. macrospadix*, and *rossteniorum*. These three species and *C. matae* have mostly thick and more or less leathery leaf blades or pinnae and leaf sheaths pinkish adaxially at the base, which dry conspicuously rosy pink to reddish. In the protologue Wendland noted that he had originally found this species in eastern

Guatemala, a term then liberally applied to the region from Guatemala to Costa Rica. *Chamaedorea warscewiczii* has never been collected in Guatemala and is known with certainty only from Costa Rica and Panama. It is reported from Colombia but likely in error. The staminate petals connate apically and there adnate to the pistillode and the corolla opening by lateral apertures place *C. warscewiczii* in subg. *Chamaedorea*.

87. *Chamaedorea woodsoniana* L. H. Bailey, *Gentes Herbarum* 6(4): 238, fig. 124 (1943). Holotype: Panama, *Allen 1901* (MO!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 237, 239; figs. 105A-E, 106A-D (1992a). N.v.: unknown.

Chamaedorea vistae Hodel & N. W. Uhl.

Solitary, erect, robust, to 12 m tall. Stem 5-10 cm diameter, prominently ringed, nodes to 2.5 cm wide, white, internodes to 20 cm, adventitious prop roots from base to 60 cm up stem. Leaves 4-6, pinnate, erect to spreading; sheath 30-80 cm, swollen, tubular, obliquely open apically; petiole to 30 cm, densely covered abaxially with irregular, small pits giving living material a rough texture; rachis 1-1.5 m, rough-textured abaxially with pits like petiole; pinnae to 36 per side, 30-65 × 3.5-5 cm, narrowly lanceolate to lanceolate, straight, only slightly falcate, acuminate, horizontal or slightly ascending off rachis briefly, a midrib and 2 primary nerves on either side conspicuous but not raised adaxially, all 5 nerves conspicuously elevated and prominent abaxially. Inflorescences inter- or infrafoliar in flower, infrafoliar in fruit, erect to ascending in flower, spreading to nodding in fruit, long-pedunculate, branched to 2 orders; peduncles to 77 cm, erect to ascending in flower, spreading to arching in fruit; bracts c. 5, to 60 cm, most distal exceeding peduncle, brown in flower, shredded and disintegrating in fruit; staminate

rachis to 75 cm, straight; staminate rachillae up to 100, to 50 cm, pendulous, basal one sometimes bifurcate; pistillate rachis to 40 cm, erect to ascending in flower, downward-pointing in fruit; pistillate rachillae up to 50, to 30 cm, erect to ascending in flower, spreading to downward-pointing in fruit. Flowers staminate densely arranged, 2.5-3 × 2.5-3.5 mm, globose; calyx 0.5-0.75 × 2.5-3.5 mm, deeply lobed, sepals connate and/or imbricate in basal 1/4-1/3, rounded apically; petals 2.5-3 × 2.5-3 mm, broadly ovate, free nearly to base, spreading apically and obtuse to acute, thick, lightly nerved adaxially, greenish yellow; stamens 1.5-1.75 mm high, filaments 0.5-1 mm, adnate basally to pistillode, anthers c. 1 mm, dorsifixed near base, tightly appressed to pistillode; pistillode 2.25-2.5 mm high, slightly shorter than petals but taller than stamens, columnar, broadly flared and buttressed basally, truncate and 3-lobed apically; pistillate 2.5 × 2.5 mm, ovoid to ovoid-globose; calyx 0.5-1 × 2.5 mm, moderately to deeply lobed, sepals connate and/or imbricate in basal 1/4-1/2, rounded apically, green; petals 2-2.5 × 2-3 mm, broadly ovate, imbricate nearly to apex, yellow; staminodes lacking or up to 6, minute, tooth-like, adnate to petals, white; ovary 2.5-2.75 × 1.75-2 mm, ovoid-globose, pale green to whitish, stigma lobes slightly exceeding petals, erect, pointed, reflexed, yellowish. Fruits 10-20 × 10-12 mm, ellipsoid to nearly globose, golden orange ripening black.

Low- to middle-elevation, moist to wet forest and cloud forest, on the Atlantic slope sometimes near the Continental Divide. Ch (Breedlove 33069, CAS); G (Hodel & Castillo-Mont 1107A, AGUAT); H (Zuniga 1452, UNAH); N (Williams 23948, F); P (Hodel et al. 1122, PMA). 600-2250 m. Mesoamérica. Mexico (Oaxaca), Colombia.

Chamaedorea woodsoniana is distinctive in its solitary and robust habit, long-pinnate leaves with pinnae prominently nerved abaxially, long-pedunculate inflorescences,

orange-yellow pistillate flowers, and golden orange nearly mature fruits that ripen dark brown to black. One of the largest species in the genus, some individuals in Panama have stems 10 cm in diameter and inflorescences with 50 to 100 rachillae. Material of *C. costaricana*, especially robust forms, have been erroneously referred to *C. woodsoniana* but the former species differs amply in its cespitose habit, leaf sheaths with prominent ligules at the apex, smaller inflorescences, yellow flowers, and globose fruits maturing green to black. Strangely, *C. woodsoniana* has not yet been collected in Costa Rica but it is expected there. The solitary, non-contiguous staminate flowers with apically free petals and solitary inflorescences place *C. woodsoniana* in subg. *Chamaedoropsis*.

88. *Chamaedorea zamorae* Hodel, *Principes* 34(4): 173-175, f. 17-21 (1990). Holotype: Cultivated in Hawaii, U. S. A., from seeds purportedly collected near Laguna Arenal, Guanacaste, Costa Rica, *Hodel & Bornhorst 830* (BH!). Illustr.: Hodel, *Chamaedorea Palms*: pp. 273; fig. 123 (1992a). N.v.: unknown.

Solitary, 1-3 m tall, sometimes flowering when appearing stemless. Stem 1-2.5 cm diameter, prominently ringed, internodes 3-8 cm, often with prominent brown prop roots 10-15 cm high basally. Leaves 3-12, pinnate to simple and bifid, erect-spreading; sheath 15-20 cm, tubular in basal half, obliquely open and distinctly light-green- to nearly white-margined apically; petiole 10-50 cm; rachis 25-80 cm, with a distinct yellow band abaxially extending on to petiole and sheath; pinnae 3-9 per side, to 20-55 × 1.5-10 cm, long-lanceolate to broadly lanceolate, mostly straight, only slightly sigmoid or falcate, long-acuminate, prominent midrib and 4-5 prominent primaries on either side of this, sometimes apical pair very large, as large or larger than all other pinnae combined, 12-18

cm wide, if blade simple then to 44-83 × 25-41 cm, bifid apically to 2/5 its length, lobes cuneate-obovate, 15-40 primary nerves per side, outer margins nearly entire to sharply toothed distally. Inflorescences interfoliar but often infrafoliar in fruit, staminate spicate or bifurcate and ascending-drooping, pistillate spicate and spreading to drooping in fruit, solitary; peduncles 10-35 cm, ascending to spreading; bracts 5-6, to 15 cm, most distal typically exceeding peduncle, green to brown in flower, brown and disintegrating in fruit; staminate rachis or rachillae 14-30 cm, pendulous; pistillate rachis or rachilla 3-20 cm, stiff, ascending and straight in flower, ascending and straight to drooping when heavily laden with fruit. Flowers staminate contiguous, even in bud, c. 4 × 2-2.5 mm, ovoid, irregularly angled or shaped by mutual pressure; calyx prominent, c. 2 × 2-2.5 mm, lobed, sepals distinct, 1-2× as long as wide, quadrate to obtriangular, connate in basal 1/2, truncate apically; petals c. 4 × 2 mm, ovate, free to base, spreading, erect, rounded-acute apically, nerveless or nearly so, cream-colored to yellow; stamens c. 3 mm high, not exceeding petals but longer than pistillode, filaments c. 2.5 mm, anthers c. 1 × 0.5 mm, medifixed at right angles; pistillode c. 1.5 × 0.5 mm, 1/2, slightly expanded apically and 3-lobed as high as stamens, columnar; pistillate contiguous, even in bud, c. 3.5 × 2.5-3.5 mm, depressed-globose to dome-shaped; calyx prominent, c. 2 × 2.5-3 mm, lobed, sepals connate basally, broadly truncate apically, thin but thicker apically; petals c. 3 × 2.5 mm, imbricate nearly to apex, cupped with a short center tip, yellow; staminodes not seen; ovary c. 2.5 × 2.25 mm, ovoid-globose, stigma lobes short, closed, triangular. Fruits 10-15 × 90-14 mm, densely packed, obovoid to obpyramidal but angled from mutual pressure, smooth, orange-red.

Low-elevation, wet forest, on the Pacific slope. CR (Hodel & Binder 1348, CR). 50-500(-800) m. Mesoamérica.

Endemic to Costa Rica, *Chamaedorea zamorae* is distinctive in its solitary, spicate inflorescences; cream-colored to yellow, contiguous staminate and pistillate flowers; and smooth, mature ripe orange-red fruits. Similar species include *C. allenii*, which differs in its echinulate, mature ripe black fruits; *C. crucensis*, which differs in its coarsely echinulate fruits; and *C. hodelii*, which differs in its smooth, mature ripe black fruits. In Hodel (1992a), I captioned figures 122B-C as *C. zamorae* but these depict pinnate-leaved forms of *C. deckeriana*. One of the few members of the genus to occur in the Pacific lowlands, *C. zamorae* ranges south from Parque Nacional Carara to the Osa Peninsula. The contiguous (even in bud) staminate flowers with apically free and spreading petals place *C. zamorae* in subg. *Stephanostachys*.

11. *Chelyocarpus* Dammer

Tessmanniophoenix Burret, *Tessmanniodoxa* Burret

By A. Henderson

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary or clustered, stout, short and procumbent or longer and aerial, with close nodes, often covered with persistent leaf bases. Leaves palmate or briefly costapalmate, reduplicate; sheaths open, fibrous, densely hairy, not splitting; petioles elongate; adaxial hastulas prominent; blades

deeply divided into two halves, each half again deeply divided into grouped, multi-fold or single fold segments, these again briefly divided apically, green or gray abaxially, with transverse veins. Inflorescences interfoliar, branched 1-2 orders, pendulous; prophylls closely sheathing the peduncle; peduncular bracts 1-4; rachillae numerous; flowers bisexual, solitary, sessile or borne on short pedicels; sepals 2-4; petals 2-4 or perianth uniseriate; stamens 4-9; gynoecium apocarpous with 1-6 carpels; fruits globose, 1(-2)-seeded, yellowish, with apical or subapical stigmatic remains; epicarps smooth or corky-tessellate; seeds with homogeneous endosperm and lateral embryos; germination remote-tubular; eophylls bifid. 4 sp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

Chelyocarpus was previously known only from South America. The present treatment follows Henderson et al. (1995).

1. *Chelyocarpus dianeurus* (Burret) H.E.Moore, *Principes* 16: 74 (1972).

Holotype: Colombia, *Archer 2199* (US *n.v.*). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 1 (1995). *N.v.*: *armana*, *armada*

Stems solitary, to 6 m long, to 9 cm diameter. Leaves 10-15; petioles 1-1.8 m long; adaxial hastulas deltoid with incurved margins, ca. 2 cm long; blades green, circular, divided into segments. Inflorescences pendulous below the leaves; rachillae numerous; flowers sessile or borne on short pedicels; sepals 4; petals 4, longer than the sepals; stamens 8(-9); fruits yellowish-brown, globose or subglobose, 1.7-3.3 cm long, 1.8-3.5

cm diameter. *Lowland rainforest*. P (*De Gracia 862*, MO). ca. 200 m. (Panama, Colombia).

12. *Coccothrinax* Sarg.

Thrincoma O.F.Cook, *Thringis* O.F.Cook, *Antia* O.F.Cook, *Beata* O.F.Cook, *Pithodes*
O.F.Cook, *Haitiella* L.H.Bailey

By A. Henderson.

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary or rarely clustered, cylindrical or sometimes with a swelling, with \pm deciduous dead leaves, rarely with persistent dead leaves, giving a 'skirt' over the stem. Leaves palmate, reduplicate; leaf sheath apices fibrous, the fibers in 2-3 layers, thin (usually <1 mm diameter), flimsy, closely woven, elongate or not greatly elongate at the apices, or the fibers stout (usually >1 mm diameter), woody, loosely woven, \pm joined at the apices and then sometimes forming stout, erect spines; hastulas rounded, apiculate, bilobed, or cuspidate; leaf blades sometimes wedge-shaped; leaf segments spreading in several planes, giving a three-dimensional appearance to the leaf, or spreading in one plane, giving the leaf a flat appearance; middle leaf segments relatively long and narrow, tapering from base to apex, scarcely folded, flexible and not leathery, a shoulder or constriction absent or poorly developed, the apices thin, deeply splitting and breaking off, or the segments relatively

short and broad, abruptly narrowed near the apex (forming a “shoulder”), otherwise parallel-sided, often strongly folded, stiff and leathery, the apices distal to shoulder short, usually <10 cm, briefly splitting; leaf segments rarely waxy adaxially, silvery-white indumentose or ± glabrous abaxially, with or without numerous, small, brown scales abaxially; transverse veinlets present or absent. Inflorescences erect, projecting amongst or above the leaves or curving, arching or pendulous amongst or below the leaves; rachis bracts narrow with prominent, longitudinal, parallel veins, or flattened or swollen, without prominent veins; flowers solitary; perianths cup-shaped with 5-9 short points; stamens 6-13; gynoecia with 1 carpel, unilocular, uniovulate, the long style terminating in a cup-like stigma; fruiting pedicels slender, cylindrical, well-developed, or obconic or irregular, poorly developed, or scarcely developed or absent; ripe fruit surfaces muricate or more often smooth or pebbled, rarely with few, projecting fibers; seeds light brown, with irregular, shallow grooves radiating from the base but not reaching the apex and not separating, the operculum not visible at the apex, or dark brown, with ± regular grooves radiating from the base and separating almost to the apex into segments, the operculum visible and sunken at apex, or seeds brown, with few grooves radiating from the base but reaching only to the equator and not separating, the operculum visible, not sunken, slightly subapical. Ca. 20 spp. Neotropics, Caribbean.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

1. *Coccothrinax argentata* (Jacq.) L.H.Bailey, *Gentes Herbarum* 4: 223 (1939).
Palma argentata Jacq., *Fragm. Bot.*: 38 (1803). Holotype: Jacquin, *Fragm. Bot.*: 1803,
 tab. 43, fig. 1. Illustr.: Quero, H. *Principes* 24: 122, figs. 4-7 (1980). N.v.: knacás, QR.

Coccothrinax readii H.J.Quero

Stems 1-6 m long, 2.9-6 cm diameter, solitary, cylindrical. Leaf sheath fibers 0.1-0.3 mm wide, flimsy, closely woven, not greatly elongate at the apices; petioles 5.6-10.5 mm wide at apex; hastulas apiculate or bilobed; palman 12-30.5 cm long at middle of leaf; segments 36-48 per leaf, spreading in several planes, giving a three-dimensional appearance to the leaf, silvery-white indumentose abaxially, with or without numerous, small, brown scales abaxially, without transverse veinlets; middle segments 39-72 cm long, 1.8-2.4 cm wide, relatively long and narrow, tapering from base to apex, scarcely folded, flexible and not leathery, a shoulder or constriction absent or poorly developed, the apices thin, deeply splitting and breaking off. Inflorescences curving, arching or pendulous amongst or below the leaves; partial inflorescences 4-5; rachis bracts flattened or swollen, without prominent veins; rachillae 5.4-8.8 cm long, 0.7-1.2 mm wide; pedicels 2.3-6.2 mm long, slender, cylindrical, well-developed; fruits 6.6-7.4 × 6.8-7.4 mm, the surfaces smooth or pebbled, rarely with few, projecting fibers; seeds light brown, with irregular, shallow grooves radiating from the base but not reaching the apex and not separating, the operculum not visible at the apex, or seeds dark brown, with ± regular grooves radiating from the base and separating almost to the apex into segments, the operculum visible and sunken at apex. *Open forest near the sea, often on sand dunes.* Y (*Sima 1134*, NY), QR (*Sanders & Frame 1721*, NY), B (*Cook & Martin 1*, US), H (*Proctor 32559*, US). 4-10 m. (United States, Mexico, Belize, Honduras [Swan Islands],

Colombia [San Andrés, Providencia], Cuba, Hispaniola, Jamaica, Bahamas, Turks and Caicos Islands, Cayman Islands).

13. *Cocos* L.

Coccus Mill., *Calappa* Steck, *Coccos* Gaertn.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, stout, erect or leaning, gray, often conspicuously swollen at the base. Leaves pinnate, reduplicate; sheaths open, fibrous; petioles moderate to elongate; rachises elongate; pinnae regularly arranged and spreading in the same plane, linear or lanceolate, green ad- and abaxially, with ramenta abaxially along mid-vein. Inflorescences interfoliar, arching, branched to 1 order; peduncles well-developed, with a prophyll and 1, large, woody peduncular bract; rachillae numerous; flower in triads proximally on rachillae, staminate only distally; staminate flowers with 3, free, imbricate sepals and 3, free, valvate petals; stamens 6; pistillodes small, trifid; pistillate flowers markedly larger than the staminate, with 3, free, imbricate sepals and 3, free, imbricate petals; staminodial ring low; gynoecia trilocular, triovulate; stigmas 3; fruits large, approximately globose to ellipsoid; stigmatic remains apical; mesocarp thick and fibrous; endocarps thick, bony, with 3, basal pores; endosperm homogeneous; embryos basal; eophylls simple. 1 sp. Cultivated worldwide in tropical areas.

Bibliography: Glassman, S. *Illinois Biol. Monogr.* 56: 1–230 (1987). Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

1. *Cocos nucifera* L., *Sp. Pl.*: 1188 (1753). *Calappa nucifera* (L.) Kuntze, *Revis. Gen. Pl.* 2: 982 (1891). *Palma cocos* Mill., *Gard. Dict.* ed. 8: n.º 2 (1768), nom. superfl. Lectotype (designated by Moore & Dransfield, 1979): Rheede, *Hort. Malab.*, 1: 1, t. 1, t. 2, t. 3, t. 4 (1678). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 29 (1995). N.v.: coco.

Stems to 20 m long, 20-30 or more cm diameter, often leaning. Leaves 25-30; pinnae 75-100 per side of rachis, regularly arranged and spreading in the same plane. Inflorescences interfoliar; fruits 20-30 cm long, 12-20 cm diameter, approximately globose to ellipsoid, greenish to reddish-brown. *Naturalized and commonly cultivated in low-lying areas, especially near the sea.* T (*Trejo & Páramo s.n.*, MEXU), Y (*Gaumer 373*, NY), C (*Ramírez 95*, MEXU), QR (*Cabrera 15476*, MEXU), B (*Dwyer 15038*, MO), G (*Anonymous s.n.*, MO), H (*Wilson 473*, NY), ES (*Calderón 809*, NY), N (*Stevens 10544*, MO), CR (*Wilbur 34302*, MO), P (*Croat 7484*, MO). 0-1000 m. (Naturalized and commonly cultivated in all tropical areas).

14. *Colpothrinax* Schaedtler

By R. Evans.

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems usually 5-20 m long, 15-20(-40?) cm diameter, solitary, usually erect, columnar or swollen proximally (*C. wrightii*), usually naked; stems of juveniles often enclosed in a mat of persistent leaf-sheath fibers. Leaves in a spreading crown, shortly costapalmate, usually 10-30 per stem with an additional 1-3 marcescent; petioles (0.5-)1-2(-3) m long, 2.1-4.6 cm wide at attachment to blade, glaucous (*C. wrightii*) or tomentose adaxially; sheaths ferruginous, disintegrating and fraying into interwoven fibers ca. 25-35 cm long; hastulas 1.6-3.4 × 1.9-5.8 cm, broadly to very depressed-triangular in outline, appressed to or elevated above the blade, the free margins hyaline, undulate or plane (*C. wrightii*); costas 12-38.5 cm long; blade with induplicate plication, 95-171 cm long centrally, 36-136 cm long laterally, divided between all ribs into single-fold segments (*C. wrightii*) or into single-fold segments except for lateral-most 1(-5) segments of each blade half, which consist of (1)2(-4) folds; depth of splitting increasing from central to lateral divisions; central division extending 1/3-2/3 to base; lateral-most blade division extending 2/3->90% to base; folds per blade half 25-45; widest single-fold segment 3.4-6 cm wide; adaxial surface glossy, ceraceous; abaxial surface whitish, lepidote. Inflorescences interfoliar, to ca. 5(-8) with flowers or fruit, erect or nearly so initially, then leaning gradually, 5-10 m long; orders of branching 3(4); primary axis slightly bent, 1.2-2.1 m long, mostly ± cylindrical (except becoming increasingly compressed towards base), ca. 4 cm diameter at juncture of peduncle and rachis; inflorescence bracts ferruginous, lanate, with trichomes papillose, beige to rufous, wavy, twisted, compressed, basally broadened, persistent, 2-8 mm long; peduncles 0.2-0.8 m long; prophylls 18-28 × ca. 5-10 cm, strongly bicarinate adaxially, split centrally abaxially (sometimes also adaxially) to near

the stem axis, basally sheathing and truncate, usually acuminate apically, persistent; peduncular bracts 4-7, 21-54.5 cm long, the basalmost bicarinate or centrally carinate adaxially, the remainder \pm carinate adaxially (at least distally); rachises 0.9-1.4 m long, rachis bract and first-order branch size (branch primary axis and prophyll length, and number of higher-order branches, including rachillae) largest near base of rachis, then gradually decreasing distally; rachis bracts 9.5-65.5 cm long, each subtending a first-order branch; first-order branches (5?-)6-12, the primary axes 3-77 cm long, with unbranched proximal portion 2-54.5 cm long, the branched distal portion 1-38 cm long; prophylls 8.5-46 cm long, persistent; proximal first-order branches with 2 persistent bracts on the unbranched primary axis, medial with 1, distal with 0; rachillae (ca. 20-)ca. 40-50 per basal first-order branch, <10-ca. 20 per apical first-order branch, 2-17.5 cm long, usually longest near base of the rachis of each first-order branch, shortest apically, tomentose, the trichomes whitish to ferruginous, 0.2-0.5 mm long, often bifid apically; rachillae with spirally arranged spurs, 0.2-0.8(-1.2) mm long, each bearing a solitary, sessile flower and subtended by a single bracteole; bracteoles 0.5-2 mm long, lanceolate to ensiform, 0.3-1 mm wide above hastate base that partially encloses rachilla spur; flowers perfect; calyces cup-like, fleshy, 2.3-5.4 mm long, free distally from corolla for 1/4-2/3 its length, the lobes 3, 0.2-0.9 mm long; corollas 2.9-6.2 mm long, connate basally (for 1/5-1/2 its length) or free (*C. wrightii*); corolla lobes 3, persistent or deciduous with a clear line of abscission (*C. wrightii*); stamens 6, membranous to fleshy; filaments 2-4.5 mm long, connate basally for 0.6-2.7 mm (1/3-3/4 their length) into an epipetalous cup; stamen-cups adnate to corolla basally, shorter than or \pm same length as calyx-cup or much longer than (*C. wrightii*) calyx-cup, 1.5-3 mm diameter; free filaments

broad basally, attenuate above; anthers 2.2-4.4 × 0.8-1.3 mm, yellow; gynoecia 2.5-4.9 × 1.1-2.1 mm; ovaries 3, distinct, 1.1-1.8 × 0.7-1.4 mm; styles connate, 1.4-3.4 mm long; fruits 1.1-2.1 cm diameter, usually developing from 1 carpel, ± globose, dark brown to black when mature; stigmatic remains apical; epicarps smooth, thin; mesocarp fleshy, with longitudinal anastomosing fibers adjacent to the crustaceous endocarp; seeds 0.7-1.3 × 0.9-1.5 cm, 1 per fruit, free from the endocarp except at the small basal hilum, obovate; raphes as long as the seed, rather broad and ± sculptured; endosperm homogeneous; embryos lateral, slightly below equator towards the base, opposite the raphe. 3 spp.

Neotropics.

Bibliography: Evans, R. *Palms* 45: 177-195 (2001).

1. Inflorescence branches pink; calyx reddish, 2.7-3.4 mm long, free distally from corolla for 0.9-1.7 mm (1/4-1/2 its length); corolla 2.9-4.2 mm long, the lobes connate basally 1/3-1/2 their length, mostly pinkish, never touching, attenuate with acute apices, membranaceous, adaxially plane with slight apical thickening; stamen-cup 2.4-3 mm diameter, fleshy, with walls 0.3-0.6 mm thick; gynoecium 1.6-2.1 mm diameter, the ovaries reddish; southern Nicaragua, Costa Rica, Panama.

1. C. aphanopetala

1. Inflorescence branches yellow; calyx yellow, 3.5-5.4 mm long, free distally from corolla for 1.9-3.7 mm (1/2-2/3 its length); corolla 4-6 mm long, the lobes connate basally 1/5-1/3 their length, mostly yellow, valvate with parallel sides and mucronulate apices, fleshy, adaxially furrowed with involute and/or thickened margins, forming a hood apically; stamen-cup 1.5-2.2 mm diameter, membranous to slightly fleshy, with

walls to 0.3 mm thick; gynoecium 1.1-1.6 mm diameter, the ovaries cream-colored;

Guatemala, Belize, Honduras.

2. *C. cookii*

1. *Colpothrinax aphanopetala* R.Evans, *Palms* 45: 189 (2001). Holotype: Panama, *Galdames et al. 2419* (PMA!). Illustr.: Evans, R. *Palms* 45: figs. 2-3 (2001). N.v.: guágara, P.

Stems (12-)15-ca. 20 m long, erect [2.5-10(-15) m long, sometimes decumbent basally, on Cerro Jefe, Panama], 15-25(-40?) cm diameter, columnar, usually naked, sometimes, particularly in closed forest, upper portion partially or completely enclosed in a mat of persistent leaf-sheath fibers; stems of juveniles less than ca. 6-8 m long usually completely enclosed in this mat; mat, when present, usually 20-30 cm thick. Leaves 12-ca. 30 per stem; petioles (0.5-)1-1.5(-2) m long, 2.1-3.9 cm wide at attachment to blade; sheath tomentose, the trichomes of two intermixed types: 1) soft, stellate trichomes, ca. 0.5 mm long, basally ferruginous, with free, white distal ends and 2) coarser, longer trichomes which are wavy, twisted, and compressed, these longer trichomes are sparsest, shortest (ca. 1.5 mm long), and lightest in color (\pm tannish) on the basal portion of the sheath, and become progressively denser, longer (to 9 mm long), and darker (rufous) distally; sheaths disintegrating and fraying into fine, loosely woven, pendulous, filiform, typically \pm terete, fibers, 0.3-0.5 mm diameter; hastulas appressed to or slightly elevated above the blade, 1.6-3 \times 1.9-4.3 cm, 1.1-1.6 times as wide as long, very broadly to depressed-triangular, usually cuspidate apically; costas (12-)17.5-28 cm long; blades 95-152 cm long centrally, 36-74 cm long laterally, divided into single-fold segments, except for lateral-most 1(-5) segments of each blade half which is composed of 1-2(3) folds;

central division extending to within 33-70 cm of (1/2-2/3 to) base, the lateral-most division extending to within 6.5-10.5(-23.5) cm of [ca. (2/3-)7/8 to] base; folds per blade half 26-35; widest single-fold segment 4.1-6 cm wide. Inflorescences with flowers or fruits to ca. 5, plus ca. 5 marcescent; primary axis 1.5-1.9 m long; inflorescence bracts lanate, with trichomes 2-8 mm long; peduncle 0.4-0.7 m long; prophylls 18-28 × 7-10 cm; peduncular bracts 4-6, 21-43.5 cm long; rachis 1.1-1.3 m long; rachis bracts 9.5-49 cm long; first-order branches (5-?)8-12; axes creamy pink, their primary axes 11.5-77 cm long, with unbranched proximal portion 6.5-48 cm long, the branched distal portion 2.5-38 cm long; prophylls 9.5-46 cm long; rachillae typically 30-50 per basal first-order branch, <10 per apical first-order branch, 2-15 cm long, tomentose, the trichomes (tannish to) ferruginous, 0.2-0.3 mm long; flower-bearing spurs 0.2- 0.4 mm long, the subtending bracteole 0.5-1.2(-1.6) mm long, 0.3-0.9 mm wide basally; floral receptacles 0.9-1.7 mm long; calyces 2.7-3.4 mm long, free distally from corolla for 1/4-1/2 its length, reddish with some yellow distally, the lobes 0.3-0.9 mm long; corolla 2.9-4.2 mm long, connate basally for 1/3-1/2 its length, mostly pinkish, creamy yellow marginally below apex, adjacent lobes never touching, the lobes attenuate with acute apices, membranaceous, adaxially plane with slight apical thickening, persistent; filaments 2-3.8 mm long, connate basally for 0.6-2 mm (1/3-3/5 their length), cream-colored; stamencups shorter than or ± same length as calyx-cup, 2.4-3 mm diameter; anthers 2.7-4.4 × 0.8-1.1 mm; gynoecia 2.5-3.5 × 1.6-2.1 mm; ovaries 1.1-1.8 × 0.9-1.4 mm, reddish; styles 1.4-2 mm long, cream-colored; fruits 1.6-2.1 cm diameter; seeds 1-1.3 × 1.2-1.5 cm. *Lowland to montane rainforest*. N (*Rueda et al.* 4537, MO), CR (*Evans et al.* 2751, MO), P (*Hammel* 4033, MO). 350-1400 m. (Endemic). (Nicaragua, Costa Rica, Panama).

2. *Colpothrinax cookii* Read, *Principes* 13: 13 (1969). Holotype: Guatemala, *Cook & Griggs 116* (US!). Illustr.: Evans, R. *Palms* 45: fig. 4 (2001). N.v.: guanano, B; shan, G; guano, H.

Stems (5-)10-20 m long, 15-25 cm diameter, erect, columnar, usually naked, sometimes, particularly in closed forest, upper portion partially or completely enclosed in a mat of persistent leaf-sheath fibers; stems of juveniles less than ca. 6-8 m long usually completely enclosed in this mat; mat, when present, usually 20-30 cm thick. Leaves 15- ca. 30 per stem; petioles (1-)1.5-2.5(-3) m long, 2.3-3.4 cm wide at attachment to blade; sheaths tomentose, the trichomes of two intermixed types: 1) soft, stellate trichomes, ca. 0.5 mm long, basally ferruginous, with free, white distal ends and 2) coarser, longer trichomes which are wavy, twisted, and compressed, these longer trichomes are sparsest, shortest (ca. 1.5 mm long), and lightest in color (\pm tannish) on the basal portion of the sheath, and become progressively denser, longer (to 9 mm long), and darker (rufous) distally; sheath disintegrating and fraying into fine, loosely woven, pendulous, filiform, typically \pm terete, fibers, 0.3-0.5 mm diameter; hastulas appressed to or slightly elevated above the blade, 2.3-3.4 \times 2.4-3.9 cm, 0.7-1.4 times as wide as long, broadly to very broadly triangular, usually cuspidate apically; costas 16.5-38.5 cm long; blades 131-170 cm long centrally, 62-136 cm long laterally, divided into single-fold segments, except for lateral-most segment of each blade half which is composed of 2(-4) folds; central division extending to within 46-67 cm of (1/2-2/3 to) base, the lateral-most division extending to within 11.5-19 cm of (ca. 4/5 to) base; folds per blade half 25-35; widest single-fold segment 4.3-5 cm wide. Inflorescences with flowers or fruits to ca. 5(-8), plus ca. 5(-7)

marcescent; primary axis 1.2-2.1 m long; inflorescence bracts lanate, with trichomes 2-8 mm long; peduncle 0.2-0.8 m long; prophylls ca. $25 \times 8-10$ cm; peduncular bracts 6-7, 27-45 cm long; rachis 0.9-1.4 m long; rachis bracts 14-47 cm long; first-order branches 9-12; axes creamy yellow, their primary axes 12-58.5 cm long, with unbranched proximal portion 2.5-37 cm long, the branched distal portion 6-32 cm long; prophylls 10.5-40.5 cm long; rachillae typically 40-50 per basal first-order branch, 10-20 per apical first-order branch, 3-15.5 cm long, tomentose, the trichomes (tannish to) ferruginous, 0.2-0.3 mm long; flower-bearing spurs 0.2-0.8(-1.2) mm long, the subtending bracteole 0.7-2 mm long, 0.4-1 mm wide basally; floral receptacles 0.7-1.7 mm long; calyx 3.5-5.4 mm long, free distally from corolla for $1/2-2/3$ its length, creamy yellow, the lobes 0.5-0.8 mm long; corolla 4-6 mm long, connate basally for $1/5-1/3$ its length, mostly creamy yellow, the lobes valvate, with parallel sides and mucronulate apices, fleshy, adaxially furrowed with involute or thickened margins, forming a hood apically, persistent; filaments 2.1-4 mm long, connate basally for 1.1-2 mm ($2/5-3/5$ their length), cream-colored; stamencups shorter than or \pm same length as calyx-cup, 1.5-2.2 mm diameter; anthers $2.3-3.5 \times 0.9-1.3$ mm; gynoecia $2.5-3.4 \times 1.1-1.6$ mm; ovaries $1.1-1.6 \times 0.7-1.3$ mm, cream-colored; styles 1.5-2.2 mm long, cream-colored; fruits 1.6-2.1 cm diameter; seeds $1-1.2 \times 1.3-1.5$ cm. *Lowland to montane rainforest*. B (*Davidse & Holland 36808*, MO), G (*Cook & Doyle 156*, US), H (*Evans 2547*, MO). 700-1600 m. (Endemic). (Belize, Guatemala, Honduras).

15. *Cryosophila* Blume

Acanthorhiza Linden

By R. Evans.

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary or very rarely clustered, erect, sometimes gradually to sharply arched upwards, armed with root-spines usually densest proximally and thinning distally, but otherwise distributed along the stem; root spines sparse to forming a very tangled mass, usually less than 20 cm long (except in *C. cookii*), although occasional outliers to over 0.5 m long, unbranched or 1(-3)-branched, usually descending (except in *C. nana*); basal adventitious roots usually not spines, but growing into soil, often forming a cone. Leaves in a spreading crown, 6-ca. 35 per stem, additionally 0-10(- ca. 20) marcescent; petioles 0.4-3.2 cm long, rounded abaxially, channeled adaxially, splitting basally with maturity (except in *C. nana*); basal sheath cream-colored, densely floccose, disintegrating and fraying into elongate fibers over time; hastulas elevated, blunt to \pm pointed, triangular to depressed-triangular, briefly bifid or not apically; blades induplicate palmate, broadly to very broadly ovate in outline, adaxial surfaces glabrous, abaxial whitish to silvery pubescent (hoary in *C. nana*); central segments 0.4-1.6 m long; marginal segments 0.2-1.1 m long; central abaxial split usually to near base of blade (except in *C. cookii*), dividing blades into 2, \pm equal halves; adaxial splits usually of 2 orders (1 in *C. nana*); deeper primary splits (but almost always less deep than central abaxial split) and less deep secondary splits; primary adaxial splits dividing each half into 4-9(-13) usually cuneate sections of 1-12 segments each; sections usually again divided by secondary adaxial splits, with amount of splitting

within each section generally increasing from central to marginal sections, such that the central sections usually have secondary splits along every or nearly every adaxial rib (except in *C. grayumii*) and the marginal sections are usually undivided by secondary adaxial splits; segments widest near central abaxial split, narrowing toward the marginal segment, often with slight constriction distally, briefly bifid and sometimes sub-sickle-shaped and diverging apically; larger lateral veins separated by 0-7(-15) smaller lateral veinlets; irregular transverse veins connecting lateral veins (or larger lateral veinlets) abundant, although often short and inconspicuous. Inflorescences usually with 2-3 orders of branching (1 in *C. cookii*), each ascending at emergence through split petiole base (except in *C. nana*, which lacks split in petiole) and then usually arching or deflected, rarely continuing to ascend (except in *C. williamsii*, which almost always has ascending inflorescences); inflorescence bracts cream-colored, floccose; peduncles cream-colored, densely floccose; prophylls usually lanceolate, strongly bicarinate and split abaxially to the stem axis, basally sheathing and truncate, usually apically acuminate (except in *C. nana* in which the prophyll is often distally split adaxially), persistent, attached ca. 2 cm or less above base of peduncle; peduncular bracts 2-10, with tubular base and cochleariform, broadly to narrowly ovate when detached and flattened, apically acuminate blade, persistent; peduncular bract scars flat to slightly oblique; rachises 1/5 to 2/3 of total inflorescence length, first order branches 9-ca. 40, longest near base of rachis, shortening distally, each subtended by a deciduous bract, generally the basal branches again twice-branched, the medial branches once-branched, and the apical branches are simple rachillae inserted directly onto the rachis axis; rachis bracts near base of rachis similar to peduncular bracts, the bracts progressively smaller, particularly in width, and

their bases progressively less sheathing toward apex of inflorescence, the apical bracts linear-obovate, attached narrowly to 1 side of rachis axis, caducous to late deciduous the apical bracts falling first, the other bracts progressively more persistent toward base of rachis; rachis bracts scars strongly oblique near base of rachis, flattening distally; rachillae generally longest near base of rachis, shortening distally, each subtended by a basally sheathing hyaline, narrow, usually elongated, persistent bracteole; flowers perfect, borne singly on short pedicels, each subtended by a small, irregularly shaped, persistent bracteole; sepals 3, acute, ivory-white to cream-colored, rarely with a pinkish cast, connate basally; petals 3, cochleariform, thickened at center, hyaline at margin, stipitate, flabelliform when detached and flattened, ivory-white to cream-colored, rarely with a pinkish cast, imbricate, adnate to calyx basally; stamens 6; filaments hyaline, connate $(1/10-1/4-3/4(-7/8))$ their length in a narrowly ampulliform tube; anthers briefly bifid at base and apex, ivory-white to cream-colored, dehiscent laterally by longitudinal slits; carpels 3, distinct, almost always only 1 developing into a fruit; styles elongate, exserted; stigmas slightly expanded; fruits \pm spheroidal to spheric-ellipsoidal or ovoidal, pale greenish yellow to cream-colored or ivory white at maturity, epicarps smooth; mesocarp slightly fleshy; endocarps membranous; seeds \pm spheroidal to spheric-ellipsoidal or ovoidal, cream to straw-colored, not adherent to the endocarp, the testa sulcate, crossed by branching, irregular rugae or follulae. 10 spp. Neotropics.

Bibliography: Evans, R. *Syst. Bot. Monogr.* 46: 1-70 (1995).

1. Mature plants with petioles not split basally; leaves with 1 order of adaxial splits; adaxial splits almost always present between each leaf fold (i.e., along every adaxial rib),

except sometimes between the marginal-most 1 or 2; abaxial leaf pubescence sparse, giving the leaf a hoary appearance; leaves ca. 5-15; prophylls 4.5-9(-12.5) cm long.

6. *C. nana*

1. Mature plants with petioles split basally; leaves with 2 orders of adaxial splits; deeper primary splits and less deep secondary splits; adaxial splits not present in some to many leaf folds; abaxial leaf pubescence dense, giving the leaf a whitish to silvery appearance; leaves (ca. 10-)15-ca. 35; prophylls 9-26 cm long, except sometimes as short as 6 cm in *C. warscewiczii*.

2. Inflorescences with 1 order of branching (i.e., rachillae inserted directly on primary inflorescence axis); root-spines a dense impenetrable mass over 1/3-2/3(-all) of stem; root-spines usually over 20 cm long; leaves with central abaxial splits to within 10-40 cm of base; all vascular bundles of leaf blade (i.e., the leaf veins) lacking fibrous girders to adaxial surface.

2. *C. cookii*

2. Inflorescences with 2-3 orders of branching; root-spine density variable, but rarely a dense mass and then only basally; root-spines usually 2-8 cm long, few over 20 cm long; leaves with central abaxial splits to within 0.5-10 cm of base, except sometimes only to within 13 cm in *C. williamsii*; larger vascular bundles of leaf blade with fibrous girders to adaxial surface.

3. Inflorescences with most rachis bracts persistent well past anthesis; carpels with stigmas plus styles (1.3-)2.1-5.1 mm long; basal rachis bracts (17.5-)21-29 cm long; widest leaf segments (3.9-)4.7-6.9 cm wide; leaf blades with cross-veins very conspicuous.

4. *C. guagara*

3. Inflorescences with most rachis bracts falling as bud opens; carpels with stigmas plus styles 0.7-2.4 cm long, except sometimes to 3 cm long in *C. warscewiczii*; basal rachis bracts 6.5-24 cm long; widest leaf segments 2.1-4.4(-5.6) cm wide; leaf blades with cross-veins inconspicuous.

4. Fruits 2-2.6 cm long, 1.8-2.3 cm wide; seeds 1.4-1.9 cm long, 1.4-1.7 cm wide; leaves with innermost primary adaxial splits ca. 50-ca. 80% to base; inflorescences with longest rachillae 5-14 cm long; leaf blade halves divided into 6-13 sections by primary adaxial splits; abaxial leaf blade pubescence whitish.

8. *C. warscewiczii*

4. Fruits 1.2-2 cm long, 1-1.9 cm wide; seeds 0.6-1.6 cm long, 0.6-1.3 cm wide; leaves with innermost primary adaxial splits ca. 75-99% to base; inflorescences with longest rachillae 1.5-8 cm long, except to 9 cm in *C. kalbreyeri*; leaf blade halves divided into 4-8 sections by primary adaxial splits, except to 9 sections in *C. williamsii*; abaxial leaf blade pubescence silvery.

5. Peduncular bracts 2-3; leaves almost never with blade sections fully divided (i.e., secondary adaxial splits present between every leaf fold within the section) and usually with all sections but the innermost undivided (i.e., secondary adaxial splits not present between any leaf fold within the section).

3. *C. grayumii*

5. Peduncular bracts (4-)5-10; leaves usually with some leaf blade sections fully divided and rarely with all sections but the innermost undivided.

6. Inflorescences almost always ascending, rarely slightly arching; peduncles 15-20 cm long; seeds irregular and misshapen; leaves with central split to within 1.5-13 cm of base.

9. *C. williamsii*

6. Inflorescences arching to deflected; peduncles 20-50 cm long; seeds \pm spheroidal to rarely spheric-ellipsoidal; leaves with central abaxial split to within 0.5-5(-8.5) cm of base.

7. Inflorescences with all but the basal-most rachis bracts falling as bud opens; basal rachis bracts (1.5-)2-4 times as long as wide (when detached and flattened); peduncular bracts 4-6; rachises (12.5-)20-50 cm long; first-order inflorescence branches 4.5-16.9 cm long; extreme southeastern Mexico and northern Central America. **7. C. stauracantha**

7. Inflorescences with some non-basal rachis bracts persisting past anthesis; basal rachis bracts 1-2 times as long as wide (when detached and flattened); peduncular bracts (4-)6-10; rachises 5-25(-30) cm long; first order inflorescence branches 3.1-6.9(-8.4) cm long; central and southeastern Panama.

8. Stems (2.3-)3.5-4.7 m long; densest concentration of root-spines usually more than 50 per 10 cm of stem; leaves with 37-43(-47) segments; central segments 53.5-65(-72.5) cm long and marginal segments (40-)48.5-56.5(-59) cm long; primary adaxial leaf blade splits usually all \pm equal in depth; prophylls 12-15.5 cm long; stamen tube 1/3 to 7/8 of total filament length; fruits 12-14 mm long, 11-12 mm diameter; seeds 6-7 mm diameter (slightly immature); central Panama. **1. C. bartlettii**

8. Stems 1-3.5(-4.8) m long; densest concentration of root-spines usually fewer than 50 per 10 cm of stem; leaves with (37-)43-56 segments; central segments 52-97.5 cm long and marginal segments 41-72.5 cm long; primary adaxial leaf blade splits increasing in depth from inner to outer splits; prophylls (8.5-)10-13 cm long; stamen tube 1/10 to 2/3 of total filament length; fruits (13-)14-16(-19) mm long, 12-17 mm diameter; seeds 10-13 mm diameter; extreme southeastern Panama. **5. C. kalbreyeri**

1. *Cryosophila bartlettii* R.J.Evans, *Syst. Bot. Monogr.* 46: 38 (1995). Holotype: Panama, *Evans & Grayum 184* (MICH!). N.v.; guágara chica, P.

Stems (2.3-)3.5-4.7 m long, 3.7-7.3(-10.3) cm diameter, solitary or very rarely clustered, ± erect, armed with root-spines usually densest proximally and thinning distally; internodes 0.9-1.7 cm long; root-spines 0- ca. 100(-150 or more) per 10 cm of stem, most to ca. 6 (avg. ca. 2-4) cm long, occasional outliers to ca. 20 cm long, usually 1(-2) times branched, usually descending; basal adventitious roots growing into the soil, similar morphologically to root-spines above, only usually longer (including their branches), forming a cone to ca. 0.5 m high and ca. 0.25 m diameter. Leaves 15-18 per stem, 4-6 distal to leaf through which youngest inflorescence emerges, additionally 3-9 marcescent; petioles (0.68-)0.98-1.6(-1.94) m long, 0.66-1.34 cm wide; hastulas 0.8-1.4 cm long, (0.9-)1.1-1.7 cm wide, 1-1.5 times as wide as long, very broadly triangular, ± pointed, rarely bifid apically; blades 0.14-0.155(-0.17) mm thick, adaxial surface dull, abaxial surface silvery pubescent; central segments 53.5-65(-72.5) cm long; marginal segments (40-)48.5-56.5(59) cm long, (3/4-)4/5-7/8(-nearly) as long as central segments; central abaxial split to within 0.5-2 cm of base, dividing blade into 2, ± equal halves of 18-24 segments each; primary adaxial splits less deep than central abaxial split with depth of splitting generally increasing from inner [(3/4-)4/5-nearly to base] to outer splits or not, dividing each half into 4-5(-6) sections of (2-)3-6 segments each, with the central sections containing (4-)5-6 segments each, the middle 2-3(-4) sections of each half containing (2-)3-5(-6) segments each, the marginal sections containing 4-6 segments each; secondary adaxial splits of central sections 1/4-3/5 to base; central section of each

half usually partially divided, very rarely undivided, the remaining sections with variable divisioning; marginal section undivided; widest segment 2.4-3.4 cm wide at its widest; longitudinal girdered veins usually 25-40 per half-segment, inconspicuous, (0.3-)0.4-0.7(-1.1) mm apart; longitudinal ungirdered veinlets (0-)1(-3) between adjacent veins, the larger superficially indistinguishable from veins, 0.2-0.5 mm apart; irregular transverse veins connecting lateral (or larger lateral veinlets) sort, inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through a split petiole base, then arching or deflected; primary axis 32-47(62.5) cm long, 0.67-1.14(-1.52) cm diameter; peduncles 22-40 cm long; prophylls 12-15.5 cm long, 1.8-3.2 cm wide; peduncular bracts 5-9, 13-20(-26) cm long, ovate to narrowly ovate; internodes between peduncular bracts averaging (2.8)3.6-5.4 cm long; rachis 8.5-20.5 cm long, 1/4-2/5 of total inflorescence length; rachis bracts 15-21, deciduous, but some persistent past anthesis, the basal bracts broadly ovate to ovate, 8.5-16.5 cm long; first-order branches to 2.5 cm long near base of rachis, shorter toward apex; rachillae to 3.9 cm long near base of rachis, shorter toward apex; rachillae bracteoles 3.2-4.8 mm long, 0.1-0.6(-0.9) mm wide; flowers 2.8-4.5 mm long, 2-3.5(-4.1) mm diameter; pedicels 0.3-1.2 mm long; floral bracteoles 0.5-2.1 mm long, 0.3-0.7 mm wide; receptacles (0.2-)0.3-0.5(-0.6) mm long; sepals 2.4-4.1 mm long, connate basally to 1/3 their length; petals 2.3-3.1(-3.7) mm long, 2.5-3.2(-4) mm wide; filaments 2.3-3.1 mm long, connate basally 1/3-7/8 their length; stamen tubes 0.8-1.4(-1.7) mm diameter; anthers 1.2-1.8 mm long, (0.4-)0.5-0.8 mm wide; ovaries 1-1.6 mm long, (0.4-)0.5-0.6(-0.9) mm diameter; stigmas plus styles 1-2.2 mm long; infructescences a dense, compacted mass of fruits with first order branches obscured and indistinguishable; fruits 1.2-1.4 cm long, 1.1-1.2 cm diameter, usually ±

spheroidal, sometimes ovoidal to spheric-ellipsoidal; seeds 0.6-0.7 cm (slightly immature) diameter, \pm spheroidal. *Lowland rainforest on limestone outcrops*. P (Evans 155, US). Ca. 100 m. (Endemic). (Panama).

2. *Cryosophila cookii* Bartlett, *Publ. Carnegie Inst. Wash.* 461: 39 (1935).

Holotype: Costa Rica, *Cook & Doyle 635* (US!). N.v.: escobón, CR.

Stems (7-)11-14 m long, (11-)14-14(-20) cm diameter, solitary, erect, typically swollen at base up to ca. 0.5 m high, armed with root-spines forming a dense tangled mass usually 15-30 cm deep over the lower 1/3-2/3(-all) of stem; internodes 2.1-4.7 cm long; root-spines almost always 1(-3)-times branched, rarely unbranched usually descending; basal adventitious roots growing into the soil similar morphologically to root-spines above; apical root-spines, when present gradually changing to ascending in distal ca. 1 m of stem. Leaves (10-)15-20(-35) per stem, ca. 6 distal to leaf through which youngest inflorescence emerges, additionally 3-11 marcescent; petioles 1.42-3.2 m long, 2.48-3.29 cm wide; hastulas 3-7.4 cm long, 2.4-4.9 cm wide, 0.9-2.3 times as long as wide, triangular to very broadly triangular, sub-pointed, briefly bifid apically; blades with marginal-most ca. 4 sections elevated from plane formed by petiole and central sections, 0.24-0.26 mm thick, adaxial surfaces glossy, abaxial surface chalk-white pubescent; central segments 90-157 cm long; marginal segments 70-104.5 cm long, 3/5-3/4 as long as central segments; central abaxial split to within 11-40 cm of base dividing blades into 2, \pm equal halves of 33-40 segments each; primary adaxial splits usually deeper than central abaxial split with depth of splitting generally increasing from inner (4/5-7/8 to base) to outer splits, dividing each half into 6-8 sections of 1-12 segments each, with the

central sections usually containing 7-10 segments each, the ca. 5 middle sections of each half containing ca. 5 segments each, and the marginal sections containing ca. 3 segments each; secondary adaxial splits of central sections 1/3-2/3 to base; inner (3-)4 sections of each half fully divided, the remaining 3(-4) sections with secondary splitting decreasing toward the marginal section, which is almost always undivided, never fully divided; widest segment 4.5-7 cm wide at its widest; longitudinal ungirded veins 6-11 per half-segment, very large, conspicuous, 1.5-4.3 mm apart; longitudinal ungirded veinlets 5-15 between adjacent veins, extremely variable in size, only the larger discernible adaxially, all abaxially, 0.1-0.5 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) usually long, conspicuous adaxially. Inflorescences with 1 order of branching, each ascending at emergence through split petiole base, then abruptly deflected; primary axis 78.5-128 cm long, 1.8-3 cm diameter; peduncles 47.5-81.5 cm long; prophylls 21-23.5 cm long, ca. 5 cm wide; peduncular bracts 8-10, 27.5-38 cm long, ovate; internodes between peduncular bracts averaging 5.9-7.4 cm long; rachises 25-46.5 cm long, ca. 1/3(-ca. 1/2) of total inflorescence length; rachis bracts ca. 15, all but basal-most usually falling as inflorescence bud opens, the basal bracts ovate, ca. 30 cm long; rachillae to 8 cm long near base of rachis, shortening to ca. 2.5 cm long toward apex, perpendicular to primary axis, densely crowded, sometimes briefly connate basally, in oblong groups arranged sequentially \pm end to end and spiraling along length of rachis, adjacent groups separated by a brief gap, each group spiraling ca. half-way around the main axis, subtended by a rachis bract; rachillae bracteoles 1.3-13 mm long, 0.1-1.2 mm wide; flowers 4.4-6 mm long, (3-)3.8-4.6 mm diameter; pedicels 0.7-1.5 mm long; floral bracteoles 1.3-4.5 mm long, 0.3-0.8 mm wide; receptacles 0.9-1.5 mm long; sepals

3.7-5.3 mm long, connate basally to 1/2 their length; petals 3.4-4.2 mm long, 3.8-6 mm wide, usually revolute and/or undulate apically; filaments 3.4-4.3 mm long, connate basally 1/2-3/4 their length; stamen tubes 2-3 mm long, 0.9-2.1 mm diameter; anthers 1.8-2.5 mm long, 0.7-1 mm wide; ovaries 0.7-1.5 mm long, 0.7-1.4 mm diameter; stigmas plus styles 2.7-3.5 mm long; infructescences a dense, very compacted mass of fruits; fruits ca. 2 cm long, ca. 1.3 cm diameter, ellipsoidal; seeds 1.5-1.6 cm long, 1.1-1.2 cm diameter, ellipsoidal. *Lowland rainforest*. CR (*Evans 131*, MICH). Low elevations. (Endemic). (Costa Rica).

3. *Cryosophila grayumii* R.J.Evans, *Syst. Bot. Monogr.* 46: 42 (1995). Holotype: Costa Rica, *Evans 174* (MICH!). N.v.: bijagua, CR.

Stems 0.7-4.9 m long, 5-8.8 cm diameter, solitary or very rarely clustered, usually arching upward, sometimes decumbent or erect, armed with root-spines spines usually distributed \pm equally along length of stem, sometimes densest proximally and thinning distally; internodes (0.5-)0.8-1.6(-2) cm long; root-spines 0-ca. 20(-ca. 100) per 10 cm of stem, most to ca. 10(avg. ca. 2-4) cm long, occasional outliers to ca. 25 cm long, unbranched or once-branched, usually descending; basal adventitious roots usually growing into the soil, usually similar morphologically to root-spines above, sometimes longer and more often branches, forming a cone to ca. 0.25 m high and ca. 0.5 m diameter. Leaves (9-)14-24(-32) per stem, 3-10 distal to leaf through which youngest inflorescence emerges, additionally 0-6(-11) marcescent; petioles 0.41-2.19 m long, 0.65-15 cm wide; hastulas 0.7-1(-1.2) cm long, 1-1.4(-1.6) cm wide, 0.9-1.7(-2.1) times as wide as long, very broadly to depressed-triangular, sub-pointed to \pm pointed, briefly

bifid apically; blades 0.12-0.18 mm thick, adaxial surfaces dull, abaxial surfaces silvery pubescent; central segments (45-)56-79.5 cm long; marginal segments (38.5-)46.5-66(-69.5) cm long, ca. $\frac{3}{4}$ - $\frac{7}{8}$ as long as central segments; central abaxial split to within (0.5-) ca. 1(-2) cm of base, dividing blades into 2, \pm equal halves of (18-)21-23(-25) segments each; primary adaxial splits usually only slightly less deep than central abaxial split [inner splits ($\frac{7}{8}$ -) nearly to base], dividing each half into 4-5(-6) sections of (1-)3-7(-8) segments each, with the central sections containing (5-)6-7(-8) segments each, the middle 2-3(-4) sections of each half containing 3-4(-7) segments each, and the marginal sections containing (2-)4-5(-7) segments each; secondary adaxial splits of central sections $\frac{1}{5}$ - $\frac{1}{2}$ (- $\frac{4}{5}$) to base; sections almost never fully divided; central section of each half almost always partially divided, all other sections usually undivided; widest segment (2.1-)2.4-2.9(-3.2) cm wide at its widest; longitudinal girdered veins usually 20-30 per half-segment, inconspicuous, 0.3-1(-1.4) mm apart; longitudinal ungirdered veinlets 0-1(-2) between adjacent veins, the larger superficially indistinguishable from veins, 0.2-0.6 mm apart; irregular transverse veins connecting lateral veins (or larger veinlets) short, inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through split petiole base, then arching or deflected (usually) or continuing to ascend; primary axis 21-47 cm long, (0.49-)0.66-1.12 cm diameter; peduncles 13.5-33.5 cm long; prophylls 10-20 cm long, 2-3.5 cm wide; peduncular bracts 2-3, 7.5-19(-22) cm long, broadly ovate to ovate; internodes between peduncular bracts averaging (4.5-)6.5-13.8 cm long; rachises 6-16 cm long, $\frac{1}{4}$ - $\frac{3}{8}$ of total inflorescence length; rachis bracts 12-18(-22), deciduous, but some persistent past anthesis, the basal bracts very broadly ovate to ovate, 7-12 cm long; first-order branches to 3.8 cm long near base of rachis,

shorter toward apex; rachillae to 3.4 cm long near base of rachis, shorter toward apex; rachillae bracteoles 1.9-7.3(-19.3) mm long, 0.1-0.8(-1.6) mm wide; flowers (3-)3.3-4.5(-4.8) mm long, (2-)2.5-3.8(-4.1) mm diameter; pedicels 0.2-1.1 mm long; floral bracteoles 0.7-2.5 mm long, 0.2-0.7 mm wide; receptacles 0.4-0.9 mm long; sepals (2.4-)2.9-4.4 mm long, connate basally to 1/2 their length; petals 2.4-3.3(-3.9) mm long, (2.4-)2.6-3.7(-3.9) mm wide; filaments 2.3-3(-3.5) mm long, connate basally (1/8-) ca. 1/2(-7/8) their length; stamen tubes (0.8-)1.1-1.7(-2) mm diameter; anthers (1.2-)1.4-1.7(-2) mm long, 0.4-0.9 mm wide; ovaries (0.7-)1-1.6 mm long, (0.4-)0.5-0.9 mm diameter; stigmas plus styles 1.2-2.3(-2.8) mm long; infructescences a dense, compacted mass of fruits with first-order branches obscured and indistinguishable; fruits 1.2-2 cm long, 1-1.6 cm diameter, usually ovoidal, sometimes spheric-ellipsoidal to \pm spheroidal; seeds 0.7-1.6 cm long, 0.7-1.3 cm diameter, usually ovoidal to spheric-ellipsoidal, sometimes \pm spheroidal. *Lowland rainforest*. CR (Evans et al. 124, MICH). 100-650 m. (Endemic). (Costa Rica).

4. *Cryosophila guagara* P.H.Allen, *Ceiba* 3: 174 (1953). Holotype: Costa Rica, Allen 6602 (EAP!). N.v.: guágura, CR.

Stems (3-)6-10(-11) m long, (7-)8.3-12.7 cm diameter, solitary, \pm erect, armed with root-spines usually densest proximally and thinning distally, sometimes distributed \pm equally along length of stem; internodes 1.7-4.3 cm long; root-spines 0-250 plus per 10 cm of stem, most to ca. 20 (avg. ca. 4-6) cm long, occasional outliers to ca. 50 cm long, usually 1(-2) times branched, sometimes unbranched, usually descending; basal adventitious roots growing into the soil, similar morphologically to root-spines above, only longer (including their branches), forming a cone to ca. 1 m high and ca. 1.5 m

diameter. Leaves (13-)18-28(-36) per stem, 4-13 distal to leaf through which youngest inflorescence emerges, additionally 0-11(-ca. 20) marcescent; petioles 1.13-3.24 m long, 1.38-2.44 cm wide; hastulas (0.9-)1.2-2.1 cm long, (1.7-)2.1-3.1 cm wide, 1.2-1.9(-2.2) times as wide as long, very broadly to depressed-triangular, usually \pm pointed, rarely bifid apically; blades 0.205-0.26 mm thick, adaxial surfaces shiny, abaxial surfaces chalk-white to whitish pubescent; central segments 83.5-138 cm long; marginal segments (55.5-)61.5-86 cm long, $1/2$ - $4/5$ as long as central segments; central abaxial split to within 2-7(-10.5) cm of base, dividing blade into two \pm equal halves of 22-36 segments each; primary adaxial splits almost always less deep than central abaxial split [inner splits (ca. $3/4$ -) $7/8$ -nearly to base], dividing each half into 5-8(-9) sections of (1-)3-5(-9) segments each, with the central sections containing (4-)6-7(-9) segments each, the adjacent (2-)3(-4) sections containing (2-)4-5(-6) segments each and the remaining (2-)3(-4) sections containing (1-)2-4(-5) segments each; secondary adaxial splits of central sections ($1/6$ -) $1/4$ - $2/3$ (- $3/4$) to base; central section of each half almost always fully divided, never undivided, the adjacent (1-)2-5(-6) sections fully divided and the remaining sections with variable divisioning; marginal section almost always undivided, never fully divided; widest segment (3.9-)4.7-5.3(-6.1) cm wide at its widest; longitudinal girdered veins 10-17 per half segment, conspicuous, (0.4-)0.8-2.4(-3.2) mm apart; longitudinal ungirdered veinlets (1-)3-7(-11) between adjacent veins, inconspicuous, 0.1-0.5 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) often long, conspicuous abaxially and adaxially. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through split petiole base, then usually abruptly deflected, rarely arching; primary axis 71-124.5 cm long, 0.85-1.75 cm diameter; peduncles 28-65.5

cm long; prophylls 12.5-18 cm long, 1.8-4.9 cm wide; peduncular bracts 6-10, 15.5-27.5(-30.5) cm long, ovate; internodes between peduncular bracts averaging 4.4-8.2 cm long; rachis 27-71 cm long, 1/3-2/3 of total inflorescence length; rachis bracts 23-36, deciduous, but most persistent past anthesis, the basal bracts (17.5-)21-29 cm long, ovate; first-order branches to 6.9(-8.4) cm long near base of rachis, shorter toward apex; rachillae to 6.8 cm long near base of rachis, shorter toward apex; rachillae bracteoles 1.8-12.8 mm long, 0.4-1.6(-2.5) mm wide; flowers 3-4.5(-5.2) mm long, 2.4-4.8 mm diameter; pedicels 0.2-0.6 mm long; floral bracteoles 0.7-2.7 mm long, 0.4-0.8(-1.1) mm wide; receptacles 0.3-0.9(-1.3) mm long; sepals 2.5-4.4(-4.9) mm long, connate basally to 1/3 their length; petals 2.4-3.7 mm long, (2.4-)3.5-5.1 mm wide; filaments 2.3-3(-3.4) mm long, connate basally (1/3-)1/2-2/3(-3/4) their length; stamen tubes 0.9-1 mm diameter; anthers (1.4-)1.5-1.6(-1.7) mm long, (0.5-)0.6-0.7(-0.8) mm diameter; ovary 0.5-1.1 mm long, 0.3-1.1 mm diameter; stigmas plus styles (1.3-)2.1-5.1 mm long; infructescences a dense, compacted mass of fruits with first order branches obscured and indistinguishable; fruits 1.3-2 cm long, 1.1-1.9 cm diameter, usually ovoidal to spheric-ellipsoidal, rarely \pm spheroidal; seeds 0.9-1.5 cm long, 0.9-1.3 cm diameter, usually spheric-ellipsoidal, sometimes \pm spheroidal. *Lowland rainforest*. CR (*Evans et al. 126*, MO), P (*Evans 147*, MO). 0-500 m. (Endemic). (Costa Rica, Panama).

5. *Cryosophila kalbreyeri* (Dammer ex Burret) Dahlgren, *Publ. Field Columb. Mus., Bot. Ser.* 14: 134 (1936). *Acanthorhiza kalbreyeri* Dammer ex Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 313 (1932). Lectotype (designated by Bernal et al., 1989): Colombia, *Killip & Smith 14412* (NY!). N.v.: nupa, P.

Stems 1-3.5(-4.8) m long, 4.5-8.8(-11.3) cm diameter, solitary, usually \pm erect, sometimes arching upward, armed with root-spines usually distributed \pm equally along length of stem; internodes 0.4-1.4(-2.2) cm long; root-spines 0-ca. 50(-ca. 100) per 10 cm of stem, most to ca. 10 (avg. ca. 2-4) cm long, occasional outliers to ca. 30 cm long, usually 1(-3) times branched, sometimes unbranched, usually descending; basal adventitious roots growing into the soil, similar morphologically to root-spines above but usually longer including their branches, forming a cone to ca. 1/2(-ca. 1) m high and ca. 1/4(-ca. 1/2) m diameter. Leaves 10-23 per stem, 6-9 distal to leaf through which youngest inflorescence emerges, additionally 0-7(-11) marcescent; petioles 0.86-2.19 m long, 0.66-1.46 cm wide; hastulas 0.6-1.4 cm long, 1-1.8(-2.1) cm wide, 1.1-1.9 times as wide as long, very broadly to depressed-triangular, usually \pm pointed, sometimes bifid apically; blade 0.135-0.165(-0.18) mm thick, adaxial surfaces dull, abaxial surfaces silvery pubescent; central segments 52-97.5 cm long; marginal segments 41-72.5 cm long, 2/3-7/8(-nearly) as long as central segments; central abaxial split to within 0.5-3.5(-6.5) cm of base, dividing blade into two \pm equal halves of (18-)21-28 segments each; primary adaxial splits almost always less deep than central abaxial split with depth of splitting generally increasing from inner (3/4-nearly to base) to outer splits or not, dividing each half into (4-)5-7 sections of (2-)-4(-8) segments each, with the central sections containing (5-)6-7(-8) segments each, the middle (2-)3-5 sections of each half containing (2-)3-4(-7) segments each, and the marginal sections containing (2-)3-5(-6) segments each; secondary adaxial splits of central sections 1/5-3/5(-3/4) to base; central section of each half usually partially divided, never undivided, the adjacent inner sections of each half often fully divided and the outer sections often undivided; marginal section

almost always undivided, never fully divided; widest segment (1.6-)2.4-3.6(-4.2) cm wide at its widest; longitudinal girdered veins usually 25-40 per half-segment, inconspicuous, (0.3-)0.4-0.9(-1.3) mm apart; longitudinal ungirdered veinlets (0-)1(-3) between adjacent veins, the larger superficially indistinguishable from veins, 0.2-0.5 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) short, inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through split petiole base, then arching or deflected; primary axis (25-)37-58.5 cm long, 0.36-1.32 cm diameter ; peduncles (18.5-)37(-41) cm long; prophylls (8.5-)10-13 cm long, 1.1-3.4(-4.8) cm wide; peduncular bracts (4-)6-10, (8.5-)12.5-23 cm long, ovate to narrowly ovate; internodes between peduncular bracts averaging (3.2-)3.7-5.9 cm long; rachises (5.5-)10-24.5(-30) cm long, (1/5-)1/4-2/5(-1/2) of total inflorescence length; rachis bracts 14-26, deciduous, but some persistent past anthesis, the basal bracts (6.5-)9.5-15.5 cm long, ovate; first-order branches to 7.2(-12.1) cm long near base of rachis, shorter toward apex; rachillae to 6.2(-9.2) cm long near base of rachis, shorter toward apex; rachillae bracteoles 0.7-4.5(-16) mm long, 0.1-0.6(-1.1) mm wide; flowers (1.8-)2.9-4.7 mm long, (1.5-)2.5-3.7 mm diameter; pedicels 0.2-0.7(-0.9) mm long; floral bracteoles 0.4-1.9(-7) mm long, 0.2-0.3(-0.8) mm wide; receptacles (0.2-)0.3-0.5(-0.6) mm long; sepals (1.3-)2.4-4.3 mm long, connate basally to 1/3 their length; petals (1.5-)2.6-3.5(-4.2) mm long, (1.5-)2.4-4 mm wide; filaments (1.3-)2.3-3.4 mm long, connate basally 1/10-2/3 their length; stamen tube (0.6-)1-2 mm diameter; anthers 1-2 mm long, 0.4-0.9 mm wide; ovaries 0.9-1.5(-1.6) mm long, (0.25-)0.5-0.7(-0.9) mm diameter; stigmas plus styles (0.7-)0.9-2.4(-2.7) mm long; infructescences usually a dense, compacted mass of fruits with first-order branches obscured and indistinguishable,

sometimes open, revealing the separate first-order branches; fruits (1.3-)1.4-1.6(-1.9) cm long, 1.2-1.7 cm diameter, usually \pm spheroidal; seeds 1-1.3 cm diameter, \pm spheroidal.

Lowland rainforest. 0-1200 m. (Panama, Colombia).

5a. *Cryosophila kalbreyeri* subsp. *kalbreyeri*

Stems 1.5-3 m long, solitary; longest root-spines 3-10(-ca. 20) cm long. Leaves 10-19 per stem; petioles 0.91-1.78 m long, 0.66-1.25 cm wide; central segments 52-93 cm long; marginal segments 41-72.5 cm long; central abaxial split to within 0.5-3.5(-6.5) cm of base, dividing blade into 2, \pm equal halves of (19-)21-27 segments each; widest segment (1.6-)2.3-3.6(4.1) cm wide at its widest. Inflorescences primary axis (25-)37-48 cm long; peduncles (18.5-)26-35.5 cm long; rachises (5.5-)9.9-21.5(-30) cm long; first order branches to 7.2(-12.1) cm long near base of rachis; rachillae to 5.2(-9.2) cm long near base of rachis; flowers (1.8-)2.9-4.7 mm long, (1.5-)2.3-3.4(-3.7) mm diameter; sepals (1.3-)2.4-4.3 mm long; petals (1.5-)2.6-3.5(-4.2) mm long; stamen tubes (0.6-)1-1.5(-2) mm diameter; anthers 1-1.8 mm long, 0.4-0.9 mm wide; ovaries (0.25-)0.5-0.7(-0.9) mm diameter; fruits 1.4-1.8 cm long, 1.3-1.7 cm diameter, usually \pm spheroidal.

Lowland rainforest. P (Gentry & Mori 14179, MO). 0-1200 m. (Panama, Colombia).

6. *Cryosophila nana* (Kunth) Blume, *Rumphia* 2: 53 (1838). *Corypha*

nana Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 1: 299 (1816). *Copernicia nana* (Kunth) Mart., *Hist. Nat. Palm.* 3: 319 (1853). Neotype (designated by Evans, 1995): Mexico, Jalisco, *Evans 239* (MICH!). Illustr.: Evans, R.,

Syst. Bot. Monogr. 46: fig. 23 (1995). Illustr.: Evans, R. *Syst. Bot. Monogr.* 46: fig. 23 (1995). N.v.: escoba, Ch.

Chamaerops mocinoi Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Acanthorhiza mocinoi* (Kunth) H.Wendl. ex Hook.f., *Cryosophila mocinoi* (Kunth) R.R.Fernandez, *Trithrinax aculeata* Liebm. ex Mart., *Acanthorhiza aculeata* (Liebm. ex Mart.) H.Wendl.

Stems (0.6-)1.3-3(-5) m long, 4.9-7.1(-10) cm diameter, solitary, erect or arching upward, armed with root-spines usually forming a dense tangled mass over some portion to all of stem; internodes 0.2-0.7 cm long; root-spines of two types: the common short (usually 1-3 cm long), usually 1(-2)-times branched, sometimes unbranched, descending to ascending root-spines are often sparsely interspersed with to sometimes entirely replaced over a portion of the stem by laterally compressed, relatively long (avg. ca. 6-8 cm long), once branched, ascending root-spines; basal adventitious roots similar morphologically to root-spines above. Leaves 6-13 per stem, 6-11 distal to leaf to which is attached the youngest inflorescence, additionally 0-3(-6) marcescent; petioles 0.52-0.84(-1.3) m long, 0.64-1.24(-1.71) cm wide; hastulas 0.5-1(-1.3) cm long, (0.6-)0.9 1.8(-2) cm wide, 1.2-2.5 times as wide as long, depressed-triangular, usually \pm pointed, rarely bifid apically; blade 0.165-0.2 mm thick, adaxial surfaces dull, abaxial surfaces hoary, sparsely pubescent; central segments 37-67.5 cm long; marginal segments 22.5-51 cm long, $1/2$ - $5/6$ (-nearly) as long as central segments, central abaxial split to within 0.5-3(-8.5) cm of base, dividing blade into 2, \pm equal halves of 13-24 segments each; adaxial splits all primary, usually along all adaxial ribs except the lateral-most 1-2(-3) which then form a single undivided marginal section, often along all adaxial ribs, rarely (in mature

plants) dividing each half into 0 or several 1-ribbed segments and 2-5(-7) undivided sections of 2(-5) segments each, usually less deep than central abaxial split with depth of splitting generally increasing from inner ($2/5$ - $3/4$ to base) to outer splits; widest segment 1.3-2.7(-3) cm wide at its widest; longitudinal girdered veins 18-28 per half-segment, inconspicuous, 0.2-1.2 mm apart; longitudinal ungirdered veinlets 1(-3) between adjacent veins, the larger superficially indistinguishable from veins, 0.1-0.3 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) short, very inconspicuous or not detectable when dried. Inflorescences with (1-)2(-3) orders of branching, ascending at emergence from leaf bases, then arching, deflected or continuing to ascend; primary axis 22.5-44 cm long, 0.42-1.34 cm diameter; peduncles 12.5-28 cm long; prophylls weakly bicarinate adaxial to stem axis, usually distally bifid abaxially and adaxially, 4.5-9(-12.5) cm long, (2-)2.6-3.2(-3.6) cm wide; peduncular bracts 3-7, 5.5-21.5 cm long, narrowly ovate to ovate; internodes between peduncular bracts averaging 2.2-7.8 cm long; rachis 5.5-22.5 cm long, $1/4$ - $1/2$ total inflorescence length; rachis bracts 9-16(-22), caducous, all but basal-most usually falling as inflorescence bud opens, the basal bracts 5-12.5 cm long, usually ovate, rarely broadly ovate; first-order branches to 9 cm long near base of rachis, shorter toward apex; rachillae to 8.9 cm long near base of rachis, shorter toward apex; rachillae bracteoles 0.7-10.6 mm long, 0.2-1.5 mm wide; flowers 2.1-3.5 mm long, 2-3.3 mm diameter; pedicels 0.1-0.2(-0.4) mm long; floral bracteole 0.3-1.2(-8.1) mm long, 0.2-0.7 mm wide; receptacles (0.2-)0.3-0.4(-0.7) mm long; sepals 1.9-3.2 mm long, connate basally to $3/8$ their length; petals 1.9-2.5 mm long, 2.3-3.1 mm wide; filaments 1.8-2.8 mm long, connate basally $1/3$ - $5/6$ their length; stamen tubes (0.7-)0.9-1.4 mm diameter; anthers 1.1-1.3(-1.5) mm long, (0.5-)0.7(-0.8)

mm wide; ovaries 0.9-1.7 mm long, 0.3-0.7 mm diameter; stigmas plus styles 0.7-1.5 mm long; infructescences usually open, revealing the separate first-order branches, sometimes a dense, compact mass of fruits with first-order branches obscured and indistinguishable; fruits 1.3-1.9 cm long, 1.2-1.7 cm diameter, usually \pm spheroidal, sometimes ovoidal to spheric-ellipsoidal; seeds 0.8-1.2 cm diameter, \pm spheroidal. *Dry, deciduous forests and pine forests.* Ch (*Bunting & Licht 309, F*). 0-1700 m. (Mexico).

7. *Cryosophila stauracantha* (Heynh.) R.J.Evans, *Syst. Bot. Monogr.* 46: 57 (1995). *Chamaerops stauracantha* Heynh., *Alph. Aufz. Gew.:* 136 (1846). *Acanthorhiza stauracantha* (Heynh.) H.Wendl. ex Linden, *Cat. Gén.* 87: ? (1871). Neotype (designated by Evans, 1995): Mexico, Quintana Roo, *Evans 204* (MICH!). N.v.: escoba, M; give-and-take, B.

Cryosophila argentea Bartlett, *Acanthorhiza collinsii* O.F.Cook, *Cryosophila bifurcata* Lundell

Stems (1.2-)3-6(-10) m long, 5-12.1 cm diameter, solitary, usually \pm erect, sometimes arching upward, armed with root-spines usually densest proximally and thinning distally, sometimes distributed \pm equally along length of stem; internodes 1.2-2.9 cm long; root-spines 0-150 or more per 10 cm of stem, most to ca. 15 (avg. ca. 4-6) cm long, occasional outliers to ca. 40 cm long, unbranched or 1(-3)-times-branched, usually descending; basal adventitious roots growing into the soil, similar morphologically to root-spines above but longer (including their branches), sometimes forming a cone to ca 0.5 m high and ca. 0.25 m diameter. Leaves 18-24 per stem, 4-5 distal to leaf through which youngest inflorescence emerges, additionally 3-7

marcescent; petioles (0.62-)0.78-1.68(-2.36) m long, (0.74-)0.93-1.72(-2.10) cm wide; hastulas 0.6-1.6(-2) cm long, 1-2.1 cm wide, 0.8-2.2 times as wide as long, (broadly to) very broadly to depressed-triangular, blunt to \pm pointed, apically bifid or not; blades 0.17-0.23 mm thick, adaxial surfaces dull, abaxial surfaces silvery pubescent; central segments (49.5-)59.5-96.5(-103.5) cm long; marginal segments 43.5-69.5(-81) cm long, (2/3-)3/4-7/8(-nearly) as long as central segments; central abaxial split to within 1-5(-8.5) cm of base, dividing blade into 2, \pm equal halves of (16-)19-23(-25) segments each; primary abaxial splits almost always less deep than central abaxial split (inner splits (4/5-)7/8(-nearly to base), dividing each half into (4-)5-8 sections of 2-5(-7) segments each, with the central sections containing 4-6(-7) segments each, the middle (2-)3-6 sections of each half containing 2-3(-4) segments each, and the marginal sections containing 2-5(6) segments each; secondary adaxial splits of central sections (1/4-)1/3-3/4(-7/8) to base; central section of each half usually fully or partially divided, never undivided, the adjacent inner sections of each half often fully divided and the outer sections often undivided; marginal section almost always undivided, never fully divided; widest segment 2.3-3.5(-4.3) cm wide at its widest; longitudinal girdered veins usually 20-40 per half segment, inconspicuous, 0.3-0.6(-0.8) mm apart; longitudinal ungirdered veinlets 0-1(-2) between adjacent veins, the larger superficially indistinguishable from veins, 0.2-0.4 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) short, inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through split petiole base, then arching or deflected; primary axis (ca. 1/3 m-)54-79.5 cm(-ca. 1 m) long, 0.54-1.32(-1.56) cm diameter; peduncles 20.5-50.5 cm long; prophylls 9-19 cm long, 2-2.7(-3.7) cm wide; peduncular bracts (4-)5-6,

13-28.5 cm long, narrowly ovate to ovate; internodes between peduncular bracts averaging 4.1-9.3(-11.4) cm long; rachises (12.5-)19.5-41.5(-ca. 50) cm long, 1/3-3/5 of total inflorescence length; rachis bracts (16-)20-32, caducous, all but basal-most usually falling as inflorescence bud opens, the basal bracts 10.5-23.5 cm long, narrowly ovate to ovate, the apical bracts briefly joined at their apices, more persistent than all but basal-most bracts, usually falling as a single unit; first-order branches to 13.6 cm long near base of rachis, shorter toward apex; rachillae bracteoles 1.3-13.3 mm long, 0.1-1.3 mm wide; flowers 3.4-4.6 mm long, 2.6-3.3 mm diameter; pedicels 0.2-1.1 mm long; floral bracteoles 0.5-2 mm long, 0.2-0.7 mm wide; receptacles 0.4-0.7 mm long; sepals 2.9-4.3 mm long, connate basally to 1/3 their length; petals 2.4-3.2 mm long, 2.6-3.6 mm wide; filaments 2.3-3 mm long, connate basally 3/5-7/8 their length; stamen tubes 0.8-1.1 mm diameter; anthers 1.2-1.6 mm long, 0.4-0.7 mm wide; ovaries 0.8-1.1 mm long, 0.4-0.7 mm diameter; stigmas plus styles 1.5-1.9 mm long; infructescences open, revealing the separate first-order branches; fruits 1.1-1.4 cm long, 1.1-1.3 cm diameter, usually \pm spheroidal, sometimes spheric-ellipsoidal; seeds 0.8-1.1 cm long, 0.8-1 cm diameter, usually spheroidal, sometimes spheric-ellipsoidal. *Wet to dry, lowland forests.* T (*Evans 193*, MO), Ch (*Breedlove 24233*, CAS), C (*Sanders 9673*, MO), QR (*Davidse et al. 20151*, MO), B (*Gentle 1392*, MO), G (*Steyermark 31983*, MO). 0-600 m. (Endemic). (Mexico, Belize, Guatemala).

8. *Cryosophila warscewiczii* (H.Wendl.) Bartlett, *Publ. Carnegie Inst. Wash.* 461: 38 (1935). *Acanthorhiza warscewiczii* Linden, *Cat. Pl. Exot.* 22/23: 47 (1869). Neotype (designated by Evans, 1995): Panama, *Evans 145* (MICH!). N.v.: guágara, CR, P.

Cryosophila albida Bartlett

Stems (1-)3-6(-12) m long, 3.9-11.8(-15) cm diameter, solitary, usually \pm erect, rarely arching upward, armed with root-spines usually densest basally and distributed \pm equally over remainder of stem or densest basally and distally, having a short \pm spineless length of stem in between, sometimes densest basally and thinning distally; internodes 0.8-3.2 cm long; root-spines 0-ca. 25(-50 or more) per 10 cm of stem, most to ca. 20 (avg. ca. 5-7) cm long, occasional outliers to ca. 40 cm long, unbranched or 1(-2)-times-branched, usually descending; basal adventitious roots growing into the soil, almost always very different from root-spines above in being longer, more robust, and less frequently branched, forming a cone to ca. 1.5 m high and ca. 1.5 m diameter. Leaves (9-)15-24(-27) per stem, 4-7(-9) distal to leaf through which youngest inflorescence emerges, additionally 0-7(-12) marcescent; petioles 0.62-2.7 m long, 0.94-2.24 cm wide; hastulas 1-2.3 cm long, 1.2-1.9(-2.4) cm wide, 0.8-1.2(-1.7) times as wide as long, broadly to very broadly (to depressed-) triangular, sub-pointed to \pm pointed, apically bifid or not; blades 0.15-0.22 mm thick, adaxial surface dull, abaxial surface chalk-white-pubescent; central segments 58-114 cm long; marginal segments 47.5-89.5 cm long, (3/5-)2/3-7/8(-nearly) as long as central segments; central abaxial split to within 0.5-4.5 cm of base, dividing blade into 2, \pm equal halves of 20-34 segments each; primary adaxial splits much less deep than central abaxial split with depth of splitting generally increasing from inner (1/2 to 4/5 to base) to outer splits, dividing each half into 6-11(-13) sections of (1-)2-3(-8) segments each, with the central sections containing (2-)4-7(-8) segments each, the middle 4-9(-11) sections of each half containing (1-)2-3(-6) segments each, and the marginal sections containing 2-5(-6) segments each; secondary adaxial splits of central

sections $1/5$ - $1/2$ (to $2/3$) to base, sometimes difficult to differentiate from shallow primary adaxial splits; central section of each half usually fully or partially divided, rarely undivided, the adjacent inner sections of each half often fully divided and the outer sections often undivided; marginal section almost always undivided, never fully divided; widest segment 2.9-4.4(-5.6) cm wide at its widest; longitudinal girdered veins usually 20-30 per half segment, inconspicuous, (0.4-)0.6-1.6(-1.8) mm apart; longitudinal ungirdered veinlets (0-)1-3(-4) between adjacent veins, the larger superficially indistinguishable from veins, (0.1-)0.2-0.4(-0.5) mm apart; irregular transverse veins connecting lateral veins (or larger lateral veinlets) short to medium in length, usually inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending at emergence through split petiole base, then usually arching or deflected, rarely continuing to ascend; primary axis 38.5-109 cm long, 0.62-1.66 cm diameter; peduncles 26.5-64 cm long; prophylls 6-20.5 cm long, 1.8-3.5 cm wide; peduncular bracts (3-)4-7, 11.5-35 cm long, narrowly ovate; internodes between peduncular bracts averaging 4.5-10.9(-14.1) cm long; rachises 12-61.5 cm long, $1/3$ to $1/2$ (- $3/5$) of total inflorescence length; rachis bracts 16-31(-40), caducous, all but basal-most usually falling as inflorescence opens, the basal bracts 9-24 cm long, narrowly ovate to ovate; first-order branches to 22 cm long near base of rachis, shorter toward apex; rachillae to 13.8 cm long; rachillae bracteoles 1.2-14.4 mm long, 0.2-1.8 mm wide; flowers 3-5.2 mm long, 2.4-4.3 mm diameter; pedicels 0.2-0.9 mm long; floral bracteoles 0.5-2.4 mm long, 0.3-0.9 mm wide; receptacle 0.3-0.7(-1) mm long; sepals 2.5-4.6 mm long, connate basally to $1/3$ their length; petals 2.2-3.7 mm long, 2.1-3.6 mm wide; filaments (2.2-)2.6-4 mm long, connate basally ($1/3$ -) $2/5$ - $3/5$ (- $2/3$) their length; stamen tube 1-1.9 mm diameter; anthers (1.3)1.5-2.1(-2.3) mm

long, (0.7-)0.8-1(-1.1) mm wide; ovary 0.8-1.4(-1.7) mm long, 0.5-0.9 mm diameter; stigmas plus styles 1.5-2.7(-3) mm long; infructescences open, revealing the separate first-order branches; fruits 2-2.6 cm long, 1.8-2.3 cm diameter, \pm spheroidal to ovoidal or spheric-ellipsoidal; seeds 1.4-1.9 cm long, 1.4-1.7 cm diameter, \pm spheroidal to spheric-ellipsoidal. *Lowland rainforest*. N (*Stevens et al. 23486*, MO), CR (*Evans 103*, NY), P (*Evans 144*, MICH). 0-1200 m. (Endemic). (Nicaragua, Costa Rica, Panama).

This species may also occur in southern Honduras.

9. *Cryosophila williamsii* P.H.Allen, *Ceiba* 3: 174 (1953). Holotype: Honduras, *Allen & Chable 6742* (EAP!). N.v.: palmiche, H.

Stems 3-7 m long, 7-10.1 cm diameter, solitary, usually \pm erect, sometimes arching upward, armed with root-spines usually densest proximally and thinning distally; internodes 1.3-3.4 cm long; root-spines 0-200 or more per stem, most to ca. 10 (avg. ca. 3-5) cm long, occasional outliers to ca. 35 cm long, unbranched or 1(-3)-times-branched, usually descending; basal adventitious roots growing into the soil, similar morphologically to root-spines above but usually longer (including their branches), forming a cone to ca 0.5 m high and 0.5 cm diameter. Leaves 17-25 per stem, 2-6 distal to leaf through which youngest inflorescence emerges, additionally 0-9 marcescent; petioles 0.93-1.96 m long, 0.98-1.82 cm wide; hastulas 1.1-1.9 cm long, 1.4-2.4 cm wide, 1-1.5 times as wide as long, very broadly to depressed-triangular, sub-pointed, bifid apically; blades 0.155-0.190 mm thick, adaxial surfaces dull, abaxial surfaces silvery pubescent; central segments 69.5-98.5 cm long; marginal segments 48-83 cm long, 5/8 to 7/8 as long as central segments; central abaxial split to within 1.5-13 cm of base, dividing

blade into 2, \pm equal halves of 22-28 segments each; primary adaxial splits almost always less deep than central abaxial split (inner splits 7/8-nearly to base), dividing each half into (5-)6(-9) sections of (1-)3-4(-7) segments each, with the central sections containing (4-)5-6 segments each and the remaining (4-)5(-8) sections containing (1-)3-4(-7) segments each; secondary adaxial splits of central sections 1/5 to 4/5 to base; inner (3-)4 sections of each half almost always fully divided, never undivided, the remaining sections with secondary splitting generally decreasing toward the marginal section, which is almost always undivided, never fully divided; widest segment 3.3-4.3 cm wide at its widest; longitudinal girdered veins usually 40-45 per half segment, inconspicuous, (0.2-)0.4-0.6(-0.8) mm apart; longitudinal ungirdered veinlets 0-1(-2) between adjacent veins, the larger superficially indistinguishable from veins, 0.2-0.4 mm apart; irregular transverse veins connecting lateral veins (or larger lateral veins) short, inconspicuous. Inflorescences with (1-)2(-3) orders of branching, each ascending through split petiole base, then almost always continuing to ascend, rarely arching; primary axis 31-38.5(-45.5) cm long, 0.76-26 cm diameter; peduncles 15.5-20.5 cm long; prophylls 9.5-11.5 cm long, 2.6-4(-5.7) cm wide; peduncular bracts 5-6(-8), 12.5-20.5 cm long, broadly ovate to ovate; internodes between peduncular bracts averaging 2.1-3.8 cm long; rachises 12.5-17.5(-28.5) cm long, 2/5 to 1/2 (to 3/5) of total inflorescence length; rachis bracts 14-19, caducous, all but basal-most usually falling as inflorescence bud opens, the basal bracts 10.5-20.5 cm long, ovate; first-order branches to 6.7 cm long near base of rachis, shorter toward apex; rachillae to 6.8 cm long near base of rachis, shorter toward apex; rachillae bracteoles 1-3.7(-5.6) mm long, 0.1-0.9 mm wide; flowers 2.7-3.8 mm long, 2.5-3.8 mm diameter; pedicels 0.2-0.8 mm long; floral bracteoles 0.3-2.1 long, 0.2-0.6 mm wide;

receptacle 0.2-0.5 mm long; sepals 2.3-3.2 mm long, connate basally to 1/4 their length; petals 2.4-2.9 mm long, 2.1-2.9 mm wide; filaments 2.3-2.9 mm long, connate basally 1/4 to 1/2 their length; stamen tubes 1.3-2.3 mm diameter; anthers 1.3-1.7 mm long, 0.8-0.9 mm wide; ovaries 0.9-1.5 mm long, 0.5-1 mm diameter; stigmas plus styles 1.2-2.2 mm long; infructescences a dense, compacted mass of fruits with first-order branches obscured and indistinguishable; fruits 1.3-1.8 cm long, 1.3-1.5 cm diameter, \pm spheroidal to spheric-ellipsoid; seeds 0.9-1.3 cm long, 0.9-1.2 cm diameter, irregularly shaped.

Lowland rainforest on limestone. H (Evans 1024, MO). Ca. 650 m. (Endemic). (Honduras).

16. *Desmoncus* Mart.

Atitara Barrère ex Kuntze

By A. Henderson.

Monoecious, iteroparous, spiny, pinnate-leaved palms. Stems solitary or clustered, slender and flexuous, usually climbing. Leaf rachis spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases, or rachis spines usually <1 cm long, mostly abaxial, recurved with markedly swollen bases; cirri well-developed, with acanthophylls, or cirri poorly-developed, the rachis terminating in a short cirrus, acanthophylls present or absent, or cirri absent, the rachis terminating beyond the distalmost pair of pinnae in a short 'stub', or cirri poorly-developed, the rachis

terminating in a short cirrus, acanthophylls absent but some small, acanthophyll-like pinnae present; cirri with few spines abaxially, mostly on proximal part only (rarely, when cirri poorly-developed, without spines), or cirri without spines abaxially, or cirri with few spines abaxially, throughout, or cirri with many, usually paired spines; cirri, when well-developed, with intermediate acanthophylls present (i.e., distalmost pair of pinnae reflexed as acanthophylls and with swollen bases and/or proximalmost pair of acanthophylls like vestigial pinnae), without a wide gap between pinnae and acanthophylls, or cirri with no intermediate acanthophylls present, usually with a wide gap between pinnae and acanthophylls (i.e., gap wider than that between adjacent acanthophylls); pinnae with long, filiform apices, or pinnae without long, filiform apices; pinnae without a beard of spines at the bases adaxially, or pinnae with an adaxial beard of spines at the bases; pinnae bases with smooth surfaces adaxially, without spinules or dense tomentum, or pinnae bases with uneven surfaces at the bases adaxially, usually covered with spinules and/or dense tomentum. Inflorescences with the rachis smooth, not twisted, narrower than the few, distantly spaced and alternate rachillae, each rachilla usually briefly adnate proximally to the rachis and with an irregular bracteole displaced onto the rachis, with or without an axillary pulvinus, or inflorescences with the rachis angular, slightly twisted, thicker than the few to numerous, closely spaced and spirally arranged rachillae, each rachilla not (or rarely) adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus, or inflorescences with the rachis angular, slightly twisted, thicker than the closely spaced and spirally arranged rachillae, each rachilla not adnate to the rachis and with an irregular bracteole adnate to the rachilla and appearing displaced distally onto the rachilla, with a poorly-to well-developed

axillary pulvinus, or inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus, or inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally arranged rachillae, each rachilla not adnate to the rachis, subtended by an acute bracteole and without an axillary pulvinus, or inflorescence rachis absent (inflorescence spicate); peduncular bracts broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins (rarely without spines), or peduncular bracts broad, the surfaces ridged, brown tomentose, sparsely to densely covered with short, recurved, markedly swollen-based, diagonally oriented spines, these triangular in cross-section, whitish-brown proximally, brown distally, with tomentose margins (rarely without spines), or peduncular bracts narrow, elongate, ribbed, scarcely brown tomentose, without spines (rarely with few spines), or peduncular bracts broad, ridged, densely covered with short, straight, swollen-based, vertically oriented spines, these terete, whitish-brown proximally, brown distally, without tomentum, or peduncular bracts broad, ribbed, densely brown tomentose, without spines (rarely with a few spines), or; peduncular bracts broad, ribbed or ridged, densely covered with felty, reddish-brown tomentum, sparsely covered with short, scarcely swollen-based, diagonally oriented, flattened spines, whitish-brown proximally, brown distally, with tomentose margins, or peduncular bracts broad, ribbed with several more prominent, lighter colored ribs, brown, scarcely or not

tomentose, without spines (rarely with a few spines), or peduncular bracts narrow, ribbed, densely whitish-brown tomentose, not spiny, or peduncular bracts broad, the surfaces ribbed or ridged, brown tomentose or glabrous, sparsely to moderately covered with short, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins, or peduncular bracts broad, the surfaces deeply ridged, dark brown tomentose, sparsely covered with long, straight or sinuous spines, the bases scarcely swollen but running directly into the ridges of the bract and lying flat against the bract surface, flattened in cross-section, brown proximally and distally, with tomentose margins; rachillae brown tomentose initially, or rachillae glabrous or scarcely tomentose initially; stamens 5-12; fruit surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers, or fruit surfaces smooth, without any apparent subepidermal fibers, or fruit surfaces uneven with numerous, subepidermal, long, branching fibers, or fruit surfaces bumpy from numerous, subepidermal, short, oblique fibers; fruiting corollas less than 1/4 as long as fruits, or fruiting corollas to half as long as fruits; fruiting corollas splitting irregularly into 3 lobes, the lobes often splitting again, or fruiting corollas not or scarcely splitting, tending to remain cupular; endocarps globose to obovoid with rounded or slightly peaked apices, the pores lateral, or endocarps narrowly ellipsoid with rounded apices, the pores lateral, or endocarps broadly obovoid with flattened apices, the pores lateral on or near flattened apices, or endocarps ovoid to obovoid with prominent, peaked apices, the pores lateral. 24 spp. Neotropics.

Bibliography: Henderson, A. *Phytotaxa* 35: 1-88 (2011).

1. Pinnae with long, filiform apices; cirri absent, the rachis terminating beyond the distalmost, opposite pair of pinnae in a <1 cm long 'stub', this with an easily broken, longer, smooth, brown extension, or cirri poorly-developed, the rachis terminating in a short cirrus with spines abaxially, acanthophylls absent but some small, acanthophyll-like pinnae present.

2. Cirri poorly-developed, the rachis terminating in a short cirrus with spines abaxially, acanthophylls absent but some small, acanthophyll-like pinnae present; rachillae 19-30; central and eastern Panama. **2. D. cirrhifer**

2. Cirri absent, the rachis terminating beyond the distalmost, opposite pair of pinnae in a <1 cm long 'stub', this with an easily broken, longer, smooth, brown extension; rachilla 1; Osa Peninsula and adjacent areas in Costa Rica. **9. D. stans**

1. Pinnae without long, filiform apices; cirri well-developed, with acanthophylls.

3. Fruits 23.9-27.4 × 20.1-24.1 mm, the surfaces bumpy from numerous, subepidermal, short, oblique fibers; proximal rachillae 17.5-19.5 cm long, 2.1-2.9 mm wide; central Panama. **4. D. kunarius**

3. Fruits 11.1-21 × 7-16.3 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers, or fruit surfaces with numerous, subepidermal, long, branching fibers; proximal rachillae 5.5-19 cm long, 0.6-2.2 mm wide.

4. Rachillae brown tomentose initially; pinnae with spinules at the bases; Caribbean coast of Nicaragua and Costa Rica and Nicoya Peninsula, Costa Rica. **5. D. moorei**

4. Rachillae glabrous or scarcely tomentose initially; pinnae with smooth surfaces at the bases adaxially, without spinules or dense tomentum.

5. Fruiting corollas cupular, not or scarcely splitting; endocarps narrowly ellipsoid with rounded apices; central and eastern Panama. **6. D. myriacanthos**

5. Fruiting corollas splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded apices and lateral pores, or endocarps broadly obovoid with flattened apices, the pores lateral on or near flattened apices.

6. Fruit surfaces with numerous, subepidermal, long, branching fibers.

7. Basal pinna 14 cm long, 4.2-5.5 cm wide; central Panama with outliers in western and eastern Panama. **7. D. obovoideus**

7. Basal pinna 18-26 cm long, 2.4-5 cm wide; Osa Peninsula and adjacent areas in Costa Rica. **8. D. osensis**

6. Fruit surfaces with numerous, subepidermal, short, often branching (Y-shaped) fibers.

8. Petioles 8-15.5 cm long; pinnae without a beard of spines at the bases adaxially;

Caribbean coast of Costa Rica. **3. D. costaricensis**

8. Petioles 0.5-4.7 cm long; pinnae with an adaxial beard of spines at the bases; southern Mexico, Belize, Guatemala, Honduras, Nicaragua. **1. D. chinantlensis**

1. Desmoncus chinantlensis Liebm. ex Mart., *Hist. Nat. Palm.* 3: 321 (1853).

Atitara chinantlensis (Liebm. ex Mart.) Kuntze, *Revis. Gen. Pl.* 2: 727 (1891). Lectotype (designated by Bailey, 1933): Mexico, Veracruz, *Liebmann 6595* (C, n.v., image!).

Desmoncus anomalus Bartlett, *Desmoncus lundellii* Bartlett, *Desmoncus quasillarius* Bartlett, *Desmoncus uaxactunensis* Bartlett, *Desmoncus ferox* Bartlett

Stems 2.5-20 m long, 1.4-3.8 cm diameter, solitary or clustered. Leaf petioles 0.5-4.7 cm long; rachises 96-128 cm long, 5.7-15 mm wide, the spines usually >1 cm long,

mostly adaxial or lateral, straight with briefly swollen bases; pinnae 18-35 per side of rachis, without long, filiform apices, with an adaxial beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 7.5-31 cm long, 1-2.5 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present, without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 5-13.1 mm wide; peduncular bracts 26.5-69 cm long, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins; rachillae 28-43, glabrous or scarcely tomentose initially; proximal rachillae 9-19 cm long, 0.9-1.7 mm wide; stamens 8-11; fruits 12.1-18.6 × 10.3-16.2 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded or slightly peaked apices, the pores lateral. *Lowland rainforest*. T (*Matuda 3196*, F), Ch (*Martínez 6344*, NY), C (*Martínez 27903*, BM), QR (*Balslev 8200*, K), B (*Balick 3275*, NY), G (*Croat 24746*, MO), H (*Balick 1715*, NY), N (*Moreno 24093*, MO). 10-550 m. (Mexico [Oaxaca, Veracruz], Belize, Guatemala, Honduras, Nicaragua).

2. *Desmoncus cirrhifer* A.H.Gentry & Zardini, *Ann. Missouri Bot. Gard.* 75: 1436 (1988 publ. 1989). Isotype: Colombia, *Gentry et al.* 53392 (MO!).

Stems 3-20 m long, 1.2-3 cm diameter, clustered. Leaf petioles 7-16.5 cm long; rachises 91-117 cm long, 4-8.1 mm wide, the spines usually <1 cm long, mostly abaxial, recurved with markedly swollen bases; pinnae 7-15 per side of rachis, with long, filiform apices, without a beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 17-21 cm long, 2.5-6 cm wide; cirri poorly-developed, the rachis terminating in a short cirrus, acanthophylls absent but some small, acanthophyll-like pinnae present, with many, usually paired spines. Inflorescences with the rachis angular, slightly twisted, thicker than the few to numerous, closely spaced and spirally arranged rachillae, each rachilla not (or rarely) adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 3.3-7.1 mm wide; peduncular bracts 22.5 cm long, broad, ribbed or ridged, densely covered with felty, reddish-brown tomentum, sparsely covered with short, scarcely swollen-based, diagonally oriented, flattened spines, whitish-brown proximally, brown distally, with tomentose margins; rachillae 19-33, tomentose initially; proximal rachillae 4-8 cm long, 1.4-2 mm wide; stamens 6; fruits 14.3-20.9 × 9.8-15.7 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded or slightly peaked apices, the pores lateral. *Lowland rainforest.* P (*de Nevers 4716*, MO). 1-700 m. (Panama, Colombia, Ecuador).

3. *Desmoncus costaricensis* (Kuntze) Burret, *Repert. Spec. Nov. Regni Veg.* 36: 202 (1934). *Atitara costaricensis* Kuntze, *Revis. Gen. Pl.* 2: 726 (1891). Holotype: Costa Rica, *Kuntze s.n.* (NY!).

Stems 4-6 m long, 1.3-2.3 cm diameter, clustered. Leaf petioles 8-15.5 cm long; rachises 67-80 cm long, 5.7-9.3 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 8-10 per side of rachis, without long, filiform apices, without a beard of spines at the bases adaxially, without spinules or dense tomentum at the bases adaxially; basal pinna 14.5-32 cm long, 3-9 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present, without a wide gap between pinnae and acanthophylls.

Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 4.6-8.2 mm wide; peduncular bracts 15-28.5 cm long, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins; rachillae 33, glabrous or scarcely tomentose initially; proximal rachillae 8.5 cm long, 0.7-1.2 mm wide; stamens 6; fruits 12.7-14.5 × 9.1-13.8 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded or slightly peaked

apices, the pores lateral. *Lowland rainforest*. CR (Aguilar 4676, MO). 1-400 m.

(Endemic). (Costa Rica).

4. *Desmoncus kunarius* de Nevers ex A.J.Hend., *Phytotaxa* 35: 27 (2011).

Holotype: Panama, *Nee & Tyson 10982* (PMA!).

Stems length not recorded, 3.1-3.6 cm diameter. Leaf petioles 3-5.5 cm long; rachises 100 cm long, 11.6-18.5 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 19 per side of rachis, without long, filiform apices, with an adaxial beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 29.5 cm long, 4 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present (i.e., distalmost pair of pinnae reflexed as acanthophylls and with swollen bases and/or proximalmost acanthophylls like vestigial pinnae), without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 7.8-10.6 mm wide; peduncular bracts 48.5 cm long, broad, the surfaces ribbed, brown tomentose, densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins; rachillae 20-22, glabrous or scarcely tomentose initially; proximal rachillae 17.5-19.5 cm long, 2.1-2.9 mm wide; stamens 12; fruits 23.9-27.4 × 20.1-24.1 mm, the surfaces bumpy from numerous, subepidermal, short, oblique

fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps obovoid with rounded apices, the pores lateral.

Lowland rainforest. P (de Nevers 4784, MO). 150-425 m. (Endemic). (Panama).

5. *Desmoncus moorei* A.J.Hend., *Phytotaxa* 35: 35 (2011). Holotype: Costa Rica, *Solano 21* (INB!).

Stems 1-32.5 m long, 1.6-3.4 cm diameter. Leaf petioles 1-4 cm long; rachises 70-113 cm long, 6.7-12 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 15-20 per side of rachis, without long, filiform apices, with an adaxial beard of spines at the bases, with uneven surfaces at the bases adaxially, covered with spinules; basal pinna 16-20 cm long, 1.2-1.8 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present (i.e., distalmost pair of pinnae reflexed as acanthophylls and with swollen bases and/or proximalmost acanthophylls like vestigial pinnae), without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 3.2-7.7 mm wide; peduncular bracts 25.5-54.5 cm long, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins; rachillae 19-38, brown tomentose initially; proximal rachillae 11.5-18 cm long, 0.8-1.4 mm wide; stamens 6; fruits 11.1-

14.3 × 10.2-13.8 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded or slightly peaked apices, the pores lateral. *Lowland rainforest*. N (Moreno 12428, MO), CR (Stevens 23935, MO). 1-700 m. (Endemic). (Nicaragua, Costa Rica).

6. *Desmoncus myriacanthos* Dugand, *Caldasia* 2: 75 (1943). Holotype:

Colombia, *Curran 174* (US!).

Desmoncus isthmus L.H.Bailey.

Stems 3-9 m long, 1.4-3.7 cm diameter, clustered. Leaf petioles 2-3.5 cm long; rachises 67-131 cm long, 4.8-11 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 18-29 per side of rachis, without long, filiform apices, with an adaxial beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 18-27 cm long, 1.2-4.2 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present (i.e., distalmost pair of pinnae reflexed as acanthophylls and with swollen bases and/or proximalmost acanthophylls like vestigial pinnae), without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 3.2-8.6 mm wide; peduncular bracts 20-34 cm long, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or

vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins; rachillae 16-32, glabrous or scarcely tomentose initially; proximal rachillae 5.5-15.8 cm long, 0.8-2.2 mm wide; stamens 8-9; fruits 12.6-21 × 7-10.3 mm, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, not or scarcely splitting, tending to remain cupular; endocarps narrowly ellipsoid with rounded apices, the pores lateral. *Lowland rainforest*. P (Croat 7759, MO). 10-125 m. (Panama, Colombia, Venezuela).

7. *Desmoncus obovoideus* A.J.Hend., *Phytotaxa* 35: 36 (2011). Holotype: Panama, *Gentry 6115* (PMA!).

Stems 3.5-7 m long, 1.4-2 cm diameter, branching not recorded. Leaf petioles 2-4.5 cm long; rachises length not recorded, 6-6.6 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae number not recorded, without long, filiform apices, with an adaxial beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 14 cm long, 4.2-5.5 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present, without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 2.8-5.7 mm wide; peduncular bracts length not recorded, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with

long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins (rarely without spines); rachillae 20-21, glabrous or scarcely tomentose initially; proximal rachillae 8.5 cm long, 1 mm wide; stamens not recorded; fruits 14-17.9 × 12.8-16.3 mm, the surfaces uneven with numerous, subepidermal, long, branching fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps broadly obovoid with flattened apices, the pores lateral on or near flattened apices. *Lowland rainforest*. P (*Hammel 1863*, MO). 25-400 m. (Endemic). (Panama).

8. *Desmoncus osensis* A.J.Hend., *Phytotaxa* 35: 39 (2011). Isotype: Costa Rica, *Aguilar 11417* (NY!).

Stems length not recorded, 1.2-2.6 cm diameter, branching not recorded. Leaf petioles 2-3.5 cm long; rachises 85 cm long, 6.4-7.8 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 13 per side of rachis, without long, filiform apices, with an adaxial beard of spines at the bases, without spinules or dense tomentum at the bases adaxially; basal pinna 18-26 cm long, 2.4-5 cm wide; cirri well-developed, with acanthophylls, without spines abaxially, with intermediate acanthophylls present, without a wide gap between pinnae and acanthophylls. Inflorescences with the rachis ridged, not twisted, much thicker than the numerous, closely spaced and spirally or irregularly arranged rachillae, each rachilla not or only briefly adnate to the rachis, subtended by an acute bracteole and with a well-developed axillary pulvinus; peduncles 4.1-4.8 mm wide; peduncular bracts length not

recorded, broad, the surfaces ribbed, brown tomentose, sparsely to densely covered with long, straight or sinuous, briefly swollen-based, diagonally or vertically oriented spines, these flattened or triangular in cross-section, whitish-brown proximally, black or brown distally, with tomentose margins (rarely without spines); rachillae 18-19, glabrous or scarcely tomentose initially; proximal rachillae length not recorded, 1.6 mm wide; stamens 9; fruits 13.9-17.3 × 11-15.9 mm, the surfaces uneven with numerous, subepidermal, long, branching fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps broadly obovoid with flattened apices, the pores lateral on or near flattened apices. *Lowland rainforest*. CR (Aguilar 11975, NY). 50-350 m. (Endemic). (Costa Rica).

Desmoncus leptochaete Burret was considered an excluded name by Henderson (2011) because the type was destroyed and the protologue equivocal. However, the type locality is close to the known range of *D. osensis*.

9. *Desmoncus stans* Grayum & de Nevers, *Principes* 32: 106 (1988). Isotype: Costa Rica, *de Nevers et al.* 7760 (NY!). Illustr.: Henderson et al., *Field Guide to the Palms of the Americas* pl. 51 (1995).

Stems 0.5-2.3 m long, 0.5-1 cm diameter, clustered. Leaf petioles 5.5-12.5 cm long; rachises 15-28 cm long, 1.7-3.3 mm wide, the spines usually >1 cm long, mostly adaxial or lateral, straight with briefly swollen bases; pinnae 4-6 per side of rachis, with long, filiform apices, without a beard of spines at the bases, with uneven surfaces at the bases adaxially, usually covered with spinules and/or dense tomentum; basal pinna 10.7-19 cm long, 2.4-4.3 cm wide; cirri absent, the rachis terminating beyond the distalmost,

opposite pair of pinnae in a <1 cm long 'stub', this with an easily broken, longer, smooth, brown extension. Inflorescences rachis absent (inflorescence spicate); peduncles 1.8-2.7 mm wide; peduncular bracts 12.3-18 cm long, narrow, ribbed, densely whitish-brown tomentose, not spiny; rachillae 1, brown tomentose initially, 1.8-3 cm long, 1.4-2 mm wide; stamens 6; fruits 12.8-13.7 × 9.5-11.1 mm wide, the surfaces uneven with numerous, subepidermal, short, often branching (Y-shaped) fibers; fruiting corollas less than 1/4 as long as fruits, splitting irregularly into 3 lobes, the lobes often splitting again; endocarps globose to obovoid with rounded or slightly peaked apices, the pores lateral. *Lowland rainforest. CR (Henderson 1811, NY). 100-700 m. (Endemic). (Costa Rica).*

17. *Dictyocaryum* H.Wendl.

Dahlgrenia Steyerm.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, rarely clustered, stout, erect, cylindrical or ventricose, with a prominent cone of stilt roots at the base. Leaves few; sheaths forming a compact crownshaft; petioles short; rachises long; pinnae numerous, praemorse, divided into segments, white-gray waxy abaxially. Inflorescences protandrous, infrafoliar, erect or pendulous in bud and at anthesis; peduncular bracts 7-10; triads spirally arranged; flowers trimerous, sessile, symmetrical; staminate flowers with 6 stamens; pistillate flowers with 6 staminodes; gynoecium

tricarpellate, triovulate, with anatropous ovule; fruits globose to ellipsoidal, usually developing from one carpel, with sub-basal to lateral stigmatic remains; seeds with basal embryo; eophylls bifid. 3 spp. Neotropics.

Bibliography: Henderson, A. *Fl. Neotrop.* 53: 1-100 (1990).

1. *Dictyocaryum lamarckianum* (Mart.) H.Wendl., *Bot. Zeitung (Berlin)* 21:131 (1863). *Iriarteia lamarckiana* Mart., *Hist. Nat. Palm.* 3(7): 190 (1838). *Deckeria lamarckiana* (Mart.) H.Karst., *Linnaea* 28: 259 (1857). Holotype. Bolivia, *d'Orbigny* 49 (P!). Illustr.: Henderson, A. *Fl. Neotrop.* 53: figs. 18-19 (1990). N.v.: palma barrigona, P.

Stems to 25 m long, 15-50 cm diameter at swelling, \pm ventricose, gray, smooth; stilt roots prominent, closely spaced, to 1.5 m long. Leaves 3-6 per stem, stiffly spreading; sheaths 1.2-2.6 m long, forming a compact crownshaft; petioles 7-75 cm long; rachises 2.7-5 m long, densely brown-tomentose adaxially, densely whitish-brown tomentose abaxially; pinnae 35-54 per side of rachis, with blunt, praemorse apices, gray-white waxy abaxially, each pinna split to the base into 12-14, stiff segments; middle pinnae split into 7-15 segments, the proximal segment 75-95 cm long, 5-8 cm wide. Inflorescences infrafoliar, erect in bud, to 3 m long; peduncles 35-80 cm long; prophylls inserted at base of peduncle; peduncular bracts 7-8, 15-40 cm long, woody, sequentially deciduous; rachises 59-180 cm long; rachillae 65-170, 16-22 cm long, the proximal ones branched into 3-9 rachillae; triads spirally arranged, 3-5 mm apart; staminate flowers 7 mm long, yellowish or cream-colored; fruits 2.5-2.8 \times 2.3-3 cm, globose, greenish-

yellow. *Montane rainforest*. P (*Henderson & Contraires 98*, NY). 1000-2000 m.
(Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia).

18. *Elaeis* Jacq.

Corozo Jacq. ex Giseke, *Alfonsia* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland &
C.S.Kunth

By A. Henderson

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, erect or procumbent and then rooting. Leaves pinnate, reduplicate; sheaths open and not forming a crownshaft; petioles moderate, with recurved thorns on the margins; rachises long; pinnae regularly or irregularly arranged, spreading in 1 or different planes. Inflorescences interfoliar, branched to 1 order, usually unisexual but both staminate and pistillate occurring on the same plant; peduncles bearing a prophyll and 1, fibrous peduncular bract; rachises condensed, bearing numerous, short, crowded rachillae; flowers borne singly or paired (staminate) in pits formed by bracts subtending flowers; staminate flowers with 3, free sepals and 3, free petals; stamens 6; pistillodes present; pistillate flowers with 3, free, imbricate sepals and 3, free, imbricate petals; staminodial ring present; gynoecia syncarpous, trilocular, triovulate; fruits usually 1-seeded, irregularly ovoid, with apical stigmatic remains; endocarps thick and bony, with subapical pores;

seeds with homogeneous endosperm and subapical embryo; eophylls entire. 2 spp., 1 Neotropical, 1 African.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995). Henderson, A. *Palms of the Amazon* (1995).

The African oil palm, *Elaeis guineensis*, is widely planted as an oil crop.

1. *Elaeis oleifera* (Kunth) Cortés, *Fl. Columb.* 1: 203 (1897). *Alfonsia oleifera* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 1: 307 (1816). *Corozo oleifera* (Kunth) L.H.Bailey, *Gentes Herbarum* 3: 59 (1933). Holotype: Colombia, *Bonpland 5379* (P!). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pls. 38, 39 (1995). N.v.: coquito, CR.

Stems 1-6 m long, to 40 cm diameter, solitary, often curved, procumbent basally and ± erect apically, rough, covered with persistent, decaying leaf sheath bases and accumulated litter, rooting where procumbent. Leaves 20-50 per stem; sheaths 20-40 cm long, open and not forming a crownshaft, fibrous; petioles 1.5-3 m long, with stout, recurved thorns on margins; rachises 2.9-5.5 m long; pinnae 33-90 per side of rachis, regularly arranged and spreading in 1 plane, linear, long acuminate, the middle ones 1-1.2 m long, 4-6 cm wide. Inflorescences interfoliar, borne tightly amongst leaf bases; prophylls not recorded; peduncular bracts fibrous and persistent; peduncles 35-80 cm long; rachillae to 100, 6-20 cm long, the staminate ones ca. 1 cm diameter with the flowers closely spaced in pits formed by a network of bracts and membranes, the pistillate ca. 1.5 cm diameter, with the flowers loosely spaced in pits; staminate flowers 5 mm long at anthesis; sepals oblanceolate, 3 mm long; petals oblanceolate, 3 mm long;

pistillodes as long as the anther tube; pistillate flowers 1.2 cm long (post anthesis); sepals ovate, 1.2 cm long; petals ovate, 1 cm long; staminodial rings 1 mm high; fruits 2.5-3 × 1.8-2 cm, ellipsoid-oblong, orange, orange-yellow, or red, with prominent, apical stigmatic remains. *Lowland rainforest and occurring in disturbed places*. N (*Nee 27588*, MO), CR (*Sanders et al. 17650*, MO), P (*Bartlett 16353*, NY). Low elevations. (Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Brazil).

No specimens from Honduras have been seen.

19. *Euterpe* Mart.

Catis O.F.Cook, *Plectis* O.F.Cook, *Rooseveltia* O.F.Cook

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems usually tall, solitary or clustered, erect or leaning. Leaves pinnate; sheaths closed and forming a compact crownshaft; ligules short and deciduous; petioles short or absent, rarely elongate, channeled adaxially, rounded abaxially; rachises ridged adaxially, flattened abaxially; pinnae numerous, linear, regularly arranged and spreading in the same plane, usually pendulous, with 1-2 lateral veins on either side of midvein. Inflorescences branched to 1 order, protandrous, infrafoliar, ± horizontal at anthesis; peduncles shorter than the rachis, dorsiventrally compressed; prophylls papyraceous, bicarinate, deciduous; peduncular

bracts equal or subequal to prophyll, papyraceous, deciduous; rachillae usually densely tomentose, with persistent hairs; flowers in triads, or paired or solitary staminate; staminate flowers sessile; petals free, valvate; stamens 6, the filaments not inflexed apically; anthers sagittate, with latrorse dehiscence; pistillate flowers with broadly imbricate sepals and petals, the petals briefly valvate at the apex; staminodes absent, rarely present; gynoecia unilocular, uniovulate; ovules laterally attached; fruits globose or rarely ellipsoid, with subapical to lateral stigmatic remains; mesocarp with radial sclereids; endocarps fibrous, the locular epidermis crustaceous; seeds with basal embryo; hilum ellipsoid; raphe branches obscure; endosperm homogeneous or rarely ruminant; eophylls bifid or palmate. 7 spp. Neotropics.

Bibliography: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: 1-90 (1996).

1. Fruits 1-2 cm diameter, with ruminant endosperm; eophylls bifid; stems usually clustered and forming large clusters; middle pinnae 2-4.5 cm wide. **1. E. oleracea**

1. Fruits 0.9-1.3 cm diameter, with homogeneous endosperm; eophylls palmate; stems usually solitary, or if clustered with only 2-3 stems and not forming large clusters; middle pinnae 1-3 cm wide. **2. E. precatoria**

1. Euterpe oleracea Mart., *Hist. Nat. Palm.* 2: 29. (1824). Holotype: Brazil, *Martius 3262* (M!). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 19 (1996).

Stems 3-20 m long, 7-18 cm diameter, clustered with up to 25 stems per cluster, or occasionally appearing solitary and then with shoots at the base, erect or leaning, with a cone of red roots at base, these to 1 cm diameter, and with pneumatophores. Leaves 8-

14 per stem, arching; sheaths 0.6-1.5 m long including a short ligule, dark brown, purple, green, dull red-green or yellow-green, with few, flat, scattered, brownish scales especially on ligule; petioles 17-50 cm long, with few, flattened or raised scales or occasionally whitish, scurfy scales adaxially and on upper part of abaxial surface, mostly glabrous abaxially; rachises 1.5-3.7 m long, with similar scales like those of petiole; pinnae 40-80 per side, pendulous or less often horizontal (especially on younger plants), opposite to subopposite, long acuminate, with punctations abaxially, with prominent midvein and 2-3 lateral veins either side, the midvein with few ramenta abaxially; basal pinna 40-74 × 0.5-1.5 cm; middle pinnae 0.6-1.1 m × 2-4.5 cm; apical pinna 24-50 × 0.6-1.8 cm. Inflorescences infrafoliar at anthesis, almost horizontal; peduncles 5-15 cm long, 2.7-4 cm diameter; prophylls 43-66 cm long, 11-14 cm diameter; peduncular bracts 66-95 cm long, without an umbo; rachises 35-68 cm long, densely covered with whitish brown, branched hairs; rachillae (58-)80-162, 21-75 cm long, 3-4 mm diameter at anthesis, thickening in fruit, absent from adaxial, proximal part of rachis, densely covered with very short, appressed, whitish-brown hairs; flowers in triads proximally, paired or solitary staminate distally; triad bracteoles rounded; first flower bracteoles apiculate, second and third flower bracteoles unequal, rounded, the largest 1-1.5 mm long; staminate flowers 4-5 mm long; sepals triangular to ovate, 2-3.5 mm long, unequal, ciliate; petals ovate, 3-4 mm long, purple to purple-red; stamens arranged on a short receptacle; filaments 1.5-4 mm long; anthers 2-2.5 mm long; pistillodes 2-3 mm long, deeply trifid at apex; pistillate flowers 3 mm long; sepals broadly triangular, 2 mm long, ciliate; petals broadly triangular, 2-3 mm long; fruits 1-2 cm diameter, globose or depressed globose, the stigmatic remains lateral; epicarp purple-black, black, or green, minutely tuberculate;

seeds globose; endosperm deeply ruminant; eophylls bifid. *Low-lying, tidal areas near the sea and in wet places near rivers, seldom occurring inland and then in wet places near streams or rivers.* P (*de Nevers 10700*, NY). Near sea level. (Panama, Colombia, Venezuela, Guayanas, Ecuador, Brazil, Trinidad).

Euterpe oleracea is occasionally cultivated in Central America.

2. *Euterpe precatoria* Mart. in A.D.d'Orbigny, *Voy. Amér. MÉR.* 7(3): 10 (1842).

Holotype: Bolivia, *d'Orbigny 27* (M!).

Stems 3-20 m long, 4-23 cm diameter, solitary or clustered, but then not forming large clusters, erect, gray, with a cone of roots visible at the base. Leaves 5-10(-20) per stem, spreading and somewhat arched; sheaths 0.5-1.6 m long including a 1-3 cm long ligule, green, striped lighter green, or yellow, with scattered, appressed, fimbriate, black or reddish brown scales; petioles (0-)12-57 cm long, adaxially densely covered with scales like those of sheaths (but absent on young leaves), fewer scales abaxially; rachises 1.6-3.6 m long, with few to many raised, fimbriate, reddish brown scales adaxially especially near pinnae insertion; pinnae 43-91 per side, weakly to strongly pendulous to horizontal, with prominent midvein and 1-2 lateral veins on either side, the midvein with ramenta abaxially, usually punctate abaxially; basal pinnae 46-70 × 0.2-1 cm; middle pinnae pinna 18-44 × 0.5-2 cm. Inflorescences ± horizontal at anthesis, becoming somewhat pendulous in fruit; peduncles 4-15 cm long, 2-4 cm diameter at peduncular bract scar; prophylls 22-85 cm long, to 6 cm diameter; peduncular bract 23-80 long including a 2 cm long umbo, 8-10 cm diameter, often with smaller bracts present distal to peduncular bract; rachises (8-)20-94 cm long; rachillae (24-)200, 16-80 cm long at base,

18-58 cm long at apex, 3-5 mm diameter at anthesis, 3-66 mm diameter in fruit, arranged \pm all round rachis or absent from adaxial, proximal part, densely covered with 0.1-0.5 mm long, stiff, stellate, brownish hairs; flowers in triads proximally, paired or solitary staminate flowers distally, occasionally an inflorescence all staminate; triad bracteoles rounded or apiculate, to 2 mm long; first flower bracteoles obscure, second and third flower bracteoles unequal, rounded, prominent, the largest 1-2 mm long; staminate flowers 3.5-5 mm long; sepals broadly ovate, blunt at the apex, 2-3 mm long, keeled, scarcely pilose, ciliate; petals lanceolate, blunt at the apex, 3-5 mm long; stamens arranged on a short receptacle; filaments 1-2.5 mm long; anthers 2 mm long; pistillodes 1.5-3 mm long, deeply trifid at the apex; pistillate flowers 2.5-4.5 mm long; sepals broadly ovate, 3 mm long, \pm glabrous or with hairs on the abaxial surface, ciliate; petals broadly ovate, 4 mm long; fruits 0.9-1.3 cm diameter, globose, the stigmatic remains lateral; epicarp purple-black, minutely tuberculate; seeds globose; endosperm homogeneous; eophylls pinnate with very short rachis. *Lowland to montane rainforest*. 0-2000 m. (Belize, Guatemala, Nicaragua, Costa Rica, Cocos Island, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil, Trinidad).

2a. *Euterpe precatoria* var. *longevaginata* (Mart.) A.J.Hend., *Palms Amazon* 111 (1995). *Euterpe longevaginata* Mart. in A.D.d'Orbigny, *Voy. Amér. MÉR.* 7(3): 10 (1842). Holotype: Bolivia, *d'Orbigny 48* (P n.v.). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 21 (1996). N.v.: mountain cabbage, B; caña lucia, CR; palmita, P.

Euterpe panamensis Burret, *E. macrospadix* Oerst., *E. leucospadix* H.Wendl. ex Hemsl., *Plectis oweniana* O.F.Cook

Stems solitary or clustered. Leaves 5-10(-20) per stem; sheaths 0.5-1.6 m long; petioles (0-)12-49 cm long; rachises 1.6-2.7 cm long; pinnae 48-73 per side, with prominent midvein and 1-2 lateral veins on either side; basal pinna 46-70 × 0.5-1 cm; middle pinnae 68-76 × 2-3 cm; apical pinna 18-32 × 1-2 cm. Inflorescences infrafoliar; peduncles 4-13 cm long; prophylls 22-53 cm long; peduncular bracts 23-80 cm long; rachises (8-)20-55 cm long; rachillae 24-99, basal rachillae 16-70 cm long, apical ones 18-58 cm long, 3-4 mm diameter at anthesis, 3-4 mm diameter in fruit, brownish, densely covered with 0.1 mm long, stiff, stellate hairs; staminate sepals not densely pilose abaxially, drying brown; pistillate sepals not densely pilose abaxially, drying brown; fruits 0.9-1.1 cm diameter globose. *Lowland to montane rainforest*. B (*Balick et al.* 2689, NY), G (*Kellerman* 7175, US), N (*Stevens* 23477, US), CR (*Stevens* 24560, NY), P (*Henderson* 86, NY). 40-1150 m. (Belize, Guatemala, Nicaragua, Costa Rica, Cocos Island, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil, Trinidad).

20. *Gaussia* H.Wendl.

Aeria O.F.Cook, *Opsiandra* O.F.Cook

Adapted from Quero, H. & Read, R. *Syst. Bot.* 11: 145-154 (1986).

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, erect or slightly decumbent or curved, columnar, or enlarged at the base and tapering apically, with annular scars, and a dense mass of cylindrical, thick, and ramified roots. Leaves

pinnate, with pinnae very near each other, reduplicate, the base usually swollen, arranged in several planes from a keeled rachis, each with a prominent yellowish midrib and two or more prominent secondary veins on either side, the older leaves with deciduous segments, with the naked rachis persistent. Inflorescences glabrous, long pedunculate, inter- or infrafoliar, ramified but sometimes with simple or merely forked branches; bracts 4-7 exclusively peduncular, tubular, flattened with a triangular apex, the lowermost bicarinate and split apically, the others ecarinate and opening obliquely, bracts at the branches lacking; flowers unisexual, arranged in acervuli with distichous rows of 2-7, the lowest pistillate, but usually with solitary staminate flowers toward the end of the rachillae; staminate flowers slightly larger than the pistillate but similar in form, glabrous; sepals 3, imbricate, petals 3, valvate, with 6 stamens, anthers dorsifixed, and with a reduced pistillode; pistillate flowers with a trigonal ovary and rudimentary staminodes; fruits red at maturity, obovoid to globose or reniform, single or multiple-seeded; epicarps smooth and thin; mesocarp fleshy with few fibers; stigmatic remnant basal; seeds obovoid, subglobose to reniform; raphe branches ramified to reticulate; embryos lateral, basal, or subbasal; endosperm homogeneous. 5 spp. Neotropics.

Bibliography: Quero, H. & Read, R. *Syst. Bot.* 11: 145-154 (1986). Moya López, C. et al.

Revista Jard. Bot. Nac. Univ. Habana 12: 15-20 (1991, publ. 1993).

1. Inflorescences with the basal primary branches forked (bifid), the others simple; peduncular bracts 4; fruits and seeds slightly reniform; Mexico, Guatemala, Belize.

1. *G. maya*

1. Inflorescences with the basal primary branches ramified, the others forked or simple; peduncular bracts 5-7; fruits and seeds subglobose to obovoid; Mexico.

2. *G. gomez-pompae*

1. **Gaussia maya** (O.F.Cook) H.J.Quero & Read, *Syst. Bot.* 11: 152 (1986).

Opsiandra maya O.F.Cook, *J. Wash. Acad. Sci* 13: 184 (1923). Holotype: Guatemala, Cook & Martin 94 (US!). Illustr.: Quero, H. & Read, R. *Syst. Bot.* 11: figs. 9-12 (1986).

Stems to 20 m long, ca. 15 cm diameter near the base, tapering slightly and gradually, nearly uniform, columnar; internodes 12-15 cm, becoming shorter above, separated by distinct leaf scar rings; superficial roots 3.5 cm thick. Leaves 2-3 m long; petioles ca. 65 cm long, very deeply channeled below; sheaths 1.5 cm thick at the back, diameter of petiole above 3 cm; rachises sharply carinate above; pinnae ca. 90 pairs in 4 rows; lowest pinnae 41-47 cm long; largest pinnae somewhat below the middle, 60-70 cm long, 3-4 cm wide; apical pinnae ca. 16-23 cm long, 0.5-1 cm wide; 1 vein on each side of the midrib more prominent than the others, especially underneath, also 5 or 6 less prominent veins, separated by 6 or 7 subequal veinlets, submarginal veins delicate. Inflorescences ca. 70-90 cm long; branches (9-)13-25, ca. 4 mm thick, at base nearly 5 mm, tapering gradually to the top, the lowest 1-4 branches forked near the base; peduncular bracts 4, the lowest (5-)7-9.5 cm long, 3.5-5.5 cm wide, bicarinate, deeply bidentate, the tips triangular-pointed 3-3.5 cm long; second bract 13-14 cm long, 3-4.5 cm wide, slightly carinate, but sharply angled at the sides; third bract 18-20 cm long, 2-2.5 cm wide; fourth bract 19- 23 cm long, 2-2.5 cm wide; flowers in groups of 2-3, but sometimes several solitary male flowers at the tip and on the branches; pistillate flowers

with sepals rounded ca. 2 mm long; petals broadly triangular ca. 2 mm long with rudimentary staminodes; pistils trigonal; staminate flowers slightly larger than pistillate; stamens with broad short filaments; anthers 1 mm long; pistillodes columnar, apiculate, 1 mm long; fruits 1-1.5 cm in diameter, subglobose or transversely sub-reniform, somewhat flattened on one side and with a vertical groove above the stigma; pericarps soft, fleshy, red, 2 mm thick; seeds 0.8-1.3 cm diameter, somewhat irregular in shape, subglobose, oblong, reniform or oval, the surface marked with a few impressed raphe branches; endosperm with a central cavity; embryos subbasal. *Lowland rainforest near the sea, usually on limestone*. QR (*Quero 2531*, MEXU), G (*Contreras 431*, MO), B (*Arvigo 508*, NY). 0-150 m. (Endemic). (Mexico, Guatemala, Belize).

2. *Gaussia gomez-pompae* (H.J.Quero) H.J.Quero, *Syst. Bot.* 11: 153 (1986).

Holotype: Mexico, Oaxaca, *Quero 3002* (MEXU!). Illustr.: Quero, H. & Read, R. *Syst. Bot.* 11: figs. 13-16 (1986).

Stems 10-14 m long, sometimes longer, to 30 cm diameter toward the base, columnar, with annular scars, erect or sometimes decumbent, supported by abundant, thick, adventitious roots; internodes very short at the base of the stem, ca. 3 cm long, increasing to 6-10 cm at the middle and becoming shorter above. Leaves mostly 10 per stem, 2-3 m long; petioles grooved, with involute edges, closing beyond the insertion of the first pinnae; rachises keeled above, rounded beneath; pinnae 85-100 per side of rachis, arranged in four rows, two along each side of the rachis, the base of the pinnae forming swellings or calluses very near each other, with a very prominent, yellowish midrib, a prominent vein on each side of it and other veinlets between the veins; proximal

pinnae 33-45 cm long, 1- 1.5 cm wide; largest pinnae towards the middle of the leaf, 70-75 cm long and 4-4.6 cm wide; apical pinnae ca. 20 cm long and 1 cm wide.

Inflorescences infrafoliar at maturity, rather robust, 90-100 cm long, with 30-40 primary branches, the most proximal twice ramified, 40-45 cm long; rachillae slender, 20-30 cm long, the middle primary branches mostly forked, ca. 30 cm long, the apical single, 15-20 cm long; peduncular bracts 5-6, each tubular, flattened, opening in a triangular apex; prophylls bicarinate, 8-13 cm long, 3.5-5 cm wide toward the base, the second bract slightly bicarinate, 16-18 cm long, 2.5-3 cm wide, third very slightly bicarinate, 21-25 cm long, 2-2.6 cm wide, the fourth not keeled, 21-24 cm long, 1.5-2.5 cm wide, the fifth not keeled, not flattened, papyraceous, 16- 21 cm long, 1.8-2.5 cm wide; flowers creamy white, sessile, mostly in groups of 3, but sometimes in distichous groups of 2-4 or solitary, the basal flower usually pistillate, the solitary ones always staminate near the ends of the rachillae or between the groups, the staminate flowers slightly larger than the pistillate but similar; staminate flowers with orbicular sepals slightly wider than long; petals narrowly triangular, ca. 4.5 mm long and 2.2 mm wide; stamens with broad filaments almost as long as the anthers, dorsifixed, ca. 1.2-1.4 mm long, thecae slightly unequal, retuse to slightly bifid at the apex, sagittate at the base; pistillodes pyramidal to columnar ca. 2 mm long; pistillate flowers with sepals similar to those of the staminate; petals narrow triangular, ca. 2.5 mm long and 1.4 mm wide; ovaries trigonal ca. 2.5 mm long; stigmas trifid; staminodes rudimentary, less than 0.5 mm long; fruits 1.5-1.6 cm diameter, globose to slightly subglobose, sessile, yellowish when immature, becoming reddish with maturity, with a basal stigmatic remnant; pericarps fleshy, less than 1 mm thick; epicarps smooth; seeds subglobose, 1.3-1.5 cm diameter, slightly compressed

toward the base near the embryo, raphes ramified to reticulate, the seed thus somewhat cerebriform; endosperm sometimes slightly intruded by the raphe branches, with a central cavity; embryos lateral to subbasal. *Lowland rainforest near the sea, on limestone soils*. T (*Zamudio s.n.*, MEXU). Sea level. (Mexico [Oaxaca, Chiapas, Tabasco]).

No specimens from Chiapas were recorded by Quero & Read (1986).

21. *Geonoma* Willd.

Vouay Aubl., *Gynestum* Poit., *Roebelia* Engel, *Kalbrejera* Burret, *Taenianthera* Burret

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or clustered. Leaves undivided or regularly pinnate, the pinnae with 1 main vein and 2 lateral veins on either side of main vein, or irregularly pinnate, if regularly pinnate the pinnae with 1 main vein only (rarely with several lateral veins), not plicate, or plicate, the bases of leaf blades running diagonally into the rachis, or recurved against the rachis; petioles (and rachis) drying orange-brown or reddish-brown, or drying green or yellowish; veins raised and rectangular in cross-section adaxially, or not raised or slightly raised and triangular in cross-section adaxially. Inflorescences unbranched, or branched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, \pm persistent, or not ribbed with elongate, unbranched fibers, flattened (if tubular, narrow, and elongate then not ribbed), deciduous

or persistent; prophylls short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophyll equal to and early deciduous with the peduncular bract, or not short and asymmetrically apiculate, the surfaces ridged with close, equal, parallel, non-dividing ridges, scarcely tomentose between the ridges, or not ridged, or if ridged then densely tomentose with widely to closely spaced ridges, these sometimes dividing, ridged, the ridges unequally wide, often dividing from and rejoining other ridges, the prophyll margins with irregular, spine-like projections (rarely these absent), the prophylls usually splitting irregularly between the ridges, or without unequally wide ridges; peduncular bracts well-developed, or vestigial, the prophyll three times or more long, sometimes the peduncular bracts apparently well-developed but then soon disintegrating, or absent; rachillae drying brown or yellow-brown; flower pits tricussately or quadricussately arranged throughout the rachillae, the groups of pits closely spaced, or usually spirally arranged, sometimes decussately or tricussately, then the groups not closely spaced nor consistently arranged throughout the rachillae, or decussately arranged throughout the rachillae, the groups of pits closely spaced, or alternately arranged (sometimes distorted by twisting and contracting of rachillae), densely hairy internally distally only (rarely some hairs on lateral margins of the pit), or glabrous internally, or densely hairy internally proximally and distally; proximal and distal lips not joined laterally, with a clear gap between them, not forming a raised cupule, the proximal lip margins usually overlapping the distal lip margins, or joined laterally with no clear gap between them, often forming a raised cupule, the margins not overlapping, drying the same color as the rachillae, or proximal and distal lips drying darker brown than the rachillae; proximal lips of flower pits with a central

notch before anthesis, often the two sides of the notch overlapping, the lips \pm heart-shaped, or without a central notch before anthesis (but often tearing in the center after anthesis), not heart-shaped, or apiculate and lobed before anthesis, not recurved at the apices after anthesis, or recurved at the apices after anthesis, hood-shaped at anthesis (the margin of the proximal lip straight when viewed from above), sometimes splitting post-anthesis, or not hood-shaped at anthesis; distal lips of flower pits absent, or well-developed, or a scarcely raised rim; staminate and pistillate petals emergent, valvate throughout, or not emergent, not valvate throughout; staminate flowers persistent post-anthesis, or deciduous post-anthesis; stamens 3, or 6, or more than 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed, or diverging at anthesis, inserted onto bifid and well-developed, non-jointed connectives, or diverging or not diverging at anthesis, inserted onto poorly to well-developed, non-split, jointed connectives, connectives when well-developed alternately long and short, or diverging at anthesis, inserted directly onto the apiculate filament apices; anthers short and curled over at anthesis, or not short and curled at anthesis, usually elongate, spiraled and twisted or sometimes remaining straight, or short at anthesis, remaining straight and parallel; gynoecium unilocular; non-fertilized pistillate flowers persistent after anthesis, or deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, or lobed at the apex, the lobes spreading at anthesis, acuminate, or lobed at the apex, the lobes not spreading at anthesis, not acuminate, those of non-fertilized pistillate flowers projecting and persistent after anthesis, or not projecting, deciduous after anthesis; fruits bases with a prominent, asymmetric stipe, or without a prominent stipe, ovoid, usually with conical apices, or not ovoid and without

conical apices, the surfaces not splitting at maturity, or splitting deeply and longitudinally at maturity to reveal mesocarp with dense layer of radial fibers, with fibers emerging, or without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices, or not bumpy and not apiculate, or ridged from the numerous, subepidermal, meridional, elongate fibers present, these coming to a point at fruit apices; locular epidermis without operculum, or with operculum, smooth, or sculpted, usually also with a raised, meridional ridge, without pores or with few pores, or with numerous pores. 68 spp. Neotropics.

Bibliography: Henderson, A. *Phytotaxa* 17: 1-271 (2011).

1. Distal lips of flower pits absent; flower pits densely hairy internally distally.
2. Flower pits densely hairy internally distally only (rarely some hairs on lateral margins of the pit); pinnae 4-47 per side of rachis; rachillae 22-120.

12b. *G. interrupta* subsp. *magnifica*

2. Flower pits densely hairy internally proximally and distally; pinnae 2-39 per side of rachis; rachillae 4-45.

3. Peduncles 9.3-20.2 mm diameter; eastern Panama with outliers in western Panama, Costa Rica, Nicaragua and Guatemala.

12a.G. *pinnatifrons* subsp. *binervia*

3. Peduncles 2.4-20.2 mm diameter.

4. Peduncles 13.6-18.8 cm long; fruits 7.4-9.3 × 5.2-7 mm; Pacific coast of Mexico and Guatemala.

12c. *G. pinnatifrons* subsp. *membranacea*

4. Peduncles 11-41 cm long; fruits 4.4-8.8 × 3.6-6.3 mm.

5. Pinnae 3-39 per side of rachis; eastern Panama.

12e. *G. pinnatifrons* subsp. *pinnatifrons*

5. Pinnae 3-7 per side of rachis; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, western Panama.

12d. *G. pinnatifrons* subsp. *mexicana*

1. Distal lips of flower pits well-developed; flower pits not densely hairy internally.

6. Flower pits tricussately arranged throughout the rachillae, the groups of pits closely spaced.

7. Peduncles 3.7-6.2 mm diameter; Belize, Guatemala. **8b. *G. deversa* subsp. *belizensis***

7. Peduncles 1.9-9 mm diameter; all other areas.

8. Rachises 17.2-80 cm long; widespread.

8a. *G. deversa* subsp. *deversa*

8. Rachises 46.5-85 cm long; Osa Peninsula of Costa Rica.

8c. *G. deversa* subsp. *peninsularis*

6. Flower pits spirally, alternately, or rarely decussately arranged.

9. Flower pits decussately arranged; peduncular bracts vestigial; stamens 3; eastern Panama.

21. *G. triandra*

9. Flower pits spirally or alternately arranged; peduncular bracts well-developed, rarely absent; stamens 6 or more; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

10. Prophyll surfaces ridged with close, equal, parallel, non-dividing ridges, scarcely tomentose between the ridges; locular epidermis with operculum.

11. Rachillae 0.8-1.9 mm diameter; staminodial tubes of non-fertilized pistillate flowers not projecting, deciduous after anthesis; Panama.

12. Rachises 20-37 cm long; western end of the Serranía de San Blas, with an outlier on the Serranía de Majé.

3a. *G. concinnoidea* subsp. *concinnoidea*

12. Rachises 9.6-27 cm long; all other areas.

13. Rachillae 0.8-1.2 mm diameter; eastern end of the Central Cordillera.

3b. *G. concinnoidea* subsp. *coclensis*

13. Rachillae 1.1-1.7 mm diameter; east of the Canal Zone (Cerro Azul, Cerro Brewster, Cerro Bruja, Cerro Jefe).

3c. *G. concinnoidea* subsp. *jefensis*

11. Rachillae 4.1-8.3 mm diameter; staminodial tubes of non-fertilized pistillate flowers projecting and persistent after anthesis.

14. Proximal lips of flower pits with a central notch before anthesis, often the two sides of the notch overlapping, the lips \pm heart-shaped; Honduras, Nicaragua, Costa Rica, western and central Panama.

15. Rachillae 6-21.5 cm long; Honduras, Nicaragua, Costa Rica (excluding Osa Peninsula and adjacent areas), and western and central Panama. **4a. *G. congesta* subsp. *congesta***

15. Rachillae 15-23 cm long; Osa Peninsula and adjacent areas on the Pacific slope in Costa Rica.

4b. *G. congesta* subsp. *osensis*

14. Proximal lips of flower pits without a central notch before anthesis (but often tearing in the center after anthesis), not heart-shaped; eastern Panama. **2. *G. calyptrogynoides***

10. Prophyll surfaces not ridged, or if ridged then densely tomentose with widely to closely spaced ridges, these sometimes dividing; locular epidermis without operculum.

16. Rachillae filiform with extended narrowed sections between the flower pits; rachillae 85-138.

17. Pinnae 3 per side of rachis; Costa Rica on the Osa Peninsula and adjacent areas.

19. *G. scoparia*

17. Pinnae 26-49 per side of rachis; western Panama.

16. *G. mooreana*

16. Rachillae not filiform and not or scarcely narrowed between the flower pits; rachillae 1-38.

18. Staminodial tubes lobed at the apex, the lobes spreading at anthesis, acuminate; stamens more than 6; Panama.

7. *G. deneversii*

18. Staminodial tubes lobed at the apex, the lobes not spreading at anthesis, not acuminate, or staminodial tubes crenulate or shallowly lobed at the apex; stamens 6; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

19. Prophylls short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophylls equal to and early deciduous with the peduncular bracts.

20. Rachillae surfaces with faint to pronounced, short, transverse ridges; rachillae 10-42 cm long.

21. Veins raised and rectangular in cross-section adaxially; Panama (San Blas).

14c. *G. longevaginata* subsp. *sanblasensis*

21. Veins not raised or slightly raised and triangular in cross-section adaxially; Nicaragua, Costa Rica, and Panama.

22. Rachises 42-101 cm long; rachillae 4-18, 10-42 cm long.

14a. *G. longevaginata* subsp. *longevaginata*

22. Rachises 16.5-37.5 cm long; rachillae 2-5, 14-25.2 cm long.

23. Peduncles 3.8-7.5 cm long; El Copé, Llano Grande, Cerro Tife.

14b. *G. longevaginata* subsp. *copensis*

23. Peduncles 7.4-12.1 cm long; El Valle.

14d. *G. longevaginata* subsp. *vallensis*

20. Rachillae surfaces without short, transverse ridges; rachillae 3.8-15 cm long.

24. Rachillae 9-30; Nicaragua. **10c. *G. ferruginea* subsp. *nicaraguensis***

24. Rachillae 5-38; Costa Rica.

25. Rachillae 5-25, 6.4-15 cm long; Cordilleras Tilarán, Central, Talamanca, and

Guanacaste.

10a. *G. ferruginea* subsp. *ferruginea*

25. Rachillae 11-38, 3.8-8 cm long; Sarapiquí Valley.

10b. *G. ferruginea* subsp. *microspadix*

19. Prophylls not short and asymmetrically apiculate.

26. Proximal lips of flower pits apiculate and lobed before anthesis, tearing in the center after anthesis; fruit bases with a prominent, asymmetric stipe.

27. Peduncular bracts absent; inflorescences unbranched; Costa Rica and western

Panama.

20. *G. talamancana*

27. Peduncular bracts well-developed; inflorescences branched or unbranched; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

28. Inflorescences branched; prophyll surfaces ridged, the ridges unequally wide, often dividing from and rejoining other ridges, the prophyll margins with irregular, spine-like projections (rarely these absent), the prophylls usually splitting irregularly between the ridges.

29. Basal pinna 0.8-13.7 cm wide; flower pits not distantly spaced; Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, western Panama. **22a. *G. undata* subsp. *edulis***

29. Basal pinna 2.4-2.7 cm wide; flower pits distantly spaced; eastern Panama

22b. *G. undata* subsp. *tacarcunensis*

28. Inflorescences branched or unbranched; prophyll surfaces without unequally wide ridges.

30. Prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, \pm persistent; inflorescences unbranched; western Panama.

13. *G. lehmannii*

30. Prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; inflorescences branched, rarely unbranched; Nicaragua, Costa Rica, Panama.

17. *G. orbignyana*

26. Proximal lips of flower pits with a central notch before anthesis, often the two sides of the notch overlapping, the lips \pm heart-shaped; fruit bases without a prominent stipe.

31. Staminodial tubes crenulate or shallowly lobed at the apex.

32. Petioles drying orange-brown; Costa Rica (Cordilleras de Guanacaste and Tilarán).

6b. *G. cuneata* subsp. *guanacastensis*

32. Petioles drying green or yellowish.

33. Leaves with the veins raised and rectangular in cross-section adaxially; widespread.

6a. *G. cuneata* subsp. *cuneata*

33. Leaves with the veins not raised or slightly raised and triangular in cross-section adaxially

34. Pinnae to 28 per side of rachis; Nicaragua, Costa Rica, Panama.

6e. *G. cuneata* subsp. *procumbens*

34. Leaves undivided; Panama.

35. Rachises 19-29 cm long; El Copé, Coclecito Road, El Valle.

6d. *G. cuneata* subsp. *minor*

35. Rachises 40-88 cm long; Santa Fé to the western end of the Serranía de San Blás.

6c. *G. cuneata* subsp. *indivisa*

31. Staminal tubes lobed at the apex, the lobes not spreading at anthesis, not acuminate.
36. Peduncular bracts vestigial.
37. Peduncles 3.8-7 cm long; rachillae 1-3; Costa Rica and Panama. **15. G. monospatha**
37. Peduncles 15-37.5 cm long; rachillae 1; Costa Rica. **1. G. brenesii**
36. Peduncular bracts well-developed.
38. Petioles absent; Costa Rica and Panama. **9. G. epetiolata**
38. Petioles 1-12 cm long; Panama. **11. G. hugonis**

1. Geonoma brenesii Grayum, *Phytologia* 84: 322 (1998 publ. 1999). Holotype: Costa Rica, *de Nevers et al.* 7789 (MO!).

Stems 0.2-0.4 m long, 1.2 cm diameter, solitary. Leaves 8-11 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 6.5-10 cm long; petioles 21-38.5 cm long, drying green or yellowish; rachises 18.8-29.8 cm long, 1.9-4.3 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 3-4 per side of rachis; basal pinna 21.5-36.5 cm long, 2-10.2 cm wide, forming an angle of 30-53° with the rachis; apical pinna 13.5-21 cm long, 6.5-12 cm wide, forming an angle of 25-32° with the rachis. Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 10-17.5 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 1.5-7.1 cm long, vestigial, inserted 3.4-7 cm above the prophyll;

peduncles 15-37.5 cm long, 1.4-2.8 mm diameter; rachillae 1, 8.5-16 cm long, 2.8-5 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips with a central notch before anthesis, often the two sides of the notch overlapping, the lip, \pm heart-shaped, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes lobed, the lobes not spreading at anthesis, not acuminate, those of non-fertilized flowers not projecting and persistent after anthesis; fruits 6.9-7.6 \times 6-6.2 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland to montane rainforest*. CR (Hammel 13875, CR). 967-1550 m. (Endemic). (Costa Rica).

2. *Geonoma calyptrogynoidea* Burret, *Bot. Jahrb. Syst.* 63: 223 (1930). Neotype (designated by de Nevers & Grayum, 1988): Colombia, *Cárdenas 668* (MO!).

Stems 1.5-4 m long, 2-2.2 cm diameter, solitary or clustered. Leaves 8-15 per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 19.5-43.5 cm long; petioles 19-50 cm long, drying green or

yellowish; rachises 48-119 cm long, 4.4-9.9 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae to 8 per side of rachis, or leaves undivided; basal pinna 42-82.5 cm long, 11.5-40.5 cm wide, forming an angle of 15-42° with the rachis; apical pinna 17.5-48 cm long, 14.3-33 cm wide, forming a 22-35° angle with the rachis.

Inflorescences branched to 1 order; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; prophylls 16-28.2 cm long, not short and asymmetrically apiculate, the surfaces ridged with close, equal, parallel, non-dividing ridges, scarcely tomentose between the ridges, without unequally wide ridges; peduncular bracts 21.5-30 cm, well-developed, inserted 1.4-4.8 cm above the prophyll; peduncles 32-60.4 cm long, 4.5-10.3 mm diameter; rachillae 3-9, 14.5-34 cm long, 4.5-8.3 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate at the apex, those of non-fertilized flowers projecting and persistent after anthesis; fruits 11.8-15.5 × 8.3-11.2 mm, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, with fibers emerging, not bumpy, not apiculate; locular epidermis with

operculum, smooth, with pores. *Lowland rainforest*. P (*de Nevers 8305*, MO). 15-550 m. (Panama, Colombia, Ecuador).

3. *Geonoma concinnoidea* A.J.Hend., *Phytotaxa* 17: 50 (2011). Holotype: Panama, *de Nevers & H. Herrera 6942* (NY!).

Stems 1.6-4 m long, 0.4-1 cm diameter, solitary or clustered. Leaves 5-8 per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 4.5-12 cm long; petioles 3-19 cm long, drying green or yellowish; rachises 9.6-37 cm long, 1.5-3.3 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae to 3 per side of rachis, or leaves undivided; basal pinna 20-25.6 cm long, 3.6-6.8 cm wide, forming an angle of 22-44° with the rachis; apical pinna 9-20.5 cm long, 3-6.4 cm wide, forming an angle of 20-37° with the rachis. Inflorescences branched to 2 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous; prophylls 3-9.1 cm long, not short and asymmetrically apiculate, the surfaces ridged with close, equal, parallel, non-dividing ridges, scarcely tomentose between the ridges, without unequally wide ridges; peduncular bracts 4.5 cm long, well-developed, inserted 0.1-0.3 cm above the prophyll; peduncles 2-8.4 cm long, 1.7-4.2 mm diameter; rachillae 7-24, 6-14 cm long, 0.8-1.9 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, hood-shaped at anthesis, sometimes splitting post-anthesis; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout;

staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized flowers not projecting and persistent after anthesis; fruits 6.4-7.7 × 4.6-5.9 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, with fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis with operculum, smooth, without pores. *Lowland rainforest*. 350-1000 m. (Panama).

3a. *Geonoma concinnoidea* subsp. *concinnoidea*

Rachises 20-37 cm long; apical pinna 12.3-20.5 cm long. Inflorescences rachillae 1.3-1.9 mm diameter. *Lowland rainforest*. P (*de Nevers 5367*, NY). 350-550 m. (Endemic). (Panama).

3b. *Geonoma concinnoidea* subsp. *coclensis* A.J.Hend., *Phytotaxa* 17: 52

(2011). Holotype: Panama, *Henderson & Ferreira 3028* (PMA!).

Rachises 14.5-27 cm long; apical pinna 9-16.2 cm long. Inflorescences rachillae 0.8-1.2 mm diameter. *Lowland rainforest*. P (*Henderson 2052*, NY). 500-900 m. (Endemic). (Panama).

3c. *Geonoma concinnoidea* subsp. *jefensis* A.J.Hend., *Phytotaxa* 17: 52 (2011).

Holotype: Panama, *Mori & Joly 7933* (holotype, MO!).

Rachises 9.6-22.5 cm long; apical pinna 11.4-18.5 cm long. Inflorescences rachillae 1.1-1.7 mm diameter. *Lowland rainforest*. P (Croat 14429, MO). 800-1000 m. (Endemic). (Panama).

4. *Geonoma congesta* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 112 (1869).

Holotype: Costa Rica, *Wendland s.n.* (K!).

Stems 1-8 m long, 1-2.7 cm diameter, solitary or clustered. Leaves 6-13 per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 15.5-27 cm long; petioles 5.5-51 cm long, drying green or yellowish; rachises 38.8-132 cm long, 2.4-15.2 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae to 24 per side of rachis, or leaves undivided; basal pinna 33-82 cm long, 4.5-35.5 cm wide, forming an angle of 15-38° with the rachis; apical pinna 21.7-48 cm long, 7.1-42 cm wide, forming an angle of 20-32° with the rachis.

Inflorescences branched 1-3 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; prophylls 6-29.7 cm long, not short and asymmetrically apiculate, the surfaces ridged with close, equal, parallel, non-dividing ridges, scarcely tomentose between the ridges, without unequally wide ridges; peduncular bracts 13-26.5 cm long, well-developed, inserted 0.3-1 cm above the prophyll; peduncles 4.2-13 cm long, 3.4-9.8 mm diameter; rachillae 3-16, 6-23 cm long, 4.1-7.2 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-

developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate at the apex, those of non-fertilized flowers projecting and persistent after anthesis; fruits $9.7-15.2 \times 8.1-11.7$ mm, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, with fibers emerging, not bumpy, not apiculate; locular epidermis with operculum, smooth, with pores. Lowland rainforest. 25-1000 m. (Honduras, Nicaragua, Costa Rica, Panama).

5a. *Geonoma congesta* subsp. *congesta*

Inflorescences rachillae 6-21.5 cm long. *Lowland rainforest*. H (*Nelson 9145*, US), N (*Stevens 7069*, US), CR (*Henderson 55*, NY), P (*Henderson 3047*, NY). 25-1000 m. (Endemic). (Honduras, Nicaragua, Costa Rica, Panama).

5b. *Geonoma congesta* subsp. *osensis* A.J.Hend., *Phytotaxa* 17: 54 (2011).

Holotype: Costa Rica, *Moore 6534* (NY!).

Inflorescences rachillae 15-23 cm long. *Lowland rainforest*. CR (*Liesner 3216*, MO). 97-100 m. (Endemic). (Costa Rica).

6. *Geonoma cuneata* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 104 (1869).

Holotype: Costa Rica, *Wendland s.n.* (K!).

Stems 0.1-3 m long, 0.4-3.4 cm diameter, solitary or clustered. Leaves 4-17 per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 9-51 cm long; petioles 0.2-113.5 cm long, drying orange-brown, reddish-brown, or green or yellowish; rachises 12-250 cm long, 1.3-9 mm diameter; veins raised and rectangular in cross-section adaxially or not raised or slightly raised and triangular in cross-section adaxially; pinnae to 35 per side of rachis, or leaves undivided; basal pinna 12.5-68 cm long, 0.3-21.5 cm wide, forming an angle of 3-95° with the rachis; apical pinna 8.5-44 cm long, 1.5-37 cm wide, forming an angle of 10-50° with the rachis. Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 4-38 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 16.5-67 cm long, well-developed, inserted 0.4-5.7 cm above the prophyll; peduncles 13.7-117 cm long, 1.1-8.2 mm diameter; rachillae 1, 5.5-52 cm long, 1.9-10.5 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips pits with a central notch before anthesis, often the two sides of the notch overlapping, recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers persistent or deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent or deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at

the apex, those of non-fertilized flowers not projecting and persistent after anthesis; fruits 5-11.6 × 4.4-6.5 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, not bumpy, not apiculate; locular epidermis without operculum, smooth or sculpted, usually also with a raised, meridional ridge, without pores. *Lowland rainforest*. 2-1750 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador).

6a. *Geonoma cuneata* subsp. *cuneata*

Geonoma obovata H.Wendl. ex Spruce, *Geonoma gracilis* Wendl. ex Spruce, *Geonoma cuneata* var. *gracilis* (H.Wendl. ex Spruce) Skov ex Govaerts & J.Dransf, *Geonoma cuneatoidea* Burret

Leaves undivided or pinnate; petioles drying green or yellowish; veins raised and rectangular in cross-section adaxially; rachises 12-250 cm long; pinnae to 35 per side of rachis, or leaves undivided. Staminate flowers deciduous after anthesis; non-fertilized pistillate flowers deciduous after anthesis. *Lowland rainforest*. N (*Stevens 8967*, MO), CR (*Grayum 6927*, MO), P (*McPherson 11448*, MO). 2-1750 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador).

6b. *Geonoma cuneata* subsp. *guanacastensis* A.J.Hend., *Phytotaxa* 17: 58

(2011). Holotype: Costa Rica, *Gómez et al. 19053* (NY!).

Leaves undivided; petioles drying orange-brown; veins not raised or slightly raised and triangular in cross-section adaxially; rachises 17.7-31.5 cm long; leaves undivided. Staminate flowers deciduous after anthesis; non-fertilized pistillate flowers

deciduous after anthesis. *Lowland to montane rainforest*. CR (Utley 3215, NY). 470-1500 m. (Endemic). (Costa Rica).

6c. *Geonoma cuneata* subsp. *indivisa* A.J.Hend., *Phytotaxa* 17: 59 (2011).

Holotype: Panama, *de Nevers et al.* 6293 (NY!).

Leaves undivided; petioles drying green or yellowish; veins not raised or slightly raised and triangular in cross-section adaxially; rachises 40-88 cm long; leaves undivided. Staminate flowers deciduous after anthesis; non-fertilized pistillate flowers deciduous after anthesis. *Lowland rainforest*. P (Henderson 3045, NY). 50-1000 m. (Endemic). (Panama).

6d. *Geonoma cuneata* subsp. *minor* A.J.Hend., *Phytotaxa* 17: 60 (2011).

Holotype: Panama, *de Nevers et al.* 6355 (NY!).

Leaves undivided; petioles drying green or yellowish; veins not raised or slightly raised and triangular in cross-section adaxially; rachises 19-29 cm long; leaves undivided. Staminate flowers deciduous after anthesis; non-fertilized pistillate flowers deciduous after anthesis. *Lowland rainforest*. P (Sytsma 2419, MO). 700-1030 m. (Endemic). (Panama).

6e. *Geonoma cuneata* subsp. *procumbens* (H.Wendl. ex Spruce) A.J.Hend., *Phytotaxa* 17: 60 (2011). *Geonoma procumbens* H.Wendl. ex Spruce, *Geonoma cuneata* var. *procumbens* (H. Wendl. ex Spruce) Skov ex Govaerts & J.Dransf. Holotype: Costa Rica, *Wendland s.n.* (K!).

Leaves pinnate; petioles drying green or yellowish; veins not raised or slightly raised and triangular in cross-section adaxially; rachises 42-108 cm long; pinnae to 28 per side of rachis, or leaves undivided. Staminate flowers deciduous after anthesis; non-fertilized pistillate flowers deciduous after anthesis. *Lowland rainforest*. N (Stevens 4779, MO), CR (Hammel 20326, MO), P (Henderson 725, NY). 50-700 m. (Endemic). (Nicaragua, Costa Rica, Panama).

7. *Geonoma deneversii* A.J.Hend., *Phytotaxa* 17: 62 (2011). Holotype: Panama, *de Nevers et al.* 8823 (NY!).

Stems 1.3 m long, diameter not recorded, solitary. Leaves 20 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths not recorded; petioles drying green or yellowish; rachises 104.5 cm long, 5.4 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 3 per side of rachis; basal pinna 87 cm long, 18.7 cm wide, forming an angle of 31° with the rachis; apical pinna 25.5 cm long, 27.5 cm wide, forming an angle of 27° with the rachis. Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 35.5 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 31 cm long, well-developed, inserted 2.7 cm above the prophyll; peduncles 92.5 cm long, 5.2 mm diameter; rachillae 1, 31 cm long, 9.9 mm wide; flower pits spirally arranged, glabrous internally; proximal lips with a central notch before anthesis, often the two sides of the notch overlapping, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the

rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens more than 6; thecae diverging at anthesis, inserted directly onto the apiculate filament apices; anthers not short and curled at anthesis, usually elongate, spiraled and twisted or sometimes remaining straight; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes lobed at the apex, the lobes spreading at anthesis, acuminate; staminodial tubes projection not recorded; fruits not recorded. *Lowland rainforest*. P (de Nevers 8823, NY). 250 m. (Endemic). (Panama).

8. *Geonoma deversa* (Poit.) Kunth, *Enum. Pl.* 3: 231 (1841). *Gynestum deversum* Poit. Holotype: French Guiana, *Poiteau s.n.* (P!).

Stems 0.3-7 m long, 0.5-1.8 cm diameter, solitary or clustered. Leaves 6-18 per stem, undivided or irregularly pinnate, sometimes regularly pinnate and the pinnae with 1 main vein only, not plicate, bases of blades running diagonally into the rachis; sheaths 5-27.5 cm long; petioles 4.2-82 cm long, drying green or yellowish; rachises 17.2-92.5 cm long, 1.4-7 mm diameter; veins not raised or slightly raised and triangular in cross-section adaxially; pinnae to 28 per side of rachis, or leaves undivided; basal pinna 10.5-60.5 cm long, 0.5-27 cm wide, forming an angle of 20-93° with the rachis; apical pinna 8.8-35.5 cm long, 0.6-26.7 cm wide, forming an angle of 14-45° with the rachis.

Inflorescences branched 1-3 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous; prophylls 3-13 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges;

peduncular bracts 3.2-7.5 cm long, well-developed, inserted 0.1-0.7 cm above the prophyll; peduncles 2-19.7 cm long, 1.9-9 mm diameter; rachillae 3-43, 6.5-32 cm long, 1-3.4 mm diameter; flower pits tricussately or quadricussately arranged throughout the rachillae, the groups of pits closely spaced, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, hood-shaped at anthesis, sometimes splitting post-anthesis; proximal and distal lips drying the same color as the rachillae, joined to form a raised cupule, the margins not overlapping; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized flowers not projecting and persistent after anthesis; fruits 4.5-8.1 × 4.4-7 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, not bumpy and not apiculate; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. 5-1200 m. (Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Peru, Bolivia, Brazil).

8a. *Geonoma deversa* subsp. *deversa*

Geonoma longepetiolata Oerst., *Geonoma flaccida* H.Wendl. ex Spruce

Leaf rachises 17.2-80 cm long. Inflorescences peduncles 1.9-7.7 mm diameter; rachillae 1-3 mm diameter. *Lowland rainforest*. H (*von Hagen 1321*, NY), N (*Molina*

14979, NY), CR (*Henderson 61*, NY), P (*Henderson 3051*, NY). 5-1200 m. (Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Peru, Bolivia, Brazil).

8b. *Geonoma deversa* subsp. *belizensis* A.J.Hend., *Phytotaxa* 17: 65 (2011).

Holotype: Belize, *Balick et al. 2698* (NY!).

Leaf rachises 31-46.5 cm long. Inflorescences peduncles 3.7-6.2 mm diameter; rachillae 1.2-2.4 mm diameter. *Lowland rainforest*. B (*Gentle 8587*, NY), G (*Moore 8219*, BH). 100-400m. (Endemic). (Belize, Guatemala).

8c. *Geonoma deversa* subsp. *peninsularis* A.J.Hend., *Phytotaxa* 17: 65 (2011).

Holotype: Costa Rica, *Henderson et al. 1817* (CR!).

Leaf rachises 46.5-85 cm long. Inflorescences peduncles 4.6-9 mm diameter; rachillae 1.1-2.6 mm diameter. *Lowland rainforest*. CR (*Grayum 4103*, MO). 65-744 m. (Endemic). (Costa Rica).

9. *Geonoma epetiolata* H.E.Moore, *Gentes Herbarum* 12: 28 (1980). Holotype:

Panama, *Dressler 4777* (BH!).

Stems 0.5-3 m long, 0.5-1.1 cm diameter, solitary or clustered. Leaves 8-10 per stem, undivided, not plicate, bases of blades recurved against the rachis; sheaths 3-8.2 cm long; petioles absent; rachises 18.8-50.5 cm long, 2.2-7.5 mm diameter; veins raised and rectangular in cross-section adaxially; leaves undivided; basal pinna forming an angle of 4-24° with the rachis; apical pinna 5.2-14 cm long, forming an angle of 16-45° with the rachis. Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate,

unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, \pm persistent; prophylls 7-12.7 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 7-8.7 cm long, well-developed, inserted 1-5.6 cm above the prophyll; peduncles 5-15 cm long, 1.3-3.2 mm diameter; rachillae 1, 9-38 cm long, 1.7-4.9 mm diameter; flower pits usually spirally arranged, sometimes tricussately, then the groups not closely spaced nor consistently arranged throughout the rachillae, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes lobed, the lobes not spreading at anthesis, not acuminate, those of non-fertilized flowers not projecting and persistent after anthesis; fruits 7.3-9.9 \times 4.7-5.3 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, not bumpy, not apiculate, ridged from the numerous, subepidermal, meridional, elongate fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. CR (Grayum et al. 5021, MO), P (de Nevers 6717, NY). 300-1200 m. (Endemic). (Costa Rica, Panama).

10. *Geonoma ferruginea* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 110 (1869).

Holotype: Costa Rica, *Wendland s.n.* (K!).

Stems 1-5 m long, 0.5-1.6 cm diameter, solitary or clustered. Leaves 9 per stem, irregularly pinnate, not plicate, bases of the blades running diagonally into the rachis; sheaths 7.3-17.3 cm long; petioles 6-45 cm long, drying green or yellowish; rachises 16.5-53 cm long, 1.4-4.7 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 3-15 per side of rachis; basal pinna 11.7-28 cm long, 0.5-8 cm wide, forming an angle of 35-95° with the rachis; apical pinna 8.6-23 cm long, 1.4-16.5 cm wide, forming an angle of 20-45° with the rachis. Inflorescences branched 1-3 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous; prophylls 4.7-12.2 cm long, short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophylls equal to and early deciduous with the peduncular bract, the surfaces not ridged, without unequally wide ridges; peduncular bracts 5.3-11.5 cm long, well-developed, inserted 0.1-0.5 cm above the prophyll; peduncles 3.7-10.7 cm long, 1.9-6.8 mm diameter; rachillae 5-38, 3.8-15 cm long, 1.5-4 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted onto bifid and well-developed, non-jointed connectives; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after

anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 5.2-9.3 × 4.2-7.3 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland to montane rainforest*. 100-1500 m. (Nicaragua, Costa Rica).

10a. *Geonoma ferruginea* subsp. *ferruginea*

Geonoma versiformis H.Wendl. ex Spruce.

Inflorescence rachillae 5-25, 6.4-15 cm long. *Lowland to montane rainforest*. CR (*de Nevers 7783*, NY). 400-1500 m. (Endemic). (Costa Rica).

10b. *Geonoma ferruginea* subsp. *microspadix* (H.Wendl. ex Spruce) A.J.Hend.,

Phytotaxa 17: 74 (2011). *Geonoma microspadix* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 110 (1869). Holotype: Costa Rica, *Wendland s.n.* (K!).

Inflorescence rachillae 11-38, 3.8-8 cm long. *Lowland rainforest*. CR (*Moore 6607*, BH). 100-950 m. (Endemic). (Costa Rica).

10c. *Geonoma ferruginea* subsp. *nicaraguensis* A.J.Hend., *Phytotaxa* 17: 74

(2011). Holotype: Nicaragua, *Pipoly 5112* (NY!).

Inflorescence rachillae 9-30, 5.5-9.5 cm long. *Lowland to montane rainforest*. CR (*Gentry 43898*, MO). 350-1500 m. (Endemic). (Nicaragua).

11. *Geonoma hugonis* Grayum & de Nevers, *Principes* 42: 94 (1998). Holotype: Panama, *Churchill & Churchill 6185* (MO!).

Stems 0.1-1.2 m long, 0.4-0.8 cm diameter, solitary or clustered. Leaves 4-12 per stem, undivided, not plicate, bases of blades running diagonally into the rachis; sheaths 3.5-14 cm long; petioles 1-12 cm long, drying green or yellowish; rachises 7-20 cm long, 1.3-2.7 mm diameter; veins raised and rectangular in cross-section adaxially; leaves undivided; basal pinna length and width not applicable, forming an angle of 22-40° with the rachis; apical pinna 5.8-17.2 cm long, width not applicable, forming an angle of 22-42° with the rachis. Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 11-17 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 1.5-18.4 cm long, well-developed, inserted 17.8-23 cm above the prophyll; peduncles 13.5-43.5 cm long, 0.9-2 mm diameter; rachillae 1, 4.6-12.5 cm long, 1.7-3.5 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips with a central notch before anthesis, often the two sides of the notch overlapping, not recurved after anthesis, not hood-shaped at anthesis; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized

pistillate flowers deciduous after anthesis; staminodial tubes lobed, the lobes not spreading at anthesis, not acuminate; staminodial tubes of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 5.4-6.9 × 4.7-6.3 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Montane rainforest*. P (Henderson 2044, NY). 1100-1450 m. (Endemic). (Panama).

12. *Geonoma interrupta* (Ruiz & Pav.) Mart., *Hist. Nat. Palm.* 2: 8 (1823).

Martinezia interrupta Ruiz & Pav. Isotype: Peru, *Pavón s.n.* (K!).

Stems 0.3-8 m long, 2.6-5 cm diameter, solitary. Leaves 8-24 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 15-60.5 cm long; petioles 9-110 cm long, drying green or yellowish; rachises 55-200 cm long, 3.8-16 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 4-47 per side of rachis; basal pinna 23.5-75.5 cm long, 0.2-27 cm wide, forming an angle of 24-60° with the rachis; apical pinna 23-65.5 cm long, 0.4-39 cm wide, forming an angle of 14-40° with the rachis. Inflorescences branched 2-4 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; prophylls 11.5-40 cm long, not short and asymmetrically apiculate, the surfaces ridged and densely tomentose with widely to closely spaced ridges, the ridges unequally wide, often dividing from and rejoining other ridges, the prophyll margins with irregular, spine-like projections, the prophylls usually splitting irregularly between the ridges; peduncular

bracts 10.5-25.5 cm long, well-developed, inserted 1-8 cm above the prophyll; peduncles 7-34 cm long, 2.5-20.1 mm diameter; rachillae 22-120, 9.2-29.7 cm long, 1.3-3.4 mm diameter; flower pits spirally arranged, densely hairy internally distally only (rarely some hairs on lateral) margins of the pits; proximal lips without a central notch before anthesis, not recurved after anthesis, hood-shaped at anthesis, sometimes splitting post-anthesis; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips absent; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent or deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex; staminodial tubes of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 4.4-7.5 × 3.6-6.3 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, sculpted, usually also with a raised, meridional ridge, without pores. *Lowland to montane rainforest*. 0-1500 m. (Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia).

12b. *Geonoma interrupta* subsp. *magnifica* (Linden & H.Wendl.) A.J.Hend., *Phytotaxa* 17: 82 (2011). *Geonoma magnifica* Linden & H.Wendl., *Linnaea* 28: 335 (1857). Holotype: Mexico, Tabasco, *Ghiesbreght s.n.* (GOET *n.v.*).

Pinnae 4-47 per side of rachis. Inflorescences peduncular bracts inserted 1.5-7.4 cm above the prophyll; non-fertilized pistillate flowers deciduous after anthesis. *Lowland to montane rainforest*. T (*Ghiesbreght s.n.*, GOET), Ch (*Matuda 16820*, F), B (*Balick 2704*, NY), G (*Contreras 2372*, NY), H (*Wilson 405*, NY), N (*Stevens 13104*, MO), CR (*Henderson 56*, NY), P (*Henderson 3021*, NY). 0-1500 m. (Mexico [Chiapas, Tabasco, Veracruz], Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia).

13. *Geonoma lehmannii* Dammer ex Burret, *Bot. Jahrb. Syst.* 63: 180 (1930). Isotype: Colombia, *Lehmann 4630* (K!).

Stems 0.1-4 m long, 0.6-1.7 cm diameter, solitary or clustered. Leaves 5-15 per stem, undivided or irregularly pinnate, not plicate or plicate, bases of blades running diagonally into the rachis; sheaths 7-24.5 cm long; petioles 1.5-72 cm long, drying green or yellowish; rachises 6.7-51.5 cm long, 1.4-7.6 mm diameter; veins raised and rectangular in cross-section adaxially or not raised or slightly raised and triangular in cross-section adaxially; pinnae to 9 per side of rachis, or leaves undivided; basal pinna 16-48 cm long, 0.5-11 cm wide, forming an angle of 7-77° with the rachis; apical pinna 9-47.5 cm long, 1.8-20.5 cm wide, forming an angle of 6-39° with the rachis.

Inflorescences unbranched; prophylls and peduncular bracts ribbed with elongate, unbranched fibers, both bracts tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 10-41.5 cm long, not short and asymmetrically apiculate, the

surfaces not ridged, without unequally wide ridges; peduncular bracts 8.7-49 cm long, well-developed, inserted 4-39 cm long; peduncles 12.5-88.5 cm long, 1.3-4.2 mm diameter; rachillae 1, 5.5-29 cm long, 2.2-6.5 mm diameter; flower pits usually spirally arranged, glabrous internally; proximal lips apiculate and lobed before anthesis, tearing in the center after anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 6.6-10.7 × 5.2-7.6 mm, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, sculpted, usually also with a raised, meridional ridge, without pores.

Montane rainforest. 1100-2900 m. (Panama, Colombia, Venezuela, Ecuador, Peru).

13b. *Geonoma lehmannii* subsp. *corrugata* A.J.Hend., *Phytotaxa* 17: 87 (2011).

Holotype: Panama, *de Nevers & Charnley 6684* (NY!).

Leaves plicate. Prophylls 16.5-41.5 cm long; peduncles 19-88.5 cm long.

Montane rainforest. P (*Henderson 2043*, NY). 1100-2500 m. (Endemic). (Panama).

14. *Geonoma longevaginata* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 109 (1869). Holotype: Costa Rica, *Wendland s.n.* (K!).

Stems 1-5 m long, 0.6-2.1 cm diameter, solitary or clustered. Leaves 6-10 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 6-26 cm long; petioles 5.5-58 cm long, drying green or yellowish; rachises 16.5-101 cm long, 1.4-8 mm diameter; veins raised and rectangular in cross-section adaxially or not raised or slightly raised and triangular in cross-section adaxially; pinnae 2-13 per side of rachis; basal pinna 8.5-50 cm long, 0.7-34.5 cm wide, forming an angle of 31-92° with the rachis; apical pinna 6.7-31.5 cm long, 5.5-30 cm wide, forming an angle of 27-50° with the rachis. Inflorescences branched to 1-2 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous; prophylls 3.3-16 cm long, short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophylls equal to and early deciduous with the peduncular bract, the surfaces not ridged, without unequally wide ridges; peduncular bracts 4-11.6 cm long, well-developed, inserted 0.1-0.6 cm above the prophyll; peduncles 3.8-16 cm long, 2.3-9.2 mm diameter; rachillae 2-18, 10-42 cm long, 1.9-5.3 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted onto

bifid and well-developed, non-jointed connectives; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits $5.1-7.9 \times 4.3-6.3$ mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. 5-1200 m. (Nicaragua, Costa Rica, Panama).

14a. *Geonoma longevaginata* subsp. *longevaginata*

Leaves veins not raised or slightly raised and triangular in cross-section adaxially; rachises 42-101 cm long. Inflorescence peduncles 5-16 cm long; rachillae 4-18, 10-42 cm long. *Lowland rainforest*. N (*Stevens 23438*, MO), CR (*Grayum 9185*, MO), P (*Hammel 14498*, MO). 5-1000 m. (Endemic). (Nicaragua, Costa Rica, Panama).

14b. *Geonoma longevaginata* subsp. *copensis* A.J.Hend., *Phytotaxa* 17: 91

(2011). Holotype: Panama, *de Nevers et al. 6392* (PMA!).

Leaves veins not raised or slightly raised and triangular in cross-section adaxially; rachises 16.5-30 cm long. Inflorescence peduncles 3.8-7.5 cm long; rachillae 2-4, 14-20.5 cm long. *Lowland rainforest*. P (*Hammel 4166*, MO). 200-1200 m. (Endemic). (Panama).

Loiseau et al. (2019), in a study of *Geonoma* phylogeny, found that two samples of *G. longevaginata* subsp. *copensis* were more closely related to *G. monospatha*, suggesting that this subspecies may better be treated as a distinct species.

14c. *Geonoma longevaginata* subsp. *sanblasensis* A.J.Hend., *Phytotaxa* 17: 92 (2011). Holotype: Panama, *de Nevers & H. Herrera 7957* (NY!).

Leaves veins raised and rectangular in cross-section adaxially; rachises 42-64 cm long. Peduncles 8-14 cm long; rachillae 4-8, 22.3-37 cm long. *Lowland rainforest*. P (*de Nevers 7251*, MO). 80-450 m. (Endemic). (Panama).

14d. *Geonoma longevaginata* subsp. *vallensis* A.J.Hend., *Phytotaxa* 17: 93 (2011). Holotype: Panama, *Henderson & Bernal 2039* (PMA!).

Leaves veins not raised or slightly raised and triangular in cross-section adaxially; rachises 20.5-37.5 cm long. Peduncles 7.4-12.1 cm long rachillae 3-5, 15.4-25.2 cm long. *Lowland rainforest*. P (*Mori 6577*, MO). 880-950 m. (Endemic). (Panama).

15. *Geonoma monospatha* de Nevers, *Principes* 42: 98 (1998). Holotype: Panama, *de Nevers et al. 10556* (PMA!).

Stems length not recorded, 0.3-0.7 cm diameter, solitary or clustered. Leaves undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 1.5-6.5 cm long; petioles 1.5-8.5 cm long, drying green or yellowish; rachises 9-23.2 cm long, 0.9-2.2 mm diameter; veins not raised or slightly raised and triangular in cross-section adaxially; pinnae to 4 per side of rachis, or leaves undivided; basal pinna 5.5-15.4 cm long, 1-5.7 cm wide, forming an angle of 16-45° with the rachis; apical pinna 4.1-6 cm long, 3.4-11.2 cm wide, forming an angle of 20-40° with the rachis. Inflorescences spicate or branched to 1 order; prophylls and peduncular bracts not ribbed

with elongate, unbranched fibers, flattened, \pm persistent; prophylls 2.2-7.4 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 0.1-0.2 cm, long, vestigial, inserted 0.9-2.8 cm above the prophyll; peduncles 3.8-7 cm long, 1.2-2 mm diameter; rachillae 1-3, 2.2-4.1 cm long, 1.8-3.3 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips with a central notch before anthesis, often the two sides of the notch overlapping, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes lobed, the lobes not spreading at anthesis, not acuminate, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 6.1-7.2 \times 4.9-5.5 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland to montane rainforest*. CR (*Jiménez et al.* 942, MO), P (*Hammel* 26281, MO). 300-1900 m. (Endemic). (Costa Rica, Panama).

Loiseau et al. (2019), in a study of *Geonoma* phylogeny, found that three samples of *G. monospatha* from Costa Rica were placed far apart from the two Panamanian

samples in their tree, suggesting that the Costa Rican population would better be treated as a distinct species.

16. *Geonoma mooreana* de Nevers & Grayum, *Novon* 5: 354 (1995). Holotype: Panama, *Croat & Guanghua Zhu 76826* (MO!).

Stems 2.4 m long, 1.2-1.7 cm diameter, clustered. Leaves 9 per stem, regularly pinnate and the pinnae with 1 main vein only, not plicate, bases of blades running diagonally into the rachis; sheaths 11.5-22 cm long; petioles 12-59 cm long, drying green or yellowish; rachises 38-78.5 cm long, 2.6-5.3 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 26-49 per side of rachis; basal pinna 14-38 cm long, 0.3-0.5 cm wide, forming an angle of 47-89° with the rachis; apical pinna 10-16.7 cm long, 0.5-2.8 cm wide, forming an angle of 15-40° with the rachis. Inflorescences branched 3-4 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; prophylls 8.1-20.9 cm long, short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophylls equal to and early deciduous with the peduncular bract, the surfaces not ridged, without unequally wide ridges; peduncular bracts 8-19 cm long, well-developed, inserted 0.3-0.7 cm above the prophyll; peduncles 7.5-16 cm long, 4.2-8.5 mm diameter; rachillae 78-136, 11-15 cm long, 0.3-1 mm diameter; flower pits alternately arranged (sometimes distorted by twisting and contracting of rachillae), glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, joined to form a raised cupule, the margins not overlapping;

distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits $4.4-6.7 \times 4.1-5$ mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. P (Nee 11252, BH). 180-966 m. (Endemic). (Panama).

17. *Geonoma orbignyana* Mart. in A.D.d'Orbigny, *Voy. Amér. Mér.* 7(3): 22 (1843). Holotype: Bolivia, *d'Orbigny 44* (P *n.v.*).

Stems 0.1-4 m long, 0.5-2.2 cm diameter, solitary or clustered. Leaves 4-20 per stem, undivided or irregularly pinnate, sometimes regularly pinnate and the pinnae with 1 main vein only, not plicate or plicate, bases of blades running diagonally into the rachis; sheaths 5-60 cm long; petioles 1.5-90 cm long, drying green or yellowish; rachises 5-76 cm long, 1.2-8.2 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae to 26 per side of rachis, or leaves undivided; basal pinna 13-59.5 cm long, 0.1-15.5 cm wide, forming an angle of $7-95^\circ$ with the rachis; apical pinna 7.7-47.5 cm long, 0.3-21.3 cm wide, forming an angle of $6-43^\circ$ with the rachis. Inflorescences spicate or branched to 1-2 orders; prophylls and peduncular bracts not ribbed with elongate,

unbranched fibers, flattened (if tubular, narrow, and elongate then not ribbed), deciduous or persistent; prophylls 3.4-41.5 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 3-49 cm long, well-developed, inserted 0.8-39 cm above the prophyll; peduncles 6-88.5 cm long, 1.3-11.1 mm diameter; rachillae 1-28, 5-31 cm long, 1.8-6.6 mm diameter; flower pits usually spirally arranged, sometimes decussately or tricussately, then the groups not closely spaced nor consistently arranged throughout the rachillae, glabrous internally; proximal lips apiculate and lobed before anthesis, tearing in the center after anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 6-16.5 × 5.1-12.9 mm, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Montane rainforest*. 1400-3000 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia).

17b. *Geonoma orbignyana* subsp. *hoffmanniana* (H.Wendl. ex Spruce)

A.J.Hend., *Phytotaxa* 17: 113 (2011). *Geonoma hoffmanniana* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 106 (1869). Holotype: Costa Rica, *Wendland s.n.* (K!).

Geonoma molinae Glassman

Peduncular bracts 10.7-27.5 cm long; peduncles 20.9-56 cm long. *Montane rainforest*. N (*Gentry 44046*, MO), CR (*Davidse 26197*, NY), P (*Croat 26469*, MO). 1400-3000 m. (Endemic). (Nicaragua, Costa Rica, Panama).

18. *Geonoma pinnatifrons* Willd., *Sp. Pl.*, ed. 4, 4: 593 (1805). Holotype:

Venezuela, *Bredemeyer 20* (M!).

Stems 0.1-6 m long, 1.2-3.2 cm diameter, solitary or clustered. Leaves 6-23 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 13-63 cm long; petioles 10-125 cm long, drying green or yellowish; rachises 36-163 cm long, 1.9-14.5 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 2-39 per side of rachis; basal pinna 21.5-65 cm long, 0.5-22.5 cm wide, forming an angle of 20-70° with the rachis; apical pinna 16-61 cm long, 3.5-44.5 cm wide, forming an angle of 21-37° with the rachis. Inflorescences branched to 1-4 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened (if tubular, narrow, and elongate then not ribbed), deciduous or persistent; prophylls 7-25 cm long, not short and asymmetrically apiculate, the surfaces ridged and densely tomentose with widely to closely spaced ridges, unequally wide, often dividing from and rejoining other ridges, the prophyll margins with irregular, spine-like projections, the prophylls usually splitting irregularly between the ridges; peduncular bracts 10-27.5 cm long, well-

developed, inserted 0.6-7.4 cm above the prophyll; peduncles 10-42 cm long, 2.4-21.2 mm diameter; rachillae 4-45, 7-28.3 cm long, 1.1-3.8 mm diameter; flower pits spirally arranged, densely hairy internally proximally and distally; proximal lips without a central notch before anthesis, not recurved after anthesis, hood-shaped at anthesis, sometimes splitting post-anthesis; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; proximal lips hood-shaped; distal lips absent; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent or deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 3.6-9.3 × 3.5-7 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth or locular epidermis sculpted and then usually also with a raised, meridional ridge, without pores. *Lowland to montane rainforest*. 4-1900 m. (Mexico, Mesoamerica, Colombia, Venezuela, Ecuador, Haiti, Trinidad & Tobago, Lesser Antilles).

18a. *Geonoma pinnatifrons* subsp. *pinnatifrons*

Leaf pinnae 3-39 per side of rachis. Peduncular bracts inserted 0.6-6.5 cm above the prophyll; peduncles 11-41 cm long, 3.6-12.9 mm diameter; rachillae 8.6-25.7 cm

long, 1.1-3.4 mm diameter; fruits 3.6-6.3 mm diameter. *Lowland to montane rainforest*. P (*Gentry 13857*, MO). 30-1900 m. (Panama, Colombia, Venezuela, Ecuador).

18b. *Geonoma pinnatifrons* subsp. *binervia* (Oerst.) A.J.Hend., *Phytotaxa* 17: 119 (2011). *Geonoma binervia* Oerst., *Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn* 1858: 33 (1859). Holotype: Nicaragua, *Orsted 6564* (C!).

Leaf pinnae 3-19 per side of rachis. Peduncular bracts inserted 0.9-4.7 cm above the prophyll; peduncles 10-38 cm long, 9.3-20.2 mm diameter; rachillae 8.7-28.3 cm long, 1.7-3.4 mm diameter; fruits 3.7-5.1 mm diameter. *Lowland rainforest*. G (*Steyermark 38757*, F), N (*Rueda 2669*, MO), CR (*Liesner 15028*, MO), P (*Hammel 14829*, MO). 4-725 m. (Guatemala, Nicaragua, Costa Rica, Panama, Colombia).

18c. *Geonoma pinnatifrons* subsp. *membranacea* (H.Wendl. ex Spruce) A.J.Hend., *Phytotaxa* 17: 120 (2011). *Geonoma membranacea* H.Wendl. ex Spruce, *J. Linn. Soc., Bot.* 11: 106 (1869). Holotype: Guatemala, *Wendland 7 & 8* (K!).

Leaf pinnae 3-8 per side of rachis. Peduncular bracts inserted 0.9-2 cm above the prophyll; peduncles 13.6-18.8 cm long, 2.4-5.8 mm diameter; rachillae 10.2-22.5 cm long, 1.4-2.4 mm diameter; fruits 5.2-7 mm diameter. *Lowland to montane rainforest*. Ch (*Matuda 18568*, MEXU), G (*Steyermark 33339*, F). 700-1650 m. (Endemic). (Mexico [Chiapas], Guatemala).

18d. *Geonoma pinnatifrons* subsp. *mexicana* (Liebm. ex Mart.) A.J.Hend., *Phytotaxa* 17: 121 (2011). *Geonoma mexicana* Liebm. ex Mart., *Hist. Nat. Palm.* 3: 316 (1853). Holotype: Mexico, Oaxaca, *Liebman 10804* (C!).

Leaf pinnae 3-39 per side of rachis. Peduncular bracts inserted 1.8-7.4 cm above the prophyll; peduncles 19-37 cm long, 3.8-10.7 mm diameter; rachillae 7-18 cm long, 1.6-3.3 mm diameter; fruits 3.7-4.5 mm diameter. *Lowland rainforest*. T (*Matuda 3477*, F), Ch (*Martínez 8800*, NY), B (*Holst 5293*, NY), G (*Lundell 2691*, NY), H (*Yuncker 8473*, NY), N (*Moreno 13033*, MO), CR (*Grayum 4845*, MO), P (*de Nevers 8838*, NY). 50-1100 m. (Mexico [Oaxaca, Veracruz], Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama).

19. *Geonoma scoparia* Grayum & de Nevers, *Principes* 32: 111 (1988). Holotype: Costa Rica, *de Nevers et al. 7757* (MO!).

Stems 2-3 m long, 0.8-1.5 cm diameter, solitary. Leaves 12-19 per stem, irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 9.5-14 cm long; petioles 18-35.5 cm long, drying green or yellowish; rachises 23.2-33.5 cm long, 1.9-2.6 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae 3 per side of rachis; basal pinna 20.5-30 cm long, 1-3.5 cm wide, forming an angle of 65-78° with the rachis; apical pinna 11.5-16.5 cm long, 5.5-9.2 cm wide, forming an angle of 34-44° with the rachis. Inflorescences branched 4 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous; prophylls 6.5-7.3 cm long, short, asymmetrically apiculate, the margins curved around the stem, the surfaces flat with dense, felty, brown tomentum, prophylls equal to and

early deciduous with the peduncular bract, the surfaces not ridged, without unequally wide ridges; peduncular bracts 7 cm long, well-developed, inserted 0.2-0.6 cm above the prophyll; peduncles 2.5-3.2 cm long, 3.1-3.6 mm diameter; rachillae 85-138, 6-13.5 cm long, 0.4-1 mm diameter; flower pits alternately arranged (sometimes distorted by twisting and contracting of rachillae), glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, joined to form a raised cupule, the margins not overlapping; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 5.8-6.1 × 4.7 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. CR (*Henderson 1813*, NY). 100-350 m. (Endemic). (Costa Rica).

20. *Geonoma talamancana* Grayum, *Phytologia* 84: 324 (1998 publ. 1999).

Holotype: Costa Rica, *Grayum 11033* (MO!).

Stems 1-1.3 m long, 1.3 cm diameter, solitary or clustered. Leaves 7-10 per stem, undivided or irregularly pinnate, plicate, bases of blades running diagonally into the

rachis; sheaths 15-23.5 cm long; petioles 12-41.5 cm long, drying green or yellowish; rachises 21-57 cm long, 1.8-5 mm diameter; veins raised and rectangular in cross-section adaxially; pinnae to 7 per side of rachis, or leaves undivided; basal pinna 28-40 cm long, 1.3-6.5 cm wide, forming an angle of 13-43° with the rachis; apical pinna 18.6-39 cm long, 5.5-8.6 cm wide, forming an angle of 10-25° with the rachis. Inflorescences spicate; prophylls ribbed with elongate, unbranched fibers, tubular, narrow, elongate, closely sheathing the peduncle, ± persistent; prophylls 16.5-38 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts absent; peduncles 55.5-81 cm long, 1.6-3.2 mm diameter; rachillae 1, 11.5-23.5 cm long, 2.5-4.6 mm diameter; flower pits spirally arranged, glabrous internally; proximal lips apiculate and lobed before anthesis, tearing in the center after anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 6.3-8.3 × 4.5-5.8 mm, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum,

smooth, without pores. *Montane rainforest*. CR (Davidse 29105, CR). 1250-2315 m. (Endemic). (Costa Rica, Panama).

21. *Geonoma triandra* (Burret) Wess.Boer, *Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2*, 58(1): 85 (1968). *Kalbreyera triandra* Burret, *Bot. Jahrb. Syst.* 63: 143 (1930). Neotype (designated by Henderson, 2011): Colombia, *Fonnegra et al.* 2002 (NY!).

Stems 2.5 m long, 0.5-1.4 cm diameter, clustered. Leaves 8-11 per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 4.7-8 cm long; petioles 4.5-14.7 cm long, drying green or yellowish; rachises 20.8-37.5 cm long, 1.6-3.6 mm diameter; veins not raised or slightly raised and triangular in cross-section adaxially; pinnae to 3 per side of rachis, or leaves undivided; basal pinna (14-30 cm long, 3.8-14.5 cm wide, forming an angle of 20-57° with the rachis; apical pinna 8.5-18 cm long, 7-12.7 cm wide, forming an angle of 28-46° with the rachis. Inflorescences branched to 2-3 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, persistent; prophylls (5.5-27 cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 0.1-6 cm long, vestigial, inserted 0.5-7.3 cm above the prophyll; peduncles 6.5-28.5 cm long, 2.1-4.5 mm diameter; rachillae 21-75, 6-15 cm long, 0.8-1.8 mm diameter; flower pits decussately arranged throughout the rachillae, the groups of pits closely spaced, glabrous internally; proximal lips without a central notch before anthesis, not recurved after anthesis, hood-shaped at anthesis, sometimes splitting post-anthesis; proximal and distal lips drying the same color as the rachillae, not joined to

form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 3; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers deciduous after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 6-7.4 × 4.8-6.1 mm, the bases without a prominent stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices; locular epidermis without operculum, smooth, without pores. *Lowland rainforest*. P (*Gentry 13856*, BH). 45-1250 m. (Panama, Colombia, Ecuador).

22. *Geonoma undata* Klotzsch *Linnaea* 20: 452 (1847). Isotype: Venezuela, *Karsten 26* (BM!).

Stems 0.7-15 m long, 0.9-5 cm diameter, solitary or clustered. Leaves 4-17 per stem, undivided or irregularly pinnate, not plicate or plicate, bases of blades running diagonally into the rachis; sheaths 5-97.5 cm long; petioles 0-113 cm long, drying green or yellowish; rachises 17-265 cm long, 2.2-28.1 mm diameter; veins raised and rectangular in cross-section adaxially or not raised or slightly raised and triangular in cross-section adaxially; pinnae to 65 per side of rachis, or leaves undivided; basal pinna 14-83 cm long, 0.3-27 cm wide, forming an angle of 10-90° with the rachis; apical pinna 8-66 cm long, 0.1-30 cm wide, forming an angle of 5-41° with the rachis. Inflorescences

branched to 1-3 orders; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened (if tubular, narrow, and elongate then not ribbed), deciduous or persistent; prophylls 5.4-49 cm long, prophylls not short and asymmetrically apiculate, the surfaces ridged and densely tomentose with widely to closely spaced ridges, the ridges unequally wide, often dividing from and rejoining other ridges, the prophyll margins with irregular, spine-like projections (rarely these absent), the prophylls usually splitting irregularly between the ridges; peduncular bracts 7-39 cm long, well-developed, inserted 0.4-11 cm long; peduncles 4.7-50 cm long, 1.5-34.4 mm diameter; rachillae 3-80, 5-54 cm long, 0.8-9.4 mm diameter; flower pits usually spirally arranged, sometimes decussately or tricussately, then the groups not closely spaced nor consistently arranged throughout the rachillae, glabrous internally; proximal lips apiculate and lobed before anthesis, tearing in the center after anthesis, not recurved after anthesis, not hood-shaped; proximal and distal lips drying the same color as the rachillae, not joined to form a raised cupule, the proximal lip margins overlapping the distal lip margins; distal lips well-developed; staminate and pistillate petals not emergent, not valvate throughout; staminate flowers deciduous after anthesis; stamens 6; thecae diverging at anthesis, inserted almost directly onto the filament apices, the connectives bifid but scarcely developed; anthers short and curled over at anthesis; non-fertilized pistillate flowers persistent after anthesis; staminodial tubes crenulate or shallowly lobed at the apex, those of non-fertilized pistillate flowers not projecting and persistent after anthesis; fruits 4.4-15.4 × 3.8-12 mm diameter, the bases with a prominent, asymmetric stipe, the apices not conical, the surfaces not splitting at maturity, without fibers emerging, bumpy from the numerous, subepidermal, tangential, short fibers present, these coming to a point at fruit apices;

ocular epidermis without operculum, sculpted, usually also with a raised, meridional ridge, without pores. *Lowland to montane rainforest*. 550-3370 m. (Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil, Lesser Antilles).

22a. *Geonoma undata* subsp. *edulis* (H.Wendl. ex Spruce) A.J.Hend., *Phytotaxa* 17: 158 (2011). *Geonoma edulis* H.Wendl. ex Spruce, J. Linn. Soc., Bot. 11: 100 (1869). Holotype: Costa Rica, *Wendland s.n.* (K!).

Geonoma seleri Burret, *Geonoma polyneura* Burret

Leaves veins raised and rectangular in cross-section adaxially; basal pinna 0.8-13.7 cm wide; apical pinna 5.7-23.2 cm wide. Inflorescence prophyll margins with irregular, spine-like projections; flower pits usually spirally arranged, not distantly spaced. *Montane rainforest*. CH (*Breedlove 35114*, MO), G (*Croat 41334*, MO), H (*D'Arcy 18069*, MO), N (*Stevens 15105*, MO), CR (*Croat 26688*, MO), P (*Croat 48593*, MO). 850-2400 m. (Endemic). (Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama).

22b. *Geonoma undata* subsp. *tacarcunensis* A.J.Hend., *Phytotaxa* 17: 161 (2011). Holotype: Panama, *de Nevers et al. 8511* (NY!).

Leaves veins raised and rectangular in cross-section adaxially; basal pinna 2.4-2.7 cm wide; apical pinna not recorded. Inflorescence prophyll margins with irregular, spine-like projections; flower pits usually spirally arranged, distantly spaced. *Montane*

rainforest on Cerro Tacarcuna. P (Gentry 13998, MO). 1400-1825 m. (Panama-Colombia border).

22. Hyospathe Mart.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or clustered, erect or creeping and then rooting. Leaves pinnate, reduplicate; sheaths closed and forming an elongate crownshaft, rarely sheaths open; petioles moderate; rachises moderate; pinnae regularly or irregularly arranged, spreading in 1 plane, occasionally leaf undivided. Inflorescences infrafoliar, rarely interfoliar, branched to 1 order; peduncles bearing a prophyll and 1 peduncular bract; rachises bearing numerous rachillae; flowers borne in triads proximally, staminate distally, distichously or spirally arranged; staminate flowers pedicellate; sepals connate into a 3-lobed, tubular calyx, solid basally and forming the pedicel; petals 3, free, valvate; stamens 6, in 2 whorls of 3, the basal whorl with the filaments attached to the base of the pistillode, the upper whorl with the filaments attached to the middle of the pistillode; pistillate flowers pedicellate or sessile; sepals 3, connate into a cupular calyx; petals 3, free, imbricate basally, briefly valvate at the apex; staminodes 6; gynoecia syncarpous, unilocular, uniovulate; fruits 1-seeded, ellipsoid to ovoid, with basal stigmatic remains; seeds with homogeneous endosperm and basal embryo; eophylls bifid. 6 spp. Neotropics.

Bibliography: Henderson, A. *Amer. J. Bot.* 91: 953-965 (2004).

1. Triads irregular, raised; pistillate flowers sessile or shortly pedicellate. **2. H. pittieri**

1. Triads regular, non-raised; pistillate flowers sessile.

2. Pinnae 8-28 per side of rachis; rachillae 20-37; Costa Rica.

1b. H. elegans subsp. costaricensis

2. Pinnae to 7 per side of rachis, or leaves undivided; rachillae 2-15; Panama.

3. Rachillae with crustose hairs; triads spirally arranged; staminate flowers red; Cerro Gaital and the eastern end of the Cordillera Central in Panama.

1a. H. elegans subsp. concinna

2. Rachillae glabrous; triads distichously or spirally arranged; staminate flowers white; Cerro Tacarcuna and western end of Serranía de San Blas, Panama.

3. Triads spirally arranged; western end of Serranía de San Blas, Panama.

1c. H. elegans subsp. sanblasensis

3. Triads distichously arranged; Cerro Tacarcuna in Panama.

1d. H. elegans subsp. tacarcunensis

1. Hyospathe elegans Mart., *Hist. Nat. Palm.* 2: 1 (1823). Holotype: Brazil, *Martius 3122* (M!). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pls. 27 (1995).

Stems 1-7 m long, 0.3-2.3 cm diameter. Sheaths 4.5-35 cm long; petioles 1-41 cm long; rachises 5.5-125 cm long, 1.4-8.5 mm wide; pinnae to 28 per side of rachis, or leaves undivided; proximal pinna angle 10-90°; distal pinna angle 15-35°; distal pinna 13-46 cm long. Inflorescences sterile basal part 0.3-6 cm long, 1.4-16.7 mm wide;

prophylls 1-37 cm long; peduncular bracts 7-50 cm long; inter-bract distance 0.5-4.2 cm; peduncles 0.9-12.5 cm long; rachises 0.1-22 cm long, 1.1-8.3 mm wide; rachillae 2-45; proximal rachilla 1.4-40 cm long; distal rachilla 1.4-37 cm long; fruits 1.3-15.7 × 3-8.4 mm. *Lowland to montane rainforest*. 40-1900 m. (Costa Rica, Panama, Colombia, Venezuela, Guyanas, Ecuador, Peru, Bolivia, Brazil).

1a. *Hyospathe elegans* subsp. *costaricensis* A.J.Hend., *Amer. J. Bot.* 91: 964 (2004). Holotype: Costa Rica, *Grayum et al. 8784* (NY!).

Rachises 61-102 cm long; pinnae 8-28 per side of rachis. Prophylls 26.7-37 cm long; peduncular bracts 26-32.5 cm long; rachillae 20-37. *Lowland rainforest*. CR (*Moore 9429*, BH). 420-1200 m. (Endemic). (Costa Rica).

1b. *Hyospathe elegans* subsp. *concinna* (H.E.Moore) A.J.Hend., *Amer. J. Bot.* 91: 964 (2004). *Hyospathe concinna* H.E.Moore, *Gentes Herbarum* 8: 195 (1949). Holotype: Panama, *Allen 1202* (MO!).

Chamaedorea falcaria L.H.Bailey.

Rachises 16-47.5 cm long; pinnae to 7 per side of rachis, or leaves undivided. Prophylls 15.5-28 cm long; peduncular bracts 19-31 cm long; rachillae 5-15. *Lowland rainforest*. P (*de Nevers 6724*, NY). 500-1000 m. (Endemic). (Panama).

1c. *Hyospathe elegans* subsp. *sanblasensis* A.J.Hend., *Amer. J. Bot.* 91: 964 (2004). Holotype: Panama, *Henderson & H. Herrera 729* (NY!).

Rachises 9-27.5 cm long; pinnae to 2 per side of rachis, or leaves undivided. Prophylls 5.4-10 cm long; peduncular bracts 17.5-27 cm long; rachillae 2-6. *Lowland rainforest*. P (*Mori 6051*, MO). 80-750 m. (Endemic). (Panama).

1d. *Hyospathe elegans* subsp. *tacarcunensis* A.J.Hend., *Amer. J. Bot.* 91: 964 (2004). Holotype: Panama, *de Nevers et al. 8391* (NY!).

Rachises 5.5-9 cm long; leaves undivided. Prophylls 1-4.2 cm long; peduncular bracts 8 cm long; rachillae 2-5. *Montane rainforest*. P (*Gentry 13694*, BH). 1300-1400 m. (Panama, Colombia).

2. *Hyospathe pittieri* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 14: 137 (1938). Lectotype (designated by Stauffer and Stauffer, 1996): Venezuela, *Pittier 14146* (VEN *n.v.*).

Stems 2-8 m long, 1.3-5 cm diameter. Sheaths 24-39 cm long; petioles 11.5-41 cm long; rachises 41-105 cm long, 3.9-11.3 mm wide; pinnae 10-27 per side of rachis; proximal pinna angle 30-90°; distal pinna angle 11-30°; distal pinna 23-37 cm long. Inflorescences sterile basal part 1.2-3.3 cm long, 5.8-15.8 mm wide; prophylls 14-45 cm long; peduncular bracts 20-31 cm long; inter-bract distance 1.4-3.4 cm; peduncles 1.2-8.2 cm long; rachises 4.5-20.5 cm long, 2.9-10.1 mm wide; rachillae 18-51; proximal rachilla 9.4-34.5 cm long; distal rachilla 7.5-17.5 cm long; fruits 8.4-14.2 × 4-7.3 mm. *Montane rainforest*. P (*Croat 37841*, MO). 1450 m. (Panama, Colombia, Venezuela).

23. *Iriartea* Ruiz & Pav.

Deckeria H.Karst.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, stout, erect, ± ventricose, with a prominent cone of black stilt roots at the base. Leaves few; sheaths forming a compact crownshaft; petioles short; rachises long; pinnae numerous, praemorse, divided into numerous segments. Inflorescence infrafoliar, protandrous, pendulous in bud and at anthesis; peduncular bracts to 15; triads spirally arranged; flowers trimerous, symmetrical; staminate flowers with 12-15 stamens; pistillate flowers with 10-13 staminodes; gynoecia tricarpellate, triovulate; ovules probably anatropous; fruits usually developing from 1 carpel, with stigmatic scar apical to sub-apical; seeds with sub-apical to lateral embryo; eophylls entire. 1 spp. Neotropics.

Bibliography: Henderson, A. *Fl. Neotrop.* 53: 1-100 (1990).

1. *Iriarteia deltoidea* Ruiz & Pav., *Syst. veg. fl. peru. chil.* 1: 298 (1798).

Holotype: Peru, *Pavón s.n.* (M!). Illustr.: Henderson, A. *Fl. Neotrop.* 53: figs. 21-22 (1990). N.v.: maquengue, CR.

Iriarteia gigantea H.Wendl.

Stems to 25 m long, 10-30 cm diameter at base, 12-70 cm diameter at swelling, 11-23 cm diameter at apex, ± ventricose, gray, smooth; stilt roots to 100, terete, nearly vertical, closely spaced and forming a dense cone, branched at or below ground level, to

2 m × 3.5 cm, black, with sharp spines. Leaves 4-7 per stem, stiffly spreading; sheaths forming a crownshaft, 60-150 cm long, glaucous, green, outer surfaces with brown or white scales; petioles terete, 2-13 × 3 cm (to 40 cm long when including narrow, apical, petiolar part of sheath), green, densely brown-tomentose; rachises ridged adaxially, rounded abaxially, 2-4.3 m long, densely whitish-tomentose abaxially, densely whitish-brown-tomentose adaxially; pinnae 15-27 per side of rachis, alternate, stiff, coriaceous, deltate with praemorse distal margins, lustrous green glabrous above, green glabrous below except for dense brown villi at base and on veins or occasionally villous overall, occasionally below with lines ca. 3 mm wide of dense white or brown tomentum running parallel to veins; middle pinnae divided to the base into numerous segments, the proximal one of a pinna largest and pendulous and all the distal ones smaller and pointing up and away from the axis and giving the leaf a two-ranked appearance (juvenile plants with undivided pinnae); proximal pinna undivided, 6-28 cm long, 0.5-8 cm wide at mid-point, erect; middle pinnae divided into as many as 18 segments, the proximal one 50-98(-122) cm long and 3-8(-47) cm wide at mid-point and the distal one 19-34 cm long and 1-2.5 cm wide at mid-point; apical pinna undivided, flabellate, 35-38 cm long, 17 cm wide at mid-point. Inflorescences pendulous at anthesis, to 2 m long, buds developing below crownshaft and erect at first, soon becoming decurved and eventually horn-shaped; peduncles terete, curved, 20-44 cm long, half encircling stem and then abruptly narrowing to 2-6 cm diameter, densely brown-velvety-tomentose, at anthesis with up to 16 bract scars; prophylls inserted at base of peduncle, triangular, bicarinate, 8 cm long, 7 cm wide at base, early caducous; peduncular bracts to 15, caducous as bud elongates, terete, with acute apex, splitting abaxially, the first ca. 6 similar than the prophyll, terete,

horn-shaped sometimes an incomplete bract of variable size present; prophylls and peduncular bracts tomentose on the outside like the peduncle; rachises 14-46 cm long, of same diameter as peduncle at base and tapering into distal rachilla; rachillae 23-37, all undivided or more often the proximal few bifurcate, at base with 3-6 cm swollen, flattened sterile section, \pm equal in length, 80-140 cm long, 5-8 mm diameter at midpoint, subtended by a vestigial bract, glabrous; triads in as many as 7 spirally arranged series, 2-6 mm apart vestigially bracteate; flowers proximally in triads (rarely tetrads with 2 pistillate), distally staminate in pairs or solitary, of often all in an inflorescence staminate, yellowish at anthesis; staminate flowers up to 7 mm long; sepals depressed-ovate, below, $2.5-3 \times 2-4$ mm, fleshy, gibbous, covered with long, stiff, caducous hairs; petals ovate-oblong, valvate, 7×3 mm; stamens (10-)12-15(-17); filaments triangular, 0.5 mm long; anthers linear, latrorse, sub-basifixed, 4-5 mm long; pistillodes minute or absent; pistillate flowers 4 mm long; sepals fleshy, imbricate, $4-5 \times 5$ mm, ciliate; petals imbricate below, valvate above, fleshy; $4-5 \times 5$ mm; staminodes 10-13, adnate to base of petals, 1.5-2 mm long, apiculate; ovaries 3-5 mm long, triangular in cross-section, 3-locular; stigmas sessile, triangular, 1 mm long, 1 mm diameter at base, erect at anthesis; fruits $2-2.7 \times 2.4-2.8$ cm including persistent expanded perianth, globose; stigmatic remains sub-apical to apical; epicarps glabrous, greenish-yellow at maturity and splitting irregularly from apex; mesocarp whitish, granular, fibrous; endocarps papery; seeds 1.5 cm diameter, globose, basally attached; raphe branches anastomosing; hilum rounded embryos sub-apical to lateral; eophylls entire. *Lowland to montane rainforest*. N (*Rueda et al.* 4873, MO), CR (*Henderson* 65, NY), P (*Henderson* 87, NY). 0-1300 m.

(Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil).

24. *Manicaria* Gaertn.

Pilophora Jacq.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or clustered, occasionally branched (dichotomously?). Leaves pinnate, reduplicate; sheaths open and not forming a crownshaft; petioles moderate; rachises elongate; pinnae irregularly split giving an unequally pinnate leaf, or leaf undivided, serrate on the margins. Inflorescences interfoliar, branched to 1, rarely 2 orders; peduncles bearing a prophyll and 1(-2) fibrous peduncular bracts; rachises bearing numerous, simple, or rarely bifurcate rachillae; flowers borne in triads proximally, staminate only distally on rachillae; staminate flowers with sepals 3, connate basally, imbricate above; petals 3, free, valvate; stamens 26-34; pistillodes absent; pistillate flowers with sepals 3, free, imbricate; petals 3, free, valvate; staminodes 10-15, linear; gynoecia syncarpous, trilocular, 1-3-ovulate; fruits 1-3 seeded, globose or 2-3-lobed, covered with short, pyramidal projections, with sub-basal stigmatic remains; seeds with homogeneous endosperm and basal embryo; eophylls bifid. 2 spp. Neotropics.

Bibliography: Henderson, A. *Palms of the Amazon* (1995). Bernal, R. & Galeano, G. *Palms* 54: 119-132 (2010).

1. *Manicaria saccifera* Gaertn., *Fruct. Sem. Pl.* 2: 468 (1791). *Pilophora saccifera* (Gaertn.) H.Wendl. in O.C.E.de Kerchove de Denterghem, *Palmiers*: 253 (1878). Lectotype (designated by Glassman, 1972): Gaertn., *Fruct. Sem. Pl.* 2: t. 176 (1791). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pl. 20 (1995). N.v.: escomfra, N; guágara, P.

Stems 0.5-10 m long, 15-20 cm diameter, solitary or sometimes clustered, occasionally branching, usually covered with persistent leaf bases and other debris. Leaves 5-25 per stem, rigid and erect, strongly plicate; sheaths 60-100 cm long; petioles 0.2-1.3(-3.5) m long; rachises 2.3-4(-8) m long; pinnae 26-55 per side of rachis, irregularly arranged and of unequal width, spreading in 1 plane, linear, with serrate margins, the middle ones 1-1.8 m long, occasionally leaf undivided but becoming split with age. Inflorescences interfoliar at anthesis and in fruit; peduncles 0.4-1.3 m long; prophylls 52-70 cm long; peduncular bracts 68-90 cm long, brown, very fibrous, persistent over developing fruits; rachises 35-60 cm long; rachillae 21-56, 8-40 cm long, densely reddish-brown tomentose, simple or occasionally bifurcate; flowers in triads on proximal ca. half of rachillae, paired or solitary staminate distally, subtended by elongate bracteoles; staminate flowers 6 mm long; sepals widely ovate, 3-4.5 mm long; petals ovate, 5-5.5 mm long; pistillate flowers 1-1.2 cm long; sepals ovate, 8-9 mm long; petals triangular, 8-9 mm long; fruits 4-6 cm diameter, larger when lobed, globose or 2-3-lobed, covered with short, pyramidal projections. *Lowland rainforest, usually in wet places near*

the sea. B (*Travers s.n.*, K), N (*Smith 66*, NY), CR (*Robles 1330*, MO), P (*Hayes 960*, NY). Low elevations. (Belize, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Brazil, Trinidad).

Manicaria saccifera is reported by Henderson et al. (1995) to occur in Guatemala and Honduras, but no specimens from there have been seen.

25. *Neonicholsonia* Dammer

Bisnicholsonia Kuntze in T.E.vonPost, *Woodsonia* L.H.Bailey

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, short and appearing subterranean. Leaves pinnate; sheaths partly closed and forming a partial crownshaft; petioles rounded abaxially, slightly channeled adaxially; rachises rounded abaxially, ridged adaxially; pinnae numerous, linear-lanceolate, horizontally spreading. Inflorescences spicate, protandrous, interfoliar, erect at anthesis and in fruit; peduncles elongate; prophylls persistent; peduncular bracts coriaceous, persistent; rachillae sparsely tomentose; flowers in triads; staminate flowers with connate sepals; petals free, valvate; stamens 6; filaments inflexed apically; anthers medifixed, sagittate; pistillate flowers with sepals free, broadly imbricate; petals free, broadly imbricate, briefly valvate apically; staminodes absent; gynoecia unilocular, uniovulate; ovules basally attached; fruits ellipsoid-oblong, with apical stigmatic remains; raphe branches few, deeply sunken into endosperm; hilum triangular, adjacent to embryo; embryos subbasal; endosperm ruminant; eophylls pinnate. 1 spp. Neotropics.

Bibliography: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: 1-90 (1996).

1. *Neonicholsonia watsonii* Dammer, *Gard. Chron.* ser. 3, 30: 178, t. 56c (1901).

Holotype: Costa Rica, *Henderson et al.* 1807 (CR!). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pl. 25 (1995). N.v.: coladegallo, CR.

Neonicholsonia georgei Dammer, *Woodsonia scheryi* L.H.Bailey

Stems 10-15(-100) cm long, diameter not recorded, solitary, very shortly aerial, with prominent roots visible at base. Leaves 4-9 per stem, spreading; sheaths closed, not forming a crownshaft, 20-30 cm long including a ligule 1-2 cm long; petioles 0.24-1 m long; rachises 1-1.2 m long; pinnae 11-15 per side, regularly spaced, alternate, linear-lanceolate, aristate, horizontally spreading in the same plane, with prominent midvein, lacking scales and punctations abaxially; basal pinna 22-37 × 0.5-2.5 cm; middle pinnae 32-49 × 2.5-5.5 cm; apical pinna 17-27 × 1-1.5 cm. Inflorescences interfoliar, erect in bud and at anthesis; peduncle 67-98 cm long, 0.5 cm diameter, terete, with a few, brown, appressed scales; prophylls 18-45 cm long, 1.5-2 cm diameter, flattened; peduncular bracts 0.7-1 m long including a 2-3 cm long umbo, 1-1.5 cm diameter, ± terete; rachises absent; rachillae 1, 27-51 cm long, 3 mm diameter at anthesis, 4 mm diameter in fruit, with dense to loose clusters of intertwined, whitish, flexuous, hairs to 0.3 mm long; triads slightly sunken in rachilla, very closely spaced; flowers in triads for ca. half the length of rachilla, paired or solitary staminate distally; triad bracteole raised, rounded; first flower bracteole apiculate, second and third flower bracteoles prominent, apiculate, 0.7 mm high; staminate flowers 4-5 mm long; sepals connate into a prominently 3-lobed cupule,

2-3 mm long; petals lanceolate, 4-5 mm long; filaments slightly connate proximally, free distally, longer (3.5 mm long) and 3 shorter (2.5 mm long); anthers 3 mm long; pistillodes trifid, 1-2 mm long; pistillate flowers 4.5 mm long; sepals deltate, 3 mm long; petals deltate, 4 mm long; fruits 0.9-1 cm long, 0.5-0.6 cm diameter, ellipsoid-oblong, the stigmatic remains apical; epicarp black; seeds ca. 5 mm diameter, \pm globose; endosperm deeply ruminant; eophylls pinnate with short rachis. *Lowland rainforest*. H (*House s.n.*, K), N (*Stevens 6797*, BH), CR (*Henderson 76*, NY), P (*Pittier 5167*, US). 80-800 m. (Endemic). (Honduras, Nicaragua, Costa Rica, Panama).

26. *Oenocarpus* Mart.

Jessenia H.Karst.

By M. J. Balick.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary to clustered, erect, slender to massive, whitish gray to black, smooth to fibrous, or, when young, covered with remains of sheaths and sheath fibers, obscurely ringed with leaf scars, bases sometimes with a small mass of slender roots. Leaves pinnate, spirally to distichously arranged in suberect (when young) or horizontally spreading (when mature) coma; sheaths clasping, somewhat split opposite petiole, thick, coriaceous, lightly furrowed on the inside, smooth on the outside, upper portions fibrous, with fibers reaching to petiole base, sometimes fibers a mat of brown fibers interwoven with stout, needle-like fibers;

petioles concave, channeled and smooth adaxially, convex and smooth abaxially; rachises trough-shaped at base, \pm 3-4-sided near center, flattened to concave adaxially, flattened to semi-convex abaxially, changing to trigonal towards apex, smooth, \pm ribbed longitudinally, frequently lepidote when young; pinnae numerous, regularly to irregularly arranged along rachis in a single plane or at various angles to rachis; adaxial surfaces glossy green; abaxial surfaces light green to white, linear lanceolate to oblong-lanceolate at center of rachis, plicate, acute to long acuminate, reflexed at attachment, 1-ribbed with prominent intermediate veins, smooth adaxially, the abaxial surface smooth, usually with waxy coating (at least when newly unfolded), in some species, sparsely to densely covered with needle-like to twisted, hair-like trichomes, or with pale, peltate to sickle-shaped or doubly sickle-shaped trichomes. Inflorescences interfoliar in bud, protandrous, weakly to strongly hippuriform; peduncles short to elongate, flattened adaxially, bracteate, bearing a sharply 2-edged, flattened prophyll with dentate margins and a larger, tubular peduncular bract swollen in the middle, longitudinally somewhat striate, tapering to a sharp point and opening lengthwise; rachises flattened adaxially, frequently lepidote, rachillae simple, inserted laterally and abaxially, arched to pendulous at anthesis, short to elongate, linear to slightly undulate, slender, attenuate; flowers unisexual, sessile, borne in triads of 2 staminate and 1 pistillate flower proximally on the rachillae, in pairs of staminate or solitary staminate distally or rarely staminate throughout; staminate flowers asymmetrical; sepals 3, ovate-lanceolate, acute or obtuse, centrally somewhat thickened, marginally thin or even somewhat translucent, basally briefly connate to valvate or briefly imbricate; petals 3, valvate, longitudinally striate, linear to oblong-lanceolate, acute, slightly fleshy, 1 or 2 in each flower often somewhat dissimilar, incurved; stamens

6 or (7-)9-20; filaments subulate or awl-shaped, slender, linear or sometimes curved and bent, apically inflexed in bud, connective not extending beyond locules; anthers dorsifixed at lower junction of thecae, \pm hastate, rounded or blunt apically, versatile, with two easily separated, bilocular thecae, longitudinally and extrorsely dehiscent; pistillodes small, trifid; pistillate flowers symmetrical; sepals 3, suborbicular, hooded-concave, enclosing corolla in bud; petals 3, imbricate (except the briefly valvate apex when mature), suborbicular, hooded-concave, somewhat thin when young, becoming larger and fleshier at maturity; staminodes lacking; gynoecia unilocular, uniovulate; ovules erect, anatropous, rarely aborted; styles short, thick; stigmas 3, reflexed at anthesis, papillate; fruits green when young, covered to a varying degree with wax, becoming purple when ripe, globose to ovoid-ellipsoid, obtuse to acute, basally with a shallow, bowl-like cupule of indurate perianth; stigmatic remains apical to slightly excentric; epicarps smooth; mesocarp fleshy, rich in oil, with thin, flattened longitudinal fibers adnate to and completely covering seed; seeds ovoid-elliptic to globose; endosperm horny, white, homogeneous or ruminant; embryos white, clavate, ca. $2/3$ as long as seed. 9 spp. Neotropics.

Bibliography: Balick, M. *Adv. Econ. Bot.* 3: 1-140 (1986).

1. Stems solitary; pinnae regularly arranged, covered abaxially with peltate to sickle-shaped or doubly sickle-shaped trichomes; staminate flowers with (7-)9-20 stamens; seeds with ruminant endosperm.

1. O. bataua

1. Stems clustered or solitary; pinnae irregularly or regularly arranged, lacking trichomes abaxially or trichomes, if present, needle-like or hair-like; staminate flowers with 6 stamens; seeds with homogeneous endosperm.

2. *O. mapora*

1. *Oenocarpus bataua* Mart., *Hist. Nat. Palm.* 2: 23 (1823). *Jessenia bataua* (Mart.) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 300 (1928). Holotype: Trinidad, *Crueger 74* (GOET *n.v.*). Illustr.: Balick, M. *Adv. Econ. Bot.* 3: 120, fig. 76 (1986). *N.v.*: trupa, P.

Stems 14-25(-28) m long, (12-)19-25(-27) cm diameter, columnar; internodes spaced 20 cm or more apart on the lower portion of the stems, much closer toward the apex. Leaves 8-16 per stem; sheaths 0.6-1.4 m long, outer surfaces dull olive green, inner surfaces brown, with stout, needle-like fibers to 1 m long; petioles green, 0.2-1 m long, ca. 5-8 cm wide apically, 8-12 cm wide basally; rachises light to dark green, 3-8 m or more long, red to light-brown lepidote when young, vestiture becoming gray with age and falling away; pinnae 65-108 per side, glossy dark green abaxially; basal pinnae ca. 0.6-1.5 m long, 2.5-2.75 cm or more wide; middle pinnae (0.75-)1-1.7(-2) m long, (4.5-)6-11(-14) cm wide; apical pinnae 15-70 cm long, 15-3.5 cm wide. Inflorescences 1-3(4 or more) apparent at any one time, creamy white at anthesis; prophylls olive-green, variable in size but often ca. 75 cm or more long, ca. 20-25 cm wide; peduncular bracts of a similar color but frequently thinly striped with yellow or brown, 1-2.3 m long, (8-)9-18(-19) cm wide, often somewhat lepidote; axis distal to peduncular bract scar (15-)22-40(-50) cm long, (4.6-)7-11(-20) cm wide at scar, axis sometimes developing reddish-velvety tomentum that is deciduous with age; rachillae (116-)135-350(-423), (50-)70-

120(-140) cm long, (2-)4-6(-7-9) mm wide; staminate flowers creamy white in bud, fragrant; sepals ca. 1.5 mm long; petals 4-7(-8) mm long, ca. 2-4 mm wide; stamens ca. 5-6 mm long; anthers ca. 2.5-5 mm long, filaments brown; pistillate flowers creamy white in bud, subtly fragrant at anthesis; sepals ca. 4-6 mm long at time of anthesis of staminate flower; fruits (2.3-)2.5-4(-4.75) cm long (not including the cupule), 2-2.75(-3 in rare 2-seeded fruits) cm wide at center, green with a waxy cast when young, becoming dark purple-black when ripe, rounded at the apex; stigmatic remains ca. 1-2 mm long, 2-3 mm wide; cupules tan, ca. 5-10 mm deep; mesocarp pulpy, purple or lavender-white; fibers ca. 1 mm wide; endosperm waxy-white, penetrated by light to dark brown rays; embryos white. *Lowland rainforest*. 5-700 m. (Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil, Trinidad).

1a. *Oenocarpus bataua* var. *bataua*

Pinnae with abaxial surfaces light green to gray, usually densely covered with peltate to sickle-shaped to doubly sickle-shaped trichomes (more apparent on newly-emerged leaves). Rachillae \pm uniform in thickness throughout, lacking strongly pronounced bracts subtending staminate pair or solitary flower; rachillae (116-)135-270(-285), with triads on proximal (20-)40-60(-65)% of individual rachillae; staminate flowers 5-7(-8) mm long with (7-)9-20 stamens; pistillate flowers (15-)40-90(-119) per rachilla. *Lowland rainforest*. P (*Duke & Bristan 218*, BH). Low elevations. (Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil, Trinidad).

2. *Oenocarpus mapora* H.Karst., *Linnaea* 28: 274 (1857). Holotype: Venezuela, *Karsten s.n.* (LE). Illustr.: Balick, M. *Adv. Econ. Bot.* 3: 104, fig. 69 (1986). N.v.: maquenque, P.

Oenocarpus panamanus L.H.Bailey

Stems 3-16(-25) m long, 9-15 cm diameter, clustered with 2-12 stems per cluster or more, rarely solitary, columnar. Leaves ca. 6-8 per stem, arching, spirally arranged; sheaths ca. 45-95 cm long, outer surface dull olive-green to leaden gray, inner surface glabrous, brown, upper margins lined with wiry brown fibers; petioles green to green-brown, ca. 15-95 cm long, ca. 2.5-3 cm wide at apex, light brown to maroon-lepidote at first, indumentum becoming gray and frequently deciduous, then glabrous; rachises green, unequally 3-sided in cross section towards center, (0.95-)2.8-5.5 m long, lepidote; pinnae 60-71 per side of rachis, inserted at regular intervals and all in the same plane at apex, often \pm irregularly arranged towards center and base, either singly or in groups of 2-4, at various angles to rachis (some to ca. 75°), linear-lanceolate, acute; basal pinnae ca. 55-75 cm long, 2-3.5 cm wide; central pinnae 0.6-1 m long, 3.5-5.5(-7.8) cm wide; apical pinnae 20-33 cm long, 1.25-2.75 cm wide. Inflorescences 1-several apparent at one time, creamy-white at anthesis, changing to reddish powdery in fruit; prophylls olive-green, ca. 25-45(-57) cm long, somewhat lepidote; peduncular bracts of similar color, 50-85 cm long, ca. 4-8 cm wide at center, light orange-lepidote when young, becoming dark orange-maroon with age; axes distal to peduncular bract scar 6-20 cm long, 1.9-4.75 cm wide at scar, axis variable in size depending on the individual; rachillae ca. 64-98, 36-73 cm long, \pm 2-5 mm wide, triads on proximal 50-60% of individual rachillae; staminate flowers creamy-white; sepals \pm 1.5-1.75 mm long; petals 3-4 mm long, 1.5-2 mm wide;

anthers \pm 1.75-2.75 mm long; filaments brown, slender, straight to somewhat undulate; pistillate flowers creamy-white in bud, 54-97 per rachilla, \pm 3-3.5 mm long, 4.5-6 mm wide at anthesis; fruits 1.8-2.9 cm long (not including cupule), 1.4-2.25 cm diameter, ellipsoid to ovoid; stigmatic remains \pm apical, ca. 2 mm long, 1-3 mm wide; cupules tan, ca. 5-9 mm deep, ca. 9-20 mm wide; epicarps grainy-waxy; mesocarp pulpy, lavender to purple, fibers ca. 0.5 mm wide. *Lowland rainforest*. 0-330 m. (Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil).

2a. *Oenocarpus mapora* subsp. *mapora*

Oenocarpus panamanus L.H.Bailey

Stems solitary or in clusters of 6-12 stems. Pinnae generally devoid of trichomes between the intermediate veins abaxially, or if trichomes present, these mostly simple and bristle-like and appressed to the lamina, or else on the intermediate veins. Fruits 1.4-2 cm wide, ellipsoid to subovoid (not including 5-6 mm deep cupule). *Lowland rainforest*. CR (*Moore 6541*, BH), P (*Croat 4537*, MO). 66-450 m. (Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil).

27. *Pholidostachys* H.Wendl. ex Benth. & Hook.f.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, rarely clustered. Leaves pinnate; sheaths open and not forming a crownshaft; petioles well-

developed; rachises elongate; sheaths, petioles, and rachises densely covered with reddish-brown tomentum; pinnae regularly arranged or irregularly arranged, spreading in 1 plane. Inflorescences interfoliar, branched to 1-2 orders or spicate, densely covered with reddish-brown tomentum; peduncles short to well-developed; rachises short to well-developed; rachillae 1-several, spreading, erect, or pendulous at anthesis; prophylls and peduncular bracts fibrous, covering all or part of the rachilla(e) at anthesis, or woody, not covering rachilla(e) at anthesis; proximal lips of flower pits regularly or irregularly shaped, rounded to acuminate, completely covering or not covering pits before anthesis, seldom recurved; fruits compressed or scarcely compressed, obovoid in lateral view with an asymmetric base, ellipsoid in frontal view, with a pronounced to obscure longitudinal ridge on one side and several lesser ridges on opposite side. 7 spp. Neotropics.

Bibliography: Henderson, A. *Phytotaxa* 43: 1-48 (2012).

1. Prophylls and peduncular bracts woody, not covering rachilla(e) at anthesis;

Nicaragua, Costa Rica, Panama.

3. P. pulchra

1. Prophylls and peduncular bracts fibrous, covering all or part of the rachilla(e) at anthesis.

2. Inflorescences spicate, with a short peduncle, absent rachis, and 1 rachilla; central

Panama

2. P. panamensis

2. Inflorescences branched to 1 order, with well-developed peduncles, short rachises, and several rachillae; eastern Panama.

1. P. dactyloides

1. Pholidostachys dactyloides H.E.Moore, *J. Arnold Arbor.* 48: 148 (1967).

Calyptrogyne dactyloides (H.E.Moore) Wess. Boer, *Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2*, 58(1): 74 (1968). Holotype: Colombia, *Cuatrecasas 15982* (BH!).
Illustr.: Henderson, A. *Phytotaxa* 43: figs. 1-2 (2012).

Stems 2-10 m long, 4-12 cm diameter, solitary. Leaves 6-25 per stem; sheaths 14-110 cm long; petioles 20-122 cm long; rachises 68-231 cm long, 7.9-20.1 mm diameter; pinnae 6-17 per side of rachis; basal pinna 34-92 cm long, 0.7-7.5 cm wide, forming an angle of 30-74° with the rachis; apical pinna 36-58 cm long, 4.5-22.5 cm wide, forming an angle of 7-20° with the rachis. Inflorescences branched to 1 order (rarely 2 orders), with a well-developed peduncle, short rachis, and several rachillae, these erect at anthesis; prophylls and peduncular bracts fibrous, covering all or part of the rachillae at anthesis; prophylls 30-59 cm long; peduncular bracts 50-65 cm long, inserted 2.5-11 cm above the prophyll; peduncles 8.5-25.5 cm long, 4.7-19 mm diameter; rachillae 2-16, 15.5-75 cm long, 4.5-9.7 mm diameter; proximal lips of flower pits irregularly shaped, often acute or acuminate, completely covering pits before anthesis; fruits 8.8-16.3 × 5.8-11.5 mm, scarcely compressed, obovoid, with obscure longitudinal ridges. *Lowland to montane rainforest*. P (*Folsom 6639*, MO). 550-1375 m. (Panama, Colombia, Ecuador).

2. *Pholidostachys panamensis* A.J.Hend., *Phytotaxa* 43: 13 (2012). Holotype: Panama, *de Nevers et al. 6371* (NY!). Illustr.: Henderson, A. *Phytotaxa* 43: fig. 1 (2012).

Stems 0.1-3 m long, 4-11 cm diameter, solitary. Leaves 8-19 per stem; sheaths 15-27 cm long; petioles 36-150 cm long; rachises 72-155 cm long, 6.1-11.1 mm diameter; pinnae 5-8 per side of rachis; basal pinna 28.5-78 cm, long, 0.7-10 cm wide, angle with the rachis not recorded; apical pinna 32.5-49.5 cm long, 10-27 cm wide,

forming an angle of 10-28° with the rachis. Inflorescences spicate, with a short peduncle, absent rachis, and 1 rachilla, this erect at anthesis; prophylls and peduncular bracts fibrous, covering all or part of the rachilla at anthesis; prophylls 11.5-18.5 cm long; peduncular bracts 19-22.5 cm long, inserted 2-5 cm above the prophyll; peduncles 3.5-6.2 cm long, 8.2-13.5 mm diameter; rachilla 1, 11.5-15.5 cm long, 8.2-12.1 mm diameter; proximal lips of flower pits regularly shaped, rounded, completely covering pits before anthesis and not recurved; fruits 22.5-32.1 × 18.1-24.5 mm, widely obovoid, without pronounced longitudinal ridges. *Lowland rainforest*. P (Henderson 3037, NY). 60-768 m. (Endemic). (Panama).

3. *Pholidostachys pulchra* H.Wendl. ex Hemsl., *Biol. Cent.-Amer., Bot.* 3: 410 (1885). *Calypstrogyne pulchra* Burret, *Bot. Jahrb. Syst.* 63: 129 (1930). Isotype: Costa Rica, *Wendland s.n.* (K!). Illustr.: Henderson, A. *Phytotaxa* 43: figs. 3-4 (2012).

Stems 1.5-6.6 m long, 3-8 cm diameter, solitary or rarely clustered. Leaves 7-23 per stem; sheaths 20-48 cm long; petioles 49-150 cm long; rachises 32-130 cm long, 3.3-13.1 mm diameter; pinnae 3-9 per side of rachis; basal pinna 35.5-61 cm long, 0.4-3 cm wide, forming an angle of 42-93° with the rachis; apical pinna 30-54 cm long, 4-20 cm wide, forming an angle of 11-27° with the rachis. Inflorescences spicate, with a well-developed peduncle, absent rachis, and 1 rachilla, this arching or erect at anthesis; prophylls 5-29 cm long; peduncular bracts 12.5-59 cm long, inserted 1.1-10 cm above the prophyll; peduncles 4.5-33 cm long, 3.6-11.8 mm diameter; rachilla 1, 7.5-85 cm long, 6.2-16.2 mm diameter; proximal lips of flower pits regularly shaped, rounded, completely covering pits before anthesis and not recurved; fruits 11.5-29.2 × 6.6-14.6 mm,

compressed, obovoid in lateral view with an asymmetric base, ellipsoid in frontal view, with a pronounced longitudinal ridge on one side and several lesser ridges on opposite side. *Lowland rainforest*. N (Bunting 772, F), CR (Henderson 52, NY), P (Henderson 3049, NY). 12-1000 m. (Nicaragua, Costa Rica, Panama, Colombia).

28. *Phytelephas* Ruiz & Pav.

Elephantusia Willd., *Palandra* O.F.Cook, *Yarina* O.F.Cook

By A. Barfod.

Dioecious, iteroparous, non-spiny, pinnate-leaved palms. Stems usually mid-sized, with short internodes. Leaf sheaths split to the base or tubular proximally as in *P. macrocarpa* ssp. *tenuicaulis*; pinnae with tomentum on abaxial side of major veins or glabrous, evenly distributed in 1 plane or irregularly distributed and pointing in different planes above the 1 plane in *P. aequatorialis*; prophylls, first peduncular bracts and incomplete peduncular bracts glabrous. Staminate inflorescences with numerous flower clusters, composed of two pairs of subopposite flowers closely inserted on a short axis; flowers sessile, or subsessile to pedicellate as in *P. aequatorialis* and *P. tumacana*; receptacles enlarged in width, flat and rounded in outline, usually with numerous boreholes from ovipositing beetles; pistillodes absent at anthesis; anthers elongate, more or less apiculate; pistillate inflorescences usually with less than 25 flowers; gynoecia 4-10 loculate, apically truncate except in *P. tumacana*; infructescences with prophylls and peduncular bracts partly

resolved distally; fruits rounded in outline, covered with pronounced, woody projections, median ridges of pyrene blunt. 4 spp. Neotropics.

Bibliography: Barfod, A. *Opera Bot.* 105: 1-73 (1991).

1. *Phytelephas seemannii* O.F.Cook, *Bull. Bur. Pl. Industr. U.S.D.A.* 242: 68 (1912). Lectotype (designated by Barfod, 1991). Colombia, *Seemann s.n.* (BM!).

Stems to 4 m long, solitary, with prostrate subterranean part of stem and aerial part wanting, or mid-sized with decumbent, or erect stem. Leaves 10-15, semierect to erect, evenly bending from base to apex; leaf sheaths split to the base; leaves 60-100 cm long from point of insertion to blade; petioles 4-5 cm wide distally, deeply rounded abaxially, with shallow, sharply edged groove adaxially, or semiterete in cross-section, green on the adaxial face often with a drab-colored waxy covering tapering into a point below the rachis; rachises 350-550 cm long, green, with median ridge adaxially raising gradually from the distal end of the petiole, often with brown tomentum along the median adaxial ridge and the lateral faces bearing the pinnae; pinnae 75-110 per side, often drying to lustrous pale green, midnerve prominent, submarginal veins indistinct, transverse commissures often conspicuous; basal pinnae alternate, 30-60 × 0.3-0.5 cm, 1-3 cm apart or remote and pendent on long petiolate individuals, middle pinnae subalternate, 55-80 × 3.4-4.5 cm, 4-7 cm apart distal pinnae opposite, 15-25 × 0.8-1 cm, 3-4 cm apart. Staminate peduncles 60-80 cm long, glabrous, compressed, 3.5-5 × 2-2.5 cm in cross-section in the middle part; prophylls 35-65 × 7-10 cm; first peduncular bracts inserted 25-35 cm above the peduncle base, 40-55 cm long, bicarinate distally, outside light brown, inside brownish-orange; incomplete peduncular bracts 3-5, oblique,

deltoid or elliptic with attenuated base, plicated basally, the proximal one 4-6 cm long; rachises 50-110 cm, compressed, 2×3 cm in cross-section in the middle part; flowers sessile, closely inserted in groups of 4(-5), or fewer proximally on rachis, distal flowers solitary; receptacles covered by masses of 300-600 stamens, expanded in width and flattened, slightly raised, rounded in outline at early anthesis, later extending to ovate or fusiform, $1.5-2 \times 1-1.5$ cm; perianths fused basally to receptacle and elongated forming a narrow shiny zone, only tips of the perianth segments free; filaments $6-12 \times 0.2$ mm, subulate; anthers $2-6 \times 0.4-0.6$ mm, shortly apiculate; pistillate peduncles 15-25 cm long, compressed, $1.5-2.5 \times 2-3.5$ cm in cross-section in the middle part; prophylls $25-35 \times 5-7$ cm, smooth, drab-colored; first peduncular bracts inserted 10-17 cm above the base, 20-30 cm long; incomplete peduncular bract 5-7, spirally arranged and covering 1.5-2.5 cm of peduncle below the bracts subtending flowers, $3-8 \times 1.5-2$ cm, obliquely ovate to deltoid, the proximal one with short acumen, the others increasingly narrow towards the bracts subtending flowers; flower-bearing zones 1-2 cm long, with 5-8 flowers; floral subtending bracts deltoid $3-5 \times 1-1.5$ cm, with long acumen; sepaloïd bracts 6-7, 4-6 cm long, narrowly deltoid with long acumen to strap shaped; tepals 6-7, 15-18 cm long, 1-1.5 cm wide basally; non-functional stamens 25-35, 10-25 mm long; anthers 6-9 mm long, obliquely sagittate basally, apiculum usually absent; pistils obliquely pyriform, bulky, smooth, with 6-9 locules; styles 11-13 cm long; stigmas 5-6, 5-7 cm long; infructescences usually numerous, up to 25 per stem, 17-25 cm diameter; peduncles 20-30 cm long, $3-4 \times 1-2$ cm in cross-section in the middle part; prophylls and first peduncular bracts 10-15 cm apart, partly resolved; incomplete peduncular bracts with persistent base or caducous; fruit-bearing zones 2-3 cm long, fruits 4-8, perianths

early caducous; fruits 6-10 cm long, tangential face rounded in outline, 12-16 cm diameter, flat with central depression, with spiny processes of variable length from 0.5 to 2.5 cm, style residuals usually absent, abscission scar to 3.5 cm diameter; inner mesocarp thin, with network of flattened fibers adherent to pyrene and exposed upon drying; seeds 6-9 in fully developed fruits; pyrenes rounded with blunt edges; rostrum absent or short; umbo basally on median blunt ridge, occasionally raised considerably, flattened or ridged, ovate in outline with the narrow end pointing up or upper margin emarginate; eophylls with 32-36 opposite pinnae. *Lowland rainforest*. 0-300 m. (Panama, Colombia).

Galeano & Bernal (2010) considered that *Phytelephas seemannii* should be included in *P. macrocarpa*.

1. Stems erect or decumbent; staminate rachises 70-110 cm long; fruits with 7-9 locules.

1a. *P. seemannii* ssp. *seemannii*

1. Stems prostrate; staminate rachises 50-80 cm long; fruits with 5-7 locules.

1b. *P. seemannii* ssp. *brevipes*

1a. *Phytelephas seemannii* subsp. *seemannii*. Illustr.: Barfod, A. Opera Bot.

105: fig. 42 (1991). N.v.: tagua, P.

Phytelephas brevipes O.F.Cook, *P. pittieri* O.F.Cook, *P. brachelus* O.F.Cook, *P. brachinus* O.F.Cook, *P. cornutus* O.F.Cook

Stem erect or decumbent; staminate rachis 70-110 cm long; fruits with 7-9 locules. *Lowland rainforest*. P (Barfod et al. 3, AAU). 0-300 m. (Panama, Colombia).

1b. *Phytelephas seemannii* subsp. *brevipes* (O.F.Cook) Barfod, *Opera Bot.* 105: 64 (1991). *Phytelephas brevipes* Cook, *J. Wash. Acad. Sci.* 3: 142 (1913). Holotype: Panama, Pittier 4473 (US!).

Stem prostrate; staminate rachis 50-80 cm long; fruits with 5-7 locules. *Lowland rainforest*. P (Allen 2941, BH). 50-300 m. (Panama, Colombia).

29. *Prestoea* Hook.f. in G.Bentham & J.D.Hooker

Euterpe Gaertn., *Martinezia* Ruiz & Pav., *Oreodoxa* Willd., *Acrista* O.F.Cook

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems short to moderate-sized, clustered or rarely solitary, erect or occasionally procumbent. Leaves pinnate or sometimes undivided; sheaths open and not forming a crownshaft, or occasionally partly closed and forming a partial crownshaft; petioles short to elongate, concave adaxially, rounded abaxially; rachises ridged adaxially, rounded or flat abaxially; pinnae few to numerous, usually linear-lanceolate, with several lateral veins either side of midvein, horizontally spreading, or sometimes the blades undivided. Inflorescences branched to 1 order or rarely spicate, corymbose, rarely racemose, protandrous, interfoliar, rarely infrafoliar, erect or arching at anthesis; peduncles often elongate, longer than the rachis, usually terete; prophylls shorter than the peduncular bract, usually persistent; peduncular bracts usually persistent, coriaceous; rachillae sparsely tomentose, white at anthesis and

becoming red in fruit; flowers in triads; staminate flowers asymmetrical; sepals free, briefly imbricate basally; petals free, valvate; stamens 6; filaments inflexed at the apex; anthers dorsifixed, sagittate; pistillate flowers with sepals free, broadly imbricate; petals free, broadly imbricate, briefly valvate apically; staminodes 6; gynoecia unilocular, uniovulate; ovules laterally attached; fruits globose, the stigmatic remains subapical; seeds with basal embryo; raphe branches reticulate; hilum elongate; embryos basal; endosperm ruminant or rarely homogeneous; eophylls bifid or pinnate. 10 spp.

Neotropics.

Bibliography: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: 1-90 (1996).

1. Staminate and pistillate sepals pilose abaxially; eophylls pinnate with elongate rachis; pinnae abruptly narrowed to a filiform apex.

2. Pinnae elliptic or subsigmoid; inflorescences spicate or with 2-11 rachillae; eastern Panama.

5. *P. pubens*

2. Pinnae linear-lanceolate (or sometimes blade undivided); inflorescences with 5-70 rachillae.

3. Rachillae (7-)30-70, covered with simple to stellate, short, stiff, persistent hairs; stems green or yellowish; Nicaragua, Costa Rica, Panama.

2. *P. decurrens*

3. Rachillae 5-13, covered with branched, erect or flexuous, deciduous; Costa Rica.

6. *P. schultzeana*

1. Staminate and pistillate sepals glabrous; eophylls bifid; pinnae long acuminate.

4. Petioles elongate, 50-200 cm long; rachillae 2-20, not angular, terete; Nicaragua to western Panama.

5. Apical pinnae wider than the others; $>4\times$ the length of the rachis; rachis shortened, 0.5-17 cm long; rachillae 2-12, usually ascending, the proximal ones not swollen and sterile basally.

4a. *P. longepetiolata* var. *longepetiolata*

5. Apical pinnae usually not wider than the others; peduncle slightly shorter or up to $3\times$ the length of the rachis; rachis elongate, usually >14 cm long; rachillae 7-16, spreading, the proximal ones swollen and sterile basally.

4b. *Prestoea longepetiolata* var. *roseospadix*

4. Petioles contracted, 0-30(-100) cm long; rachillae (13-)23-117, angular.

6. Inflorescences infrafoliar or interfoliar at anthesis; peduncles 27-93 cm long; peduncular bracts 70-220 cm long; rachises 20-140 cm long; rachillae (13-)18-60; Costa Rica, Panama.

3. *P. ensiformis*

6. Inflorescences infrafoliar at anthesis; peduncles 3-20 cm long; peduncular bracts 63-98 cm long; rachises (17-)40-85 cm long; rachillae 23-117; Nicaragua, Costa Rica, Panama.

1. *P. acuminata*

1. *Prestoea acuminata* (Willd.) H.E.Moore, *Gentes Herbarum* 9: 286 (1963).

Oreodoxa acuminata Willd., *Mem. Acad. Roy. Sci. Hist. (Berlin)* 1804: 35. 1807. *Euterpe acuminata* (Willd.) H.Wendl. in O.C.E.de Kerchove de Denterghem, *Palmiers*: 244 (1878). Neotype (designated by Henderson & Galeano, 1996): Venezuela, *Steyermark 91608* (NY!). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 23 (1996). N.v.: maquenque, P.

Stems (3-)6-15 m long, 4-20 cm diameter, solitary or clustered and then with 2-12 stems per cluster, erect or slightly leaning, often with a cone of roots visible at the base. Leaves 4-10 per stem, spreading or erect; sheaths closed for $1/3-1/2$ their length and

forming a partial crownshaft, 26-80(-108) cm long, green, dark green, purplish, violet, or reddish brown, densely to moderately covered with appressed, brown, fimbriate scales; petioles 0-30(-60) cm long, densely whitish brown tomentose adaxially, usually glabrous abaxially, glabrescent; rachises (0.6-)1.1-2.6 m long, with tomentum like that of petiole; pinnae 30-60 per side, regularly spaced and stiffly spreading in the same horizontal plane, seldom erect, sub-opposite or alternate, linear-lanceolate, coriaceous, with prominent midvein adaxially and abaxially and with several prominent lateral veins, the midvein with ramenta abaxially; basal pinna 39-69 × 0.5-2 cm; middle pinnae (0.3-)0.6-1.2 m × (2-)3-6.5 cm; apical pinna 13-34 × 0.5-2.5 cm. Inflorescences corymbose, infrafoliar at anthesis; peduncles 3-20 cm long, 1-3(-4) cm diameter at peduncular bract scar, terete or slightly dorsiventrally compressed; prophylls 23-51 cm long, 4-6(-12) cm diameter; peduncular bracts 63-98 cm long including a 3 cm long umbo, to 6(-12) cm diameter, almost terete, often with other incomplete bracts present distally; rachises (17-)40-85 cm long; rachillae 23-117, 18-74 cm long proximally, 9.5-23 cm long distally, to 6 mm diameter in fruit, each subtended by a small bract or sometimes the proximal few rachillae with bracts to 6 cm long, almost glabrous or typically with scattered to numerous short crustose or granular hairs, occasionally intermixed with a few longer, flexuous, branched hairs or sometimes with a dense covering of branched hairs; flowers in triads proximally, paired or solitary staminate distally; triad bracteole low, apiculate; first flower bracteole obscure, second and third flower bracteoles ± equal, apiculate, 0.3-0.5 mm long; staminate flowers 4-6 mm long, either sessile or on short, flattened pedicels; sepals deltate to narrowly triangular, 1.5-2.5 mm long, gibbous; petals ovate or lanceolate, 3-5.5 mm long, white or pink with purple apex; stamens arranged on a short

receptacle; filaments 1.5-2.5 mm long, flattened; anthers 2-3.5 mm long; pistillodes 2-3 mm long, trifid at apex; pistillate flowers 2.5-4 mm long; sepals shallowly triangular or depressed-ovate, 2-4 mm long; petals shallowly triangular to depressed ovate, 2-4 mm long; staminodes deltate or digitate; fruits globose, rarely ovoid or obovoid, 1-1.2(-1.8) cm diameter, the stigmatic remains lateral; epicarps purple-black, sparsely and minutely tuberculate; seeds 0.8-1.4 cm diameter, globose; endosperm ruminant; eophylls bifid.

Lowland to montane rainforest. 500-2700 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Cuba, Hispaniola, Puerto Rico, Lesser Antilles).

1a. *Prestoea acuminata* var. *acuminata*

Prestoea allenii H.E.Moore

Stems to 15 m long, to 15 cm diameter, often clustered. Inflorescences often somewhat elongate; rachillae angular, with scattered to numerous short crustose or granular hairs, occasionally intermixed with a few longer, flexuous, branched hairs or sometimes with a dense covering of branched hairs; flowers and fruits somewhat sunken in the rachillae; fruits to 1 cm diameter, globose; fruiting perianths to 4.5 mm long.

Montane rainforest. N (*Stevens 6510*, MO), CR (*Moore 6677*, BH), P (*Croat 13576*, MO). 850-2450 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia).

2. *Prestoea decurrens* (H.Wendl. ex Burret) H.E.Moore, *Gentes Herbarum* 9:

286 (1963). *Euterpe decurrens* H.Wendl. ex Burret, *Bot. Jahrb. Syst.* 63: 63 (1929).

Neotype (designated by Henderson & de Nevers, 1988): Costa Rica, *Henderson 50*

(NY!). Illustr. Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 27 (1996). N.v.: canna lucia, CR.

Stems 1.4-7(-10) m long, 3-12 cm diameter, clustered with 2-7 stems per cluster or rarely solitary, erect or occasionally leaning or procumbent, green or yellowish with conspicuous nodes. Leaves 4-10 per stem, spreading; sheaths semi-open and forming a partial crownshaft, this almost always obscured by persistent, dead leaf bases, 0.3-1 m long including a fibrous ligule to 10 cm long, green, green-violet, or brown-violet, fibrous on margins; petioles (18-)30-95(-155) cm long, densely covered, especially abaxially, with appressed, whitish brown, pectate-lacerate scales; rachises 1.2-3.1 m long, with tomentum like that of petioles; pinnae 35-58 per side, regularly arranged and horizontally spreading in the same plane, subopposite or alternate, linear-lanceolate, abruptly acuminate or almost acute apically, plicate, with prominent midvein and several lateral veins, without conspicuous ramenta on the midvein abaxially, with punctations abaxially; basal pinna 28-60 × 0.8-2 cm; middle pinnae 43-73(-81) × 2-5.5 cm; apical pinna 8-25(-40) × 0.5-2 cm. Inflorescences infraxillary, erect in bud; peduncle 8-30(-75) cm long, 0.8-2 cm diameter, terete, densely covered with whitish, stellate, short, stiff, persistent hairs; prophylls 18-45 cm long, 3-4 cm diameter; peduncular bracts 0.5-1.4 m long including a 3 cm long umbo, densely covered abaxially with appressed brown scales, persistent; rachises (6.5-)13-60 cm long, with hairs similar to those of peduncle; rachillae (7-)30-70, (30-)35-54(-75) cm long proximally, to 24(-60) cm long distally, 1-2 mm diameter at anthesis, 1.5-2(-5) mm diameter in fruit, subtended by bracteoles, these occasionally prominent, densely to moderately covered with simple to stellate, 0.1-0.2 mm long, stiff, persistent, white hairs; flowers in triads proximally, paired or solitary

staminate distally, the triads sometimes densely crowded on the rachillae, superficial or somewhat sunken; triad bracteoles low, apiculate; first flower bracteoles obscure, second and third flower bracteoles \pm equal, deltate or rounded and apiculate, 0.3-0.5 mm long; staminate flowers 3-4 mm long; sepals deltate, 1-1.5 mm long, imbricate proximally, keeled; petals ovate to elliptic, 2.5-4 mm long, pilose abaxially especially distally; stamens arranged on a very short receptacle; filaments 1.5-2 mm long, lanceolate, flattened, adnate proximally to petals; anthers 1-1.5 mm long; pistillodes 1.5-2.5 mm long, trifid at the apex; pistillate flowers 2.5-3.5 mm long; sepals very widely ovate, 1.5-2 mm long, ciliate; petals widely ovate, 2-3 mm long, ciliate; staminodes digitate; fruits 0.7-1.1 cm diameter, globose, loosely spaced or rarely crowded on the rachillae, the stigmatic remains subapical to lateral; epicarps purple-black, scarcely minutely tuberculate; seeds 5-8 mm diameter, globose; endosperm lightly to deeply ruminant; eophylls pinnate with long rachis. *Lowland rainforest*. N (Moreno 23880, NY), CR (Henderson *et al.* 1818, NY), P (*de Nevers* 7379, MO) 100-1500 m. (Nicaragua, Costa Rica, Panama, Colombia, Ecuador).

3. *Prestoea ensiformis* (Ruiz & Pav.) H.E.Moore, *Gentes Herbarum* 9: 286 (1963). *Martinezia ensiformis* Ruiz & Pav., *Syst. veg. fl. peruv. chil.* 1: 297 (1798). *Euterpe ensiformis* (Ruiz & Pav.) Mart., *Hist. Nat. Palm.* 2: 32 (1824). Holotype: Peru, Ruiz & Pavón s.n. (M!). Illustr. Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 28 (1996).

Prestoea sejuncta L.H.Bailey, *P. darienensis* A.J.Hend., *P. integrifolia* de Nevers & A.J.Hend.

Stems 2.5-9 m long, 3-13 cm diameter, clustered or solitary, erect, brown or gray, often covered with persistent leaf bases, with reddish roots visible at base. Leaves 5-14 per stem, erect or arching, pinnate or rarely irregularly pinnate or undivided; sheaths closed for ca. 1/2 their length, rarely forming a crownshaft, persistent on the stem, 0.3-1 m long including a short, blunt, fibrous ligule less than 1 cm long, often reddish, fibrous at the margins distally, densely to moderately covered abaxially with appressed, white or brown peltate-lacerate scales, glabrescent, leaving punctations; petioles 0.2-1.1 m long, with scales like those of sheath, or sometimes glabrous abaxially, glabrescent; rachises 0.4-2.3 m long, with scales like those of sheath, glabrescent; pinnae 36-49 per side, regularly arranged and spreading horizontally in the same plane, subopposite to alternate, linear-lanceolate, long acuminate, with a prominent midvein and several lateral veins, with midvein essentially glabrous abaxially or with a few small ramenta, with punctations abaxially; basal pinna 36-55 middle pinna 50-82 \times 3-5 cm; apical pinna 1.3-4.5 cm, or rarely the leaves undivided, then 1-1.1 m long, 30-35 cm wide, with 1-4 separate pinnae distally and with 14-15 each side and deeply bifid apically. Inflorescences infrafoliar or interfoliar (usually persistent leaf sheaths), erect or arching or horizontal, straight or curved in bud; peduncles 27-93 cm long, 1-2 cm diameter, terete, densely covered with brown tomentum, glabrescent; prophylls 13-60 cm long, 4-5 cm diameter, reddish, sparsely covered with whitish-brown scales; peduncular bracts 0.7-2.2 m long including a 2-4(-8) cm long umbo, inserted either near prophyll or halfway up the peduncle, densely covered abaxially with brown tomentum, persistent; rachises 0.2-1.4 m long, white at anthesis, with similar tomentum to that of peduncle; rachillae (13-)18-60, 35-72 cm long distally, 21-45 cm long proximally, 1-2 mm diameter at anthesis, 2-3 mm diameter in

fruit, swollen at base, with loose to sometimes dense clusters of brownish, rarely whitish, flexuous, flattened, deciduous hairs to 0.5 mm long, occasionally almost glabrous or with crustose hairs, glabrescent; flowers in triads proximally, paired or solitary staminate distally, superficial on the rachillae; triad bracteoles short, apiculate; first flower bracteoles obscure, second and third flower bracteoles \pm equal, apiculate, 0.3 mm long; staminate flowers 4-7 mm long, sessile; sepals deltate, 1.5 mm long, gibbous, yellowish brown and lighter-colored than the petals when dry; petals ovate-lanceolate, 3.5-5 mm long; stamens arranged round a very short receptacle; filaments to 2 mm long, linear, flattened; anthers to 2.5 mm long; pistillodes 1-1.5 mm long, deeply trifid at the apex; pistillate flowers 2-3.5 mm long; sepals very widely ovate, 2-2.5 mm long, fleshy, minutely ciliate; petals widely ovate, 2.5-3.5 mm long; staminodes minute or absent or well developed, digitate; fruits 0.7-1 cm diameter, globose, with lateral stigmatic remains; epicarps purple-black, minutely tuberculate; seeds globose; endosperm deeply ruminate; eophylls bifid. *Lowland rainforest*. CR (*de Nevers et al. 7780*, NY), P (*de Nevers & Henderson 6411*, NY). 350-1300 m. (Costa Rica, Panama, Colombia, Ecuador, Peru).

4. *Prestoea longepetiolata* (Oerst.) H.E.Moore, *Gentes Herbarum* 9: 286 (1963). *Euterpe longepetiolata* Oerst., *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn* 1858: 32 (1859). Holotype: Costa Rica, *Oersted 6562* (C!). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 29 (1996). N.v.: surtua, CR; manaca, P.

Stems 0.3-3 m long, 2-5(-10) cm diameter, clustered, usually with 1 stem well-developed and with basal suckers, occasionally solitary, often repent or procumbent,

usually partially covered with persistent leaf bases, with reddish roots visible at base. Leaves 4-6 per stem, spreading; sheaths open and not forming a crownshaft, 30-43 cm long, fibrous on margins distally and with a 4 cm long fibrous ligule; sheaths, petioles and rachises densely covered with brown, felt-like tomentum, glabrescent; petioles 0.5-2 m long; rachises 1.1-2 m long; pinnae 17-33 per side of rachis, regularly arranged and horizontally spreading in 1 plane, subopposite to alternate, linear-lanceolate, long acuminate, with a prominent midvein and several lateral veins, veins with or without ramenta abaxially, obscurely punctate abaxially; basal pinna 13-55 × 0.5-1.5 cm; middle pinnae 34-69 × 1.5-3.5 cm; apical pinna 11-40 × 0.5-6 cm; undivided leaves with blades cuneate, 72-86 cm long, 25-26 cm wide, with 16-17 primary veins per side.

Inflorescences interfoliar, arching or erect, corymbose; peduncles 0.1-1 m long, 0.5-1.1 cm diameter, ± terete, sparsely to densely covered with brown peltate-lacerate scales; prophylls 9.5-37 cm long, 1.5-2.5 cm diameter, ± glabrous; peduncular bracts 0.3-1.1 m long including 2-3 cm umbo, 2-4 cm diameter, abaxially with appressed, brown scales, persistent; rachises 1-16(-40) cm long, with hairs like those of peduncle; rachillae 2-20, 9-40 cm long (± all the same length on an inflorescence), 1-2 mm diameter at anthesis, subtended by bracteoles to 6 cm long proximally, moderately to densely covered with reddish brown or mixed reddish brown and whitish, flexuous, flattened woolly hairs, occasionally almost glabrous; flowers in triads from half to almost the ends of the rachillae, paired or solitary staminate distally; triad bracteoles apiculate; first flower bracteoles obscure, second and third flower bracteoles ± equal, rounded, 0.5-0.6 mm long; staminate flowers 4.5-6 mm long; sepals deltate, 1-2 mm long, gibbous; petals lanceolate, 4.5-5.5 mm long; filaments 2-2.5 mm long, lanceolate; anthers 2.5-3 mm

long; pistillodes 2-3 mm long, trifid at apex; pistillate flowers 2.5-4 mm long; sepals depressed ovate, 2-3 mm long, fleshy; petals depressed ovate, 2.5-3.5 mm long; staminodes digitate; fruits 0.7-1 cm diameter, globose, the stigmatic remains subapical; epicarps black, prominently and minutely tuberculate; seeds 5-9 mm diameter, globose; endosperm ruminant or rarely homogeneous; eophylls bifid. *Lowland or montane rainforest*. 450-2100 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela).

4a. *Prestoea longepetiolata* var. *longepetiolata*

Euterpe brachyspatha Burret, *Malortiea simiarum* Standl. & L.O. Williams, *Euterpe simiarum* (Standl. & L.O. Williams) H.E. Moore, *Euterpe williamsii* Glassman.

Stems 0.5-3 m long, 2-5 cm diameter Leaves pinnate; apical pinna 12-40 × 2.5-6 cm, usually wider than the other pinnae. Inflorescences arching; peduncles 0.1-1 m long, 0.5-1.1 cm diameter, terete, densely covered with brown peltate-lacerate scales; rachises 1-17 cm long, with scales similar to those of peduncle; rachillae 2-12, 9-32 cm long, 1-2 mm diameter at anthesis, the proximal ones slightly or not swollen basally and with a sterile part 0.5-1 cm long, usually ascending, subtended by bracteoles to 6 cm long proximally, moderately to densely covered with reddish brown, or mixed reddish brown and whitish, flexuous, flattened woolly hairs; endosperm ruminant. *Lowland or montane rainforest*. N (*Moreno 18129*, MO), CR (*Moore 6639*, BH), P (*Churchill 5875*, MO). 600-2100 m. (Nicaragua, Costa Rica, Panama).

4b. *Prestoea longepetiolata* var. *roseospadix* (L.H. Bailey) A.J. Hend. &

Galeano, *Fl. Neotrop.* 72: 67 (1996). *Euterpe roseospadix* L.H. Bailey, *Gentes Herbarum*

6: 201 (1943). *Prestoea roseospadix* (L.H.Bailey) H.E.Moore, *Principes* 9: 73 (1965).

Holotype: Panama, *Woodson & Schery 623* (BH!). Illustr.: Henderson, A. & Galeano, G.

Fl. Neotrop. 72: fig. 29 (1996). N.v.: manaca, P.

Stems 0.1-3 m long, 5-10 cm diameter, solitary, usually partially covered with persistent leaf bases. Leaves pinnate; apical pinna 11-17 × 0.5-2 cm, not wider than the other pinnae. Inflorescences erect at anthesis and in fruit; peduncles 15-48 cm long, 5-7 mm diameter, terete, sparsely to densely covered with brown lacerate-peltate scales; rachises 14-36 cm long; rachillae 7-16, 20-40 cm long, 1.5 mm diameter at anthesis, erect or spreading, the proximal ones swollen at the base and sterile for up to 5 cm, glabrous or densely covered with reddish brown, flexuous, flattened, wooly hairs; endosperm ruminant; eophylls bifid. *Montane rainforest*. CR (*Hammel 14961*, NY), P (*Hammel 2255*, MO). 1200-2100 m. (Endemic). (Costa Rica, Panama).

5. *Prestoea pubens* H.E. Moore, *Gentes Herbarum* 12: 37 (1980). Holotype: Colombia, *Cuatrecasas 15983* (COL!).

Stems 1.4-3.5 m long, 2-5 cm diameter, clustered with 3-6 stems, rarely solitary, sometimes procumbent and partly subterranean, brown or green, with nodulated roots visible at base. Leaves 4-10 per stem, arching; sheaths open and not forming a crownshaft, 17-27(-774) cm long, persistent, with brown scales, fibrous on margins, ligules short or absent; petioles 0.3-1 m long, densely covered with closely appressed, brown hairs, glabrescent; rachises 0.5-1.8 m long, with hairs like those of petiole, glabrescent; pinnae 8-20 per side, regularly arranged and spreading in 1 plane, subopposite, elliptic or subsigmoid, contracted proximally and distally, distally abruptly

and asymmetrically long apiculate, the filiform apex to 10 cm long, the apical pinna irregularly bifid, \pm glabrous abaxially, with prominent midvein and several, obscure lateral veins, with thin and inconspicuous ramenta on mid-vein abaxially; basal pinna 18-32 \times 1.8-4 cm; middle pinnae 19-54 \times 2.5-8 cm; apical pinna 19-24 \times 1.8-4 cm. Inflorescences corymbose, interfoliar, arching, spicate or branched; peduncles 6-50 cm long, 2-7 mm diameter, terete, with scattered brown scales or pubescent with soft pale hairs, glabrescent; prophylls (1.2-)4.5-22 cm long, 1.1-2.5 cm diameter, glabrous or with scales or hairs; peduncular bracts (9-)29-90 cm long, including a 1 cm long umbo, 1-2 cm diameter at middle, covered with appressed, light-brown scales, persistent; rachises 2.5-15 cm long (absent if inflorescence spicate), with stellate, white hairs; rachillae 1-11, 8-32(-47) cm long, all \pm equal in length, ca. 2 mm diameter at anthesis, thickening to ca. 3 mm diameter in fruit, glabrous or with simple to furcate, sub-stellate or stellate, 0.1 mm long, white hairs; flowers in triads almost to apex of rachillae, white at anthesis, the triads very close together, \pm sunken in the rachillae; triad bracteole rounded; first flower bracteoles obscure, second and third flower bracteoles \pm equal, apiculate, 0.3 mm long; staminate flowers 2-4 mm long, sessile or on short flattened pedicels; sepals deltate, 1-1.5 mm long, gibbous, ciliate; petals triangular, 2-4 mm long, glabrous or with tuft of white hairs at apex; stamens arranged on a short receptacle; filaments 1-3 mm long, flattened, adnate proximally to petals; anthers 0.8-2 mm long, oblong; pistillodes 1-2 mm long, deeply trifid at apex; pistillate flowers 2.5-3 mm long; sepals very widely ovate, 2 mm long, fleshy, minutely ciliate, glabrous or with white hairs abaxially; petals very widely ovate, 2 mm long, not fleshy; staminodes digitate; fruits 0.8-1 cm diameter, globose; stigmatic remains lateral; epicarps black, glabrous or minutely tuberculate; seeds 6-7 mm diameter,

globose; endosperm lightly (then almost homogeneous) to deeply ruminant; eophylls not seen. *Lowland rainforest*. 0-1000 m. (Panama, Colombia).

5a. *Prestoea pubens* var. *semispicata* A.J. Hend & Galeano, *Fl. Neotrop.* 72: 68 (1996). *Prestoea semispicata* de Nevers, *Ann. Missouri Bot. Gard.* 75: 213 (1988).

Holotype: Panama, *de Nevers et al.* 6290 (MO!). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 30 (1996).

Inflorescences spicate or branched; rachillae 1(-4), glabrous or rarely with simple to furcate, sub-stellate or stellate, 0.1 mm long, white hairs; staminate flowers 2.5-4 mm long; petals usually glabrous; fruits with endosperm lightly (almost homogeneous) ruminant. *Lowland rainforest*. P (*de Nevers et al.* 6351, MO). 0-1000 m. (Endemic). (Panama).

6. *Prestoea schultzeana* (Burret) H.E. Moore, *Gentes Herbarum* 12: 34 (1980). *Euterpe schultzeana* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 14: 326 (1939).

Holotype: Ecuador, *Schultze-Rhonhof* 2433 (B!). Illustr.: Henderson, A. & Galeano, G. *Fl. Neotrop.* 72: fig. 33 (1996).

Stems 0.2-5 m long, 3-5.5 cm diameter, clustered, rarely solitary, generally with 1 stem developed and basal shoots, but sometimes with to 10 stems, erect or leaning, brown, often covered with persistent leaf bases, with a 30-70 cm high cone of roots visible at base. Leaves 4-10, spreading; sheaths closed for ca. 1/2 their length and not forming a crownshaft, persistent on the stem, 37-50 cm long including a short ligule, with scattered, brown, flat scales; petioles 0.8-1.6 m long, densely whitish brown tomentose,

glabrescent; rachises 1.2-2.2 m long, ridged adaxially, rounded abaxially, tomentose like petioles abaxially, glabrescent; pinnae (21-)33-38 per side, regularly spaced and horizontally spreading in the same plane, subopposite, linear-lanceolate with an abruptly narrowed, ca. 6 cm long filiform apex, with midvein prominent adaxially and abaxially, several lateral veins present, lacking ramenta abaxially; basal pinna (23-)32-47 × 0.3-1.5 cm; middle pinnae (30-)46-58(-81) × 2.-4.4(-6) cm; apical pinna 10-21(-40) × 0.5-2 cm. Inflorescences corymbose, interfoliar, arching; peduncles 45-80 cm long, 0.8-2 cm diameter, almost terete, with flattened, branched, whitish or brownish hairs; prophylls 18-37 cm long, 2 cm diameter, flattened; peduncular bracts 0.6-1.2 m long including a 12-14 cm long umbo, tubular, persistent, inserted 6-12 cm above insertion of prophyll; rachises 4-30 cm long, with hairs like those of peduncle; rachillae 5-13, spirally arranged, slightly swollen at base, proximal ones 20-75 cm long, distal ones 16-60 cm long, 1.5-3.5 mm diameter in flower, thickening to 2-3.5 mm in fruit, white at anthesis, becoming red in fruit, densely covered with whitish, branched, erect or flexuous hairs; flowers in triads proximally, paired or solitary staminate distally, white at anthesis; triad bracteoles apiculate; first flower bracteoles apiculate, second and third flower bracteoles prominent, ± equal, strongly apiculate to almost deltate, 0.5 mm high; staminate flowers 3-5 mm long; sepals deltate, acute at the apex, 1.5-1.7 mm long, keeled, minutely ciliate; petals lanceolate-ovate, 3-5 mm long, with white hairs abaxially; filaments 2-3 mm long, lanceolate, flattened, adnate proximally to petals; anthers 2-2.5 mm long; pistillodes 3-3.5 mm long, deeply trifid at apex; pistillate flowers 2-4 mm long; sepals very widely ovate, 2-3 mm long, ciliate, with whitish hairs abaxially; petals widely ovate, 3.5 mm long, glabrous, minutely ciliate; staminodes digitate or sometimes absent; fruits globose, 0.7-1

cm diameter, the stigmatic remains subapical to lateral; epicarps black at maturity, minutely tuberculate; seeds globose, 5-7 mm diameter; endosperm slightly ruminant; eophylls pinnate with elongate rachis. *Lowland rainforest*. CR (Grayum & G. Herrera 9228, MO). 0-800 m. (Costa Rica, Colombia, Ecuador, Peru).

Grayum (in Hammel et al., 2003) was the first to point out that *Prestoea schultzeana* occurred in Costa Rica. It is also likely to occur in Panama but no specimens from there have been seen.

30. *Pseudophoenix* H.Wendl. ex Sarg.

Sargentia H.Wendl. & Drude ex Salomon, *Cyclospathe* O.F.Cook, *Chamaephoenix*

H.Wendl. ex Curtiss

By S. Zona.

Stems solitary, erect, cylindrical, ventricose or lageniform, gray at maturity, smooth or prominently ringed with leaf scars, glabrous or waxy. Leaves alternate and spirally arranged (distichously arranged in juveniles), pinnately divided with pinnae irregularly arranged along the rachis and displayed in multiple planes; sheaths forming an incomplete crownshaft; petioles rounded abaxially, channeled adaxially (when young) or with a low ridge along the length of the adaxial channel (at maturity); pinnae greatly

reduced at the base of the leaf, becoming largest at the middle of the leaf, and again reduced distally, lanceolate, lax or stiff; midvein prominent; secondary and tertiary veins numerous; transverse veinlets not evident. Inflorescences erect, ascending or arching, branched to 4 orders; peduncles dorsiventrally flattened, glabrous, bearing two bracts; prophylls oblanceolate, bearing scurfy dark scales along the two keels but otherwise glaucous, opening apically; inner bracts bearing dark brown scales along both edges; inflorescence axes glabrous, with small bracteoles subtending each branch; rachillae divaricating or directed toward the apex of the inflorescence, glabrous; flowers borne singly, subtended by a minute bract, borne on a pseudopedicel; calyces of 3 connate sepals, a shallow cupule with three spreading lobes or three sided; petals 3, ovate, valvate, spreading in anthesis (spreading or reflexed in fruit); stamens 6 in two whorls, the outer whorl alternate with the petals, the inner whorl opposite the petals, basally adnate to the petals and sometimes briefly connate by their filament bases (forming a shallow staminal tube); filaments awl-shaped, with tips embedded in the connective; anthers elongate, somewhat gibbous, bilocular; dehiscence latrorse-introrse; pistillodes (in staminate flowers) conical to pyramidal, green; gynoecia (in bisexual flowers) of 3 connate uniovulate carpels, trigonous, cylindrical to ovoid or conical, styles absent, stigmas apical, inconspicuously trifid; fruits a drupe with 1-3 endocarps, globose with one endocarp, lobed with two or three endocarps, red, perianths and pseudopedicels persistent; mesocarp fleshy and juicy; endocarps globose or flattened globose, brown, smooth; stigmatic scars basal (in single seeded fruits) or apical (in 2- or 3-seeded fruits); seeds globose or flattened globose, brown, with prominent impressed fibers radiating

from the short, prominent raphe; endosperm homogeneous; embryos basal; germination remote tubular, eophylls linear and undivided. 4 spp. Neotropics, Caribbean.

Bibliography: Zona, S. *Palms* 46: 19-38 (2002).

1. *Pseudophoenix sargentii* H.Wendl. ex Sarg., *Bot. Gaz.* 11: 314 (1886).

Chamaephoenix sargentii (H.Wendl. ex Sarg.) Curtiss, *Florida Farmer Fruit Grower* 1(8): 57 (1887). Holotype: USA, *Sargent s.n.* (A!).

Stems 1-8 m tall, cylindrical, 9.5-25 cm diameter, gray, with prominent leaf scars when young. Leaves 7-16 in the crown, spreading or ascending, 0.9-2.2 m long; sheaths 18-41 cm long, green with silvery gray scales near the apex; petioles 24-119 cm long; rachises 64-165 cm long, often with brown scales along margins; pinnae 37-122 per side of the rachis; middle pinnae 29-64 cm long, 0.9-3.2 cm wide, lanceolate with an acuminate tip, gray-green, glaucous abaxially, glaucous to glossy adaxially, ramenta present on the abaxial surface of the midvein at the base of the pinnae. Inflorescences erect, ascending or horizontal, branched to 3 or 4 orders, 100-150 cm long; peduncles often hidden by the leaf bases, 60-88 cm long, 1.7-1.8 cm diameter, glabrous; prophylls 24-105 cm long, 2.6-6 cm wide, bearing dark brown scales along both edges (keels); inner bracts 10-74 cm long, 1.6-5 cm wide, bearing dark brown scales along both edges; rachillae 1.3-5.5 (-9) cm long and 0.4-1.4 mm diameter, strongly divaricating; flower pseudopedicels 2.2-7.6 mm long, 0.4-1(-1.7) mm diameter, green to glaucous; calyces shallow, triangular, cupular, 2.1-4.2 mm diameter, green to glaucous, margins hyaline; petals ovate, 4.8-6.6 mm long, 3.2-4.8 mm wide, green, glaucous abaxially, spreading, with ca. 7-13 major veins; filaments 2.2-3.7 mm long, basally connate forming a short

staminal tube, anthers ovoid, 2.4-4.1 mm long, 0.8-2.5 mm wide, yellow; gynoecium (in bisexual flowers) 3-4.2 mm long, 1-2.3 mm diameter (pistillode in staminate flowers smaller), green; fruits 10.6-17.1 mm long, 9.1-16.1 mm diameter (in single-seeded fruits); endocarps 7.9-13.5 mm long, 6.8-11.8 mm diameter, 0.1-0.2 mm thick; seeds 6.4-10.5 mm long, 6.6-9.6 mm diameter. *Low-lying areas near the sea on limestone soils in seasonal, dry forest.* Y (*Orellana et al.* 396, CICY), QR (*Sanders & Frame* 1720, NY), B (*Turner* 33, BH). Near sea level. (United States, Mexico, Belize, Bahamas, Turks and Caicos, Cuba, Hispaniola, Dominica).

31. *Raphia* P.Beauv.

Sagus Rumph.

By A. Henderson.

Monoecious, semelparous, spiny, pinnate-leaved palms. Stems solitary or clustered, aerial or subterranean, erect. Leaves pinnate, reduplicate; sheaths open and not forming a crownshaft; petioles either short or long; rachises long; pinnae linear, either regularly arranged and spreading in 1 plane, or irregularly arranged and spreading in different planes, usually with small spines. Inflorescences interfoliar, branched to 2 orders; peduncular bracts several; rachises with numerous rachillae, these distichously arranged, rachis, primary branches, and rachillae covered with sheathing bracts; flowers solitary, pistillate proximally and staminate distally on rachillae; staminate flowers with sepals 3,

connate into a lobed cupule; petals 3, briefly connate basally, free above, almost woody and greatly exserted; stamens 6-30; pistillodes minute or absent; pistillate flowers with sepals 3, connate into a 3-lobed calyx; petals 3, connate into a 3-lobed corolla; staminodes 6-16; gynoecia tricarpellate, triovulate; fruits usually 1-seeded, ellipsoid or ellipsoid-oblong, covered with overlapping scales; seeds with ruminant endosperm and lateral embryo; eophylls pinnate or bifid. 21 spp. 1 Neotropical, others Africa.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

1. *Raphia taedigera* (Mart.) Mart., *Hist. Nat. Palm.* 3: 217 (1838). *Sagus taedigera* Mart., *Hist. Nat. Palm.* 2: 54 (1824). 1824). *Metroxylon taedigerum* (Mart.) Spreng., *Syst. Veg.* 2: 139 (1825). *Raphia vinifera* var. *taedigera* (Mart.) Drude in C.F.P.von Martius & auct. suc. (eds.), *Fl. Bras.* 3(2): 287 (1881). Holotype: Brazil, *Martius s.n.* (M!). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pls. 9-10 (1995). N.v.: yolillo, CR; matomb, P.

Raphia nicaraguensis Oerst., *Raphia vinifera* var. *nicaraguensis* (Oerst.) Drude in C.F.P.von Martius, *Raphia aulacolepis* Burret

Stems 1-4 m long, 28-40 cm diameter, clustered, covered with persistent leaf bases and other debris, with a mount of roots at the base. Leaves 5-15 per stem, stiffly ascending; sheaths 1.5-5.1 m long, with stiff, brown fibers on the margins; petioles 1.5-4.2 m long, ± terete; rachises 4.7-8.5 m long, spiny on adaxial ridge; pinnae 136-205 per side of rachis, ± regularly arranged or clustered in groups of 2-3, spreading in different planes, linear, the middle ones 0.6-1.7 m long, 3-5 cm wide, with spines on veins.

Inflorescences interfoliar; peduncles, prophylls and peduncular bracts not recorded; rachises ca. 1.5 m long, covered with sheathing bracts; rachillae numerous; flowers unisexual, the pistillate solitary at the base of the rachillae, the staminate solitary distally; staminate flowers 1.2-1.3 cm long; sepals 3 mm long; petals lanceolate, 11-12 mm long; staminodes united into a low ring; fruits 5-7 cm long, 3-4 cm diameter, ellipsoid-oblong, covered with broad, overlapping, reddish-brown scales; endosperm ruminant. *Low-lying, wet areas near the sea.* N (*Rueda et al. 4065*, MO), CR (*Henderson 1815*, NY), P (*Fendler 460*, NY). Sea level. (Nicaragua, Costa Rica, Panama, Colombia, Brazil).

32. *Reinhardtia* Liebm.

Malortiea H.Wendl.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or clustered, slender to stout, often covered with persistent leaf bases. Leaves undivided or pinnate; sheaths tubular, not forming a crownshaft, fibrous on the margins; petioles well-developed, with or without wings along the margins; pinnae multi-fold and then praemorse at the apices or single-fold and then with narrow apices, when multi-fold often with windows at bases of pinna. Inflorescences spicate or branched to 1-2 orders; peduncles elongate, bearing a prophyll and 1 peduncular bract; rachises bearing few to numerous rachillae; flowers in triads; staminate flowers with 3, free, imbricate sepals and

3, free, valvate petals; stamens 8-49; pistillate flowers with 3, free, imbricate sepals and 3, free, valvate petals; staminodes numerous, digitate; gynoecia trilocular, triovulate; fruits 1-seeded, ellipsoid, black, with apical stigmatic remains; seeds basally or laterally attached, with homogeneous or ruminant endosperm; eophylls simple or bifid. 6 spp.

Neotropics.

Bibliography: Moore, H. *Gentes Herbarum* 8: 541-575 (1957). Henderson, A. *Amer. J. Bot.* 89: 1491-1502 (2002).

1. Pinnae single-fold, 38-40 per side of rachis, with 1 vein per pinna; Mexico, Honduras.

1. R. elegans

1. Pinnae multi-fold, to 7 per side of rachis, with 3-13 veins per pinna, or leaves undivided.

2. Pinnae to 2 per side of rachis, or leaves undivided; windows absent, rarely present.

3. Rachillae 1; stamens 8-10; Nicaragua, Costa Rica, Panama.

3. R. koschnyana

3. Rachillae 2-8; stamens 14-19; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

5. R. simplex

2. Pinnae 2-7 per side of rachis; windows present.

4. Petioles winged; rachises 3.2-22.5 cm long, 1.1-3.1 mm wide; Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama.

2. R. gracilis

4. Petioles not winged; rachises 45-53 cm long, 4.6-9.9 mm wide; Belize, Honduras, Nicaragua, Costa Rica.

4. R. latisecta

1. Reinhardtia elegans Liebm., *Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider* 1845: 9 (1846). Lectotype (designated by Moore, 1957): Mexico, Oaxaca, *Liebman 10805* (C n.v.). Illustr.: Moore, H. *Gentes Herbarum* 8: figs. 160-161 (1957). N.v.: palmito, H.

Reinhardtia spinigera L.H.Bailey

Stems to 3 m long, ca. 5 cm diameter, solitary or clustered. Petioles ca. 32 cm long, not winged; rachises ca. 101.5 cm long, 3.4-6.8 mm wide; pinnae single-fold, 38-40 per side of rachis, with 1 vein per pinna; windows absent; proximal pinna margins 9.5-36 cm long, forming a 124° angle with the rachis; distal pinna margins 8.7-13.5 cm long, forming a 8-14° angle with the rachis. Inflorescences branched to 1-2 orders; rachises 3.7-14.5 cm long, 4.5-8.7 mm wide; rachillae 5-10; proximal rachilla 10.5-34 cm long; distal rachilla 9-25 cm long; stamens 26-49; fruits 16.6-18 × 10.8-11.7 mm; seeds laterally attached; endosperm ruminant; eophylls not recorded. *Lowland to montane rainforest*. T (*Purpus 10550*, NY), H (*Hawkins 387*, NY). 850-1600 m. (Mexico [Oaxaca, Chiapas, Tabasco], Honduras).

2. Reinhardtia gracilis (H.Wendl.) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 554 (1932). *Malortia gracilis* H.Wendl., *Allg. Gartenzeitung* 21: 26 (1853). *Geonoma fenestrata* Linden, *Cat. Pl. Exot.* 12: 35 (1857), nom. superfl. Holotype: Guatemala, *Kegel s.n.* (image only, BH!). Illustr.: Moore, H. *Gentes Herbarum* 8: figs. 163-166 (1957).

Malortiea lacerata W.Bull, *Reinhardtia gracilis* var. *gracilis*, *R. gracilior* Burret, *R. gracilis* var. *gracilior* (Burret) H.E.Moore, *R. rostrata* Burret, *R. gracilis* var. *rostrata* (Burret) H.E.Moore, *R. gracilis* var. *tenuissima* H.E.Moore

Stems 0.5-2.5 m long, 0.3-0.9 cm diameter. Petioles 7.5-44.5 cm long, winged; rachises 3.2-22.5 cm long, 1.1-3.1 mm wide; pinnae multi-fold, 2-6 per side of rachis with 3-12 veins per pinna; windows 4-14 per leaf; proximal pinna margins 4-13.8 cm long, forming a 75-137° angle with the rachis; distal pinna margins 8-22.5 cm long, forming a 2-23° angle with the rachis. Inflorescences branched to 1 order; rachises 0.1-11 cm long, 1.1-4.1 mm wide; rachillae 2-13; proximal rachilla 3.2-18 cm long; distal rachilla 3.1-13 cm long; stamens 8-18; fruits 8.1-15.3 × 5.6-7.7 mm; seeds basally attached; endosperm homogeneous; eophylls simple. *Lowland rainforest*. Ch (*Breedlove* 57329, NY), B (*Balick* 3746, NY), G (*Moore* 8220, BH), H (*Moore* 6783, BH), N (*Proctor* 27242, NY), CR (*Moore* 10125, BH), P (*de Nevers* 6870, NY). 5-1100 m. (Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia).

Moore (1957) recognized four varieties of *Reinhardtia gracilis*. Henderson (2002) showed that this species was more variable than previously supposed, and that at least seven distinct forms could be recognized, although these were not given any taxonomic status.

3. *Reinhardtia koschnyana* (H.Wendl. & Dammer) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 554 (1932). *Malortiea koschnyana* H.Wendl. & Dammer, *Gard. Chron.*, ser. 3, 29: 341 (1901). Neotype (designated by Moore, 1957): Costa Rica, *Cook & Doyle* 52 (US!). Illustr.: Moore, H. *Gentes Herbarum* 8: figs. 168 (1957).

Stems 0.5-1 m long, 0.3-0.5 cm diameter, clustered. Petioles 5-13.7 cm long, winged; rachises 13-18.5 cm long, 1-1.7 mm wide; pinnae multi-fold, 1 per side of rachis, with 6-9 veins; windows absent; proximal pinna margins 6.7-9.6 cm long, forming a 150-160° angle with the rachis; distal pinna margins 3.5-6.4 cm long, forming a 5-14° angle with the rachis. Inflorescences spicate; rachises absent; rachillae 1, 3.5-9.5 cm long; stamens 8-10; fruits 10.9-13.5 × 7.5-8.8 mm; seeds basally attached; endosperm homogeneous; eophylls simple. *Lowland rainforest*. N (*Danin 77152*, NY), CR (*Hammel 15319*, MO), P (*Gentry 7127*, MO). 10-830 m. (Nicaragua, Costa Rica, Panama, Colombia).

4. *Reinhardtia latisecta* (H.Wendl.) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 554 (1932). *Malortia latisecta* H.Wendl., *Allg. Gartenzeitung* 21: 146 (1853). Neotype (designated by Moore, 1957): Belize, *Schipp 1149* (NY!). Illustr.: Moore, H. *Gentes Herbarum* 8: figs. 162 (1957).

Malortia intermedia H.Wendl. ex Schaedtler

Stems 3-4 m long, 3.5-4.3 cm diameter. Petioles 15-29.5 cm long, not winged; rachises 45-53 cm long, 4.6-9.9 mm wide; pinnae multi-fold, 3-7 per side of rachis, with 11-13 veins per pinna; windows 11-13 per leaf; proximal pinna margins 30.5-41 cm long, forming a 129-164° angle with the rachis; distal pinna margins 22-26 cm long, forming a 5-147° angle with the rachis. Inflorescences branched to 2 orders; rachises 10.5-25 cm long, 3.9-9 mm wide; rachillae 11-53; proximal rachilla 11.5-14.5 cm long; distal rachilla 3.5-7 cm long; stamens 22-27; fruits 16.4-19.7 × 9-11.4 mm; seeds laterally attached; endosperm ruminant; eophylls not recorded. *Lowland rainforest*. B (*Gentle 8639*, NY), H

(*Evans 1608*, MO), N (*Stevens 12145*, NY), CR (*Henderson 1814*, NY). 30-950 m, (Endemic). (Belize, Honduras, Nicaragua, Costa Rica).

5. *Reinhardtia simplex* (H.Wendl.) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 554 (1932). *Malortiea simplex* H.Wendl., *Bot. Zeitung (Berlin)* 17: 5 (1859). Holotype: Costa Rica, *Friedrichsthal s.n.* (BH!). Illustr.: Moore, H. *Gentes Herbarum* 8: figs. 167 (1957).

Stems 0.8-1.5 m long, 0.3-0.6 cm diameter, clustered. Petioles 4-16 cm long, winged; rachises 12-21 cm long, 1.1-2.3 mm wide; pinnae multi-fold, 1-2 per side of rachis with 6-12 veins per pinna; windows absent, rarely present; proximal pinna margins 4-8.3 cm long, forming a 110-153° angle with the rachis; distal pinna margins 0.2-2.6 cm long, forming a 1-18° angle with the rachis. Inflorescences branched to 1 order; rachises 0-3.7 cm long, 1.1-2.5 mm wide; rachillae 2-8; proximal rachilla 3-8.2 cm long; distal rachilla 2-5.5 cm long; stamens 14-19; fruits 9-14.2 × 4.2-8.4 mm; seeds basally attached; endosperm homogeneous; eophylls not recorded. *Lowland rainforest*. B (*Wright s.n.*, BH), H (*Saunders 1134*, NY), N (*Proctor 26909*, NY), CR (*Grayum 4838*, NY), P (*Croat 16258*, NY). 5-1000 m. (Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia).

Reinhardtia simplex is recorded from Mexico and Guatemala, but no specimens from there have been seen.

33. *Roystonea* O.F.Cook

Gorgasia O.F.Cook

By S. Zona.

Solitary, unarmed, pleonanthic, monoecious palms. Stem smooth, gray-white to gray-brown or mauve-brown, to ca. 40 m tall and 66 cm diam., sometimes ventricose or variously swollen and tapered, and often with conspicuous leaf scars. Leaves spirally arranged, pinnately divided with reduplicately plicate segments borne in 2 or 3 planes, although generally only 1 plane apparent toward apex; leaf bases sheathing, forming a conspicuous green crownshaft, bearing scurfy pubescence, especially near the apex; petioles to 0.5 m long; pinnae numerous, lanceolate, bearing scurfy pubescence along the abaxial side of the midrib and minute, punctate trichomes on the abaxial surface of the lamina; apex acute and bifid. Inflorescences infrafoliar, subtended by a bicarinate prophyll and a single, glabrous or scurfy pubescent, caducous peduncular bract that splits longitudinally on the adaxial side then abscises transversely from the peduncle; inflorescence with 4 orders of branching, each branch subtended by an inconspicuous bract; rachillae puberulent when mature, but bearing caducous, farinaceous, stellate to dendritic, multicellular, white trichomes (“free trichomes”) while enclosed by the peduncular bract; flowers unisexual, borne in triads (some dyads or monads distally), sessile; staminate flowers white, yellow, or violet; sepals 3, imbricate, reniform to triangular, chartaceous, margins hyaline, minutely serrate or ciliate, especially basally; petals 3, valvate, obovate, weakly costate, with thickened margins, sparingly connate at base and adnate to the stamens; stamens (5-)6(-10); filaments narrowly triangular; anthers

dorsifixed, versatile, with pigmented connective, dehiscing laterally; pistillodes globose; pistillate flowers white, yellow, or violet; sepals 3, imbricate, reniform, chartaceous, margins entire to minutely erose; petals 3 ovate, connate for ca. half their length, valvate, coriaceous; staminodes cupulate with 6 lobes, adnate to the corolla for the basal half to two thirds their length; gynoecia globose, pseudomonomerous; stigmas eccentric, 3-lobed, dry; ovules hemitropous; fruits drupes, globose or dorsiventrally compressed spheroid to gibbous-ellipsoid, brown- to purple-black, with a thin, smooth epicarp, an oily, fleshy, fibrous mesocarp, and a papery to woody endocarp; stigmatic scars basal; seeds dorsiventrally depressed ellipsoid, ventrally adnate to the endocarp to varying degrees; testas thin with a conspicuous raphe; embryos small, basal; endosperm homogeneous, bony, oily; germination adjacent ligular; eophylls linear-lanceolate to lanceolate, stipitate or exstipitate, costate to weakly costate, undivided, the margins minutely toothed. 10 spp. Neotropics, Caribbean.

Bibliography: Zona, S. *Fl. Neotrop.* 71: 1-35 (1996).

1. Peduncular bracts more or less as long as crownshafts.

1. R. dunlapiana

1. Peduncular bracts ca. three-fourths the length of the crownshafts or much less.

2. R. regia

1. Roystonea dunlapiana P.H.Allen, *Ceiba* 3: 15 (1952). Holotype: Honduras, Allen et al. 6140 (US!).

Stems gray-white, to 20 m long, ca. 38 cm diameter. Leaves ca. 15, lowest leaves hanging below the horizontal; crownshafts ca. 2 m long; rachises ca. 4 m long; middle

pinnae 78-88 cm long and 2.5-6.5 cm wide. Inflorescences ca. 1 m long and 1 m wide; prophylls not recorded; peduncular bracts ca. 2 m long, narrowly acuminate, as long as the crownshafts, widest in the middle; rachillae ca. 37 cm long and 1-1.3 mm diameter, stiff; staminate flowers white; sepals triangular, ca. 1 mm long and 0.8-1.8 mm wide; petals elliptical to ovate, 2.9-5.6 mm long and 2.1-2.4 mm wide; stamens 6, ca. 3.5 mm long; filaments awl-shaped, 2.4-4.8 mm long; anthers 1.8-2.7 mm long, purplish; pistillodes minute; pistillate flowers 1.5-3.5 per cm, not recorded; fruits 12-14.7 mm long, 7.5-9.8 mm dorsiventral thickness, and 7.1-9.5 mm wide, obovoid and gibbous; epicarps purplish black; stigmatic scars plain; endocarps ellipsoid, 11-13.6 mm long, 6.5-8.2 mm dorsiventral thickness, and 6.5-7.4 mm wide; seeds ellipsoid, 7.3-10.3 mm long, 4.5-5.8 mm dorsiventral thickness, and 5.1-6 mm wide; raphes circular; eophylls linear-lanceolate, exstipitate, weakly costate. *Coastal swamps*. QR (*Quero 3602*, MEXU), H (*Zona & Martínez 422*, RSA), N (*Allen 6479*, EAP). Sea level. (Endemic.)

This species also occurs in Belize, but only photographs, not specimens, have been seen.

2. *Roystonea regia* (Kunth) O.F.Cook, *Science*, ser. 2, 12: 479 (1900). *Oreodoxa regia* Kunth in F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, *Nov. Gen. Sp.* 1: 305 (1816). *Oenocarpus regius* (Kunth) Spreng., *Syst. Veg.* 2: 140 (1825). Holotype, Cuba, *Bonpland 1276* (P!).

Roystonea regia var. *hondurensis* P.H.Allen.

Stems gray-white, to 20(-30) m long, 37-57.5 cm diameter. Leaves ca. 15, lowest leaves hanging below the horizontal; crownshafts ca. 2 m long; rachises ca. 4 m long;

middle pinnae 63-119 cm long and 2.5-4.6 cm wide. Inflorescences ca. 1 m long and 1 m wide; prophylls ca. 36 cm long and 7.3 cm wide; peduncular bracts 0.8-1.6 m long and 9.8-13 cm wide, widest at the middle, apex acuminate; rachillae 11-31 cm long and 0.9-2.3 mm diameter; staminate flowers white; sepals triangular, 0.8-1.4 mm long and 0.9-2 mm wide; petals elliptical to ovate, 3.5-6.4 mm long and 2.2-3.5 mm wide; stamens 6-9, 3.2-7.5 mm long; filaments awl-shaped, 2.3-5.6 mm long; anthers 2.4-4.5 mm long; pistillodes minute; pistillate flowers white, 2-4.5 per cm; sepals reniform, 0.7-1.8 mm long and 1.8-3.4 mm wide; petals ovate 2.7-3.7 mm long; staminodes 6-lobed, 1.3-2.8 mm long, free for 0.6-1.2 mm; gynoecia 1.1-3.5 mm long and 0.9-2.6 mm diameter; fruits 8.9-15.1 mm long, 6.9-11.2 mm dorsiventral thickness, and 7-10.9 mm wide, spheroid to ellipsoid, somewhat dorsiventrally compressed; epicarps purplish black, stigmatic scars plain; endocarps ellipsoid, 7.5-11.1 mm long, 6-7.7 mm dorsiventral thickness, and 5.8-7.9 mm wide; seeds ellipsoid, somewhat dorsiventrally compressed, 5.5-9.7 mm long, 4-6.3 mm dorsiventral thickness, 5.1-7.2 mm wide; raphes circular; eophylls linear-lanecolate, 13.5-19 cm long and 1.3-1.5 cm wide, exstipitate, weakly costate. *Lowland forest, persisting and naturalizing in disturbed areas.* T (*Zona & Flores 458, FLAS*), Y (*Quero 2988, MEXU*), C (*Moore 8073, BH*), B (*Cook & Doyle 9, US*), H (*Zona et al. 421, BH*). Low elevations. (United States, Mexico, Belize, Honduras, Bahamas, Cayman Islands, Cuba).

34. *Sabal* Adans.

Inodes O.F.Cook

By S. Zona.

Solitary, hermaphroditic palms with aerial or subterranean woody unarmed trunks. Stems covered with leaf bases or clean, obscurely to strongly ringed, becoming more or less smooth or striate and bare with age. Leaves few to numerous, alternate and spirally arranged, blade weakly to strongly costapalmate, glaucous or paler on the abaxial surface or not; petioles unarmed, convex abaxially, more or less concave adaxially, splitting at the base; hastulas usually well developed on adaxial surface, obtuse to acuminate triangular, with peltate trichomes (these often caducous), the margins entire or undulate, erect, involute, or revolute; plication induplicate; leaf segments lanceolate, basally connate to connate for half their length or groups of two or three segments connate for almost their entire length, glabrous, glabrescent, or lepidote on abaxial surface of mid veins, usually filiferous between leaf segments, apices acute or bifid and bearing a filament in each cleft; midveins prominent, transverse veinlets obscure to conspicuous; stomata anomocytic, present on both surfaces or only the abaxial surface. Inflorescences interfoliar, paniculate, erect, ascending, arcuate or cernuous, with 2-4 orders of branching; main axis bearing 2-5 sterile bracts above the prophyll; rachillae glabrous; flowers solitary, sessile, perfect, white, fragrant; calyces cupulate, urceolate or campanulate with three tanniferous lobes, carnosose at the base, becoming membranous distally, margins hyaline; petals three, imbricate, elliptical, obovate, or spatulate, alternate with the outer whorl of stamens (basally connate in *S. yapa*), margins hyaline and denticulate, membranous to carnosose, spreading to reflexed at anthesis, basally adnate to

the filaments; stamens six, outer whorl alternate with the petals, the inner whorl opposite the petals; filaments awl-shaped to acuminate, basally connate; anthers hastate, dorsifixed, versatile, dehiscence latrorse by longitudinal slits; pollen yellow, ellipsoidal, monosulcate, exine reticulate; ovary of three carpels, connate, with a single stylar canal, superior, nectaries three, septal, style 0.5-1 mm long, stigma papillose, minutely three-lobed, dry; placentation basal-axile; ovules three, anatropous; fruits 1-3-seeded berry, oblate, spheroidal, pyriform, or with 2 or 3 lobes when more than one seed develops; epicarp greenish-brown to black; mesocarp brown to black; endocarps brown, membranous, separating from the seed; seed oblate, flat to concave at the funicular end, brown; endosperm bony, homogeneous, white; embryos supra-equatorial, equatorial or rarely subequatorial, minute; germination remote; eophylls simple, linear-lanceolate. 18 spp. Neotropics.

Bibliography: Zona, S. *Aliso* 12: 583-666 (1990). Quero, H. *Principes* 35: 219-224 (1991).

1. Leaf segments partially connate in groups of 2 or 3.

2. Lamina with stomata on both surfaces; inflorescences with 3 orders of branching; petals triangular-ovate, carnose, connate basally; calyces campanulate; filaments acuminate; Yucatan Peninsula.

4. S. yapa

2. Lamina with stomata on the abaxial surface; inflorescences with 4 orders of branching; petals ovate to obovate, membranous, alternating and adnate to the outer whole of stamens; calyces cupulate (rarely urceolate); filaments awl-shaped; Mexico, Central America.

2. S. mauritiiformis

1. Leaf segments not partially connate in groups of 2 or 3.
3. Leaf segments 6-7 cm wide; seeds oblate-spheroidal; Yucatan Peninsula.

1. *S. gretherae*

3. Leaf segments 3-5 cm wide; seeds oblate, concave; United States, Mexico, El Salvador.

3. *S. mexicana*

1. *Sabal gretherae* Quero, *Principes* 35: 219 (1991) as "*gretheriae*." Isotype: Mexico, Quintana Roo, *Quero 3592* (NY!).

Stems to 8 m long, 20-30 cm diameter, with persistent leaf bases below the crown. Leaves evenly green, strongly costapalmate, filiferous; petioles 5-6 cm wide, ca. 1.2-1.4 m long; hastulas narrowly triangular to acuminate, 15-20 cm long, glabrous, margins erect or incurved; segments 100-120 per leaf, connate for ca. 50% of their length; middle segments 110-130 cm long, 6-7 cm wide, transverse veinlets abundant and conspicuous, the apex bifurcate for 30-40 cm. Inflorescences ascending to arcuate with 3 orders of branching, exceeding the leaves in length; rachillae 1.0-1.2 mm in diameter, 9-11 cm long; flowers 4.0-4.5 mm long; calyces urceolate to cupulate, trilobed, strongly costate when dry, 1.5-2.0 mm long; petals spatulate, costate when dry (apparent even in mature buds), membranous, ca. 4 mm long, 1.5 mm wide; stamens ascending-spreading; filaments awl-shaped, ca. 5 mm long, adnate to the corolla; anthers 1.4-1.5 mm long; gynoecia ca. 4.0 mm long, ovary 1.2-1.5 mm high; fruits 16-20 mm in diameter, 16-18 mm high, globose to globose-pyriform, with a thick pericarp; seeds globose to irregularly oblate spheroid, 9.5-12.2 mm in diameter, 6-9 mm high, with smooth or protruding

funicular remains; embryos supra-equatorial, rarely equatorial. *Disturbed habitats*. QR (*Quero 3591*, NY). Low elevations. (Endemic). (Mexico).

2. *Sabal mauritiiformis* (H.Karst.) Griseb. & H.Wendl. in A.H.R.Grisebach, *Fl. Brit. W. I.*: 514 (1864). *Trithrinax mauritiiformis* H.Karst., *Linnaea* 28: 244 (1856).

Lectotype (designated by Glassman, 1972): Karsten, *Fl. colomb.* 2: t. 172 (1866).

Sabal allenii L.H.Bailey, *S. morrisiana* Bartlett ex L.H.Bailey, *S. nematoclada*

Burret

Stems to 25 m long, 15-20 cm diameter, green and prominently ringed when young and aging to brown-gray. Leaves 15-25, evenly green or strongly glaucous, weakly costapalmate, not filiferous; petioles 2.2-3.2 cm wide, 2-3 m long; hastulas acuminate or occasionally acute, 6.5-11 cm long, lepidote or glabrescent, margins revolute, erect, or involute and strongly ridged, entire or undulate; segments 90-120 per leaf, connate in groups of 2 or 3 for nearly their entire length (rarely solitary), the groups connate for only ca. 30% of their length; middle segments 125-200 cm long, 2.5-3.7 cm wide, 0.1 mm or less thick, transverse veinlets prominent, abundant and long, apex bifurcate for 10-35 cm. Inflorescences ascending (becoming more or less arcuate in fruit) with 4 orders of branching, exceeding the leaves in length, sheathing bracts lepidote; rachillae 7-14 per branchlet, 0.5-1.1 mm in diameter, 4.5-6 cm long; flowers 3.5-4.8 mm long; calyces cupulate or rarely urceolate, non- or only weakly costate when dry, 1.4-2.4 mm long, 1.1-2.0 mm wide, sinuses 0.6-0.9 mm deep; petals ovate (rarely obovate), non-costate when dry, membranous, 2.4-3.9 mm long, 1.5-1.8 mm wide; outer whorl stamens erect, inner whorl stamens spreading-reflexed; filaments awl-shaped, 2.7-3.5 mm long, basally

connate and adnate to the corolla for 0.6-3.5 mm; anthers ca. 1.2 mm long and 0.6 mm wide; gynoecia 2.5-3.1 mm long, ovary 0.8-1.3 mm high, 0.8-1.1 mm in diameter; fruits 8.8-11 mm in diameter, 8.5-11 mm high, spherical to pyriform; seeds 6.6-7.9 mm in diameter, 4.9-6.2 mm high, oblate spheroidal, with rounded or bulging funicular remains; embryos supra-equatorial or rarely equatorial. *Lowland rainforest and persisting in disturbed areas.* T (Zona 141, RSA), Ch (Martínez 6942, RSA), B (Lundell 6683, NY), G (Moore & Cetto 8202, BH), CR (Grayum & Schatz 5253, MO), P (Duke 8395, MO). 0-1000 m. (Mexico, Belize, Guatemala, Costa Rica, Panama, Colombia, Venezuela, Trinidad.)

3. *Sabal mexicana* Mart., *Hist. Nat. Palm.* 3: 246 (1838). *Inodes mexicana* (Mart.) Standl., *Contr. U.S. Natl. Herb.* 13: 71 (1920). Lectotype (designated by Glassman, 1972): Mexico, *Karwinski s.n.* (M n.v.; frag. FI!).

Inodes texana O.F.Cook, *Sabal guatemalensis* Becc., *S. texana* Becc.

Stems to ca. 15 m long, 20-35 cm diameter, gray, with or without leaf bases. Leaves 10-25, evenly green, strongly costapalmate, filiferous; petioles 2.9-3.2 cm wide, ca. 1-2m long; hastulas acuminate to acute, 9.5-15.5 cm long, glabrous or glabrescent, margins erect and undulate, occasionally entire or strongly involute and ridged; segments 80-115 per leaf, connate for ca. 30% of their length; middle segments 80-145 cm long, 3.2-5.3 cm wide, 0.2-0.4 mm thick, transverse veinlets abundant, long and conspicuous (very rarely inconspicuous), the apex bifurcate for 20-40 cm. Inflorescences arcuate with 3 orders of branching, equaling the leaves in length; sheathing bracts lepidote or glabrescent; rachillae 7-27 per branch, 0.8-1.6 mm in diameter, 5.5-14 cm long; flowers

3.7-6.5 mm long; calyces cupulate, strongly costate when dry, 1.8-2.7 mm long, 1.3-2.1 mm wide, sinuses 0.4-1.2 mm deep; petals obovate, costate when dry (apparent even in mature buds), membranous, 3.1-4.9 mm long, 1.0-2.3 mm wide; stamens ascending-spreading; filaments awl-shaped, 3.2-4.9 mm long, adnate to the corolla for 0.7-2.1 mm; anthers ca. 1.4 mm long and 0.7 mm wide; gynoecia 2.5-4.0 mm long, ovary 0.6-1.8 mm high, 0.6-1.2 mm in diameter; fruits 14.8-19.3 mm in diameter, 13.8-17.0 mm high, spherical to oblate-spheroidal, with a thick pericarp; seeds oblate concave, 8.6-13.3 mm in diameter, 5.4-7.4 mm high, with smooth or protruding funicular remains; embryos supra-equatorial, rarely equatorial. *Disturbed habitats*. Ch (Bailey 577, BH), Y (Zona et al. 145, RSA), ES (Allen 6897, NY). Low elevations. (United States, Mexico, El Salvador).

4. *Sabal yapa* C.Wright ex Becc., *Webbia* 2: 64 (1907). *Inodes yapa* (C.Wright ex Becc.) Standl., *Contr. U.S. Natl. Herb.* 23: 71 (1920) as “*yapa*.” Holotype: Cuba, *Wright 3971* (B, destroyed, frag. FI!).

Sabal mayara Bartlett, *Sabal yucatanica* L.H.Bailey.

Stems to ca. 20 m long, 15-26 cm diameter, green and prominently ringed when young and aging to brown-gray. Leaves 15-20, evenly green, moderately costapalmate, not filiferous; petioles 2.3-3.5 cm wide, ca. 0.5-2 m long; hastulas acuminate, 4.8-6.7 cm long, glabrescent (or lepidote on the abaxial side of midveins at their insertion to the petiole), margins revolute, erect, or involute, undulate; segments 90-115 per leaf, connate in groups of 2 (rarely 3) for ca. 50% of their length, the groups connate for only ca. 15% of their length; middle segments 90-125 cm long, 2.0-3.2 cm wide, 0.1-0.2 mm thick,

transverse veinlets abundant, long, and conspicuous, apex bifurcate for 9-23 cm. Inflorescences ascending (sometimes becoming arcuate in fruit) with 3 orders of branching, exceeding the leaves in length; sheathing bracts lepidote or glabrescent; rachillae 6-28 per branchlet, 0.5-1.3 mm in diameter, 4-10 cm long; flowers 4.0-5.7 mm long; calyces strongly campanulate, shriveled but not costate when dry, 1.5-2.3 mm long, 1.5-2.7 mm wide, sinuses 0.2-1.2 mm deep; petals triangular-ovate, non-costate when dry (rarely weakly costate), carnose, basally connate, reflexed at anthesis, 3.3-4.4 mm long, 2.2-2.8 mm wide; outer whorl stamens erect, inner whorl stamens spreading-reflexed; filaments acuminate, 2.6-4.6 mm long, basally connate and adnate to the corolla tube for 0.8-2.0 mm; anthers ca. 1.8 mm long and 0.9 mm wide; gynoecia 2.7-5.0 mm long, ovary 0.5-1.9 mm high, 0.9-1.9 mm in diameter; fruits 9.8-12.8 mm in diameter, 8.9-12.2 mm high, spheroidal to pyriform; seeds oblate spheroidal, 6.1-8.9 mm in diameter, 4.7-5.5 mm high, usually with smooth funicular remains; embryos supra-equatorial, rarely equatorial. *Lowland forests on well-drained, limestone soils, often on the steep banks of swamps or sinkholes.* Y (*Quero 2327*, MO), C (*Zona et al. 146*, RSA), QR (*Lundell 7727*, MICH), B (*Gentle 602*, MICH). Low elevations. (Mexico, Belize, Cuba).

35. *Schippia* Burret

By A. Henderson.

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary, slender, often rough. Leaves palmate; sheaths split basally, densely tomentose, becoming fibrous;

petioles elongate, tomentose; adaxial hastulas triangular or rounded; blades divided to below the middle into numerous, single-fold, induplicate segments, with briefly bifid apices, lighter colored abaxially. Inflorescences interfoliar, shorter than the leaves, branched to 2 (-3) orders; peduncles bearing a prophyll and 3 peduncular bracts, all bracts densely tomentose; rachis bearing numerous, short rachillae; flowers solitary, hermaphrodite or staminate; calyces forming a pseudopedicel, tubular basally, 3-lobed above; petals 3, free, imbricate; stamens 6; gynoecia unicarpellate; fruits globose with apical stigmatic remains; seeds with homogeneous endosperm; embryos apical; eophylls simple. 1 sp. Neotropics.

Bibliography: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas* (1995).

1. *Schippia concolor* Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 868 (1933).

Neotype (designated here): Belize, *Nee 46802* (NY!). Illustr.: Henderson, A, Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pl. 3 (1995). N.v.: silver pimento, B.

Stems 5-10 m long, 5-10 cm diameter, solitary. Leaves 6-15; petioles to 2 m long; blades circular in outline, ca. 1 m diameter, divided into ca. 30 segments, lighter colored abaxially. Inflorescences branched to 2 orders; peduncular bracts 3, densely woolly-tomentose; rachillae numerous, to 12 cm long; fruits to 2.5 cm diameter, white. *Lowland rainforest or often in pine forests*. B (*Balick 3145*, NY). 5-700 m. (Endemic). (Belize).

Schippia concolor may also occur in northern Guatemala, but no specimens from there have been seen.

36. *Socratea* H.Karst.

Metasocratea Dugand

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, rarely clustered, stout, erect, cylindrical, with a prominent, open cone of stilt roots at the base. Leaves few, imparipinnate; sheaths forming a compact crownshaft; petioles short; rachises long; pinnae numerous, praemorse, undivided or divided into few segments. Inflorescences protogynous, solitary at a node, interfoliar in bud, infrafoliar and erect at pistillate anthesis, becoming pendulous at staminate anthesis; peduncular bracts few; triads spirally arranged; flowers trimerous; staminate flowers asymmetrical, with (17-)30-145 stamens; pistillate flowers symmetrical, lacking staminodes; gynoecia tricarpellate, triovulate, ovules orthotropous; fruits ovoid-elliptic, rostrate or erostrate, with apical or slightly sub-apical stigmatic scar; seeds with apical or slightly subapical embryo; eophylls bifid. 5 spp. Neotropics.

Bibliography: Henderson, A. *Fl. Neotrop.* 53: 1-100 (1990).

1. *Socratea exorrhiza* (Mart.) H.Wendl., *Bonplandia* 8: 103 (1860). *Iriarteia exorrhiza* Mart., *Hist. Nat. Palm.* 2: 36 (1824). Type: Martius, C., *Hist. Nat. Palm.* 2:

tabs. 33, 34 (1824). Illustr.: Henderson, A. *Fl. Neotrop.* 53: figs. 28-29 (1990). N.v.: jira palm, P.

Iriartea durissima Oerst., *Socratea durissima* (Oerst.) H.Wendl.

Stems to 20 m long, usually less, 13-18 cm diameter at base, ca. 10 cm diameter at apex, gray, smooth; stilt roots to 25, widely spaced and forming a loose cone, diagonal, branched near or below ground level, terete, 1-2(-4) m \times to 9 cm, brown at first then black, with spines to 2 cm long. Leaves 7 per stem, spreading; sheaths 90-150 cm long, forming a compact crownshaft, grayish-green, densely white-tomentose at first; petioles terete, 15-40 cm long (including petiolar sheath extension), densely white-tomentose; rachises ridged adaxially, rounded abaxially, 1.4-2.8 m long, densely brown-tomentose adaxially, densely white-tomentose abaxially; pinnae 15-25 per side of rachis, opposite or alternate, asymmetrically cuneate, to 90 cm long, to 20 cm wide at mid-point, the margins entire except for praemorse apex, green adaxially, lighter green abaxially, glabrous adaxially, glabrous or sparsely to moderately whitish velutinous abaxially especially on veins and near point of insertion, with lines below up to 3 mm wide of dense white tomentum parallel to veins; middle pinnae split to the base into segments, the proximal segments of a pinna longer and narrower, erect and arching near apex, the distal one shorter and broader, held horizontally; proximal pinna undivided, to 40 cm long, 5 cm wide at mid-point; middle pinnae divided into up to 8 segments, the proximal ones to 90 cm long and 3 cm wide at mid-point, the distal one to 70 cm long and 15 cm wide at mid-point; proximal pinna undivided, up to 40 cm long, 5 cm wide at mid-point; veins yellow, prominent abaxially. Inflorescences to 90 cm long and erect in bud, becoming pendulous at anthesis; peduncles to 50 \times 2-5 cm, dorsiventrally compressed, at first densely white-

tomentose; prophylls to 11 cm long, 4 cm diameter, dorsiventrally compressed, splitting apically and becoming tubular, persistent, inserted near base of peduncle, at first densely whitish-brown-tomentose on outside; peduncular bracts (3-)4(-5), to 61 cm long, with tomentum similar to that of prophyll, proximal 2 splitting adaxially, distal 2 abaxially; rachillae to 17, usually fewer, subtended by a small bract, with same tomentum as peduncles, 30-40 cm long, 2-3 mm diameter at anthesis at mid-point (dry), thickening to 4 mm diameter in fruit (dry); triads spirally arranged, densely crowded; flowers cream colored; staminate flowers 9-12 mm long; sepals shortly connate below, triangular, 2 mm long, 3 mm diameter at base; petals valvate, open before anthesis, adnate to receptacle at base, 9-10 mm long, 6-7 mm diameter at middle; stamens (17-)30-45(-65); filaments ca. 1 mm long, swollen at base; anthers 6-7 mm long, sub-basifixed, latrorse; pistillodes 1-2 mm long, trifid at apex; pistillate flowers 4-8 mm long, creamy white at anthesis; sepals imbricate, ciliate, 4 mm long, 4-7 mm wide at base; petals similar to sepals; ovary 4-7 mm long; stigmas sessile, erect at anthesis; staminodes absent; fruits 2.5-3.5 × 1.5-2 cm, ovoid-cylindric, stigmatic scars sub-apical and obscure; epicarps yellowish at maturity and splitting irregularly from the apex; seeds 1.5-2.5 × 1-1.5 cm, obovoid, basally attached; raphe branches conspicuous, anastomosing; hilum rounded; embryos apical.

Lowland rainforest. N (Smith 79, US), CR (Henderson 66, NY), P (Henderson 81, NY). 0-1000 m. (Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guayanas, Ecuador, Peru, Bolivia, Brazil).

Both Molina (1975) and Standley (1931) list *Socratea exorrhiza* from Honduras, but no specimens from there have been seen.

37. Synechanthus H.Wendl.

Rathea H.Karst., *Reineckea* H.Karst.

By A. Henderson.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or clustered, erect or occasionally procumbent. Leaves pinnate or pinnately veined if undivided; sheaths elongate, splitting opposite the petiole; petioles elongate; rachises elongate; pinnae 2-numerous per side of rachis or occasionally blade undivided and then with bifid apex, reduplicate, with 1 to several veins. Inflorescences interfoliar or becoming infrafoliar, spicate or branched 1-2 orders, erect at anthesis, arcuate or pendulous in fruit; peduncles elongate with a short prophyll and 5-10 tubular peduncular bracts; rachises elongate or absent; rachillae 1-numerous, slender, the tips usually slender and appearing spinose; flowers arranged in acervuli (1 proximal pistillate flower and 4-14 distal biseriate staminate flowers), the acervuli borne distichously or all round rachillae; staminate flowers with 3 sepals connate in a low cupule; petals 3, valvate; stamens 3 or 6 with short filaments incurved in bud, erect at anthesis; pistillodes small; pistillate flowers with 3 sepals connate in a 3-lobed cupule; petals 3, imbricate, twice as long as the sepals; staminodes apparently lacking or connate in a 6-lobed ring and partially adnate to the petals; pistils trilocular, triovulate; fruits globose to ellipsoid, red at maturity, with basal stigmatic remains; seeds with inconspicuous basal hilum; raphe branches ascending;

embryos lateral to subapical; endosperm homogeneous or minutely ruminant marginally to markedly ruminant. 3 spp. Neotropics.

Bibliography: Moore, H. *Principes* 15: 10-19 (1971). Henderson, A. & Ferreira, E. *Syst. Bot.* 27: 693-702 (2002). Grayum, M. & De Gracia, J., *Phytoneuron* 73: 1-10 (2016).

1. Leaves undivided and bifid; inflorescences spicate with 1 rachilla; acervuli distributed all around the rachilla; Panama. **1. S. dasystachys**

1. Leaves pinnate, rarely undivided and bifid; inflorescences branched with 2-117 rachillae; acervuli distichously arranged on the rachillae.

2. Pinnae irregularly arranged; inflorescences branched to 1-2 orders; stamens 6;

Veracruz, Oaxaca, Tabasco, Belize, Guatemala, Honduras, Nicaragua, Costa Rica,

Panama.

2. S. fibrosus

2. Pinnae regularly arranged (rarely blades undivided); inflorescences branched to 1 order; stamens 3; Nicaragua, Costa Rica, Panama. **3. S. warszewiczianus**

1. Synechanthus dasystachys De Gracia & Grayum, *Phytoneuron* 73: 2 (2016).

Holotype: Panama, *Grayum et al.* 13293 (PMA *n.v.*). Illustr.: Grayum, M. & De Gracia, J., *Phytoneuron* 73: fig. 1 (2016).

Stems 0.5-1.5 m long, 2-3 cm diameter, clustered, rarely solitary, procumbent to erect. Leaves 5-10; sheaths and petioles 50-90 cm long; rachises to 85 cm long; blades undivided, bifid, with 15-20 veins. Inflorescences ca. 70 cm long; peduncles 24-37 cm long; peduncular bracts 5; rachises absent; rachilla 1, 10-24 cm long; acervuli distributed all round the rachilla; staminate flowers (5)6-7(-10) per acervulus; stamens 3; fruits 18-20

× 8-10 mm. *Lowland rainforest*. P (McPherson & van der Werff 20004, MO). 91-294 m. (Endemic). (Panama).

2. *Synechanthus fibrosus* (H.Wendl.) H.Wendl., *Bot. Zeitung (Berlin)* 16: 145 (1858). *Chamaedorea fibrosa* H.Wendl., *Index Palm.*: 57 (1854). *Rathea fibrosa* (H.Wendl.) H.Karst., *Wochenschr. Gärtnerei Pflanzenk.* 1: 377 (1858). *Collinia fibrosa* (H.Wendl.) Oerst., *Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn* 1858: 5 (1859).
 Holotype: Holotype: cultivated in Europe (destroyed, image BH!). Illustr.: Moore, H. *Principes* 15: figs. 2-4 (1971). N.v.: monkey-tail palm, B; corocilla, H.

Synechanthus mexicanus L.H.Bailey ex H.E.Moore

Stems 0.1-3 m long, 2-7 cm diameter, clustered or solitary, erect or procumbent. Leaves few; sheaths and petioles to 1.1 m long; rachises 74-125 cm long; pinnae 10-23 per side of rachis, irregularly arranged, with 3-7 veins. Inflorescences to 1 m long, branched to 1-2 orders; peduncles 35-120 cm long; peduncular bracts 5-8; rachises to 22 cm long; rachillae 14-115; proximal rachillae 11-41 cm long; acervuli distributed on opposite sides of the rachillae; staminate flowers 4-10 per acervulus; stamens 6; fruits 9-21 × 6-13 mm. *Lowland to montane rainforest*. T (Guadarrama 4015, MEXU), B (Balick 2695, NY), G (Stevens 25448, MO), H (Brant 2801, MO), N (Sandino 165, MO), CR (Grayum 5326, MO), P (Santamaría et al. 7769, MO). 3-1600 m. (Mexico [Veracruz, Oaxaca, Tabasco], Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama).

3. *Synechanthus warscewiczianus* H.Wendl., *Bot. Zeitung (Berlin)* 16: 145 (1858). Holotype: cultivated in Europe (destroyed, image BH!). Illustr. Henderson, A,

Galeano, G. & Bernal, R., *Field Guide to the Palms of the Americas*, pl. 14 (1995). N.v.: palmilla, P.

Synechanthus angustifolius H.Wendl., *Synechanthus gracilis* Schaedtler,
Synechanthus panamensis H.E.Moore, *Reineckea triandra* H.Karst.

Stems 0.1-5 m long, 2-5 cm diameter, clustered or solitary. Leaves ca. 10; sheaths and petioles to 92 cm long; rachises to 170 cm long; pinnae 2-31 per side of rachis, regularly arranged, occasionally leaf undivided, with 3-54 veins. Inflorescences to 1 m long, branched to 1 order; peduncles 22-87 cm long; peduncular bracts 6-10; rachises 1-30 cm long; rachillae 2-117; proximal rachillae 1-49 cm long; acervuli distributed on opposite sides of the rachillae; staminate flowers 4-14 per acervulus; stamens 3; fruits 6-26 × 4-15 mm. *Lowland to montane rainforest*. N (*Moreno 13057*, MO), CR (*Henderson 51*, NY), P (*Henderson 3052*, NY). 1-1450 m. (Nicaragua, Costa Rica, Panama, Colombia, Ecuador).

38. *Thrinax* L.f. ex Sw.

Porothrinax H.Wendl. ex Griseb.

Adapted from: Read, R. *Smithsonian Contr. Bot.* 19: 1-98 (1975).

Monoecious, iteroparous, non-spiny, palmate-leaved palms. Stems solitary, columnar, tan to gray, smooth or fibrous, obscurely ringed with leaf scars, bases usually a mass of roots forming a mound on rock substrate. Leaves palmate; sheaths fibrous, at first tubular,

velutinous; petioles with a predetermined abaxial groove below insertion of sheath which splits on expansion of the bud permitting egress of the inflorescence, above sheath mostly flat abaxially, conspicuous, various in outline, abaxially a ridge, flap, or small projection; blades palmate, entirely lacking a central costa, adaxial surfaces glabrous, abaxial surfaces variously lepidote; segments narrowly rhomboid, trullate, or obovate, fused variously toward the base forming a plicate palm, mostly bifid at the apex.

Inflorescences interfoliar, elongate, erect to arching, divided into numerous, pendulous, primary branches, these mostly simply branched; lowermost primary bracts bicarinate, inserted about 1 cm above the base of the peduncle, others tubular with an oblique aperture, all primary bracts densely appressed lepidote, each enclosing the base of the next higher bract and the peduncle of a primary branch with its bract, the latter bicarinate and bifid, and partially enclosing the flowers prior to anthesis, inserted midway along the flattened peduncle of the primary branch; each ultimate branch subtended by a narrow triangular bract; flowers bisexual, mostly protandrous, solitary on prominent or very short bracteolate pedicels; perianths a single series, forming a 6-lobed or dentate cupule, not enclosing reproductive parts; stamens (5-)6-12(-15); filaments usually straight, slender, mostly free; anthers auriculate basally, retuse apically, basifixed, locules linear to oblong, dehiscent introrsely by lateral slits; pistils unilocular, uniovulate, with a narrow, very short style flaring upward to a laterally compressed infundibuliform stigma; ovules with a well-developed funicular aril, erect at the base of the locule; fruits small, depressed-globose to globose, white at maturity, often with persistent apical stigmatic remains and persistent basal perianth; epidermis smooth at maturity when fresh; mesocarp thin, mealy; seeds depressed-globose, smooth, tan when fresh, depressed basally at the hilum;

endosperm homogeneous but intruded partially or completely through the center from base to apex by the testa; embryos lateral to subapical. 3 spp. Neotropics, Caribbean.

Bibliography: Read, R. *Smithsonian Contr. Bot.* 19: 1-98 (1975).

1. *Thrinax radiata* Lodd. ex Schult. & Schult.f., *Syst. Veg.* 7(2): 1301

(1830). *Coccothrinax radiata* (Lodd. ex Schult. & Schult.f.) Sarg. ex K.Schum., *Just's Bot. Jahresber.* 27(1): 469 (1901). Holotype: Cultivated in Europe (M!). Illustr.: Read, R. *Smithsonian Contr. Bot.* 19: fig. 5 (1975). N.v.: chit, QR.

Stems length not recorded, 8.1-11.6(-13) cm diameter, tapering out to an enlarged base and mound of roots, internodes 4-7 cm apart on lower stem. Leaf sheaths 58.4-62.2 cm long, apex oblique down from petiole, tearing away from petiole and soon becoming coarsely fibrous, indumentum persistent on fibers; petioles 36-94 cm long, adaxially flat to slightly convex, 2.2-3.1 cm wide at sheath, rounded abaxially, 1.6-2.3 cm wide at narrowest and 2.1-3.2 cm wide at apex, abaxially with scattered scales, soon glabrescent or with few persistent scales; hastulas acuminate or sharply triangular, 1-1.9 cm long, often tending to decurve or split with the expansion of the blade, abaxially a short 0.1-0.4 cm long flap or ridge, often with 1-2 rounded or tooth like prominences; leaf blades, when expanded, circular in outline, 1.2-1.6 m diameter, abaxial surface lighter in color than adaxial surface, abaxially dull, often glaucescent, flecked with conspicuous gray lepidia, zone around hastula yellow green, translucent when viewed from below against the light; principal nerves yellow green; palman 30-55 cm broad, relatively flat or slightly folded; segments 51-63 in number, narrowly trullate, often acuminate, with long slender apical filaments which are readily lost, (73-)79-113(-115) cm long, (4.6-)5.1-6.2(-6.4)

cm wide, widest at sinus or rarely slightly above; fusion 30-55 cm long in palman, relatively uniform throughout blade, but gradually longer toward upper middle; center 2 segments near apex of blade often fused throughout their length, basal segments commonly overlapping. Inflorescences erect, or arching slightly at anthesis, 1.2-2.2 m long, bracts green, with white or gray scales, 13-21 glabrous primary branches, the lowermost primary branches with (24-)27-37 ultimate branches, these white at anthesis, tip to 12 cm long; pedicels at anthesis (1.4-)1.6-2.3(-2.7) mm long; flowers white, fragrant, 46-56 per branch; stamens (5-)6-8(-10); anthers linear (2-)2.2-8.5(-3.6) mm long when fresh, (1.7-)1.8-2.3(-2.5) mm long when dry; filaments very narrowly connate basally, angle of connation acute or rounded; fruits 7-8.2 mm diameter, smooth, white at fresh maturity, green and slightly papillate shortly before; seeds 6-6.8 mm diameter, light brown, completely perforated; primary branches yellowish-green at fruit maturity, pedicels (1.2-)2-5(-5.2) mm long. *Open forest near the sea.* Y (Schott 293, US), QR (Moore 8086, BH), B (Wilson 360, NY), H (Wilson 360, NY). Low elevation. (United States, Mexico, Belize, Honduras, Bahamas, Cuba, Hispaniola, Jamaica).

39. *Welfia* H. Wendl.

By A. Henderson & I. Villalba

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary, erect, stout, orange-brown near apex, with conspicuous nodes. Leaves large, pinnate; sheaths splitting opposite the petiole, becoming fibrous on the margins, not forming a crownshaft; petioles

short; rachises elongate; pinnae reduplicate, regularly arranged and spreading in the same plane, broadly lanceolate, single-fold. Inflorescences infrafoliar, pendulous, branched to 1(-2) orders, protandrous; peduncles short, stout, recurved, bearing a prophyll and several peduncular bracts, the first larger and stouter; rachises short; rachillae 7-16, stout, pendulous; flower pits in rows along the rachillae, covered initially with a bract; flowers in triads; staminate flowers with 3, narrow sepals, briefly united basally; petals 3, elongate, connate and joined with the floral receptacle for ca. 1/3 their length, valvate; stamens 33-46; pistillodes small, 3-lobed; pistillate flowers with 3, free, imbricate sepals; petals 3, connate in a tube for 2/3 their length or more, valvate; staminodes numerous; gynoecium trilocular, triovulate; stigmas 3, recurved; fruits almond-shaped, dorsiventrally compressed, ridged laterally especially toward the apex, pointed apically, without a contracted base, or globose, not or scarcely dorsiventrally compressed, scarcely ridged laterally and blunt apically, with a contracted base, dull purple, with basal stigmatic remains; epicarps smooth; seed ellipsoid or globose, with homogeneous endosperm and basal embryo; eophylls bifid. 2 spp. Neotropics.

Bibliography: Henderson, A. & Villalba, I. *Phytotaxa* 119: 33-44 (2013).

1. *Welfia regia* H.Wendl., *Gard. Chron.* 1869: 1236 (1869). Lectotype (designated by Henderson & Villalba, 2013): André, 1871: Pl. LXII. Illustr.: Henderson, A. & Villalba, I. *Phytotaxa* 119: fig. 5 (2013). N.v.: palmito, CR; amargo, P.

Welfia georgii B.S.Williams.

Stems 4.4-22.5 m long, 10-25 cm diameter, solitary. Leaves 9-26 per stem; sheaths 23-165 cm long; petioles 5-83 cm long; rachises 279-540 cm long; pinnae 33-90

per side of rachis. Inflorescences prophylls 97-113 cm long; peduncular bracts 80-105 cm long, inserted 1.5-4.5 cm above the prophyll; peduncles 8-30 cm long, 27.6-59.1 mm diameter; rachillae 7-15, 46.5-110 cm long, 12.2-31.9 mm diameter; stamens 33-43; fruits 28.6-40.8 × 10.8-18.2 mm, almond-shaped, dorsiventrally compressed, ridged laterally especially toward the apex, pointed apically, without a contracted base. *Lowland rainforest*. N (*Salick 8079*, MO), CR (*Moore 6557*, BH), P (*Duke 8025*, US). 0-1325 m. (Nicaragua, Costa Rica, Panama, Colombia, Ecuador).

Welfia is reported to occur in Honduras but no specimens from there have been seen.

40. *Wettinia* Poepp. ex Endl.

Catoblastus H.Wendl., *Acrostigma* O.F.Cook & Doyle, *Catostigma* O.F.Cook & Doyle,
Wettinella O.F.Cook & Doyle, *Wettiniicarpus* Burret

By R. Bernal.

Monoecious, iteroparous, non-spiny, pinnate-leaved palms. Stems solitary or less often clustered, moderate to large, erect, with a prominent, closed cone of stilt roots at the base. Leaves pinnate, reduplicate, occasionally distichous; sheaths closed and forming a crownshaft; petioles short; rachises long; pinnae praemorse, either undivided and regularly arranged and spreading in 1 plane, or divided into segments, these spreading in different planes. Inflorescences spicate or branched to 1 order, infrafoliar, erect in bud

before anthesis, usually unisexual, (1-)3-15 per node; peduncles bearing a prophyll and 3-5 peduncular bracts; rachises bearing 1-few rachillae; flowers solitary or paired; staminate flowers with 3-4, free sepals; petals 3-4, free; stamens 6-20; pistillodes very small or absent; pistillate flowers with 3-4, free sepals; petals 3-4, free; staminodes small or absent; gynoecia syncarpous, uniovulate, or trilobulate, uniovulate by abortion of 2 ovules (but occasionally 2 ovules developing); fruits 1(-2)-seeded, densely crowded or loosely arranged, irregularly prismatic, globose, ovoid, obovoid, or ellipsoid, with basal stigmatic remains; epicarps rough, hairy, warty, or verrucose; seeds with homogeneous or ruminant endosperm and basal embryos; eophylls undivided. 22 spp. Neotropics.

Bibliography: Bernal, R. *Caldasia* 17: 367-378 (1995). Galeano, G. & Bernal, R. *Palmas de Colombia. Guia de campo* (2010). De Gracia et al. *Novon* 25: 145-149 (2017).

1. Fruits densely arranged in compact infructescences, their sides angled by mutual pressure.

3. W. panamensis

1. Fruits loosely arranged along the rachillae, not angled by mutual pressure.

2. Pinnae narrowly elliptic, undivided.

1. W. aequalis

2. Pinnae broadly triangular or rhombic, undivided or divided.

3. Pinnae 11-17 per side of rachis, undivided or more commonly divided into segments; staminate inflorescences with (1-)2-6 rachillae, pistillate with 3-6 rachillae. **4. W. radiata**

3. Pinnae 6-8 per side of rachis, undivided; staminate and pistillate inflorescences spicate.

2. W. donosoensis

1. *Wettinia aequalis* (O.F.Cook & Doyle) R.Bernal, *Caldasia* 17: 368 (1995). *Acrostigma aequale* O.F.Cook & Doyle, *Contr. U.S. Natl. Herb.* 16: 228 (1913). *Catoblastus aequalis* (O.F.Cook & Doyle) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 935 (1930). *Catostigma aequale* (O.F.Cook & Doyle) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 934 (1930). Holotipo: Colombia, Doyle 4 (US!). Illustr.: Galeano, G. & Bernal, R. *Palmas de Colombia*, pp. 188-190 (2010).

Tallo solitario, 4-10 m de alto, 7-13 cm de diámetro, con numerosas verrugas; raíces zanconas 20-80 cm de alto. Hojas 4-6; las hojas secas permanecen colgando en la palma hasta que se desintegran; capitel poco notorio, verde a rojizo o amarillento, con verrugas prominentes en la parte superior, que se deshace con la edad en numerosas fibras persistentes; pecíolo 12-86 cm de largo; raquis 2-3.5 m de largo; pinnas 19-40 a cada lado, individas, horizontalmente extendidas, estrechamente elípticas, glabras por ambas caras, hasta 1.1 m de largo y 16 cm de ancho. Inflorescencias 3-11 en cada nudo, con 2 brácteas grandes de hasta 41 cm, con pelos violáceos, las de la inflorescencia femenina persistentes y deshaciéndose en fibras con la edad; ramas 2-8, de 15-25 cm de largo en la inflorescencia masculina, hasta 115 cm en la infructescencia; frutos no apiñados, ovoides a elipsoides, 3-5 × 2.3 cm, amarillos al madurar; cáscara lisa a ligeramente verrugosa, glabra o con indumento aterciopelado castaño; semilla ovoide, 1.5-3 × 1-1.5 cm; endosperma homogéneo. *Selva de tierras bajas*. P (*de Nevers 10680*, NY). 100-500 m. (Panama, Colombia, Ecuador).

2. *Wettinia donosoensis* De Gracia & Grayum, *Novon* 25: 146 (2017). Holotype:

Panama, *De Gracia et al.* 882 (PMA *n.v.*). Illustr.: De Gracia, J., Grayum, M. & Schatz, G. *Novon* 25: 147, fig. 1 (2017).

Stems clustered or rarely solitary, 3-5 m long, 4-5 cm diameter, brown, smooth, ringed; stilt roots 0.2-0.4 m long, 1.5-2.5 cm diameter, brown, prickly. Leaves 5-7 per stem; sheaths 30-40 cm, with ligules ca. $10 \times 1-1.5$ cm, with reddish brown, bulbous-based trichomes; petioles 27-43 cm; rachises 64-109 cm, subterete; pinnae 6-7(-8) per side, alternate, regularly arranged and spreading in the same plane, undivided, narrowly rhombic, praemorse at apex, puberulous below with reddish brown, flat trichomes; proximal pinnae $10-25 \times 5-6.5$ cm, with 14-15 veins; middle pinnae $26-39 \times 10-12$ cm, with ca. 16 veins; apical pinna $22-28 \times 16-24$ cm, flabellate, acuminate to caudate at apex (the acumen ca. 1-3 cm), with ca. 32 veins. Inflorescences infrafoliar, 3-5 to per node, spicate, unisexual, the central usually pistillate, the lateral staminate; prophylls ca. 2 cm long, tubular, bicarinate, with simple trichomes; peduncles 7-10.5 cm long, decurved, with reddish brown, bulbous-based trichomes; peduncular bracts 4, the 2 proximal 4-7.5 cm long and tubular, the 2 distal 11-18 cm long and cucullate, all bearing simple trichomes; rachises 11-22 cm long; staminate flowers with sepals ca. 2×1 mm, triangular; petals ca. 23×2 mm, linear, striate; stamens 3-6; filaments ca. 2 mm; anthers basifixed, ca. 9 mm, acuminate at apex (the acumen ca. 2 mm); pistillate flowers (post-anthesis) with sepals 2-2.5 mm, triangular; petals $25-30 \times 2-3$ mm, linear, longitudinally striate; fruits $2.5-3 \times 1-1.2$ cm, chocolate-brown, ovate-elliptic, densely brown-hispidulous with bulbous-based and filamentous trichomes, with a persistent style; seeds ca. 17×19 mm, ovoid. *Lowland rainforest*. P (*Grayum et al.* 13262, MO). Below 500 m. (Endemic). (Panama).

3. *Wettinia panamensis* R.Bernal, *Caldasia* 17: 373 (1995). Holotipo: Panama, Moore et al. 10187 (BH!). N.v.: chonta, P.

Tallo solitario, 3-16 m alto, 5-10 cm de diámetro, con un cono de raíces epígeas 25-60 cm alto, las raíces individuales 2-3.5 cm de diámetro, con espinas cortas. Hojas 4-8; vaina 65-100 cm, verde-grisácea, con pelos violáceos muy cortos, la superficie suave al tacto; pecíolo 10-50 cm de largo, cilíndrico; raquis 145-220 cm, por encima ardovelutino, por debajo igual pero con pelos más cortos, la superficie áspera; pinnas 20-31 a cada lado, indivisas, insertas en un mismo plano, péndulas, estrecha a (más frecuentemente) ampliamente lanceoladas, la margen distal entera en 12-28 % de su longitud, en adelante leve a marcadamente premorsa, la margen proximal entera casi hasta el ápice, glabras por encima, excepto una porción basal, esparcidamente pilosas por debajo en la superficie, las venas con pelos muy cortos, adpresos, las pinnas medias con 15-20 venas; pinnas proximales 34-57 × 6.5-12 cm; pinnas medias 64-97 × 4.8-11 cm; pinnas apicales unidas en un abanico triangular 27-31 cm de largo en la margen inferior, 13-38 cm de ancho en el ápice. Inflorescencias (1-)3-5(-6) en cada nudo; perfilo tubular, 3-4.8 cm, con pelos violáceos adpresos, glabrescente; brácteas pedunculares 4, con indumento como el del perfilo, las dos proximales tubulares, abiertas, agudas en el ápice, 4.3-15 cm de largo, las dos distales cerradas en la yema, cuculadas, estriadas, hasta 35 cm de largo, insertas hasta 9 cm por encima de la base del pedúnculo; inflorescencia masculina simple o más raramente con 2-3 ramas, el eje o las ramas espiraladamente retorcidos en la yema; pedúnculo 11-12 cm; raquis hasta 1 cm; espiga o raquilas 13-22 cm de largo, 3-4 mm de diámetro en la parte media; flores masculinas 7-8 mm de largo;

sépalos triangulares, 1-1.5 mm de largo; pétalos 3(-4), triangulares, 5-6 × 1 mm, más cortos que los estambres; estambres 8-12; filamento ca. 1.5 mm, anteras 5-6 mm, bifidas en la base, con un ápiculo ca. 0.2 mm, con pelos blanquecinos largos de ca. 2 mm; inflorescencia femenina simple o más raramente con 2-4 raquilas; pedúnculo 12-20 cm de largo, con indumento ferruginoso delgado; raquis hasta 2 cm; espiga o raquilas 9-12 cm de largo, 7 mm de diámetro en la parte media, 2.1-2.7 cm de diámetro incluyendo las flores; flores femeninas muy densamente dispuestas, obpiramidadas, 8-10 mm de alto, 12-13 mm de ancho; sépalos triangulares, brevemente imbricados en la base, 8-11 × 3-4 mm; pétalos ovado-triangulares, 11-13 × 4-6 mm, sobresaliendo por entre los carpelos en la anthesis, pero progresivamente ocultos por los frutos a medida que éstos se desarrollan; estilo 5-7 mm, estigmas 4-6 mm; gineceo con denso tomento de pelos blanquecinos aplanados; infrutescencia con pedúnculo hasta 20 cm; espiga o raquilas fructíferas hasta 34 cm de largo, 1.3-1.9 cm de diámetro en la mitad, toda la mazorca hasta 35 cm de largo y 8.5 cm de diámetro; frutos 2.7-3.3 × 1.7-2.5 cm, ampliamente obpiramidados, el ápice ampliamente redondeado, el ápice áspero, glabrescente, diminutamente verruculoso; semillas 2.1-2.4 × 1.3 cm, oblongas; endospermo homogéneo. *Lowland rainforest*. P (Henderson & Brako 506, NY). 200-1200 m. (Endemic). (Panama).

4. *Wettinia radiata* (O.F.Cook & Doyle) R.Bernal, *Caldasia* 17: 368 (1995).
Catostigma radiatum O.F.Cook & Doyle, *Contr. U.S. Natl. Herb.* 16: 231
 (1913). *Catoblastus radiatus* (O.F.Cook & Doyle) Burret, *Notizbl. Bot. Gart. Berlin-Dahlem* 10: 934 (1930). Holotipo: Colombia, *Doyle 5* (US!).

Tallo solitario, 3-9 m de alto, 7-15 cm de diámetro; raíces zanconas hasta 70 cm de alto. Hojas 5-8; capitel hasta 1.2 m, verde a pardo-amarillento, hacia al parte superior con pelos violáceas cortos, irritantes; pecíolo 8-60 cm de largo; raquis 1.8-3.4 m de largo; pinnas 11-17 a cada lado, muy separadas, individas y ampliamente triangulares o, mas comunmente, divididas en 2-7 segmentos de hasta 96 cm de largo y 16 cm de ancho, radiados en todas direcciones. Inflorescencias 3-11 en cada nudo, frecuentemente muy por debajo de las hojas, envueltas hasta la floración por 2-3 brácteas de hasta 30 cm de largo; inflorescencia masculina con 2-6 ramas colgantes (frecuentemente una sola) de hasta 14 cm de largo; inflorescencia femenina con 3-6 ramas colgantes de hasta 71 cm de largo; frutos 2-3.7 cm de largo, estrechamente elipsoides a oblongos o casi cilindricos, a veces estrechamente ovoides, con frecuencia dos frutos melizos desarrollándose de una sola flor; cáscara madura amarilla, diminutamente granulosa o verrugosa; semillas 1.7-2.4 cm de largo, elipsoide a oblongas; endosperma homogéneo. *Selva de tierras bajas*. P (Henderson 96, NY). Ca. 350 m. (Panama, Colombia, Ecuador).

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