

apex, rarely slightly incised-praemorse; middle pinnae 11–45 × 5–16 cm. *Peduncle* 43–120 cm long, 2–9 mm diam. at apex, minutely spinulose or sparsely to densely covered with brown spines, to 3(–5) cm long; rachis 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; pistil ca. 3 mm high, glabrous or with some minute spinules at base. *Fruit* red to purple, globose, ca. 7–11 mm diam., glabrous to minutely spinulose; endocarp globose, 6–9.5 mm diam., 0.5–1 mm thick, with numerous fine pits apically.

Illustrations. Figs. 13A (pollen), 18B (distribution map), 21AA (middle pinnae); Motiska et al., 1984; fig. 8 (as *A. pachyclada*).

Distribution and habitat. Known from premontane forest in Panama at 600–1400 m, the eastern slopes of northern Cordillera Central in Colombia at 1600–1900 m, and western slopes of Cordillera Occidental at 100–1500 m.

Specimens examined. PANAMA. BOCA DEL TORO: Fortuna Dam area, continental divide, ridge trail to unnamed peak E of oleoducto rd., 1200 m, 1 Aug 1984 (imm fr), *Churchill 5874* (MO). COCLÉ: N of El Valle, between Cerro Caracorral and Cerro Gaital, 1000 m, 18 Jul 1982 (fem fl), *Knapp et al. 6060* (CAS); foot of Cerro Pilon, above El Valle de Anton, 700 m, 27 Mar 1969 (st), *Porter et al. 4388* (MO); continental divide above El Copé, 700 m, 27 Nov 1985 (infl), *de Nevers et al. 6405* (NY); El Valle de Antón, Cerro Gaital, 26 Nov 1985 (infl), *de Nevers et al. 6366* (NY). DARIÉN: Serranía de Pirre, 900 m, 18 Jan 1985 (fem fl), *Henderson & Contraires 099* (NY); Cerro Pirre, ridge top near Rancho Plástico, 1200 m, 10 Jul 1977 (imm fr), *Folsom 4325* (MO); *ibid.*, just S of Pirre, 10 Jul 1977 (fr), *Folsom 4513* (MO); Parque Nacional del Darien, Cerro Mali, ca. 22 km E of Pucuro, 1350 m, 23 Oct 1987 (imm fr), *de Nevers et al. 8416* (CAS); Alto de Nique, southernmost peak of Cerro Pirre massif, exactly on the Panama/Colombia border, 1400 m, 19 Apr 1980 (st), *Gentry et al. 28658* (BH). PANAMA: Panamá, (fem fl), *Nee 11606* (MO); Comarca de San Blas, Cerro Brewster, 850 m, 21 Apr 1985 (st), *de Nevers et al. 5395* (NY); Cerro Campana along trail to summit, 22 Jun 1972 (st), *Croat 17194* (MO); Cerro Jefe, 5 km S of the summit, 4 Feb 1973 (imm fr), *Busey & Croat 268* (MO); *ibid.*, near summit, 10 Mar 1973 (infl), *Croat 22684* (MO); *ibid.*, 3 km beyond tower, 13 Dec 1987 (st), *Henderson & Herrera 722* (NY).

COLOMBIA. ANTIOQUIA: Mun. de Cocorná, hwy. Medellín–Bogotá, km 63, quebrada El Bihao, 1900 m, 26 Apr 1980 (fl), *Bernal et al. 171* (COL); Mun. de Frontino, Murri, Río Venados, 750–850 m, 19 Jun 1982 (fl, fr), *Bernal*

& *Galeano 349* (COL, HUA); Mun. de Mutatá, rd. to Pavarandogrande, 100–150 m, 8 Dec 1982 (fl), *Bernal & Galeano 440* (COL); Mun. de Santa Rita, 7 km NE of Guatapé, 1900 m, 16 Aug 1980 (fl), *Galeano & Bernal 238* (COL, HUA); 17 Sep 1987 (fl), *Bernal & Tobón 1378* (AAU, BH, COL, HUA, NY); Mun. de Urrao, Río Polo, 1500 m, 16 Jun 1982 (fl), *Bernal & Galeano 348* (COL, HUA). CHOCÓ: Mun. de El Carmen de Atrato, rd. Medellín–Quibdó km 150, vereda El Doce, Río El Aguilón, 640 m, 4 Jan 1980 (fl, imm fr), *Bernal & Galeano 56* (COL, HUA), 57 (COL); Mun. de San José del Palmar, Río Torito, 900 m, 12 Mar 1980 (fl), *Forero et al. 7224* (COL).

This subspecies is the most variable of the four. In Panama and the northern parts of Cordillera Central there is a strong tendency toward thickening of the rachillae, densely inserted triads, and pistillate flowers with conspicuously acuminate sepals and petals. In extreme cases inflorescences may approach those of *A. gelatinosa* in structure. On the western slopes of Cordillera Occidental these tendencies are less pronounced, and plants from the southern Chocó (*Forero 7224*) form a transition to subsp. *fosteriorum* differing only in size. Pollen of *A. hirsuta* subsp. *hirsuta* appear to be rather uniform, with tectate, perforate to rugulate exine with supracteal warts or spines.

The confusion regarding typification of *A. monostachys*, *A. leiopatha*, and *A. macroloba* has been elucidated by Bernal (1986). *Aiphanes monostachys* Burret was based on a mixed collection including the leaves of *A. monostachys* and the misplaced inflorescence of what Burret described as *A. macroloba*; thus the misleading name. The real inflorescence of *A. monostachys* was probably associated with the leaves of a Geonomoid palm (*Kalbreyer 1607*) and described by Burret as a separate species, *A. leiopatha* (see “Doubtful names and Excluded taxa”).

10b. *Aiphanes hirsuta* subsp. *kalbreyeri* (Burret) Borchsenius & Bernal stat. nov.

Aiphanes kalbreyeri Burret, Notizbl. Bot. Gart. Berlin-Dahlem 11: 572. 1932. Type. COLOMBIA. Antioquia: Amalfi, La Vivora (“La Viborra”), 1650–1750 m, 10 May 1980, *Kalbreyer 1653* (holotype, B¹). Neotype (Bernal et al., 1989). COLOMBIA. Antioquia: Mun. de Amalfi, quebrada La Vivora, 6 km E of village, 1650 m, 24 Sep 1987 (fl, fem fl), *Bernal & Tobón 1393* (holoneotype, COL; isoneotypes, AAU, BH, FTG, HUA, K, NY).

Stems up to 12, each 4–10 m tall, 5–8 cm diam., densely armed with black, to 25 cm long spines. *Leaves* 4–6; sheath 70–90 cm long, densely armed; petiole 14–32 cm long, densely armed with black spines, to 7 cm long; rachis 125–194 cm long, yellow to brown spinulose, abaxially with few black spines;

pinnae 30–40 per side, in lax groups of 3–9, nearly in one plane, linear, 10–14 times as long as wide, oblique to lobulate praemorse at apex, glabrous adaxially, with short spinules abaxially; middle *pinnae* 48–65 × 3.5–5 cm. *Peduncle* 21–107 cm long, ca. 10 mm in diam. at junction with rachis, densely armed with brown, to 2 cm long spines; rachis 20–44 cm long, densely covered with crimped, to 1.5 cm long spines, becoming shorter toward apex; *rachillae* 22–38; basal rachillae 40–53 cm long, with an up to 10 cm long basal flowerless part, 2–3 mm diam. in the androgynous part, covered between the flower groups with 0.5–1 cm long, crimped, black spines, distally very slender. *Staminate flowers* violet to white, with yellow anthers, 2.5–3 mm long; anthers linear, 0.9–1.2 × 0.5–0.7 mm. *Pistillate flowers* violet, 5–6 mm long; sepals rounded; petals acuminate; pistil sparsely covered with minute, applanate spinules. *Fruit* globose, 11–13 mm diam.; epicarp with minute, black spinules; endocarp 10–12 mm diam., with numerous shallow to deep pits, especially at apex.

Illustrations. Figs. 13C–D (pollen), 18B (distribution map), 21Z (middle *pinnae*), 23C (habit).

Local names. Cirquí (Antioquia).

Distribution and habitat. Known from the north-eastern slopes of the Colombian Cordillera Central (type locality), and the western slopes of Cordillera Occidental, between 1300 and 2000 m, often left over on pasture.

Specimens examined. COLOMBIA. ANTIOQUIA: Mun. de Frontino, Murri, rd. Nutibara–La Blanquita, 1900–1950 m, 3 Jan 1982 (fl, fem fl, imm fr), *Galeano & Bernal 461* (COL, HUA), 462 (COL); Mun. de Urrao, quebrada La Agudelo, a tributary to Río Calles, 1300–1400 m, 14 Jun 1982, *Bernal & Galeano 330* (COL, HUA). RISARALDA: Pueblo Rico, Río Taibá, 1350 m, 13 Mar 1986 (fl, fem fl, imm fr), *Bernal et al. 958* (COL, FTG).

This subspecies includes plants with linear *pinnae* held more or less in one plane, densely armed inflorescences with relatively few, long, slender rachillae, and small spinulose fruits with a globose endocarp. In the northern part of Cordillera Central it co-occurs with subsp. *hirsuta*, and the two give the impression of being distinct in this area. In Cordillera Occidental it occurs at higher altitudes than subsp. *hirsuta*. To the south, leaves and inflorescences show a gradual transition to subsp. *intermedia*, found in Chocó and Valle. The subspecies is well characterized morphologically, but its pollen display a surprising variation in exine ornamentation. The neotype collected in Cordillera

Central (*Bernal & Tobón 1393*) has pollen with rugulate exine (Fig. 13C); pollen of *Bernal et al. 958*, collected in Cordillera Occidental, have perforate exine with numerous long, supracteal spines (Fig. 13D).

10c. *Aiphanes hirsuta* subsp. *intermedia* Borchsenius & Bernal, subsp. nov. Type. COLOMBIA. Chocó: San José del Palmar, 500 m E of town, 1300 m, 15 Mar 1991 (fl, fem fl, fr), *Bernal & Borchsenius 1962* (holotype, COL; isotypes, AAU, CHOCO, NY).

A subsp. *hirsuta* petiolo 43–80 cm longo, pinnis 44–81 cm longis, inflorescentia ramis 60–108, et fructu 11–15 mm diametro endocarpo longitudinaliter exarato differt.

Stems 1–4, each 2–8 m tall, 6–10 cm diam., densely armed. *Leaves* 5–7; sheath 40 cm long, densely armed; petiole 43–80 cm long; rachis 220–242 cm long, unarmed; *pinnae* 31–32 per side, in rather lax groups of 3–5 separated by 13–22 cm, narrowly cuneate to cuneate, 3.5–8 times as long as wide, finely plicate, glabrous adaxially, minutely spinulose abaxially, truncate to lobulate-praemorse at apex; middle *pinnae* 44–81 × 14–15 cm. *Peduncle* 15–85 cm long at flowering, to 120 cm in fruit, 8–25 mm diam. at apex, covered with black spines, to 3 cm long; rachis 50–75 cm long, with numerous spines, to 1 cm long proximally, fewer and shorter distally; *rachillae* 60–108, densely covered with brown spinules, ca. 0.3 mm long, and with some short spines proximally; basal rachillae 40–84 cm long, without flowers for 2–8 cm, ca. 4 mm diam. in the androgynous part, ca. 2 mm diam. distally. *Staminate flowers* ca. 1.5 mm long (dry), violet to white, anthers purple, pollen orange. *Pistillate flowers* 4–5 mm long (dry), purple; sepals rounded; petals acute; pistil with whitish yellow spinules proximally. *Fruit* dark red, 11–13 mm diam.; epicarp minutely spinulose; endocarp with 3 deep broad longitudinal furrows, almost without pits.

Illustrations. Figs. 13E–F, 14N (pollen), 18B (distribution map), 21Y (middle *pinnae*), 23D (habit).

Distribution and habitat. Western slopes of Cordillera Occidental in the departments of Chocó and Valle in central Colombia, 1300–2200 m, often left on pasture.

Specimens examined. COLOMBIA. CHOCÓ: Rd. Cartago–San José del Palmar, ca. 10 km E of San José, 1800 m, 2 Apr 1976 (fl, fr), *Dransfield et al. 4854* (BH, K); ibid.,