

Such a misinterpretation would give an underestimation of the number of species. In the latter case, a supposed trait may be distributed as a character, giving an overestimation of the number of species. In the case of *Hyospathe elegans* sensu Skov and Balslev (1989), I reject this species concept because I find that traits are distributed as characters (e.g., pistillate flower type is a character with two states—sessile or pedicellate—not a trait); therefore, Skov and Balslev underestimated the number of species. The advantage of the multivariate approach as used in this study is that the data matrix is available for future studies and can be easily used to test the species hypotheses presented here.

TAXONOMIC TREATMENT

Hyospathe Mart., Hist. nat. palm. 2: 1. 1823. TYPE: *Hyospathe elegans* Mart.

Key to the species of *Hyospathe*.

1. Inflorescences interfoliar 1. *H. macrorachis*.
1. Inflorescences infrafoliar 2.
2. Rachillae filiform; pistillate flowers pedicellate 3.
2. Rachillae non-filiform; pistillate flowers sessile or very shortly pedicellate 4.
3. Pistillate sepals tubular; rachillae glabrous 2. *H. peruviana*.
3. Pistillate sepals non-tubular; rachillae with long, flexuous hairs 3. *H. wendlandiana*.
4. Triads irregular, raised; pistillate flowers sessile or very shortly pedicellate 5. *H. pittieri*.
4. Triads regular, non-raised; pistillate flowers sessile 5.
5. Pistillate sepals tubular 4. *H. frontinensis*.
5. Pistillate sepals non-tubular 6. *H. elegans*.

1. *Hyospathe macrorachis* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 15: 34. 1940. TYPE. ECUADOR. Pastaza: Mera, 1000 m, 7 Sep 1938, *H. Schulze-Rhnhof* 2789 (holotype: B, destroyed). ECUADOR. Pastaza: shore of Río Pastaza, opposite Mera, 1000 m, 6 Feb 1956, *E. Asplund* 19249 (neotype (Skov and Balslev, 1989): S; photo at AAU!).

Stem length: 0.6 (0.2–1.0) m, CV 0.6, *N* = 7. **Stem diameter:** 1.1 (0.8–1.4) cm, CV 0.2, *N* = 6. **Internode length:** 1.2 (0.5–1.6) cm, CV = 0.4, *N* = 6. **Sheath length:** 13.1 (9.0–16.0) cm, CV 0.2, *N* = 5. **Petiole length:** 17.7 (6.5–36.5) cm, CV 0.6, *N* = 10. **Rachis length:** 26.4 (17.0–37.5) cm, CV 0.2, *N* = 10. **Rachis width:** 2.8 (1.9–3.4) mm, CV 0.2, *N* = 10. **Number of divisions:** 2.3 (1–4), CV 0.5, *N* = 11. **Proximal pinna angle:** 37.0° (20°–50°), CV 0.2, *N* = 11. **Distal pinna angle:** 23.0° (17°–29°), CV 0.2, *N* = 10. **Distal pinna length:** 23.9 (17.5–29.5) cm, CV 0.1, *N* = 10. **Sterile basal part length:** 3.7 (2.2–5.0) cm, CV 0.3, *N* = 5. **Sterile basal part width:** 4.6 (3.2–5.6) mm, CV 0.2, *N* = 5. **Prophyll length:** 19.7 (12.0–24.5) cm, CV 0.3, *N* = 3. **Peduncular bract length:** 44.0 (39.0–50.0) cm, CV 0.1, *N* = 3. **Interbract distance:** 6.5 (4.5–8.0) cm, CV 0.2, *N* = 5. **Peduncle length:** 25.9 (21.0–30.0) cm, CV 0.1, *N* = 5. **Rachis length:** 22.1 (15.0–36.0) cm, CV 0.3, *N* = 9. **Rachis width:** 1.9 (1.2–2.6) mm, CV 0.2, *N* = 9. **Rachillae number:** 22.1 (11–34), CV 0.4, *N* = 9. **Proximal rachilla length:** 10.2 (8.0–12.4) cm, CV 0.2, *N* = 9. **Distal rachilla length:** 4.3 (1.7–9.5) cm, CV 0.6, *N* = 9. **Fruit length:** 7.7 (6.6–8.8) mm, CV 0.2, *N* = 2. **Fruit diameter:** 5.5 (4.0–6.9) mm, CV 0.4, *N* = 2.

Distribution. Eastern Andean slopes in Ecuador and northern Peru between 0°43'–5°50' S and 77°34'–78°55' W at a mean elevation of 1627 (1100–2100) m (Fig. 4).

2. *Hyospathe peruviana* Henderson, sp. nov.—TYPE. PERU. Huánuco: Prov. Leoncio Prado, road between Tingo María and Pucallapa, km 35, 9°10' S, 75°48' W, 1500 m, 3 Jun 1981, *G. Sullivan & K. Young* 1180 (holotype: NY!; isotype: MO!).

Ab omnibus speciebus generis his notulius differt: inflorescentiis infrafoliis, rachillis filiformibus, triadibus elevatis, irregularibus, floribus pistillatis pedicellatis, et sepalis pistillatis tubularibus.

Stem length: no data. **Stem diameter:** 0.8 (0.6–1.0) cm, CV 0.2, *N* = 5. **Internode length:** 6.4 (3.7–9.0) cm, CV = 0.4, *N* = 5. **Sheath length:** 13.3 (13.0–13.5) cm, CV 0.0, *N* = 2. **Petiole length:** 7.6 (5.5–9.5) cm, CV 0.2, *N* = 4. **Rachis length:** 17.9 (14.0–21.0) cm, CV 0.1, *N* = 5. **Rachis width:** 2.5 (2.1–3.0) mm, CV 0.2, *N* = 5. **Number of divisions:** 2.8 (1–5), CV 0.5, *N* = 5. **Proximal pinna angle:** 41.6° (30°–55°), CV 0.2, *N* = 5. **Distal pinna angle:** 26.4° (24°–30°), CV 0.1, *N* = 5. **Distal pinna length:** 20.9 (18.0–23.4) cm, CV 0.1, *N* = 4. **Sterile basal part length:** 2.2 (1.0–3.4) cm, CV 0.5, *N* = 5. **Sterile basal part width:** 3.3 (2.3–4.5) mm, CV 0.3, *N* = 5. **Prophyll length:** 11.5 cm, *N* = 1. **Peduncular bract length:** 22 cm, *N* = 1. **Interbract distance:** 2.1 (1.1–3.3) cm, CV 0.4, *N* = 5. **Peduncle length:** 3.4 (2.0–5.0) cm, CV 0.4, *N* = 5. **Rachis length:** 8.0 (5.4–11.0) cm, CV 0.3, *N* = 5. **Rachis width:** 2.4 (1.5–3.5) mm, CV 0.3, *N* = 5. **Rachillae number:** 25.4 (18–34), CV 0.2, *N* = 5. **Proximal rachilla length:** 10.1 (5.5–13.3) cm, CV 0.3, *N* = 5. **Distal rachilla length:** 7.6 (3.9–11.0) cm, CV 0.4, *N* = 5. **Fruit length:** 8.8 (8.0–9.5) mm, CV 0.1, *N* = 2. **Fruit diameter:** 7.1 (6.8–7.3) mm, CV 0.1, *N* = 2.

Distribution. Eastern Andean slopes in northern Peru between 5°45'–9°15' S and 75°45'–77°45' W at a mean elevation of 1640 (1500–1850) m (Fig. 4).

3. *Hyospathe wendlandiana* Dammer ex Burret, Notizbl. Bot. Gart. Berlin-Dahlem 10: 855. 1929. TYPE. COLOMBIA. Antioquia: Dos Quebradas, 1435 m, 21 Jan 1880, *W. Kalbreyer* 1348 (holotype: B, destroyed). COLOMBIA. Antioquia: carretera Granada-San Luis, 5.5 km adelante de El Chocó, 1750 m, 20–21 Sep 1987, *R. Bernal & L. Tobón* 1386 (neotype (Bernal et al., 1989): COL).

Stem length: 2.5 m, *N* = 1. **Stem diameter:** 0.9 (0.8–0.9) cm, CV 0.1, *N* = 2. **Internode length:** 3.7 (2.0–5.3) cm, CV = 0.6, *N* = 2. **Sheath length:** 21.0 (16.0–26.0) cm, CV 0.3, *N* = 2. **Petiole length:** 10.1 (4.5–16.5) cm, CV 0.6, *N* = 4. **Rachis length:** 32.9 (26.5–39.9) cm, CV 0.2, *N* = 4. **Rachis width:** 3.7 (2.6–4.8) mm, CV 0.2, *N* = 5. **Number of divisions:** 6.6 (3–11), CV 0.5, *N* = 5. **Proximal pinna angle:** 57.4° (54°–65°), CV 0.1, *N* = 5. **Distal pinna angle:** 26.8° (25°–30°), CV 0.1, *N* = 5. **Distal pinna length:** 20.6 (18.5–22.2) cm, CV 0.1, *N* = 3. **Sterile basal part length:** 1.6 (1.0–3.0) cm, CV 0.5, *N* = 5. **Sterile basal part width:** 5.2 (4.3–6.8) mm, CV 0.2, *N* = 5. **Prophyll length:** no data. **Peduncular bract length:** no data. **Interbract distance:** 1.4 (0.9–1.9) cm, CV 0.3, *N* = 5. **Peduncle length:** 3.3 (2.5–4.1) cm, CV 0.2, *N* = 5. **Rachis length:** 7.5 (6.0–9.4) cm, CV 0.2, *N* = 5. **Rachis width:** 3.3 (2.9–3.6) mm, CV 0.1, *N* = 5. **Rachillae number:** 23.8 (19–26), CV 0.1, *N* = 5. **Proximal rachilla length:** 16.2 (15.0–18.5) cm, CV 0.1, *N* = 4. **Distal rachilla length:** 13.7 (13.7–14.5) cm, CV 0.1, *N* = 3. **Fruit length:** 11.3 (9.8–12.7) mm, CV 0.2, *N* = 2. **Fruit diameter:** 6.0 (5.5–6.5) mm, CV 0.1, *N* = 2.

Distribution. Eastern slopes of the Cordillera Central in Co-

lombia between 6°01'–6°55' N and 75°01'–75°04' W at a mean elevation of 1599 (1495–1750) m (Fig. 4).

Discussion. Although an isoneotype is reported to be at NY (Bernal et al., 1989), it is not there. Other isoneotypes supposedly at AAU and BH have not been received on loan for this study. This name is therefore interpreted from *R. Bernal* & *L. Tobón 1389* (COL, FTG), from the same locality and with the same collection date as the neotype.

4. *Hyospathe frontinensis* Henderson, sp. nov.—TYPE. COLOMBIA. Antioquia: Municipio de Frontino, corregimiento de Murri, camino desde la quebrada Peñitas hacia Cienegetas, 1200–1500 m, 19 Sep 1983, *R. Bernal, G. Galeano & I. Turner 706* (holotype: COL!; isotype: NY!).

Ab omnibus speciebus generis his notulibus differt: inflorescentiis infrafoliis, rachillis non filiformibus, triadibus non elevatis, regularibus, floribus pistillatis sessilibus, et sepalis pistillatis tubularibus.

Stem length: 2.0 (1.4–2.5) m, CV 0.2, *N* = 7. **Stem diameter:** 0.7 (0.5–0.9) cm, CV 0.2, *N* = 8. **Internode length:** 6.9 (3.7–9.5) cm, CV = 0.3, *N* = 7. **Sheath length:** 11.5, *N* = 1. **Petiole length:** 10.5 (7.0–14.5) cm, CV 0.2, *N* = 10. **Rachis length:** 18.0 (13.0–26.0) cm, CV 0.2, *N* = 10. **Rachis width:** 2.9 (2.9–4.1) mm, CV 0.2, *N* = 10. **Number of divisions:** 1, *N* = 11. **Proximal pinna angle:** 31.5° (25°–40°), CV 0.2, *N* = 10. **Distal pinna angle:** 23.6° (20°–27°), CV 0.1, *N* = 10. **Distal pinna length:** 23.9 (20.0–33.0) cm, CV 0.2, *N* = 10. **Sterile basal part length:** 3.3 (1.7–7.2) cm, CV 0.5, *N* = 10. **Sterile basal part width:** 3.0 (2.1–4.0) mm, CV 0.3, *N* = 10. **Prophyll length:** 10.9 (6.0–19.5) cm, CV 0.4, *N* = 6. **Peduncular bract length:** 32.5 (21.5–50.0) cm, CV 0.3, *N* = 6. **Interbract distance:** 3.8 (2.3–6.5) cm, CV 0.4, *N* = 10. **Peduncle length:** 14.0 (7.9–18.0) cm, CV 0.2, *N* = 10. **Rachis length:** 1.9 (0.1–5.5) cm, CV 0.8, *N* = 11. **Rachis width:** 1.6 (1.2–2.0) mm, CV 0.2, *N* = 11. **Rachillae number:** 3.2 (2–5), CV 0.3, *N* = 11. **Proximal rachilla length:** 18.6 (12.5–23.0) cm, CV 0.2, *N* = 8. **Distal rachilla length:** 17.4 (11.0–22.5) cm, CV 0.2, *N* = 7. **Fruit length:** 8.7 (8.2–9.2) mm, CV 0.1, *N* = 2. **Fruit diameter:** 6.1 (5.9–6.3) mm, CV 0.1, *N* = 2.

Distribution. Western slopes of the Cordillera Occidental in Colombia between 6°29'–6°45' N and 76°14'–76°25' W at a mean elevation of 1370 (1000–1725) m (Fig. 4).

5. *Hyospathe pittieri* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 14: 137. 1938. TYPE. VENEZUELA. Aragua: Valle de Ocumare, 1000 m, 17 Sep 1937, *H. Pittier 14146* (holotype: B, destroyed; lectotype (Stauffer and Stauffer, 1996): VEN; photo in Stauffer and Stauffer, 1996!).

Stem length: 4.7 (2.0–8.0) m, CV 0.4, *N* = 14. **Stem diameter:** 2.3 (1.3–5.0) cm, CV 0.4, *N* = 19. **Internode length:** 3.2 (1.5–7.0) cm, CV = 0.6, *N* = 10. **Sheath length:** 35.3 (24.0–39.0) cm, CV 0.1, *N* = 9. **Petiole length:** 21.8 (11.5–41.0) cm, CV 0.3, *N* = 19. **Rachis length:** 76.1 (41.0–105.0) cm, CV 0.3, *N* = 12. **Rachis width:** 8.0 (3.9–11.3) mm, CV 0.2, *N* = 28. **Number of divisions:** 19.5 (10–27), CV 0.2, *N* = 14. **Proximal pinna angle:** 49.9° (30°–90°), CV 0.3, *N* = 24. **Distal pinna angle:** 16.5° (11°–30°), CV 0.3, *N* = 15. **Distal pinna length:** 28.7 (23.0–37.0) cm, CV 0.1, *N* = 11. **Sterile basal part length:** 1.9 (1.2–3.3) cm, CV 0.3, *N* = 31. **Sterile basal part width:** 10.8 (5.8–15.8) mm, CV 0.2, *N* = 22. **Prophyll length:** 27.5 (14.0–45.0) cm, CV 0.5, *N* = 4. **Peduncular bract length:** 32.7 (20.0–31.0) cm, CV 0.3, *N* = 3. **Interbract distance:** 2.2 (1.4–3.4) cm, CV 0.2, *N* = 31. **Peduncle length:** 4.0 (1.2–8.2) cm, CV 0.4, *N* = 29. **Rachis**

length: 13.5 (4.5–20.5) cm, CV 0.3, *N* = 20. **Rachis width:** 5.3 (2.9–10.1) mm, CV 0.3, *N* = 22. **Rachillae number:** 38.7 (18–51), CV 0.3, *N* = 16. **Proximal rachilla length:** 23.6 (9.4–34.5) cm, CV 0.3, *N* = 16. **Distal rachilla length:** 12.6 (7.5–17.5) cm, CV 0.3, *N* = 5. **Fruit length:** 11.6 (8.4–14.2) mm, CV 0.2, *N* = 8. **Fruit diameter:** 6.0 (4.0–7.3) mm, CV 0.2, *N* = 8.

Distribution. Montane areas in northern Venezuela and Colombia and just reaching Panama between 1°08'–10°47' N and 66°35'–77°45' W at a mean elevation of 1459 (1100–1980) m (Fig. 4).

6. *Hyospathe elegans* Mart., Hist. nat. palm. 2: 1. 1823. TYPE. BRAZIL. Amazonas: Rio Negro, no date, *C. Martius 3122* (holotype: M!; isotype: P!; F neg. 18528a).

Stem length: 2.7 (1.0–7.0) m, CV 0.5, *N* = 91. **Stem diameter:** 1.0 (0.3–2.3) cm, CV 0.4, *N* = 291. **Internode length:** 3.9 (1.0–11.0) cm, CV = 0.4, *N* = 238. **Sheath length:** 16.8 (4.5–35.0) cm, CV 0.4, *N* = 149. **Petiole length:** 15.0 (1.0–41.0) cm, CV 0.5, *N* = 286. **Rachis length:** 41.0 (5.5–125.0) cm, CV 0.5, *N* = 264. **Rachis width:** 4.0 (1.4–8.5) mm, CV 0.3, *N* = 321. **Number of divisions:** 4.5 (1–28), CV 1.1, *N* = 290. **Proximal pinna angle:** 40.4° (10°–90°), CV 0.4, *N* = 297. **Distal pinna angle:** 23.4° (15°–35°), CV 0.2, *N* = 232. **Distal pinna length:** 26.4 (13.0–46.0) cm, CV 0.3, *N* = 155. **Sterile basal part length:** 1.6 (0.3–6.0) cm, CV 0.6, *N* = 351. **Sterile basal part width:** 5.3 (1.4–16.7) mm, CV 0.4, *N* = 286. **Prophyll length:** 13.1 (1.0–37.0) cm, CV 0.6, *N* = 49. **Peduncular bract length:** 24.5 (7.0–50.0) cm, CV 0.4, *N* = 34. **Interbract distance:** 1.7 (0.5–4.2) cm, CV 0.4, *N* = 349. **Peduncle length:** 3.6 (0.9–12.5) cm, CV 0.5, *N* = 347. **Rachis length:** 6.3 (0.1–22.0) cm, CV 0.6, *N* = 332. **Rachis width:** 3.3 (1.1–8.3) mm, CV 0.4, *N* = 335. **Rachillae number:** 15.9 (2–45), CV 0.5, *N* = 329. **Proximal rachilla length:** 18.0 (1.4–40.0) cm, CV 0.4, *N* = 234. **Distal rachilla length:** 15.1 (1.4–37.0) cm, CV 0.4, *N* = 199. **Fruit length:** 10.0 (1.3–15.7) mm, CV 0.3, *N* = 72. **Fruit diameter:** 6.2 (3.0–8.4) mm, CV 0.2, *N* = 72.

Key to the subspecies of *Hyospathe elegans*

1. Amazon region and eastern Andean slopes 6a. *H. elegans* subsp. *elegans*.
1. West of the Andes in Ecuador and Colombia, and Central America 2.
2. Rachillae with dense crustose hairs; western Colombia and Ecuador 6f. *H. elegans* subsp. *sodiroidi*.
2. Rachillae glabrous or with crustose hairs; Central America (just reaching Colombia on Cerro Tacarcuna) 3.
3. Pinnae 8–28 per side of rachis; rachillae 20–37; Costa Rica 6b. *H. elegans* subsp. *costaricensis*.
3. Pinnae 1–7 per side of rachis; rachillae 2–15; Panama and Colombia (Cerro Tacarcuna) 4.
4. Rachillae with crustose hairs; triads spirally arranged; staminate flowers red; Cerro Gaital and the eastern end of the Cordillera Central in Panama 6c. *H. elegans* subsp. *concinna*.
4. Rachillae glabrous; triads distichously or spirally arranged; staminate flowers white; Cerro Tacarcuna in Panama and adjacent Colombia, and western end of Serranía de San Blas, Panama 5.
5. Triads spirally arranged; western end of Serranía de San Blas, Panama 6d. *H. elegans* subsp. *sanblasensis*.
5. Triads distichously arranged; Cerro Tacarcuna in Panama and adjacent Colombia 6e. *H. elegans* subsp. *tacarcunensis*.

6a. *Hyospathe elegans* subsp. *elegans*

Hyospathe filiformis H. Wendl. ex Drude in Mart., Fl. bras.: