

Three new species of *Elaphoglossum* Schott ex J. Sm. (Dryopteridaceae) from the pacific of Costa Rica

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Abstract

In this paper three new species of *Elaphoglossum* Schott ex J. Sm., are described and illustrated, located on the pacific slope of Cordillera de Talamanca and Cerro Caraigres (Cerro Dragón), Costa Rica. The new species are: *E. dragonense* A. Rojas, *E. flavosquamum* A. Rojas and *E. pacificum* A. Rojas, all belong to the section *Elaphoglossum* subsection *Pachyglossa* Christ. The first species resembles *E. gloeorrhizum* Mickel but is separated by showing a scaly rhizome, phyllopodia with two sections, the basal one resinous as the rhizome and the second non-resinous, bigger stipe scales, and the abaxial blade is scaly. The second entity resembles *E. delgadilloanum* A. Rojas, but differs by having blonde to orange-yellowish rhizome scales with long lateral processes and the blade scales are mainly smaller, less dense and bicolorous with black central body and brown rays. The latter species is similar to *E. cismense* Rosenst., but is identified by its more slender rhizome, fronds at less distance between them, shorter phyllopodia, narrowly elliptic blade, bigger abaxial blade scales and a linear-elliptical and narrower fertile blade.

Key words: Caraigres; *Elaphoglossum dragonense*; *Elaphoglossum flavosquamum*; *Elaphoglossum pacificum*; endemic; neotropics; subsection *Pachyglossa*.

Resumen

Tres especies nuevas de Elaphoglossum Schott ex J. Sm. (Dryopteridaceae) para el pacífico de Costa Rica

En este artículo se describen e ilustran tres especies nuevas de *Elaphoglossum* Schott ex J. Sm., localizadas en la vertiente pacífica de la Cordillera de Talamanca y Cerro Caraigres (Cerro Dragón), Costa Rica. Las especies nuevas son: *E. dragonense* A. Rojas, *E. flavosquamum* A. Rojas y *E. pacificum* A. Rojas, todas de la sección *Elaphoglossum* subsección *Pachyglossa* Christ. La primera especie se parece a *E. gloeorrhizum* Mickel, pero se separa por mostrar escamas en el rizoma, filopodio con dos secciones, la basal resinosa como el rizoma y la segunda no resinosa, escamas del estípide más grandes y el envés de la lámina con escamas estrelladas. La segunda entidad se asemeja a *E. delgadilloanum* A. Rojas, pero difiere por presentar escamas del rizoma rubias a anaranjado-amarillentas y con largos procesos laterales y escamas de la lámina la mayoría más pequeñas, menos densas y bicoloras con el centro negro y los rayos pardos. La última especie es similar a *E. cismense* Rosenst., pero se identifica por su rizoma más delgado, largo-reptante, frondas más distantes, con filopodios más cortos, lámina angostamente elíptica, escamas del envés más largas, lámina fértil más corta y linear-elíptica.

Palabras clave: Caraigres, *Elaphoglossum dragonense*, *Elaphoglossum flavosquamum*, *Elaphoglossum pacificum*, endémico, neotrópico, subsección *Pachyglossa*.

Introduction

Elaphoglossum Sm. is one of the largest and most complex of ferns genera, with perhaps 600 species and distributed throughout the tropics (Mickel & Atehortúa, 1980).

The genus is remarkably uniform with mostly simple-bladed ferns with acrostichoid sori and free veins (with two exceptions) (Mickel & Atehortúa, 1980).

The section *Elaphoglossum* is the larger group of the genus with approximately 75% of the species, and is characterized by absent hydathodes, present phyllopodia, medium size blades and stellate blade scales; the subsection *Pachyglossa* Christ is characterized by subcoriaceous to coriaceous blades and minute and stellate blade scales (vs. chartaceous blades and absent scales in subsection *Tenuifolia* Mickel & L. Atehortúa) (Rojas 2003).

Rouhan et al. (2004) mentioned that the section *Elaphoglossum* contains many species; consequently, it is probably the most difficult group to circumscribe in the whole genus.

In all molecular analyses, section *Elaphoglossum* consists of two well supported subclades, each of which corresponds to a subsection. Only subsection *Pachyglossa* was recognized by Mickel and Atehortúa (1980), but Skog et al. (2004) pointed out that molecular analyses supported the distinction between two clades: *Platyglossa* Christ and *Pachyglossa*. Both names were first published by Christ (1899), but their morphological definitions must be modified regarding changes of species belonging to each subsection (Rouhan et al., 2004). Moran, Garrison and Rouhan (2007) indicated that no known macromorphological or anatomical characters distinguish these two clades; however, three perispore characters are synapomorphic for subsect. *Pachyglossa*: the presence of cristae, spines and perforations.

In this work three new species of *Pachyglossa* clade are described and registered as endemic to Costa Rica, thanks to expeditions made by the authors to the pacific slope of the Cordillera de Talamanca and Cerro Caraigres.

Material and methods

The new species here described are the result of comparison of specimens with the species registered from Costa Rica and deposited in the National Herbarium (CR), and after the revision of related species and keys from the Neotropics as: Gómez & Arbeláez (2009), Mickel (1995), Mickel & Smith (2004), Murillo et al. (2008). The specimens

collected are deposited in Herbario Nacional de Costa Rica (CR), Kew Botanical Garden (K), Missouri Botanical Garden (MO) and Herbario de la Universidad de Costa Rica (USJ).

New species

Elaphoglossum dragonense A. Rojas, **sp. nov.** (fig. 1).

TYPE: COSTA RICA. San José: Acosta, Cangrejal, Zona Protectora Cerro Caraigres, 9°43'29"N, 84°08'23"W, 2420–2500 m, 10 ago 2014, I. Chinchilla & A. Rojas 1978 (Holotype: CR; Isotypes: K, MO).

Diagnoses. *Elaphoglossum dragonense* differs from *E. gloeorrhizum* Mickel by having a scaly rhizome, a rhizome with a conspicuous and resinous projection at the base of the stipe, non-resinous phyllopodia, bigger stipe scales and scaly abaxial blade surface.

Description. Terrestrial; 5–7 mm diameter rhizome, short-creeping, resinous; rhizome scales 0.5–2 x 0.5–1.2 mm, ovate, black, lustrous, medially appressed, marginally entire; fronds 27.4–64 cm long, proximal to 5–10 mm distant; rhizome projection 4–10 mm, phyllopodia 6–16 mm long, non-resinous; stipe 6.8–27 cm long, 1/4–1/2 times the length of the frond; stipe scales 1–2 x 0.5–1 mm, ovate to lanceolate, resinous, sparse to absent, sometimes replaced by resinous dots; blade 20–40 x 2–3.3 cm, elliptic to narrowly lanceolate, subcoriaceous to coriaceous, cuneate at base, rounded to acuminate at apex; blade glabrous adaxially, abaxial blade scales 0.2–0.4 mm, stellated, dark brown, opaque, sparse to absent; costal scales 1–1.5 x 0.6–0.8 mm, ovate, dark brown, marginally ciliate; veins single to 1-bifurcate, 0.5–1 mm distant between them, in angle to 70°–75° with respect to costa; hydathodes absent; fertile fronds 30.5 cm long; stipe 9.1 cm long (ca. 1/3 of the frond size); fertile blade 20 x 2 cm, narrowly elliptic, cuneate at base, acute to attenuate at apex; intersporangial scales absent.

Distribution. Endemic, known only from Zona Protectora Cerro Caraigres at 2420–2500 m. (I. Chinchilla & A. Rojas 1978, CR, K, MO).

Etymology. The specific epithets make reference to the type locality in Cerro Dragón (Caraigres) as it is locally called.

Observations. *Elaphoglossum dragonense* differs from *E. gloeorrhizum* Mickel in having

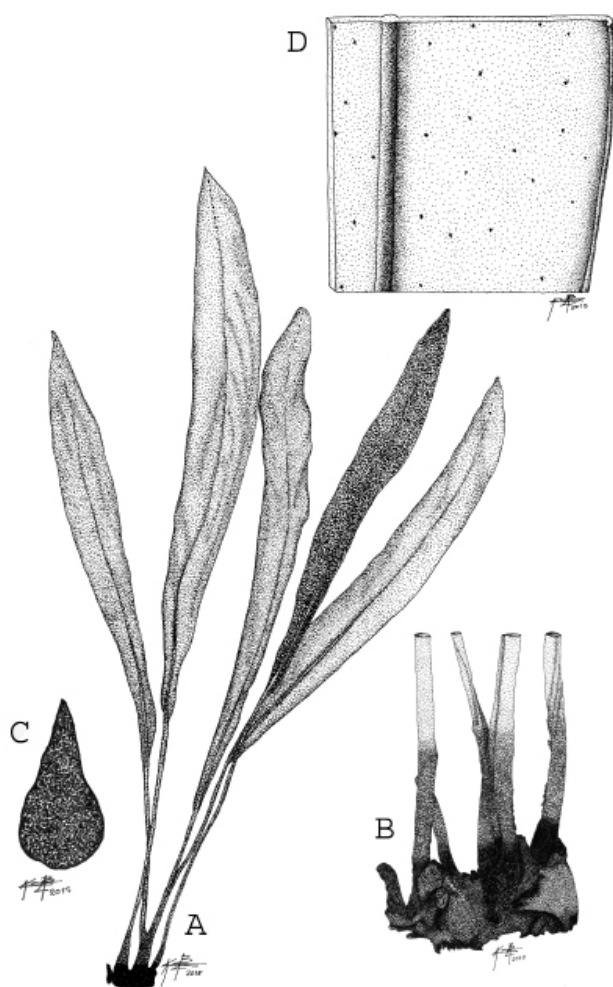


Figure 1. A–D. *Elaphoglossum dragonense* (I. Chinchilla & A. Rojas 1978, CR). **A.** General aspect of type specimen. **B.** Rhizome detail. **C.** Rhizome scale. **D.** Abaxial blade detail.

rhizome scaly (vs. not scaly), rhizome with a conspicuous and resinous projection to stipe base (vs. without projection), not resinous (vs. resinous) phyllopodia, bigger (1–2 x 0.5–1 mm vs. 0.5–1.0 x 0.3–0.6 mm) stipe scales and abaxial blade scaly (vs. resinous)(fig. 1).

Elaphoglossum flavosquamum A. Rojas & Baaijen, **sp. nov.** (fig. 2).

TYPE: COSTA RICA. San José: Acosta, Cangrejal, Valle de Candelaria, Zona Protectora Cerro Caraigres, ascenso por el potrero, 9°43'40"N, 84°08'22"W, 2100–2300 m, 28 feb 2015, A. Rojas & W. Baaijen 10987 (Holotype: CR).

Diagnoses. *Elaphoglossum flavosquamum* differs from *E. delgadilloanum* A. Rojas in having blonde to orange-yellowish rhizome scales with

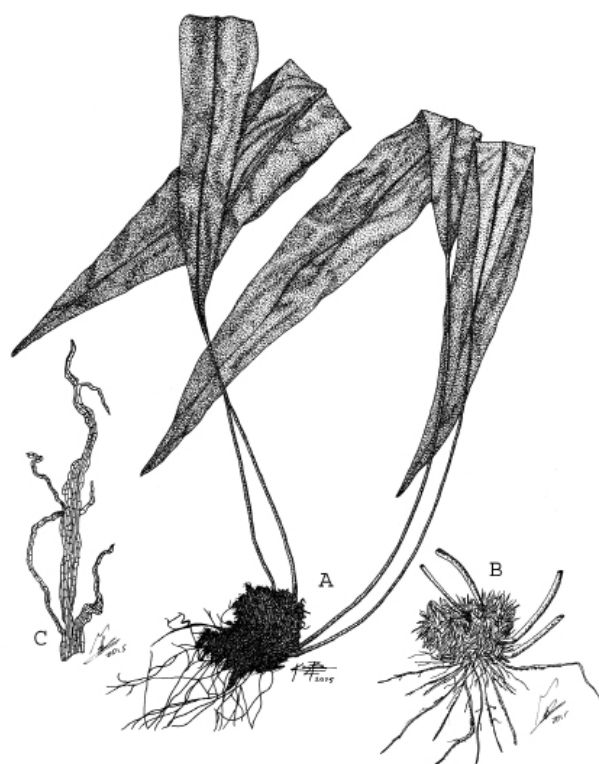


Figure 2. A–C. *Elaphoglossum flavosquamum* (A. Rojas & W. Baaijen 10987, CR). **A.** General aspect of type specimen. **B.** Rhizome detail. **C.** Rhizome scale.

long lateral processes and the blade scales are smaller, less dense and bicolorous with black central body and brown rays.

Description. Epiphytic; rhizome 4–8 mm in diameter, compact to short-ascending; rhizome scales 10–20 x 1–2.5 mm, linear, blonde to orange-yellowish, lustrous, crisped, entire to occasionally with long hair-like lateral processes; fronds 48–62 cm long, approximate; phyllopodia 8–12 mm long (hidden by the scales); stipe 17.5–25 cm long, (1/6–)1/3–2/5 of the frond length, strawish, glabrous; blade 31–37 x 3.8–5.4 cm, elliptic, coriaceous, cuneate at base, acute to acuminate at apex; adaxial surface glabrous, abaxially scaly, the scales 0.3–1 mm in diameter (but most 0.3–0.5 mm in diameter), stellate, bicolorous, with pale brown rays and blackish attached point, lustrous, appressed, long-ciliate at margin; veins (single–) 1–2 bifurcate, ca. 1 mm distant between them, in angle to 60–70° with respect to costa; hidathodes absent; fertile fronds not seen.

Distribution. Endemic, known only from Zona Protectora Cerro Caraigres at 2350–2400 m. (A. Rojas & W. Baaijen 10987, CR).

Etymology. The specific epithets make reference to the blonde rhizome scales similar to a blond hair.

Observations. *Elaphoglossum flavosquamum* differs from *E. delgadilloanum* A. Rojas in having blonde to orange-yellowish (vs. orange mixed with partially or fully brown to blackish) rhizome scales with long lateral processes (vs. entire with occasionally long ciliate margin) and most the blade scales are smaller (most of them 0.3–0.5 mm in diameter vs. 0.6–1 mm in diameter), less dense and bicolorous with black central body and brown rays (vs. concolorous and blackish) (see fig. 2). They also differ from *E. ciliatosquamum* A. Rojas because of a relatively broader (1–2.5 mm broad vs. 0.5–1.5 mm), blonde to orange-yellowish (vs. orange to brown-reddish at apex) and with long hair-like lateral processes (vs. entire) rhizome scales, relatively smaller (most of them 0.3–0.5 mm in diameter vs. 1–2 x 0.5–1.0 mm) and bicolorous (concolorous) with blackish central body and pale brown rays (vs. fully orange-yellowish) abaxial blade scales.

***Elaphoglossum pacificum* A. Rojas, sp. nov.** (fig. 3).

TYPE: COSTA RICA. San José: Pérez Zeledón, Rivas, Cordillera de Talamanca, Parque Nacional Chirripó, entre Llano Bonito y antes de Monte sin Fé, 9°26'55"N, 83°32'05"W, 2600–2900 m, 29 jul 1996, A. Rojas 2877 (holotype: CR; isotypes: MO).

Diagnoses. *Elaphoglossum pacificum* differs from *E. cismense* Rosenst. in having long-creeping rhizome, fronds distant 10–19 mm between them, phyllopodia are shorter, blade is narrower and 8–12 times longer than wide and narrowly elliptic, abaxial blade scales relatively longer and stellated, narrower fertile blade and 12–20 times longer than wide and they linear–elliptic.

Description. Terrestrial; rhizome 5–9 mm in diameter, long-creeping; rhizome scales 1–2 x 0.5–1 mm, rounded to lanceolate, brown, occasionally with dark brown center, appressed to medially appressed, entire to erose at margin; fronds 50–64 cm long, distance of 10–19 mm between them; phyllopodia 10–20 mm long; stipe 14–21.7 cm long (1/4–1/3 of the frond length); basal stipe scales 1–3 x 0.5–1.5 mm, ovate to lanceolate, pale to dark brown, entire at margin, progressively less dense distally; blade 34–47 x 2.9–5.3 cm, narrowly elliptic, coriaceous, cuneate at base, acuminate at apex; adaxial surface glabrous; abaxially scaly, the scales 0.2–0.5 mm in diameter, stellated, brown,

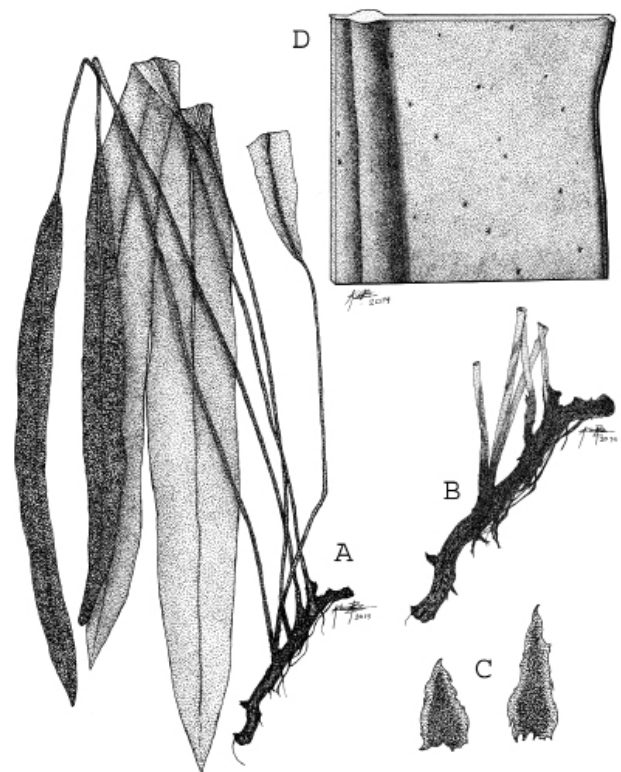


Figure 3. A–D. *Elaphoglossum pacificum* (A. Rojas 2877, CR). **A.** General aspect of type specimen. **B.** Rhizome detail. **C.** Rhizome scales. **D.** Abaxial blade detail.

with dark brown to blackish attached point, sparse to absent, ciliate at margin; costal scales 1–2 x 0.8–1 mm, ovate, pale brown, erose to ciliate at margin, with dark brown to blackish attachment point; veins single to 1-bifurcate, 1–1.4 mm distant between them, in angle to 70°–85° with respect to costa; hydathodes absent; fertile fronds 42–63.5 cm long; stipe 17.2–35.3 cm long (2/5–1/2 of the frond length); fertile blade 23–28.5 x 1.2–2.2 cm, linear-elliptic, cuneate at base, acuminate at apex; intersporangial scales absent.

Distribution. Endemic to Costa Rica in Cordillera de Talamanca, Parque Nacional Chirripó between 2600–2900 m (A. Rojas 2877, CR, INB, MO) and Zona Protectora Cerro Caraigres between 2300–2350 m (*I. Chinchilla* & A. Rojas 1946, CR, MO, USJ).

Additional specimen examined. COSTA RICA. San José: Acosta, Cangrejal, estribaciones del Cerro Caraigres, 9°43'33"N, 84°08'14"W, 2300–2350 m, 10 ago 2014, *I. Chinchilla* & A. Rojas 1946 (CR, K, MO).

Etymology. The specific epithets make reference to its distribution in the Pacific side of Costa Rica.

Observations. *Elaphoglossum pacificum* differs from *E. cismense* Rosenst. in having long-creeping (vs. compact to short-creeping) rhizome, fronds distant 10–19 mm (vs. 2–7 mm) between them, phyllopodia shorter (10–20 mm vs. 20–30 mm), narrower (2.9–5.3 cm vs. 5.0–12.6 cm) blade, the blade is 8–12 times (vs. 5–6 times) longer than wide and narrowly elliptic (vs. elliptic, lanceolate or oblanceolate), abaxial blade scales relatively longer (0.2–0.5 mm vs. 0.1–0.3 mm), stelled (vs. fimbriate), narrower (1.2–2.2 cm vs. 3–5 cm) fertile blade, the blade 12–20 times (vs. 7–9 times) longer than wide and linear-elliptic (vs. narrowly elliptic) (see fig. 3).

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