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Taxonomic revision of neotropical *Connarus* (*Connaraceae*) identifies three undescribed species

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Abstract: An ongoing taxonomic revision of neotropical *Connarus* has identified three undescribed species of the genus, which are published here. One of them, *C. foreroi*, is known only from a single gathering from central Peru, probably reflecting scarcity of botanical inventories. *Connarus revolutus*, on the other hand, seems to be more common, but it is restricted to northeastern Espírito Santo and southern Bahia, Brazil. *Connarus pedicellatus*, originally described as a variety of *C. erianthus*, is elevated to the rank of species; it is distributed widely in the Amazon forest of Brazil, extending to southern Suriname. The present study describes and illustrates these three new species and provides a geographic distribution map, comparisons, information on habitat, phenology and preliminary conservation risk assessments, along with a key to distinguish them from similar taxa.

Key words: *Connaraceae*, *Connarus*, neotropics, *Oxalidales*, taxonomic novelties

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Introduction

With more than 75 species, *Connarus* L. is the largest genus in *Connaraceae* (Lemmens & al. 2004). It is a pantropical group, represented especially by lianas, scandent shrubs or small trees, mainly from lowland tropical wet forests or savannas of South America, central Africa and southeastern Asia (Leenhouts 1958; Forero 1983; Lemmens 1989a). Its species richness is centred in the neotropics, where c. 55 species are found, mostly dispersed in the Amazon and Atlantic forests, to which several taxa are restricted (Forero 1983).

Connarus is morphologically characterized by the lenticellate branchlets, alternate, compound and imparipinnate leaves without stipules, inflorescences usually in thyrses (or variations thereof), heterostylous, pentamerous and actinomorphic flowers, androecium with two whorls of ten stamens alternating in length, gynoecium with a single carpel, and follicular fruits with black seeds bearing colourful arils (description largely based on Forero 1983; Lemmens 1989a; Lemmens & al. 2004). While the most inclusive phylogenetic study of *Connaraceae* – based exclusively on morphological data – recognized *Connarus* as sister to the clade formed by the African genera *Burttia* Baker f. & Exell, *Ellipanthus* Hook. f., *Hemandradenia* Stapf and *Vismianthus* Mildbr. (Lemmens 1989b), a recent preliminary genomic approach to the Plant and Fungal Tree of Life (https://treeoflife.kew.org/tree-of-life) came up with different conclusions, in which *Connarus* forms a monophyletic group with *Ellipanthus*, *Jollydora* Pierre ex Gilg and *Vismianthus*, although *Burttia* and *Hemandradenia* were not included. *Connarus* differs from other *Connaraceae* by the imparipinnate leaves, punctate perianth, a single carpel, relatively broader follicular fruits

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and seeds without endosperm (Forero 1983; Lemmens & al. 2004; Toledo & al. 2020).

Forero's (1983) contribution to the taxonomic knowledge of neotropical *Connarus* was enormous and several new species were described at the time. After his revisionary work, more than 35 years ago, several other taxonomic novelties in neotropical *Connarus* have been identified, reflecting relative neglect of modern systematic studies for this genus.

While developing a taxonomic revision of *Connarus* in the neotropics, three new species of this genus were discovered (including a new specific status for a previously published variety). These species are described and illustrated here. The present study also includes a geographic distribution map, information on habitat, phenology and conservation status, taxonomic discussions and an identification key to separate the new species from similar taxa.

Material and methods

The new species presented in this study were described based on examination of specimens deposited in the following herbaria (herbarium codes according to Thiers 2020+): COL, CVRD, ESA, IAN, INPA, K, MA, MG, NY, P, RB, U, UB , UFACPZ and US. General morphological terms applied in the descriptions are based on Font Quer (1953), while venation patterns follow Ellis & al. (2009) and inflorescence architecture follows Weberling (1992).

The geographic distribution map was prepared using ArcGIS 10.5 (ESRI 2016), based on the localities indicated on herbarium sheet labels. Preliminary conservation risk assessments were inferred according to IUCN (2012, 2017) guidelines and criteria, with Extent of Occurrence (EOO) calculated in GeoCAT (Bachman & al. 2011).

The identification key following and accessory to the treatments of the three new species was built with the intention of facilitating the prompt recognition of the new species when compared to morphologically similar taxa.

Taxonomic treatment

Connarus foreroi C. Toledo, **sp. nov.** – Fig. 1, 2.
Holotype: Peru, Huánuco, Pachitea, Dtto. [Distrito de] Honoria, Bosque Nacional de Iparia, región de "bosque seco tropical" a lo largo del Río Pachitea cerca del campamento Miel de Abeja (1 km arriba del pueblo de Tournavista a unos 20 km arriba de la confluencia con el Río Ucayali), alt. 300–400 m, 14 Nov 1967, fr., *J. Schunke V. 2317* (US 2859402!; isotype: F [n.v.]).

Diagnosis — Morphologically similar to *Connarus fasciculatus* (DC.) Planch. in the cauliflorous inflorescences, but differing by the branchlets and inflorescences with only simple trichomes (vs. branchlets and inflorescences with dendroid and simple trichomes in *C. fasciculatus*).

Description — Shrubs, c. 1.5 m tall; branchlets subglabrous, indumentum with only simple trichomes, lenticels conspicuous. *Leaves* 5-foliolate; petiole c. 13 cm long, glabrous; rachis c. 9 cm long, glabrous; pulvinuli c. 4 mm long, glabrous; leaflets opposite to subopposite, slightly discolorous, flat, chartaceous; basal pair symmetric, obovate, c. 16 × 7.5 cm, base symmetric, acute; other leaflets obovate, 21.5–23.3 × 9.5–10.2 cm, base symmetric, acute, apex acuminate, acumen 9–14 mm long; all leaflets: abaxial surface sparsely sericeous, indumentum brown, adaxial surface dull, glabrous, margin flat; secondary veins 11–12 pairs, forming angle of 45–55° with midvein, slightly arcuate, abaxially prominent, adaxially flat; tertiary veins percurrent, abaxially prominent, adaxially flat. *Inflorescences* cauliflorous, in simple, determinate thyrses; peduncle c. 0.5 cm long, sparsely sericeous; rachis at maturity not seen, sparsely sericeous, lateral branches not seen, indumentum of these structures with only simple trichomes, brown. *Flowers* not seen, but pedicellate; sepals (persistent on fruits) slightly basally connate, outer surface sericeous, indumentum brown, inner surface subglabrous, sparsely sericeous at apex. *Fruits* reddish, obovoid, 2.2–2.3 × 1.4–1.6 cm, outer surface subglabrous, inner surface glabrous or subglabrous, glandular trichomes absent; stipe 2–5 mm long; calyx deciduous or partially persistent, sepals reflexed or patent; style partially persistent, apiculate or spinescent, c. 1 mm long; seed c. 1.5 × 0.7 cm.

Distribution, habitat and phenology — The only known specimen of *Connarus foreroi* was collected in the department of Huánuco, central Peru (Fig. 1). This individual was reported as a shrub c. 1.5 m tall, growing along river margins in a dense, wet forest, at 300–400 m elevation. This fruiting specimen was collected in November.

Etymology — The specific epithet was chosen in order to honour Dr. Enrique Forero, given his consistent contribution to the taxonomy of neotropical *Connaraceae*.

Conservation status — As *Connarus foreroi* is here described based on a single gathering, and considering that it was acquired in a poorly collected area, this species is here assigned the category Data Deficient (DD) according to the IUCN (2012, 2017).

Remarks — Even though this new species is known from a single gathering, it is distinguished from other neotropical *Connarus* by the 5-foliolate leaves, large, obovate leaflets, cauliflorous inflorescences with rachises bearing only simple trichomes, and fruits glabrous or subglabrous on the inner surface. This combination of characters is unique among the neotropical species of the genus. *Connarus fasciculatus* also has cauliflorous inflorescences, but with rachises covered by dendroid trichomes, which are not seen in *C. foreroi*.

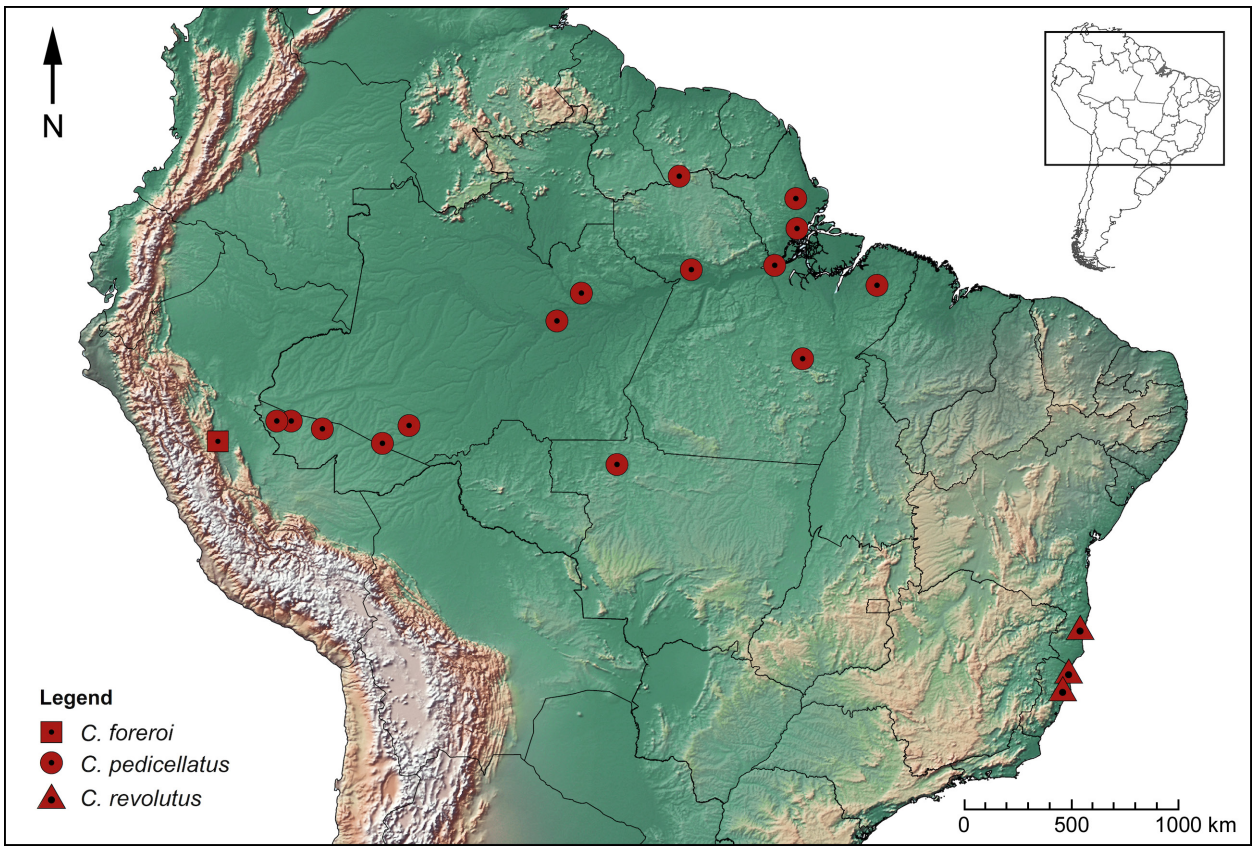

Fig. 1. Geographic distribution of *Connarus foreroi* (square) in Peru, *C. pedicellatus* (circles) in Brazil and Suriname and *C. revolutus* (triangles) in Brazil.

Connarus pedicellatus (Forero) C. Toledo, **comb. & stat. nov.** ≡ *Connarus erianthus* var. *pedicellatus* Forero in Brittonia 32: 40. 1980. – Holotype: Brazil, Pará, Estrada entre Planalto A e Tinguelim, km 14, 10 Jul 1969, fl., *N. T. Silva 2387* (IAN 134211!). – Fig. 1, 3.

= *Connarus erianthus* var. *stipitatus* Forero in Brittonia 32: 40. 1980. – Holotype: Brazil, Pará, Santarém, km 70 da estrada do Palhão, ramal do Caetetú, 11 Sep 1969, fr., *M. Silva & R. Souza 2551* (MG barcode MG037357!; isotypes: COL!, NY!), syn. nov.

Description — Shrubs, treelets or trees, 2–14(–18) m tall; branchlets tomentose to glabrescent, indumentum with dendroid and simple trichomes, lenticels absent or inconspicuous. *Leaves* 7–11-foliolate; petiole 2.5–9 cm long, glabrous; rachis 6.5–17.2(–28) cm long, glabrous; pulvinuli 3–7 mm long, glabrous or subglabrous; leaflets opposite to alternate, concolorous or slightly discolorous, flat, chartaceous; basal pair symmetric to asymmetric, ovate or elliptic, less frequently narrowly ovate, 3.8–10.3 × 2–4.5 cm, base asymmetric or slightly so, rounded or obtuse; other leaflets symmetric to asymmetric, ovate, narrowly ovate, elliptic or narrowly elliptic (apical leaflet usually elliptic), 5–16.4 × 2.5–5.7 cm, base asymmetric or slightly so, rounded, obtuse or acute, apex long acuminate to cuspidate, acumen 5–23 mm long; all leaflets: both surfaces glabrous or subglabrous, adaxial surface dull, margin flat; secondary veins 5–7 pairs, forming angle of 45–65° with midvein, arcuate or slightly so, abaxially slightly prominent, adaxially flat, rarely slightly impressed; tertiary veins percurrent, abaxially flat or slightly prominent, adaxially flat, rarely slightly prominent. *Inflorescences* axillary, 1–6 per axil, rarely ramiflorous, in simple, determinate thyrses; peduncle 0.2–1 cm long or inflorescence subsessile, tomentose; rachis 4.5–15 cm long, tomentose, lateral branches c. 0.3 mm long, tomentose, indumentum of these structures with dendroid and simple, unicellular trichomes, brown or ferruginous. *Flowers* subsessile or pedicel 0.5–2 mm long; sepals 4 or 5, with 1 or 2 pairs of sepals connate for c. ½ their length, ovate or orbicular, 2–2.2 × c. 2.2 mm, apex obtuse, and 1–3 sepals slightly connate to others at base, narrowly ovate, 2–3 × c. 1 mm, apex acute; all sepals: outer surface tomentose, indumentum brown or ferruginous, inner surface glabrous, occasionally pubescent at apex; petals narrowly obovate or oblong, 3–4 × 1–1.5 mm, glandular dots absent or 1–5, both surfaces glabrous or subglabrous, glandular trichomes absent or sparse, margin glabrous, apex acute or obtuse; stamens (based on longistylous flowers) basally connate for c. 0.3 mm, shorter series c. 2 mm long, longer series c. 3 mm long, stamens (based on brevistylous flowers) basally connate for 0.5–0.7 mm, shorter series c. 2 mm long, longer series 3–3.5 mm long, filaments glabrous or with sparse, glandular trichomes; ovary (in longistylous flow-

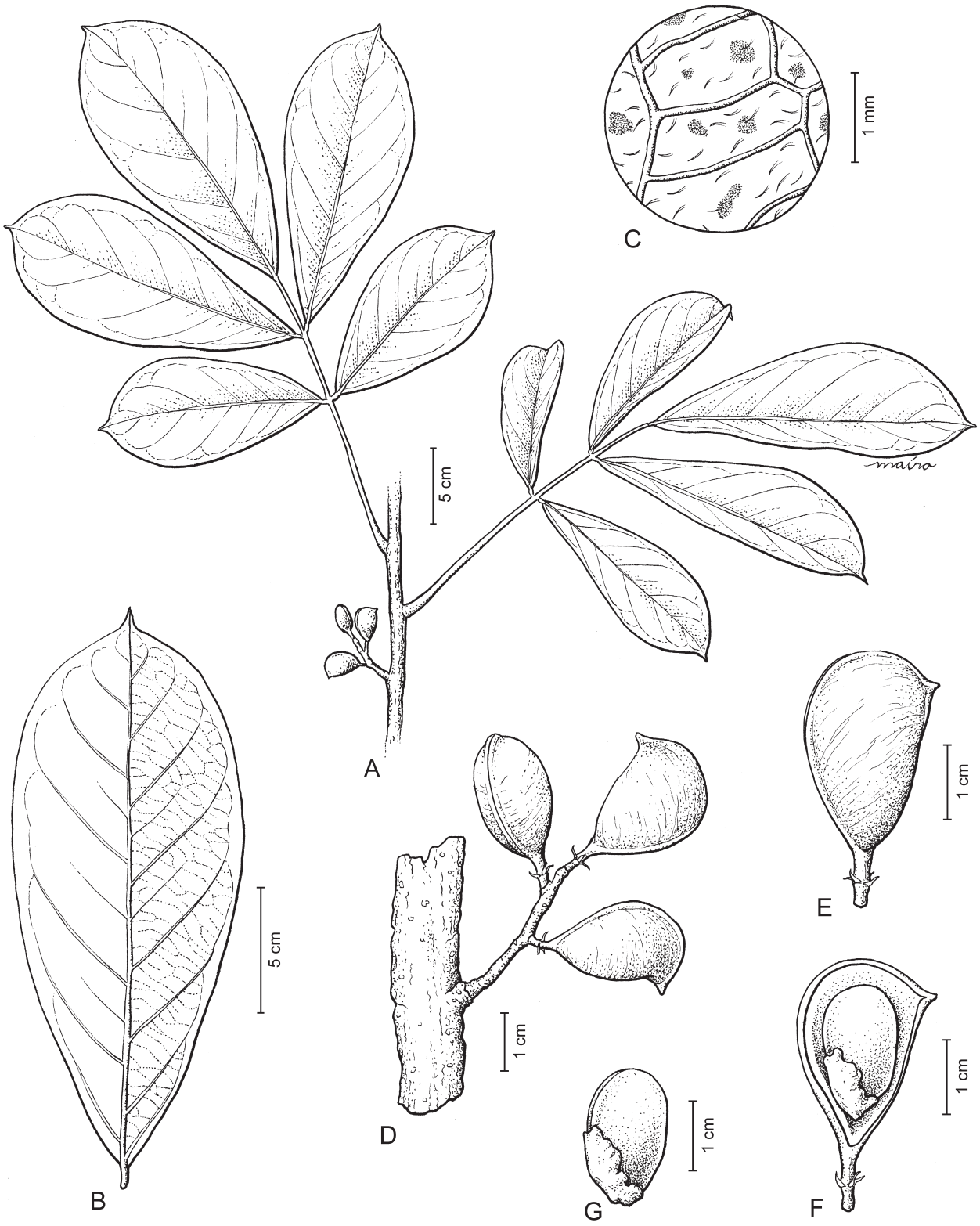

Fig. 2. *Connarus foreroi* – A: fruiting branchlet; B: leaflet abaxial surface showing venation; C: detail of indumentum on leaflet abaxial surface; D: cauliflorous fruits; E: fruit, external view; F: fruit, internal view; G: seed with aril. – Drawn by Maíra Mezzacappa from *J. Schunke V. 2317* (US).

ers) c. 1.5 mm long, densely pubescent, style c. 0.5 mm long, stigma discoid, surface multilobate. *Fruits* reddish or orangish, obovoid, 1.7–2.2 × 1.2–1.4 cm, outer surface lanate to glabrescent, indumentum ferruginous, inner surface tomentose or densely so, glandular trichomes absent; stipe 2–4 mm long; calyx persistent or partially persistent, sepals reflexed, patent or ascending; style partially persistent, apiculate, 0.3–1 mm long; seed 1.2–1.4 × 0.6–0.7 cm.

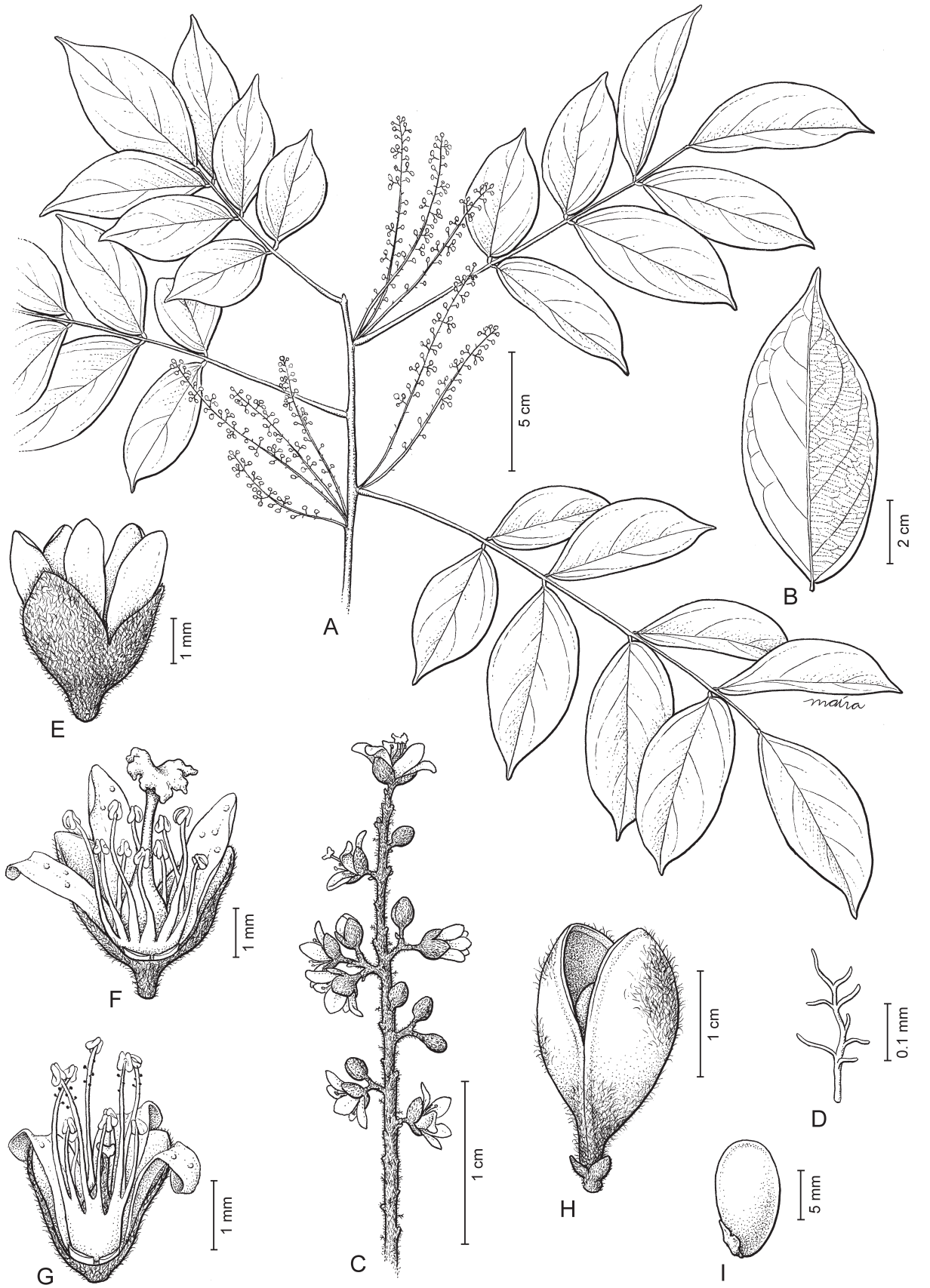

Fig. 3. *Connarus pedicellatus* – A: flowering branchlet; B: leaflet abaxial surface showing venation; C: inflorescence architecture; D: dendroid trichome from inflorescence rachis; E: flower, side view, note connate sepals; F: longistylous flower, sepals and petals removed on one side; G: brevistylous flower, sepals and petals removed on one side; H: fruit, external view; I: seed with aril. – Drawn by Maíra Mezzacappa from *C. A. Cid & al. 10481* (UFACPZ), *D. C. Daly & al. 8975* (UFACPZ) and *F. C. S. Walthier 155* (UFACPZ).

Distribution, habitat and phenology — Connarus pedicellatus is exclusively found in the Amazon forest, where it is widely distributed, especially in the Brazilian states of Acre, Amapá, Amazonas and Pará, with few collections known from Mato Grosso (Brazil) and southern Suriname (Fig. 1). Individuals of this species are shrubs or trees usually up to 14 m tall, occurring in upland forests, flooded areas (igapó) or along watercourses (igarapé) of the Amazon, at elevations ranging from 50–500 m. It has been collected with flowers from April to August and with fruits from June to December.

Etymology — The specific epithet refers to the pedicellate flowers of this taxon. This is a diagnostic feature distinguishing *Connarus pedicellatus* from *C. erianthus* Benth. ex Baker, which has sessile flowers.

Conservation status — Connarus pedicellatus is widely distributed in the Brazilian Amazon, and the Extent of Occurrence (EOO) of the species is estimated at more than 1,800,000 km^2. In addition, despite significant degradation of this phytogeographic domain in the past years, it is still the largest tropical forest worldwide, and several populations of *C. pedicellatus* exist in protected areas. Given both the EOO and what is currently known of its distribution, *C. pedicellatus* is here assigned the category Least Concern (LC) according to the IUCN (2012, 2017).

Remarks — Among the neotropical species of *Connarus* with dendroid trichomes on branchlets and inflorescences, *C. pedicellatus* is distinguished by the shrubby or arboreal habit, leaves 7–11-foliolate, leaflet base asymmetric, inflorescences in thyrses, and fruits lanate to glabrescent on the outer surface, with stipe 2–4 mm long. *Connarus pedicellatus* is similar to *C. erianthus* and was previously treated as a variety of that species, but it differs by the chartaceous leaflets with flat margins (vs. usually coriaceous leaflets with revolute margins in *C. erianthus*), branched inflorescences with dendroid and simple, unicellular trichomes (vs. unbranched inflorescences with dendroid and simple, unicellular and multicellular trichomes), pedicellate flowers (vs. sessile flowers) and fruits with stipe 2–4 mm long (vs. fruits sessile). These characteristics are strongly consistent to recognize two separate species.

Besides *Connarus erianthus* var. *pedicellatus*, Forero (1980) also described *C. erianthus* var. *stipitatus*, distinguished from the other two varieties by the sessile or shortly pedicellate flowers and stipitate fruits (Forero 1983). However, after conducting a careful revision of neotropical *Connarus*, it became clear that Forero's (1980, 1983) concept of *C. erianthus* var. *stipitatus* also included flowers with pedicels of variable length, which was difficult to measure because the specimens analysed by the author under *C. erianthus* var. *stipitatus* included only fruiting material, so it may have led to the conclusion that the pedicels of *C. erianthus* var. *pedicellatus* are significantly longer than in *C. erianthus* var. *stipitatus*, which is not the case. Considering that both *C. erianthus* var. *pedicellatus* and *C. erianthus* var. *stipitatus* have inflorescences in thyrses, pedicellate flowers and stipitate fruits, then only one taxon should be recognized. The former name is here chosen over the latter because the diagnostic character (pedicellate flowers) can be visualized both in flowering or fruiting specimens. Therefore, *C. erianthus* var. *stipitatus* is here treated as a synonym of *C. pedicellatus*.

Additional specimens examined — Brazil: Acre: Cruzeiro do Sul, Igarapé Humaitá, afluente da margem direita do Rio Juruá, colocação Santo Antônio, 30 Oct 1991, fr., *C. A. Cid. & al. 10481* (NY, UFACPZ); Cruzeiro do Sul, Rio Juruá & Rio Moa, Igarapé São Francisco, 9 May 1971, fl., *P. J. M. Maas & al. P12837* (INPA, NY); Estrada Rio Branco/Porto Acre, km 33, 11 Oct 1980, *B. Nelson 691* (NY, UB); Mâncio Lima, Parque Nacional Serra do Divisor, Serra do Moa, hunting trail leading from Boca da Serra to Igarapé Anil (= Ig. República), 07°21'30"S, 73°27'37"W, 9 May 1996, fl., *D. C. Daly & al. 8975* (NY, UFACPZ); Rio Antimarí, margem esquerda, 14 Jun 1993, fl., *F. C. S. Walthier 155* (UFACPZ); Tarauacá, 07°55'50"S, 71°32'15"W, 20 Jun 2006, fr., *M. Silveira & al. 3863* (RB). Amapá: coastal region, Igarapé Ariramba, 01°13'N, 51°03'W, 3 Aug 1962, fr., *J. M. Pires & P. B. Cavalcante 52320* (IAN, K, MG, NY); Mazagão, margem esquerda do rio Jarí, morro do Felipe VI, 18 Aug 1985, fl., *J. M. P. Pires & al. 553* (INPA, K). Amazonas: Boca do Acre, entrada do Igarapé São Francisco, 08°29'22"S, 67°38'36"W, 5 Jul 2009, fr., *M. G. Bovini & al. 2909* (MBM, RB, VIC); Manaus, estrada Manaus-Itacoatiara, km 60, 21 Oct 1961, fr., *W. Rodrigues & D. Coêlho 3522* (NY); Manaus-Itacoatiara Road, km 69–70, 5 Sep 1973, fr., *G. T. Prance & al. 17542* (INPA, K, MG, NY); Manaus-Porto Velho Highway, BR 319, km 380, Manaus-Porto Velho road, 2 km S of Rio Jutaí, 13 Oct 1974, fr., *G. T. Prance & al. 22854* (MG, NY); Manicoré, near Santa Fé, basin of Rio Madeira, 8–11 Sep 1934, fr., *B. A. Krukoff 6042* (K, NY). — Mato Grosso: Picadão que dá acesso ao Rio Juruena à pista do garimpo do mesmo nome, 12 Jun 1977, fl., *N. A. Rosa & M. S. Santos 2110* (RB). — Pará: Almeirim, Gleba Monte Dourado da Reserva Genética, 00°52'S, 52°32'W, 10 Jul 1987, fl., *J. M. Pires 1724* (K); Gurupi, 50–65 km N of Gurupi, Belém-Brasília, 12 Aug 1964, fr., *G. T. Prance & N. T. Silva 58680* (NY, P, UB); Jarí, estrada do Munguba, km 10, 10 Jul 1969, fl., *N. T. Silva 2387* (MG, NY); Oriximiná, Rio Trombetas, a jusante de Cach, porteira, margem do Lago Abui, 01°16'S, 57°00'W, 22 Aug 1986, fr., *C. C. C. Ferreira & al. 7987* (MG); Paragominas, área do Projeto Sustentabilidade dos Usos da Terra na Amazônia, 22 Apr 2011, fl., *E. A. P. Nascimento 147* (IAN, RB); Rio Jarí, estrada que liga Monte Dourado a Caracurú, 6 Dec 1967, fr., *E. de Oliveira 3759* (IAN, NY); Rio Jarí, Planalto de Monte Dourado, 22 Jan 1968, fr., *E. de Oliveira 3951* (NY); Serra dos Carajás, AMZA camp 3-Alfa, 05°48'S, 50°33'W, 525 m, 7 Jun 1982, fl., *C. R. Sperling & al. 5936* (MG, NY). — Suriname: S base

of Vier-Gebroeders-Mts, alt. 325 m, 23 Oct 1968, fr., *F. H. F. Oldenburger & al. 331* (K, NY, U, US).

Connarus revolutus C. Toledo, **sp. nov.** – Fig. 1, 4.
Holotype: Brazil, Espírito Santo, Linhares, Reserva Natural Vale, estrada Jacarandá, 28 Sep 1994, fl., *D. A. Folli 2379* (CVRD 5016!; isotypes: ESA!, NY, UB!).

Diagnosis — Morphologically similar to *Connarus coriaceus* G. Schellenb. in the sepals being hairy on the inner surface and the long-stipitate fruits, but differing by the strongly revolute leaflet margins (vs. flat or slightly revolute in *C. coriaceus*), ferruginous inflorescence rachis (vs. aureous) and petals being pubescent on the outer surface (vs. glabrous or subglabrous).

Description — Lianas or scandent shrubs, 3–4 m tall; branchlets glabrous, subglabrous or irregularly sparsely sericeous, indumentum with trichomes simple, unicellular, lenticels absent or inconspicuous. *Leaves* 3-foliolate; petiole 3–11.7 cm long, glabrous, subglabrous or irregularly sparsely sericeous; rachis 0.5–2.3 cm long, glabrous, subglabrous or irregularly sparsely sericeous; pulvinuli 4–7 mm long, glabrous or subglabrous; leaflets opposite to subopposite, slightly discolorous, flat, coriaceous; basal pair symmetric or slightly asymmetric, narrowly ovate or lanceolate, less frequently elliptic, 7.5–16(–19) × 2.5–5.7(–8) cm, base symmetric or slightly asymmetric, rounded, subcordate or obtuse; other leaflets symmetric, narrowly ovate or lanceolate, less frequently elliptic, 9.5–17.3(–21.5) × 2.8–7(–8.7) cm, base symmetric, rounded, subcordate or obtuse, apex acute or acuminate, acumen 5–7 mm long; all leaflets: abaxial surface subglabrous or irregularly sparsely sericeous, more densely so near veins and margin, adaxial surface shining or dull, glabrous or subglabrous, margin strongly revolute; secondary veins 8–9 pairs, forming angle of 45–60° with midvein, arcuate, abaxially prominent, adaxially flat or slightly impressed, rarely slightly prominent; tertiary veins percurrent, abaxially prominent, adaxially flat or slightly prominent. *Inflorescences* axillary or pseudoterminal, 1–3 per axil, in simple or compound, determinate thyrses; peduncle 0.2–0.8 cm long or inflorescence subsessile, sericeous; rachis 4–12.5 cm long, sericeous, lateral branches 0.3–1.5 cm long when simple thyrses, 0.3–8 cm long when compound thyrses, sericeous, indumentum of these structures with simple, unicellular trichomes, ferruginous. *Flowers* with pedicel 0.5–1.3 mm long; sepals 5, slightly basally connate, ovate, narrowly ovate, triangular or narrowly triangular, 2.3–3 × 0.8–1.2 mm, outer surface sericeous or densely pubescent, indumentum brown or ferruginous, inner surface pubescent or sparsely so, more densely so near margin and apex, apex acute; petals narrowly obovate or oblanceolate, 3.5–4.8 × 1–1.3 mm, glandular dots more than 10, outer surface sparsely to densely pubescent, trichomes occasionally concentrated in ventral portion, glandular trichomes abundant, inner surface with only sparse to abundant glandular trichomes, margin with only sparse glandular trichomes, apex acute; stamens (based only on longistylous flowers) basally connate for c. 0.5 mm, shorter series c. 1.5 mm long, longer series c. 2.5 mm long, filaments with sparse, glandular trichomes; ovary (in longistylous flowers) 1–1.2 mm long, densely pubescent, style 1.5–1.8 mm long, stigma bilobate. *Fruits* obovoid, reddish, 2–2.2 × 1.4–1.6 cm, outer surface subglabrous, black dots abundant, inner surface pubescent or sparsely so, glandular trichomes sparse to abundant; stipe 4–8 mm long; calyx persistent or partially persistent, sepals reflexed or patent; style partially persistent, apiculate, c. 0.5 mm long; seed not seen.

Distribution, habitat and phenology — *Connarus revolutus* is found only in northeastern Espírito Santo and southern Bahia, in the limits between the northeastern and southeastern regions of Brazil (Fig. 1). This lianescent species occurs close to coastal areas of the Atlantic Forest, growing in semideciduous forests on sandy soils (tabuleiro) or in coastal vegetation (restinga), at low elevations. Flowering specimens have been collected in September and fruiting specimens in October.

Etymology — The specific epithet refers to the strongly revolute leaflet margins, which are very distinctive in this species, observed in all analysed specimens.

Conservation status — *Connarus revolutus* is currently known to be restricted to a very few sites along the limits of the states of Bahia and Espírito Santo, Brazil. As a result, an EOO of approximately 900 km^2 was estimated for this species. Although some of the areas where the new species was collected are protected by law, some others belong to private properties or fragments along sideroads, which have been severely fragmented in the region, especially due to monoculture of eucalyptus (one of the largest in Brazil). Therefore, considering the restricted distribution and the reduced number of individuals as well, it is suggested here that *C. revolutus* be assigned the category Endangered (EN), based on the criteria B1ab(iii,iv), according to the IUCN (2012, 2017).

Remarks — *Connarus revolutus* is morphologically recognized by having leaves always 3-foliolate, leaflets coriaceous with strongly revolute margin, secondary veins strongly prominent, tertiary veins percurrent, sepals pubescent on the inner surface, petals pubescent on the outer surface, and fruit stipe 4–8 mm long. Among the neotropical species, it can be confused with *C. coriaceus* due to having sepals hairy on the inner surface and long-stipitate fruits, but *C. revolutus* is restricted to the Atlantic Forest, characterized by strongly revolute leaflet margins, inflorescence rachis with ferruginous indumentum and petals pubescent on the outer surface, whereas *C. coriaceus* is widely distributed in Amazonia, characterized

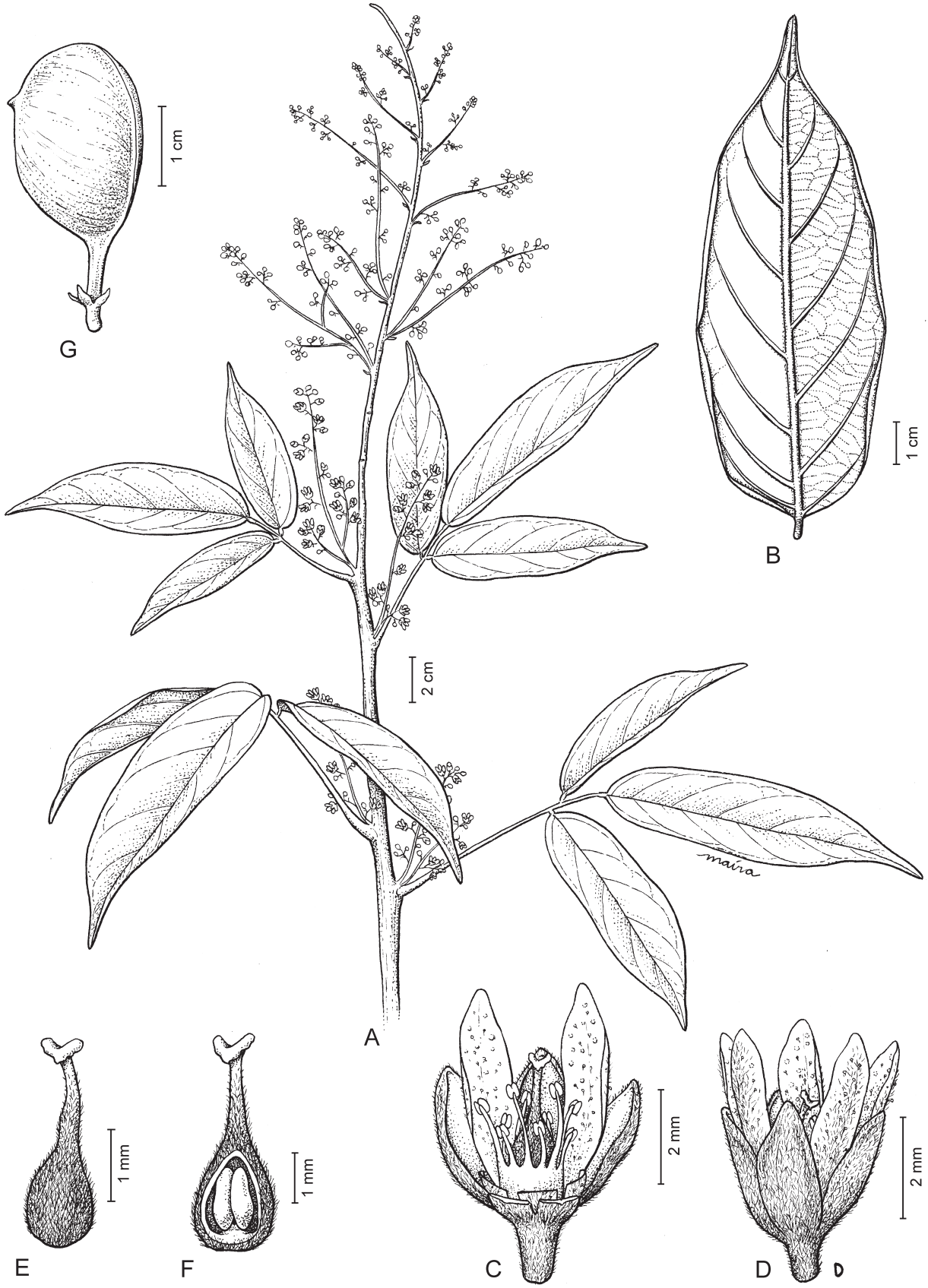

Fig. 4. *Connarus revolutus* – A: flowering branchlet; B: leaflet abaxial surface showing venation and revolute margin; C: longistylous flower, sepals and petals removed on one side; D: flower, side view; E: ovary, side view; F: ovary, side view, cut open to show ovules; G: fruit, external view. – Drawn by Maíra Mezzacappa from *A. O. Giaretta & M. M. Monteiro 673* (RB), *D. A. Folli 6726* (ESA) and *D. A. Folli 7410* (ESA).

by flat or slightly revolute leaflet margins, inflorescences rachis with aureous indumentum and petals glabrous or subglabrous on the outer surface. *Connarus revolutus* can also be confused with *C. blanchetii* Planch. (also occurring in southern Bahia), but differs by the flat leaflets (vs. conduplicate in *C. blanchetii*) and fruit stipe 4–8 mm long (vs. 1–3 mm long).

Additional specimens examined — Brazil: Bahia: Porto Seguro, Trancoso, estrada Porto Seguro à Trancoso, −16.566331, −39.168533 [16°33'58.8"S, 39°10'06.7"W], 12 Sep 2010, fl. bud, *D. A. Folli 6726* (CVRD, ESA, UB). — Espírito Santo: Conceição da Barra. Área 214 da Aracruz Celulose S. A., 5 Nov 1992, fr., *O. J. Pereira 4147* (VIES); Área 214 da Aracruz Celulose S. A., 24 Aug 1993, fl., *O. J. Pereira & J. M. L. Gomes 4769* (VIES); Área 215 da Aracruz Celulose S. A., 17 Dec 1992, fr., *O. J. Pereira 4505* (VIES); Área da Veracruz, 22 Oct 2018, sterile, *C. A. P. Toledo & N. C. Bígio 401* (ESA); Lajinha, próximo ao rio São Mateus, seguindo a estrada de terra atrás do campus do CEUNES, próximo ao Bairro Litorâneo, 1 Aug 2007, fl., *R. F. A. Martins 162* (VIES); Parque Estadual de Itaúnas, área atrás da Fazenda Jequitaia, 18.4239°S, 397392°W, 12 Oct 2009, fr., *A. O. Giaretta & M. M. Monteiro 673* (RB, SAMES, VIES); Linhares, Reserva Natural Vale, 28 Sep 2015, fl., *D. A. Folli 7410* (CVRD, ESA, RB, UB); Sooretama, trilha próxima ao herbário, 17 Oct 2018, sterile, *C. A. P. Toledo & N. C. Bígio 398* (ESA).

Key to the new species and morphologically similar taxa of *Connarus*

1. Branchlets and inflorescences with dendroid and simple trichomes **2**
– Branchlets and inflorescences with only simple trichomes **4**
2. Inflorescence rachis lanate, simple trichomes multicellular; flowers sessile . . . . . ***C. erianthus***
– Inflorescence rachis tomentose, simple trichomes unicellular; flowers pedicellate **3**
3. Secondary veins adaxially impressed or slightly so; inflorescences cauliflorous or ramiflorous, in cymes . . . . . ***C. fasciculatus***
– Secondary veins adaxially flat, rarely slightly impressed; inflorescences axillary, rarely ramiflorous, in thyrses . . . . . ***C. pedicellatus***
4. Inflorescences cauliflorous . . . . . ***C. foreroi***
– Inflorescences axillary or pseudoterminal **5**
5. Fruit stipe 1–3 mm long . . . . . ***C. blanchetii***
– Fruit stipe 4–13 mm long **6**
6. Leaflet margin flat or slightly revolute; inflorescence rachis aureous; petals glabrous or subglabrous on outer surface . . . . . ***C. coriaceus***
– Leaflet margin strongly revolute; inflorescence rachis ferruginous; petals pubescent on outer surface . . . . . ***C. revolutus***

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