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# FIVE NEW SPECIES OF *NEMATANTHUS* SCHRAD. (GESNERIACEAE) FROM EASTERN BRAZIL WITH A REVISED KEY TO THE GENUS

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ABSTRACT. Five new *Nematanthus* species are described, mapped, and illustrated: *N. albus* Chautems; *N. kautskyi* Chautems & J.Rossini; *N. punctatus* Chautems; *N. pycnophyllus* Chautems, T.Lopes & M.Peixoto; and *N. wiehleri* Chautems & M.Peixoto. Their conservation status following IUCN criteria is given. Three species are melittophilous, adding a new pollination syndrome to the genus. The circumscription of *Nematanthus* therefore is redefined and includes 31 species. A revised key to the whole genus is provided.

*Key words/Palavras-chave:* Brazil, Atlantic forest, pollination syndrome, species key, *Nematanthus,* Gesneriaceae

RESUMO. Cinco novas espécies de *Nematanthus* são descritas, mapeadas, e ilustradas: *N. albus* Chautems; *N. kautskyi* Chautems & J.Rossini; *N. punctatus* Chautems; *N. pycnophyllus* Chautems, T.Lopes & M.Peixoto; e *N. wiehleri* Chautems & M.Peixoto. O estatuto de conservação é estabelecido seguindo os critérios da UICN. Três espécies são melitófilas, adicionando uma nova síndrome de polinização ao gênero. *Nematanthus* é assim redefinido e inclui 31 espécies. Uma chave de identificação revisada para todas as espécies do gênero é apresentada.

## INTRODUCTION

The last revision of the genus *Nematanthus* (Chautems 1988) recognized 26 species inhabiting the coastal rain forest in Brazil commonly known as "mata atlântica." All were characterized by epiphytic (sometimes lithophytic) habit and ornithophilous flowers with brightly colored perianth.

In the course of revising Gesneriaceae for several floristic accounts in Brazil (Chautems 1991a, 1991b, 1995, 1997, 2002; Chautems & Kiyama 2003; Chautems et al. 2000), five new epiphytic species have been encountered. Among them, two could be immediately identified as undescribed *Nematanthus.* The other three species exhibited a melittophilous syndrome, inferred from their large funnel-shaped white flowers. To establish their affinities, further investigations were needed. After their introduction in cultivation, hybrids were obtained from crosses with several other *Nematanthus* species, suggesting a close relationship. An additional synapomorphy with *Nematanthus* and some related Episcieae genera was observed in examining fruit morphology. In the three melittophilous species, the glistening mass of funicles and seeds is split in two parts that remain attached to the valves. In the typical "display capsule" (Weber 2004), this mass forms a central cone separated from the placentas when the valves curved back at maturity. Both situations were observed in the remaining species of *Nematanthus.* Chromosomes were counted for one of the white-flowered species, and a number similar to other *Nematanthus* ($n = 8$) was found. Furthermore, recent molecular data show that the three melittophilous taxa are clustered within a clade containing all the other *Nematanthus* species (Loeuille 2004). This vast array of characters provides strong evidence that the three species belong to this genus, and consequently

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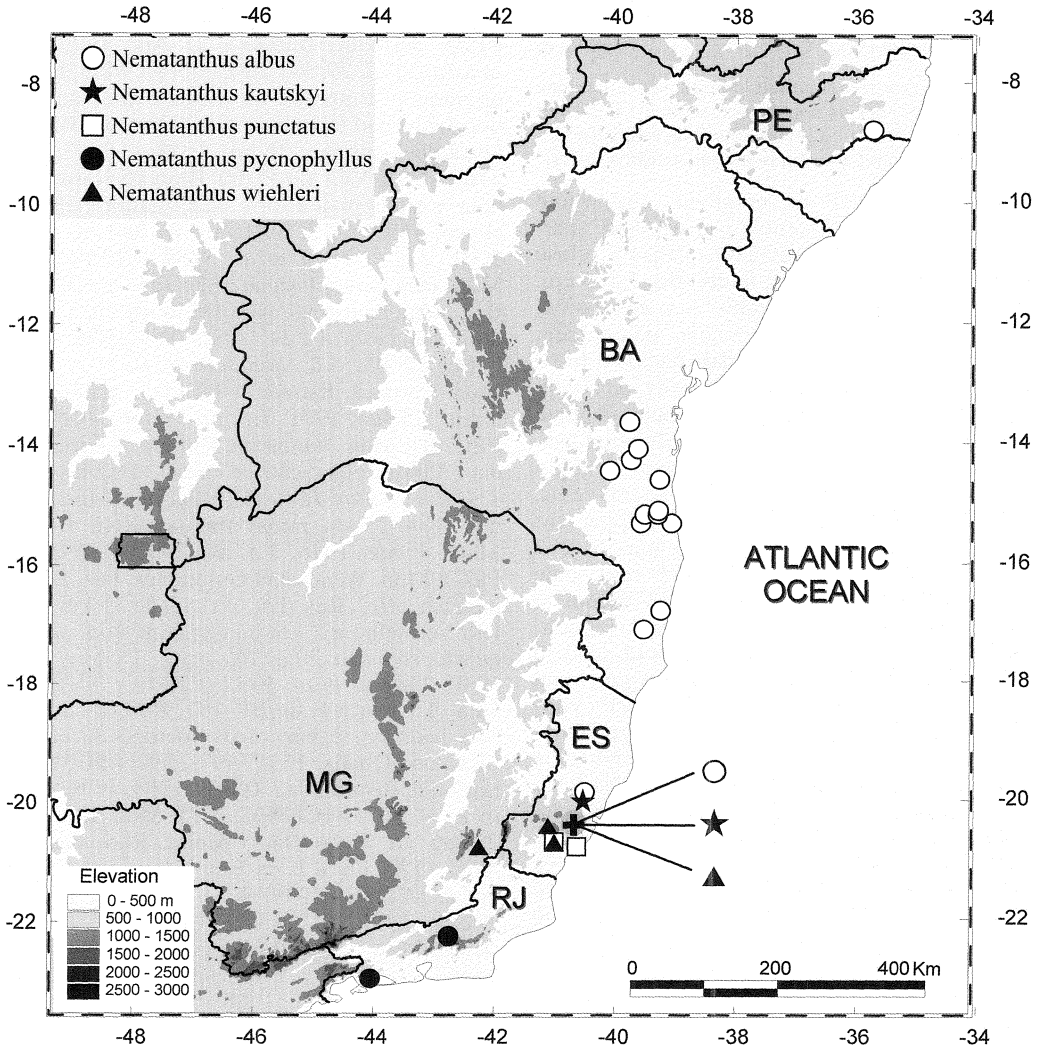


FIGURE 1. Distribution of *Nematanthus albus, N. kautskyi, N. punctatus, N. pycnophyllus,* and *N. wiehleri* in Brazil (PE = Pernambuco, BA = Bahia, ES = Espírito Santo, MG = Minas Gerais, RJ = Rio de Janeiro).

five new species are described here. All of them are rare and grow in remnant patches of rain forest at 300–1100 m elevation. Among them, one species has a fairly large distribution along the coast from Espírito Santo to Pernambuco, while the others are mostly restricted to one state: Rio de Janeiro, Espírito Santo, or Espírito Santo and adjacent Minas Gerais (FIGURE 1). Previously the genus was known to occur between northern Rio Grande do Sul and southern Bahia (Chautems 1988). The recently found occurrence in Pernambuco shifts northward by 600 km the overall genus distribution. Presently *Nematanthus* is known to occur between 30°S and 8°S, with its range practically covering the total extension of the "mata atlântica."

Our descriptions are based on examination of live material observed in the field, in cultivated accessions, and in spirit-fixed and herbarium specimens deposited at the Geneva Conservatoire et Jardin Botaniques (G) or in Brazilian or North American collections. Indument terminology follows Hewson (1988).

Taking into account the newly described taxa, we provide an expanded description of the genus and a revised key to its 31 taxa.

## NEW SPECIES

**Nematanthus albus** Chautems, sp. nov. TYPE: Brazil—Espírito Santo, Mun. Santa Teresa, Estação Biológica de Santa Lúcia, 650 m, 6

Jan. 1999, *L. Kollmann 1486* (Holotype: MBML; Isotype: G). FIGURE 2.

Planta fragrans trichomatibus capitatis tecta, laminae foliorum ovatae, nervis conspicuis, sepalis 15–25 mm longis, tubo et limbo corollae albis, fauce flavo-punctata lobis imaculatis ab omnibus congeneribus differt.

***Subshrub*** 0.3–0.8 m, epiphytic; the whole plant fragrant, stem ascending or pendent, sparingly branched, 4–8 mm diam., densely pilose to villous in younger parts; internodes 1.5–5 cm. ***Leaves*** anisophyllous; petioles 3–5 mm (small ones) to 5–15 mm (larger ones), pale green; blades 2.5–5 × 1.5–2 cm (small ones) to 6–10 × 2–3.5 cm (large ones), ovate, fleshy, adaxially green, densely pilose, with multicellular capitate trichomes, abaxially light green or often reddish, sparsely pilose, apex acute, base cuneate, margin subentire, 3–5 pairs of conspicuous lateral veins. ***Flowers*** strongly fragrant, solitary, in upper leaf axils, non-resupinate, bracts 6–10 mm × 2–3 mm, early caducous; pedicels 4–6 mm, pale green, pubescent. ***Calyx*** fused for 3–6 mm at base, sepals 15–25 × 6–9 mm, ovate, papyraceous, pubescent, green, sometimes with reddish streaks, margin entire. ***Corolla*** 4.5–6 cm long, funnel-shaped, hanging downwards, base cylindric, ca. 10 mm long × 5 mm diam., gradually expanded to 15–18 mm high, 18–20 mm wide towards the middle section, slightly constricted towards the mouth, white, sparsely pubescent, throat spotted with yellow dots, some of them finely surrounded by a purple line, glabrous, lobes 10–12 × 12–15 mm, except for the ventral lobe 1–2 mm longer and wider, spreading, white all over the inner faces; filaments 25–30 mm, glabrous, anthers included, pollen white; nectary gland 3–4 × 3–3.5 mm, greenish; ovary 6–8 mm long, greenish, glabrous, style 30–35 mm, white, glabrous. ***Capsule*** ovoid, 1.8–2.5 × 1–1.5 cm, cream, glabrous, displaying at dehiscence a white mass of placental tissue and funicles, split in two parts which are attached to the wine red valves, seeds maroon.

This species very often self-pollinates and forms mature seed capsules in cultivation. The sweet and somewhat citric fragrance was identified as a mixture of aldehydes (N. Williams & H. Wiehler pers. comm.).

CYTOLOGY: The chromosome count is $n = 8$ (M. Kiehn pers. comm.).

ADDITIONAL SPECIMENS EXAMINED: Brazil—Pernambuco: Mun. Jaqueira, Serra do Urubu, mata da Serra do Quengo, 750 m, 8 Oct. 2000, *J.A. Siqueira-Filho 1097* (UFP); Bahia: Mun. Una, Km 9 da estrada São José/Una. Ramal a direita a partir de São José, 7 Apr. 1995, *A.M. Amorim et al. 1672* (CEPEC, NY); Mun. Jussari, Entrada ca. 7.5 km de Jussari. Faz. Teimoso, RPPN Serra do Teimoso, 21 Apr. 1999, *A.M. Amorim et al. 2913* (CEPEC, NY); Mun. Itacaré, on ramal of Embratel TV tower, 4 km from junction with road to Itacaré & 20 km from BR-101, Serra do Jacutinga, 31 Jan. 1978, *C.E. Calderon 2462* (US); Vila da Pedra Branca, serra da Jiboia, estrada para a torre de TV, afloramento rochoso, 15°09′18″S, 39°18′07″W, 580 m, 8 Mar. 2001, *J.G. Jardim et al. 3189* (CEPEC, NY); Mun. Boa Nova, Fazenda São José, a 8.8 km de Boa Nova na estrada para Dário Meira, a 1.4 km do ramal a esq., 14°24′14″S, 40°09′16″W, 850 m, 7 Mar. 2003, *S.C. Santana et al.* 1071 (NY); Mun. Camacã, Estrada a Jacaraci, plantação de cacau, 25 Jan. 1971, *T.S. dos Santos 1419* (CEPEC, R); Mun. Itamaraju, Campo Alegre, estrada a Piraja, plantação de cacau, 14 May 1971, *T.S. dos Santos 1640* (CEPEC, R); Mun. Ibirataia, Km 23 do ramal Ibirataia/Rod. BR-101, Mata, 4 Apr. 1976, *T.S. dos Santos 3092* (CEPEC); Mun. Wenceslau Guimarães, Faz. Boa Esperança prox. Res. Est. da cidade, 8 km acima Rio Vermelho e 2 km junção com Rod. para Taquara, 13°37′S, 39°47′W, mata, 15 May 1992, *W.W. Thomas et al. 9333* (CEPEC, NY); Mun. Una, 8.5 Km a E da BR-101, Rod. ao Sul para São José, ca. 2 km, prox. ao topo da encosta, Serra dos Quatis, 15°05′49″S, 39°17′50″W, mata higrofila, disturbada, 10 Feb. 1994, *W.W. Thomas et al. 10359* (CEPEC, NY); Mun. Boa Nova, 27 km ao W de Dário Meira, Rod. para Boa Nova (17.1 km a E da Boa Nova), mata disturbada, 14°26′S, 40°06′W, 14 Oct. 2000, *W.W. Thomas et al. 12239* (CEPEC, NY). —Espírito Santo: Mun. Santa Teresa, Estação Biológica de Santa Lúcia, May 1988, specimen from cultivated material Oct. 1988 (fl.), *H. Boudet Fernandes 2514* (MBML); Estação Biológica de Santa Lúcia, trilha Tapinoá, parcela 385/94, 16 Dec. 1994, *C. Chamas & R.R. Santos 342* (G, MBML); Country-club, mata acima da cachoeira, 3 Jun. 1987, *A. Chautems & M. Peixoto 264* (G); Estação Biológica de Santa Lúcia, 7 Mar. 1990 (fl.), *A. Chautems & H. Boudet Fernandes 381* (G, MBML); Valsugana Velha, propiedade Ebi José Bringhenth, 8 Aug. 2000 (sterile), *V. Demuner et al. 1360* (MBML); Mun. Santa Teresa, Estação Biológica de Santa Lúcia, Nov. 1985 (fl.), *W.A. Hoffmann 298* (CEPEC, MBLM); Valsugana Velha, Estação Biológica de Santa Lúcia, baixo da cachoeira, 550 m, 11 Feb. 1999 (bd.), *L. Kollmann 1947* (MBML); Estação Biológica de Santa Lúcia, 14 Nov. 2000, *L. Kollmann 3251* (MBML); Penha, 1 Jan. 2004 (fl.), *L. Kollmann 6342* (MBML); Estação Biológica de Santa Lúcia, trilhas às margens do rio Timbuí, 24 Feb. 1996 (fr.), *J.A. Lombardi & L.G. Temponi 1074* (G); Mun. Vargem Alta, São

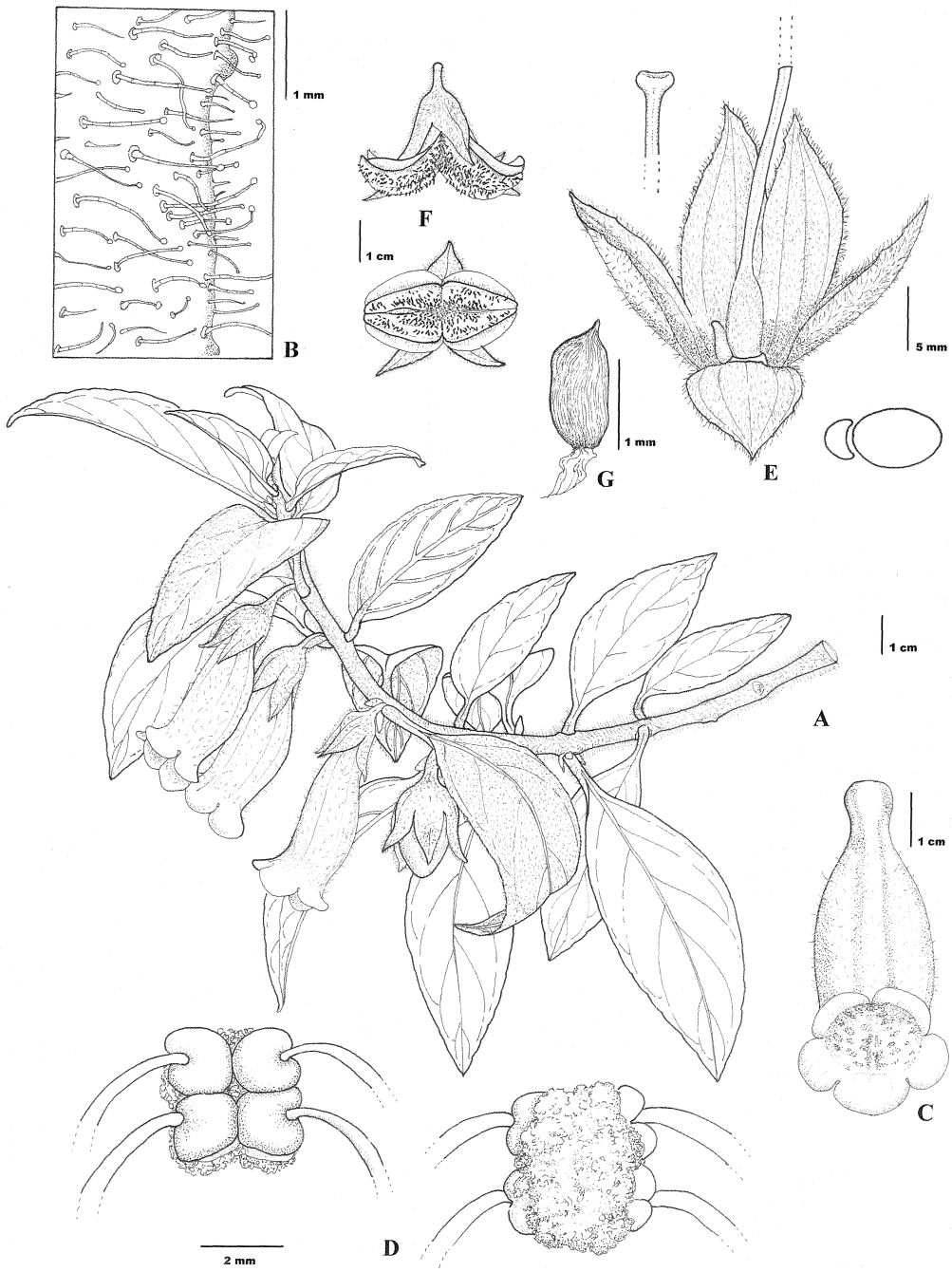


FIGURE 2. *Nematanthus albus.* **A.** Habit. **B.** Glandular trichomes on adaxial face of leaf. **C.** Corolla dorsal view. **D.** Anthers dorsal and ventral view. **E.** Opened calyx showing ovary, style, stigma, dorsal nectary gland, and schematic transversal cross-section of the ovary + gland. **F.** Calyx and fruit at maturity, lateral and frontal view. **G.** Seed with a remnant of funicle at base. Drawn from live material and spirit-fixed flowers (accession # AC-1369), voucher: *A. Chautems & M. Peixoto 264* (G). Illustrator: Maya Mossaz.

José de Fruteira, sobre pedras, 10 Dec. 1956 (fl.), *E. Pereira 2275* (RB); Mun. Santa Teresa, Nova Lombardia, Reserva Biol. Augusto Ruschi, na trilha do Muriqui, 22 Jan. 2003 (fr.), *J. Rossini et al. 208* (MBML); Reserva Biol. Augusto Ruschi, após sede da Fazenda de D. Marlene, 5 Feb. 2003 (fl.), *J. Rossini et al. 223* (MBML); Reserva Biol. Augusto Ruschi, Feb. 2003 (fl.), *J. Rossini et al. 237* (MBML); Santa Teresa, 27 Dec. 1985, *G.F. Santos s.n.* (VIES); Estação Biológica de Santa Lúcia, 16 Sep. 2002, *R.R. Vervloet 926* (MBML); 16 Sep. 2002, *R.R. Vervloet et al. 935* (MBML); 24 Feb. 2003, *R.R. Vervloet et al. 1899* (MBML); Mun. Santa Teresa, Nova Lombardia, Reserva Biol. Augusto Ruschi, trilha seguindo córrego, 1 Apr. 2003 (fl, fr.), *R.R. Vervloet & E. Bausen 2092* (MBML).

MATERIAL IN CULTIVATION: Distributed through the American Gloxinia and Gesneriad Society (AGGS) in the past years by means of a seed-list published in its journal, *The Gloxinian,* under the name *Nematanthus* sp. "Santa Teresa." The origin of this accession is the live material collected by A. Chautems and M. Peixoto, voucher *Chautems & Peixoto 264.*

ETYMOLOGY: The specific epithet refers to the white corolla (albus, Latin for white).

DISTRIBUTION, HABITAT, AND PHENOLOGY: Scattered in eastern Brazil in the states of Pernambuco, southern Bahia, and Espírito Santo. This species grows in hygrophilous and mesophilous forests at 300–850 m elevation. Flowers were recorded in October in Pernambuco and from January to April/May in Espírito Santo/Bahia. Fruits were observed from January to July in Espírito Santo and from March to October in Bahia.

CONSERVATION STATUS: Endangered in Espírito Santo, as submitted to the editors of the Espírito Santo Red-List (Anon. 2005). Nevertheless this taxon was not included in the list because its name was unpublished at the time of submission. No Red-List projects are in preparation for the states of Bahia or Pernambuco, but this taxon needs to be respectively assigned to the categories endangered and critically endangered. The species has been found only in well-preserved or recently disturbed patches of rain forest. Some areas are protected, under private or local management, but they occupy small extensions of the coastal rain forest, which, on the whole, suffers continuous degradation.

*Nematanthus albus* Chautems was first recognized as a new species of uncertain generic affinity by F.C Hoehne in 1958, based on his identification label indicating "pode ser nova espécie de *Episcia* ou outro gênero" (*E. Pereira 2275* in RB). When a cutting received from Brazil (coming from Santa Teresa, Espirito Santo) flowered for the first time in the Geneva Conservatoire et Jardin Botaniques around 1984, the unusual corolla morphology evoked an unknown genus or a giant *Codonanthe,* based on the white melittophilous corolla. A few years later, similar material was observed during a fieldtrip in Espírito Santo and in Bahia and introduced into cultivation. These collections were kept by Mauro Peixoto, who successfully crossed them with other *Nematanthus* species with brightly colored corollas (M. Peixoto pers. comm.). Chromosome count performed at the University of Vienna in the early 1990s confirmed the typical $N = 8$ number found in all the other *Nematanthus* for which chromosomes were counted (M. Kiehn pers. comm.). As this number is only shared in the tribe Episcieae by the genus *Codonanthe,* the species could either belong to a new *Nematanthus* displaying melittophilous syndrome or to a new *Codonanthe* with giant flowers. After additional data from a molecular phylogeny including both genera were obtained (Loeuille 2004), the placement of this species (along with the two other taxa with large funnel-shaped white flowers) became unambiguously established within genus *Nematanthus,* with *Codonanthe* in sister position.

Sharing some floral morphology features with *Nematanthus punctatus* and *N. wiehleri, N. albus* is distinguished by the ovate leaves, moderately anisophyllous, often reddish adaxially and bearing conspicuous venation, fragrant flowers with white lobes and yellow-dotted throat (TABLE 1).

At the time of the first introduction of this new taxon into cultivation in the United States around 1990, the name *Nematanthus sp. nov. ined.* "Santa Teresa" was given, but inopportunely, the Latin epithet "albus" appeared subsequently on some websites dealing with cultivated Gesneriaceae. The species is propagated easily from seeds commonly produced in fruits after self-pollination. A proper description is made here, validating the provisional name by which it has been known among some Gesneriaceae growers.

**Nematanthus kautskyi** Chautems & J.Rossini, sp. nov. TYPE: Brazil—Espírito Santo: Mun. Santa Teresa, Valsugana, Estação Biológica de Santa Lúcia, margem direita Rio Timbuí, Oct. 1988, *H. Boudet Fernandes 2612* (Holotype: MBML). FIGURE 3.

Haec species caulis internodiis elongatis (1–6 cm), sepalis coriaceis late trullatis, corolla aurantiaca ventricosa atque compressa, capsula atrovirenti ab omnibus congeneribus distinguitur.

TABLE 1. Comparison of leaf and flower characters between the three melittophilous *Nematanthus* species.

| Characteristics | *N. albus* | *N. punctatus* | *N. wiehleri* |
|---|---|---|---|
| Anisophylly: (large vs. small leaf ratio) | 1.5–2.5:1 | >3:1 | 1.5–2.5:1 |
| Leaf indument | Glandular trichomes | Glandular trichomes | Eglandular trichomes |
| Leaf blade | | | |
| Shape | Ovate | Elliptic to obovate | Narrowly elliptic to obovate |
| Base | Cuneate | Cuneate | Attenuate |
| Apex | Acute | Acuminate | Acute |
| Venation | Conspicuous | Conspicuous | Inconspicuous |
| Margin | Subentire | Crenulate | Finely serrate |
| Sepal length | 15–25 mm | 25–30 mm | 25–35 mm |
| Corolla lobe ornamentation | Spotless | Completely spotted | Incompletely spotted |
| Fragrance | Weak in vegetative parts and strong in flowers | Weak in flowers | Absent |

***Subshrub*** 0.3–1.5 m, epiphytic; shoots ascending, stiff, sparingly branched, stems 2–7 mm diam., glabrous; internodes 1–6 cm. ***Leaves*** anisophyllous; petioles 5–12 mm, often reddish; blades 2–5 × 1–2.5 cm (small ones) to 4–7 × 2–4 cm (large ones), elliptic, fleshy, glabrous, green adaxially, light green abaxially with some small reddish dots when young, apex acute, base cuneate, margin entire, venation inconspicuous. ***Flowers*** 1–2, restricted to the 2–3 upper leaf axils, non-resupinate; pedicels 0.8–1.8 cm, red, glabrous. ***Calyx*** fused for ca. 3 mm at base, sepals 10–12 × 5–8 mm, broadly trullate, coriaceous, glabrous, pale red, margin entire. ***Corolla*** 2–2.5 cm long, strongly ventricose, base cylindric, 6–8 mm long × 3–4 mm diam., then abruptly gibbous, 10–14 mm high, 7–8 mm wide, with a lateral compression in the median portion of the tube just before the gibbosity, dark orange, glabrous, glossy, constricted in a pentagonal mouth, lobes 1.5 × 2–2.5 mm, erect, uniformly dark orange; filaments 1.5–1.8 cm, glabrous, anthers included, pollen white; nectary gland 2–2.5 × 4 mm, cream to greenish; ovary 5 mm long, yellow at base, orangeish toward apex, glabrous style 1.3–1.5 cm, white, glabrous. ***Capsule*** ovoid, 1–1.5 × 0.8–1 cm, outside dark green, glabrous, placenta and funicles not observed.

ADDITIONAL SPECIMENS EXAMINED: Brazil—Espírito Santo: Mun. Santa Teresa, Estação Biológica de Santa Lúcia, lado esquerdo Rio Timbuí, Jul. 1989, *W. Boone et al. 1317* (MBML); Estação Biológica de Santa Lúcia, lado direito Rio Timbuí, Jul. 1989, *W. Boone 1329* (MBML); Morro da Estação Receptora de TV, 4 Sep. 1985, *H. Boudet Fernandes 1469* (CEPEC, MBML); Estação Biológica da Caixa d'Água, 8 Sep. 1985, *H. Boudet Fernandes 1474* (MBML); Valsugana Velha, Estação Biológica de Santa Lúcia, parcela baixa encosta, 26 Aug. 1993, *C. Chamas 32* (MBML); Estação Biológica de Santa Lúcia, trilha Timbuí, 21 Oct. 1994, *C. Chamas 284* (G, MBML); Estação Biológica de Santa Lúcia, trilha do Palmiteiro, Sep. 1999, *V. Demuner et al. 72* (MBML); Parque Natural Municipal de São Lourenço, 650 m, Aug. 1998, *L. Kollmann et al. 295* (G, MBML); Valsugana Velha, Estação Biológica de Santa Lúcia, Trilha do sagui, 650 m, May 2000, *L. Kollmann & R.R. Vervloet 2906* (MBML); Valsugana Velha, Estação Biológica de Santa Lúcia, 550 m, Aug. 2000, *L. Kollmann 3040* (MBML); Penha, Estação Biológica de Santa Lúcia, do lado da estrada Fundão-Santa Teresa, 30 May 2001, *L. Kollmann et al. 3755* (MBML); Reserva Biológica Augusto Ruschi, 13 Mar. 2002, *L. Kollmann 5655* (MBML); Estação Biológica de Santa Lúcia, 13 Aug. 2003 (fl, fr), *L. Kollmann 6292* (MBML); Reserva Biológica Santa Lucia, 600 m, 1986, *G. Martinelli et al. 11613* (RB); Estação Biológica de Santa Lúcia, 29 Jun. 1993, *L.D. Thomaz 1817* (MBML); Reserva Biológica Augusto Ruschi, 24 Oct. 2002, *R.R. Vervloet 1267* (MBML); Vale dos Colibris, 19 Jun. 1984, *Vimercat 203* (MBML).

ETYMOLOGY: In honor of Roberto A. Kautsky, who drew our attention to this rare species on his property in Domingos Martins and introduced it into cultivation.

DISTRIBUTION, HABITAT, AND PHENOLOGY: Endemic to the state of Espírito Santo and only found in hygrophilous forests, in shady locations, at 500–800 m elevation. Flowers were observed from March to August.

CONSERVATION STATUS: Endangered as submitted to the editors of the Espírito Santo Red-

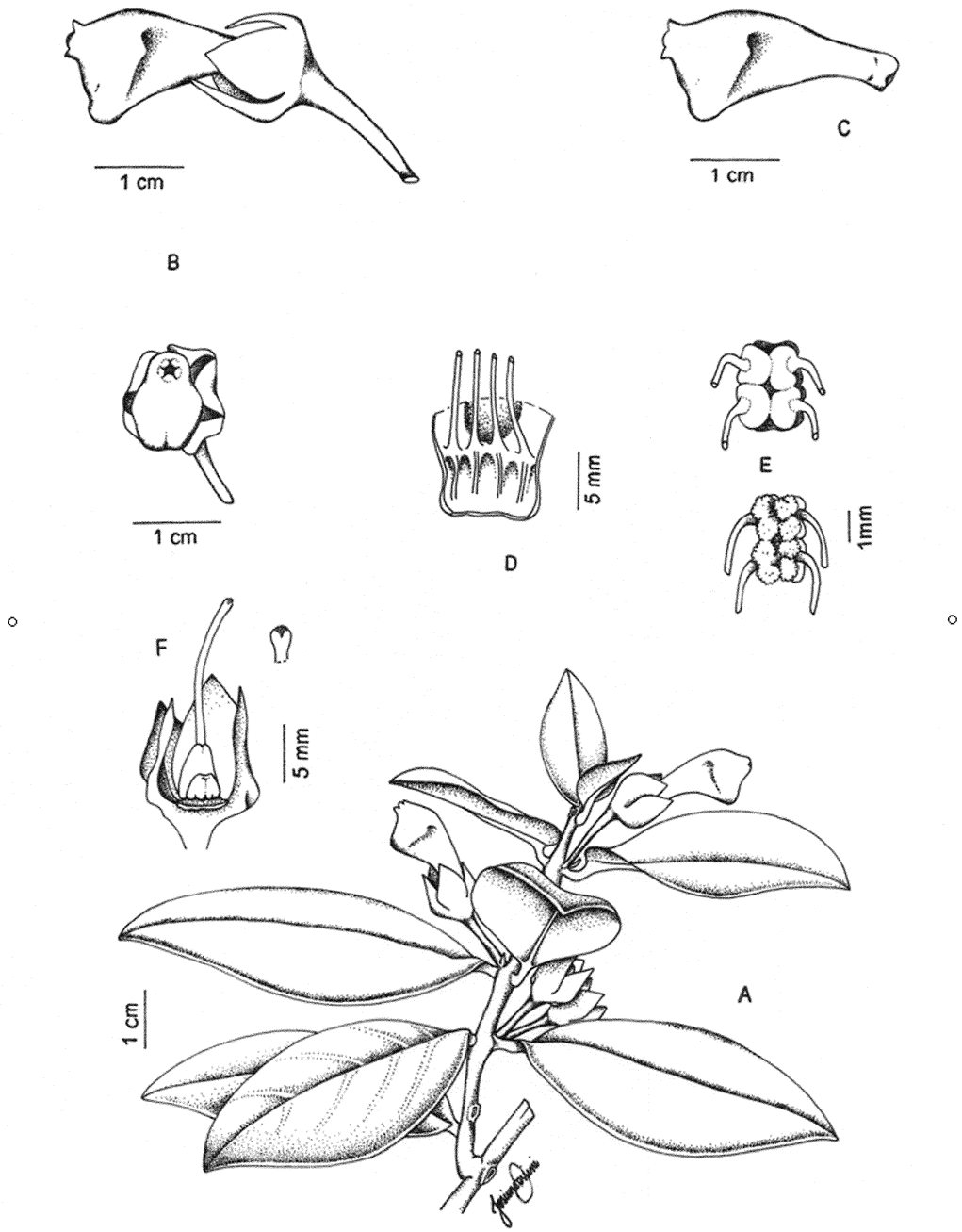


FIGURE 3. *Nematanthus kautskyi.* **A.** Habit. **B.** Flower lateral and frontal view. **C.** Corolla lateral view. **D.** Opened base of corolla showing filaments shortly adnate to corolla tube. **E.** Anthers dorsal and frontal view. **F.** Calyx with corolla removed showing ovary, style, dorsal nectary gland, and enlarged stigma. Voucher: *L. Kollmann 6292* (MBML). Illustrator: Josiene Rossini.

List (Anon. 2005). Nevertheless, this taxon was not included in the list, because its name was unpublished at the time of submission.

*Nematanthus kautskyi* is related to *N. gregarius* D.L.Denham, considering the similar size, texture, and color of the flower, but the two species can be distinguished by internode length, sepal shape, corolla morphology, and capsule

color (see key below). Furthermore *N. gregarius* is endemic to the state of São Paulo.

We provide here full description and validation of the provisional name found along with color photographs in a book dedicated to the numerous plants discovered by Kautsky (Silva et al. 1999).

**Nematanthus punctatus** Chautems, sp. nov. TYPE: Brazil—Espírito Santo: Mun. Alfredo Chaves, São Bento de Urania, *A. Chautems 277,* 06 Jun. 1987, (Holotype: CEPEC; Isotypes: G, SEL, US). FIGURE 4.

Planta multo anisophylla, foliis apice acuminatis, tubo corollae albo, fauce et limbo omnino cum punctis vinosis ab omnibus congeneribus diversa.

***Subshrub*** 0.3–1.5 m, epiphytic; stem pendent or ascending, leafless at base, provided with leaves towards the apex, sparingly branched, 2–8 mm diam., villous; internodes 1–3 cm. ***Leaves*** strongly anisophyllous; petiole 3–6 mm (small leaf) to 10–20 mm (large leaf), pale green; blades 2–3.5 × 0.8–1.2 cm (small ones) to 7–11 × 2.5–4 cm (large ones), elliptic to obovate, somewhat fleshy, villous, with glandular trichomes, green adaxially, light green abaxially, apex acuminate, acumen 10–12 mm long, base narrowly cuneate, margin crenulate, 5–6 pairs of conspicuous lateral veins, mostly alternate. ***Flowers*** fragrant, solitary in upper leaf axils, non-resupinate; pedicels 5–10 mm, pale green, villous. ***Calyx*** fused for 3–4 mm at base, sepals 25–30 × 6–8 mm, lanceolate, papyraceous, pubescent to villous, pale green, margin entire. ***Corolla*** 5–6 cm long, widely funnel-shaped, base cylindric, 10 mm long × 5 mm diam., gradually expanded to 15–18 mm high, 18–20 mm wide in the middle section, slightly constricted towards the mouth, white on the outside, except dorsally towards the base with small vinaceous dots, pubescent, throat yellow with irregular vinaceous spots, glabrous, lobes 10–12 × 12–15 mm, except for the ventral one which is 1–2 mm longer and wider, spreading, white with fine vinaceous dots all over the inner face; filaments 35–40 mm, glabrous, anthers included, pollen white; nectary gland 3–4 × 4 mm, greenish; ovary 6–7 mm long, greenish, pubescent, style 40–45 mm, white, glabrous. ***Capsule*** ovoid, 2–2.5 × 1–1.5 cm, cream, glabrous, displaying at dehiscence a white mass of placental tissue and funicles, split in two parts which are attached to the cream valves, seeds maroon.

ADDITIONAL SPECIMEN EXAMINED: Brazil—Espírito Santo, Cachoeira de Itapemirim, Vargem Alta, Corrego d'Ouro, 2 Sept.1948, *A.C. Brade 19406* (G [fragment], RB).

ETYMOLOGY: The specific epithet refers to the fine vinaceous dots all over the inner face of the corolla lobes.

DISTRIBUTION, HABITAT, AND PHENOLOGY: Endemic to the state of Espírito Santo, in remnants of hygrophilous forest. Flowers were observed from June to September.

CONSERVATION STATUS: Critically endangered as submitted to the editors of the Espírito Santo Red-List (Anon. 2005). Nevertheless, this taxon was not included in the list, because its name was unpublished at the time of submission. *Nematanthus punctatus* is only known from the type collection and another collection found more than 50 years ago. Areas covered by rain forest in Espírito Santo were drastically cleared during the last decades, with only small fragments escaping from destruction because of their locally steep and hilly relief. The preserved areas in Espírito Santo are in limited numbers and cover small extensions.

*Nematanthus punctatus* is related to *N. albus* and *N. wiehleri,* but differs by the combination of the following characters: leaves strongly anisophyllous, leaf blades much less fleshy and acuminate, flowers weakly fragrant, inner face of corolla lobes fully covered with vinaceous dots (see TABLE 1).

This plant was illustrated with a questionable identification as "? *Columnea picta* Karst." (Hoehne 1970: Tab. 75). On a label pertaining to the *A.C. Brade 19406* specimen used for this plate, Hoehne wrote "? *Columnea picta* Ch. Lem., Det. Hoehne 7.1957," and then mentioned "*Nematanthus sp. nov.*?". As it is clear that it does not belong to genus *Columnea* (which is defined by narrowly tubular corollas and fruits of the berry types and species mostly occurring between Panama and Ecuador), Hoehne's second identification was correct, but because of his death in 1958, it remained unnoticed. The Hoehne book published in 1970 was a compilation of his illustrations, which were organized and edited posthumously.

*Nematanthus punctatus* crossed successfully with *N. fissus* (Vell.) L.E.Skog, *N. fluminensis* (Vell.) Fritsch, *N. jolyanus* (Handro) Chautems, and *N. striatus* (Handro) Chautems (M. Peixoto pers. comm. Photographs can be found at http://mpeixoto.sites.uol.com.br/gesneriads/hibrido/fotohibrido.html).

**Nematanthus pycnophyllus** Chautems, T. Lopes & M.Peixoto, sp. nov. TYPE: Brazil—Rio de Janeiro: Mun. Paraty, APA Cairuçu, Morro do Corisco, 8 Mar. 1994, *C. Duarte et al. 19* (Holotype: RB; Isotype: RB). FIGURE 5.

Ab omnibus ceteris speciebus generis foliis fere ses-

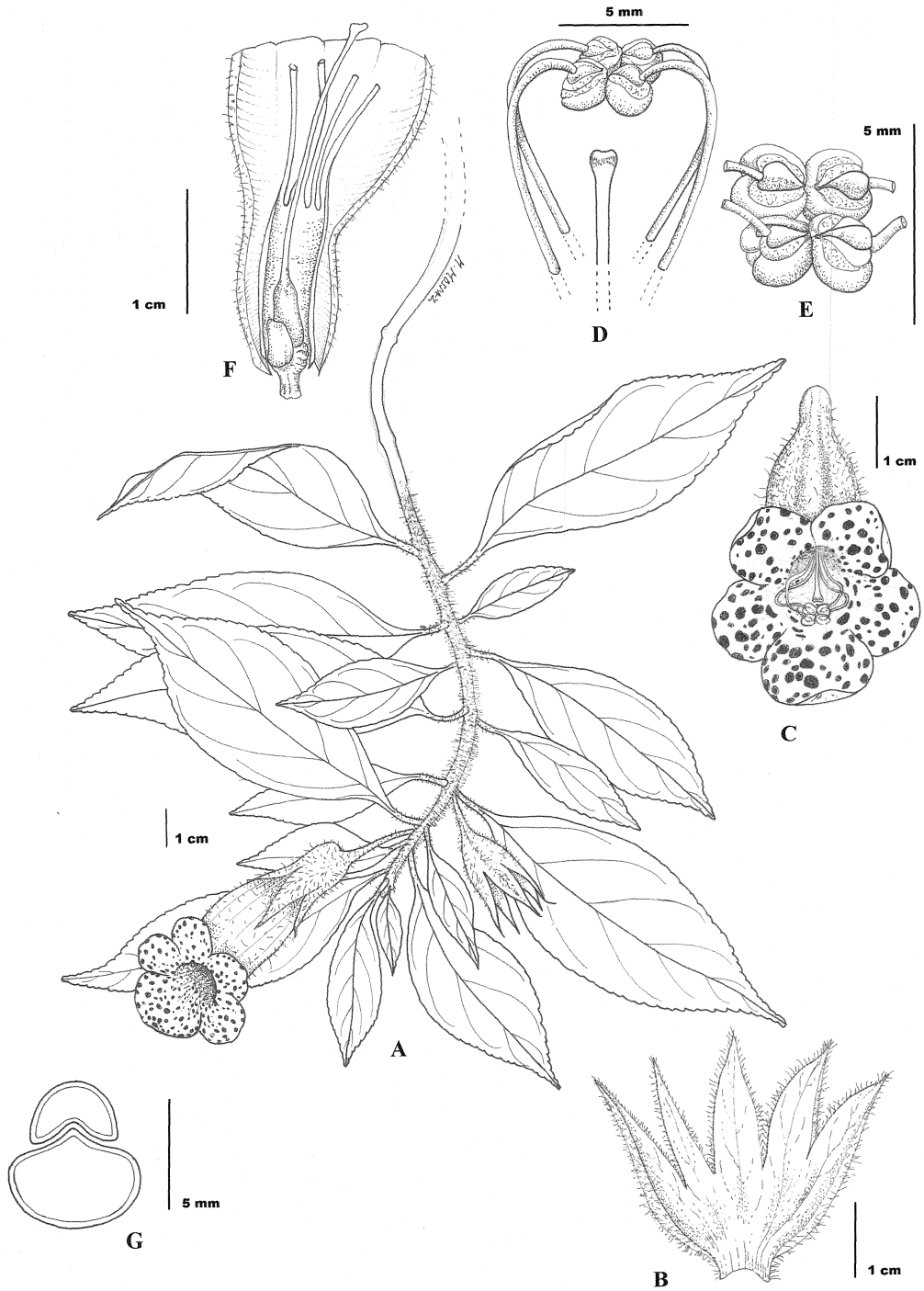


FIGURE 4. *Nematanthus punctatus.* **A.** Habit. **B.** Calyx, opened showing interior surface. **C.** Corolla frontal view. **D.** Stamens and stigma. **E.** Anthers, dorsal view. **F.** Opened base of corolla showing filaments shortly adnate to corolla tube, nectary gland, ovary, style, and stigma. **G.** Schematic transversal cross-section of ovary + dorsal nectary gland. Voucher: *Chautems et al. 277* (G). Illustrator: Maya Mossaz.

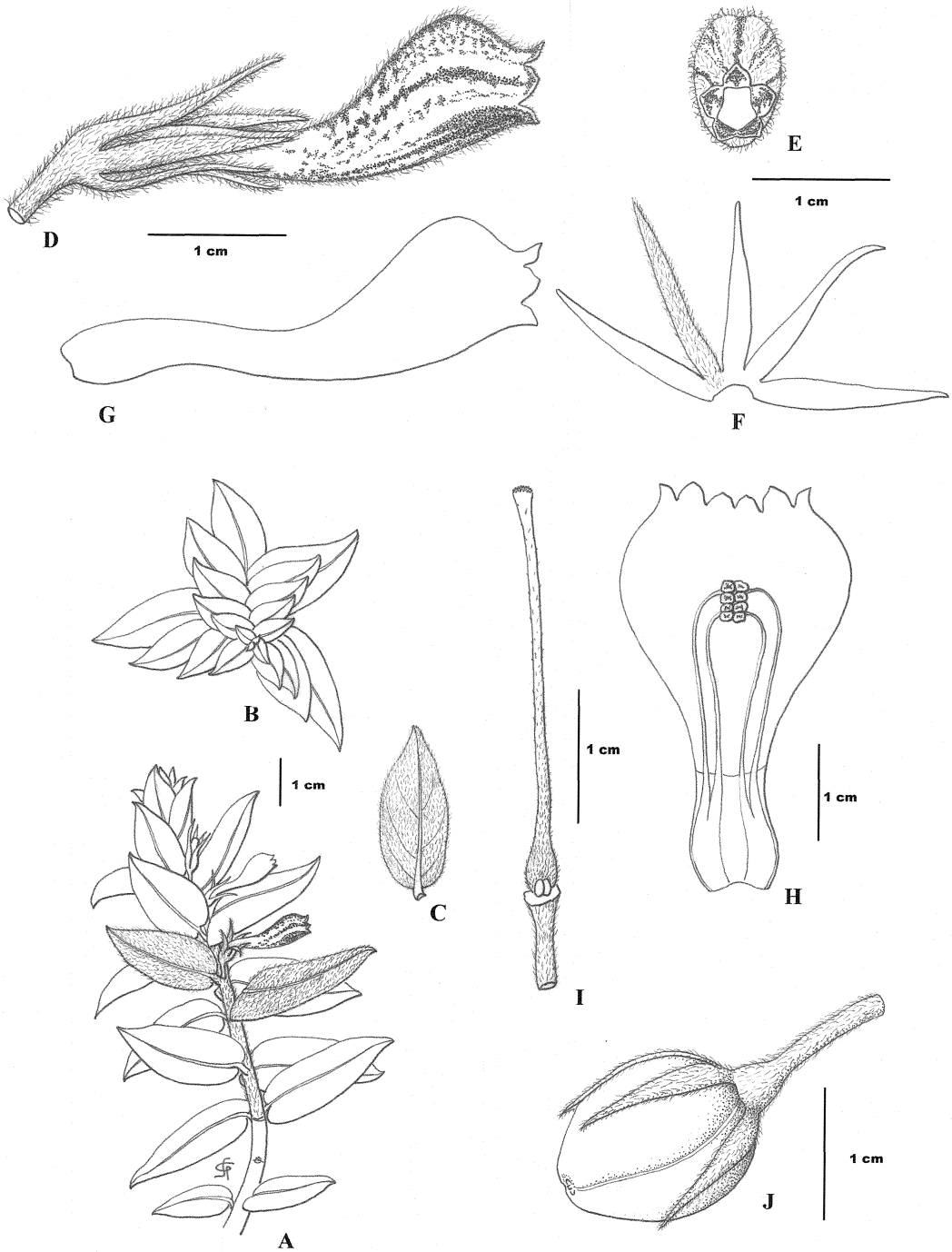


FIGURE 5. *Nematanthus pycnophyllus.* **A.** Habit. **B.** Stem apex with crowded imbricate leaves, frontal view. **C.** Leaf abaxial view. **D.** Flower lateral view. **E.** Corolla frontal view. **F.** Opened calyx showing internal surface. **G.** Corolla shape lateral view. **H.** Opened corolla showing stamens. **I.** Ovary with style, stigma, and nectary gland. **J.** Fruit shortly before full maturity. **A–I**: drawn from live material and spirit-fixed flowers (accession # AC-2702), voucher *T.C.C. Lopes et al. 02* (RUSU 12086). **J**: drawn from pictures of material found in Nova Friburgo, Macaé de Cima, and cultivated by Mauro Peixoto. Illustrator: Giovanna Steinman.

silis ad caulis apicem congestis imbricatisque, corollae sordidae, capsula globulosa differt.

***Subshrub*** 0.3–0.6 m, epiphytic; stem ascending or pendent, sparingly branched, 3–6 mm diam., equally pilose in young and mature parts; internodes 0.5–2 cm. ***Leaves*** crowded towards apex of stems, imbricate, slightly anisophyllous; petioles ca. 1 mm, pale green; blades 2–4.5 × 1.3–2.5 cm (smaller ones) to 6–10 × 2–3.5 cm (larger ones), ovate, fleshy, adaxially green, pilose, with multicellular trichomes ca. 1.5 mm long, abaxially light green, pilose, apex acute, base very briefly cordate, margin subentire, 3–4 pairs of inconspicuous lateral veins. ***Flowers*** solitary, in upper leaf axils, resupinate, bracts ca. 5 mm × 1 mm, not caducous before anthesis; pedicels 2–4 mm long, pale green, pubescent. ***Calyx*** fused for 3–4 mm at base, sepals 12–15 × 2 mm, narrowly ovate, subulate towards the apex, papyraceous, pubescent, green, margin entire. ***Corolla*** 3.4–3.8 cm long, narrowly tubular, horizontally held, glabrous at the very base, pilose at the apex, base cylindric, dorsally enlarged, ca. 15 mm × 4–5 mm diam., tube then constricted to 2.5 mm diam., curved upward and ventricose towards the apex, pale yellow in the section hidden by the sepals, then dull orange with red dots and streaks on the ventricose part, with a dull brown zone on dorsal side below the tip, looking like a withered part already at bud stage, mouth opening pentagonal, 3 mm diam., lobes 1.5 mm × 2–2.5 mm, the two dorsal ones a little smaller and red-brown, the three others yellow with dark red marks; filaments 26–30 mm, glabrous, anthers included, pollen white; nectary gland 1.4–1.5 mm × 1–1.2 mm, cream, ovary 3 mm long, greenish, villous, style 28–30 mm, white, pilose at base, glabrous at the apex. ***Capsule*** globular, 1–1.5 cm diam., bright orange, glabrous, displaying at dehiscence a white mass of placental tissue and funicles, seeds maroon.

ADDITIONAL SPECIMENS EXAMINED: Brazil—Rio de Janeiro: Mun. Mangaratiba, Reserva Rio das Pedras, trilha para o Pico do Corisco, ca. 750 m, 18 Jan. 2001 (fl.), *T.C.C. Lopes et al. 02* (RUSU 12086); Reserva Rio das Pedras, Toca da Aranha, 420 m, 19 Feb. 2003 (fl.), *T.C C. Lopes et E. Saddi 32* (RUSU 13583); Reserva Rio das Pedras, trilha para a Lagoa Seca, *T.C.C. Lopes, E. Saddi & A. Calvente 36,* 21 Feb. 2003 (sterile) RUSU 13587.

MATERIAL IN CULTIVATION: Live material collected by A. Chautems, T.C.C. Lopes, and M. Peixoto, in Rio de Janeiro, Mun. Mangaratiba, Reserva Rio das Pedras. Cultivated in the Geneva Conservatoire et Jardin Botaniques, Accession number AC-2702. Other collection by M. Peixoto from Rio de Janeiro, Mun. Nova Friburgo, Macaé de Cima, observed in 2003 and cultivated by him in Brazil.

ETYMOLOGY: The specific epithet (pycno- is Greek for close, dense, compact; and -phyllus is Greek for leaf) refers to the leaves crowded and imbricate towards the stem apex.

DISTRIBUTION, HABITAT, AND PHENOLOGY: Endemic to the state of Rio de Janeiro and found in hygrophilous forest, in shady locations, at 400–1100 m elevation. Flowers were observed from January to February and fruits in March.

CONSERVATION STATUS: Endangered (Lopes et al. 2004).

This species differs from *Nematanthus fissus* (Vell.) L.E.Skog by its thick leaves that are crowded and imbricate towards the stem apex, petioles almost lacking, corolla with ventral gibbosity nearly perpendicular to corolla axis (vs. projected toward or beyond corolla opening), fruit globular, bright orange (vs. flattened and pale yellow).

**Nematanthus wiehleri** Chautems & M.Peixoto, sp. nov. TYPE: Brazil—Espírito Santo: Mun. Santa Teresa, São Lourenço, estrada do Caravage, Reserva da prefeitura, 750 m, 27 Oct. 1998, *L. Kollmann et al. 794* (Holotype: MBML; Isotype: G). FIGURE 6.

Haec species a congeneribus omnibus foliis anguste obovatis basi attenuati apice acutis nervis inconspicuis sepalis 25–35 mm longis corollae lobis partim maculatis distinguitur.

***Subshrub*** 0.3–0.8 m, epiphytic; stem ascending, sparingly branched, 4–8 mm diam., villous; internodes 0.8–3 cm. ***Leaves*** anisophyllous; petioles 3–5 mm (small leaf) to 6–15 mm (large leaf), pale green; blades 3–6 × 0.8–1.5 cm (small ones) to 7–15 × 1.5–3.5 cm (large ones), narrowly elliptic to obovate, very fleshy, villous, with eglandular trichomes, adaxially green, abaxially light green, sometimes reddish, acute at the apex, attenuate at the base, margin finely serrate, 2–5 pairs of lateral veins inconspicuous on fresh material. ***Flowers*** non-fragrant, solitary, in upper leaf axils, non-resupinate, bracts ca. 15 mm × 3–3.5 mm, early caducous; pedicels 5–10 mm, pale green, villous. ***Calyx*** fused for 4–6 mm at base, sepals 25–35 × 6–9 mm, ovate, papyraceous, villous at base, pubescent at the apex, green, sometimes wine red at the apex, margin entire. ***Corolla*** wide funnel-shaped, 5–6 cm long, held more or less horizontally, base cylindric, ca. 10 mm × 5 mm diam., gradually expanded to 15–18 mm high, 20–22 mm wide toward the middle section, slightly constricted toward the mouth, white, pubescent, throat

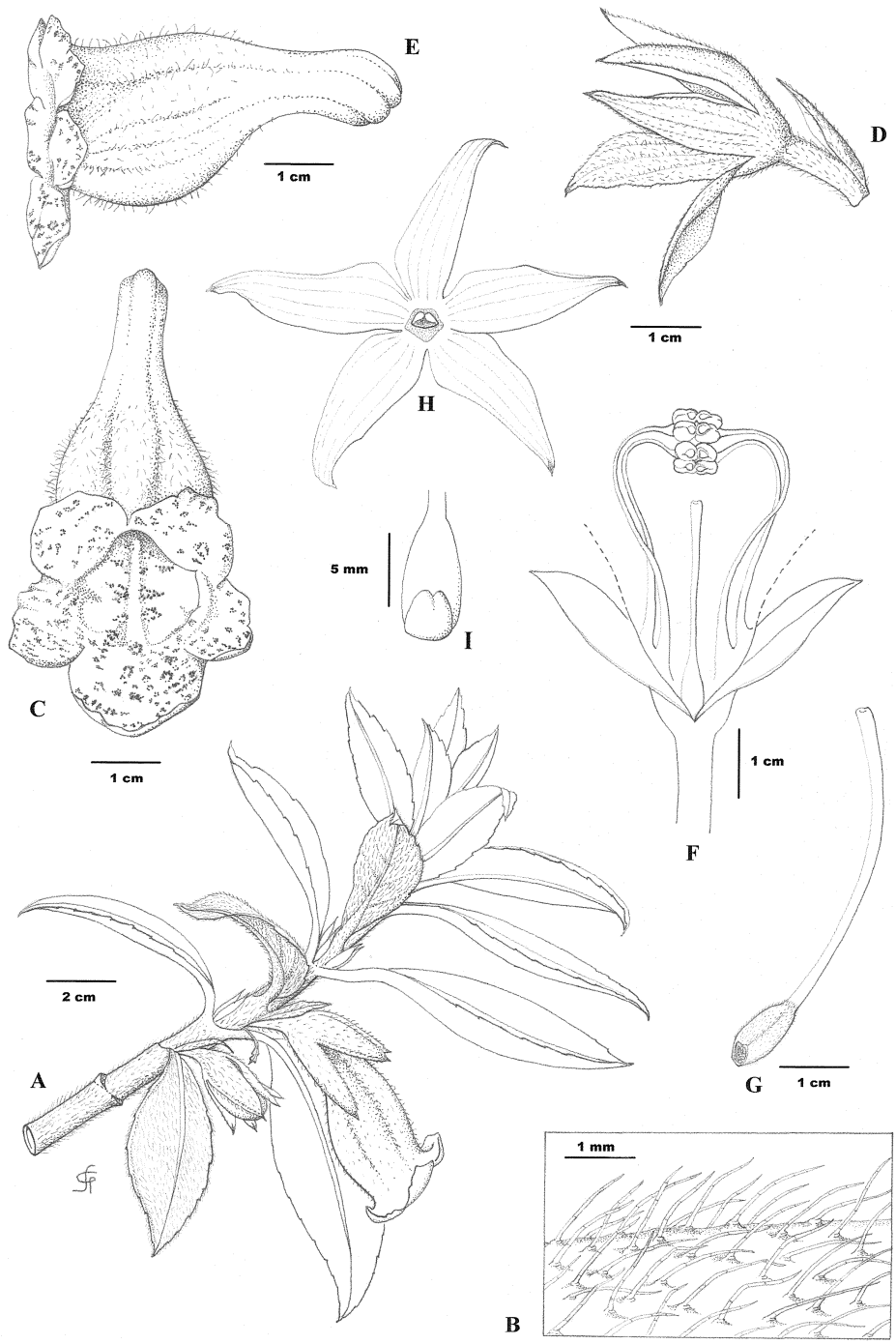


FIGURE 6. *Nematanthus wiehleri.* **A.** Habit. **B.** Eglandular trichomes on adaxial face of leaf. **C.** Flower dorsal view. **D.** Calyx with bract. **E.** Corolla lateral view. **F.** Opened corolla base showing stamens, ovary, style, and immature stigma. **G.** Detail of ovary and style. **H.** Opened calyx with corolla removed to show dorsal nectary gland. **I.** Ovary and nectary gland. Drawn from live material and spirit-fixed flowers (accession # AC-1482). Illustrator: Giovanna Steinman.

white, glabrous, with a yellow nectar-guide at the bottom bordered by wine red dots reaching 2–3 mm diam., flush of pink within the dorsal swelling, lobes 10–12 × 12–15 mm, except for the ventral one, which is 1–2 mm longer and wider, spreading, white with small wine red dots (0.5–0.7 mm diam.) all over the inner faces, dots larger (1–1.5 mm diam.) on ventral lobe; filaments 35–40 mm, glabrous, anthers included, pollen white; nectary gland 2–2.5 × 3–4 mm, greenish; ovary 6–7 mm long, greenish, pubescent, style 40–45 mm, white, glabrous. ***Capsule*** ovoid, 2–2.5 × 1–1.5 cm, cream to wine red, glabrous, displaying at dehiscence a white mass of placental tissue and funicles, split in two parts which are attached to the wine red valves; seeds maroon.

ADDITIONAL SPECIMENS EXAMINED: Brazil—Minas Gerais: Mun. Carangola, Fazenda Santa Rita, mata de encosta ao lado do manancial hídrico, 600 m, 20°46′S, 42°02′W, 15 Oct. 1991 (fl, fr.), *L.S. Leoni 1665* (GFJP); Faria Lemos, Fazenda Santa Rita, 600 m, 30 Oct. 2001 (fl.), *L.S. Leoni 4780,* (GFJP); Feb. 2002 (fr. imat.), *L.S. Leoni 4887,* (GFJP).—Espírito Santo: Mun. Santa Teresa, Cabeceira de 25 de Julho, 8 Jun. 1987, *H. Boudet Fernandes 2151* (MBML); Mun. Domingos Martins, arredores, 7 Nov. 1986, *G. Hatschbach 50778* (MBM, US); Venda Nova do Imigrante, Mata Fria, cultivated in Hatschbach property in Sapindaduva (Paraná), Oct. 1996 (fl.), *G. Hatschbach 65336* (MBM); Mun. Santa Teresa, Reserva Biol. Augusto Ruschi, estrada de Nova Lombardia, 850 m, 9 Jan. 2002, *L. Kollmann et al. 5277* (MBML); Mun. Venda Nova do Imigrante, Braço Sul, Prop. dos Bellon, 10 Nov. 1998 (fl.), *R.R. Santos s.n.* (MBML 7988); Mun. Santa Teresa, Nova Lombardia, Reserva Biol. Augusto Ruschi, córrego próx. ao marco 112, 830 m, 3 Oct. 2002, *R.R. Vervloet et al. 1146* (MBML).

MATERIAL IN CULTIVATION: Live material collected by A. Chautems and M. Peixoto in June 1987 near Alfredo Chaves in Espírito Santo was cultivated in Brazil by Mauro Peixoto (private collection) and by the Conservatoire et Jardin Botaniques under the respective accession numbers MP50 and AC-1482. This is the source of material available in the AGGS plant society seed bank, under the name *Nematanthus sp.* MP50.

ETYMOLOGY: The species is named in honor of our colleague and friend Hans Joachim Wiehler (1930–2003), who devoted more than 30 years to the study of neotropical Gesneriaceae. In 1991, during a field trip of the Gesneriad Research Foundation in Brazil, Hans and the GRF participants observed live material of this species in Carangola.

DISTRIBUTION, HABITAT, AND PHENOLOGY: Restricted to the state of Espírito Santo and neighboring areas in Minas Gerais. The species grows in hygrophilous forest at 600–850 m elevation. Flowers were observed from June to November, and immature fruits were registered only for one collection in February.

CONSERVATION STATUS: Endangered, as submitted to the editors of the Espírito Santo Red-List (Anon. 2005). Nevertheless, this taxon was not included in the list, because its name was unpublished at the time of submission.

This species is closely related to *Nematanthus albus,* and for several years, we considered it as a mere variation of the latter. Close examination of material in cultivation and recently collected specimens made its recognition possible. TABLE 1 presents the main characteristics of *N. wiehleri* vs. *N. albus.* It differs by the following combination of characters: glandular trichomes, narrower leaves, much longer calyx lobes, non-fragrant corollas. Besides these characters, *N. wiehleri* is a slow bloomer; the few buds produced take several months to mature and open during a 2- to 3-week flowering period. *Nematanthus albus,* on the contrary, produces buds that open after a few weeks over a 2- to 3-month flowering period. Additionally, *N. wiehleri* rarely forms fruit by selfing, in contrast to *N. albus.* These differences were noticed while growing the species for many years since our first collection in 1987. In the wild, the flowering period appears to differ, i.e., November to March in Espírito Santo for *N. albus* and June to November for *N. wiehleri.* Nevertheless, the data for the latter taxon rely on a limited number of collections and may not reflect the true phenology.

## NEW GENERIC CIRCUMSCRIPTION

The genus description is taken largely from Weber (2004), with some modifications, in particular concerning flower morphology to accommodate the here-described melittophilous taxa.

***Nematanthus*** **Schrad.**, Gött. Gel. Anz. 1: 718 (1821), nom. cons.

SYNONYMS: *Orobanchia* Vand. (1788), nom. rej, *Hypocyrta* Mart. (1829), pro parte, *Orobanche* Vell. (1829) non L.

***Plant*** epiphytic or occasionally lithophytic subshrubs or herbs; stem ascending, climbing, creeping, or pendent, lignescent or woody at base, with fibrous roots from the nodes. ***Leaves*** opposite, often anisophyllous, subsessile, or pet-

iolate, blades elliptic, ovate or obovate, hard-fleshy, sometimes purple on the lower surface. ***Axillary cymes*** 1- to 8-flowered, pedicels short and erect or long and pendent. ***Sepals*** shortly connate at base, often colored. ***Corolla*** either white, broadly funnel-shaped, limb with spreading, semi-orbicular lobes, mouth widely open, or of another color (yellow, orange, red, rose to dark purple), often resupinate, tube cylindrical or gradually widening and laterally compressed, sometimes sharply bent at base, making an angle of 20–90° in relation to the pedicel axis, usually strongly ventricose, limb with short spreading or reflexed lobes, mouth constricted, orbicular or pentagonal. ***Stamens*** 4, didynamous, included; filaments shortly adnate to corolla base; anthers all cohering. ***Nectary*** a dorsal bilobed gland. ***Ovary*** superior. ***Fruit*** a fleshy, white or variously colored display capsule, ovoid and somewhat laterally compressed, rarely globular, included in or emerging from the persistent calyx, dehiscence loculicidal, displaying cream or colored placentas and prominent funicles bearing the seeds; $N = 8$.

Thirty-one species occur in the Atlantic coastal rain forest in S, SE, and NE Brazil, including the two natural hybrids *Nematanthus kuhlmannii* and *N. mattosianus.*

## Revised Key to the Genus

1. Corolla white, broadly funnel-shaped (melittophilous syndrome) . . . . . 2
1′. Corolla brightly colored, tube cylindrical and ± ventricose or gradually widening and laterally compressed below the mouth (hummingbird pollination syndrome) . . . . . 4
2. Leaves strongly anisophyllous (large leaf at least three times length of small leaf), blades acuminate . . . . . *Nematanthus punctatus*
2′. Leaves not strongly anisophyllous (large leaf less than three times length of small leaf), blades not acuminate . . . . . 3
3. Leaf blades margin subentire, sepals 15–25 mm long, corolla throat spotted with yellow dots, some of them finely surrounded by a purple line, inner face of lobes white all over . . . . . *Nematanthus albus*
3′. Leaf blades margin finely serrate, sepals 25–35 mm long, corolla throat white, glabrous, with a yellow nectar-guide at the bottom bordered by wine red dots, inner face of lobes red-spotted all over . . . . . *Nematanthus wiehleri*
4. Leaves with a dense indument on both faces or at least on abaxial face (but see comments for *Nematanthus fritschii*) . . . . . 5
4′. Leaves glabrous or sparsely pubescent on both faces . . . . . 16
5. Abaxial face of leaf blades with a well delimited red blotch . . . . . 6
5′. Abaxial face of leaf blades green or rarely reddish underside . . . . . 8
6. Pedicels 2–10 cm, corolla pink, longly tubular-cylindrical, abruptly gibbous at the apex, (in some São Paulo populations leaves glabrescent) . . . . . *Nematanthus fritschii*
6′. Pedicels less than 4.5 cm, corolla red or wine red, tubular, gradually gibbous . . . . . 7
7. Corolla 2.5–3.5 cm long, dark red with lobes yellow, pedicels 2.5–3.5 cm . . . . . *Nematanthus kuhlmannii* (*N. villosus* × *N. fritschii*)
7′. Corolla 3.5–4.5 cm long, wine red with lobes concolor, pedicels 3–4.5 cm . . . . . *Nematanthus mattosianus* (*N. fissus* × *N. fritschii*)
8. Flower resupinate, corolla tubular and gibbous only towards the apex, covered with long trichomes (1–3 mm) . . . . . 9
8′. Flower non-resupinate, corolla gibbous for most of its length, covered with short trichomes (0.5–1 mm) . . . . . 11
9. Leaves nearly sessile, crowded and imbricate at shoot apex . . . . . *Nematanthus pycnophyllus*
9′. Leaves petiolate, not crowded and imbricate at shoot apex . . . . . 10
10. Sepals black-violet, reflexed at the apex, corolla 1.5–2.5 cm long, wine red . . . . . *Nematanthus villosus*
10′. Sepals green to reddish, erect, corolla 3–3.5 cm long, bright red (sometimes with yellow stripes) . . . . . *Nematanthus fissus*
11. Leaf blades 5–9 cm long, corolla 3.5–4.5 cm long . . . . . *Nematanthus mirabilis*
11′. Leaf blades 1.5–6 cm long, corolla 1.5–3 cm long . . . . . 12
12. Calyx and corolla glabrescent . . . . . *Nematanthus teixeiranus*
12′. Calyx and corolla with erect trichomes . . . . 13
13. Petioles 5–15 mm, corolla and lobes concolor . . . . . 14
13′. Petioles less than 5 mm, corolla lobes not concolor . . . . . 15
14. Corolla pale red, gibbosity protruding in relation to corolla main axis . . . . . *Nematanthus bradei*
14′. Corolla orange, gibbosity perpendicular to corolla main axis . . . . . *Nematanthus serpens*
15. Leaf blades 1.5–3.5 cm long, abaxial face with short erect hairs, corolla 1.5–2.5 cm long, cylindric base of the tube <5 mm long . . . . . *Nematanthus strigillosus*
15′. Leaf blades 2.5–6 cm long, abaxial face with long sericeous appressed hairs, corolla 2.5–3 cm long, cylindric base of the tube 8–10 mm long . . . . . *Nematanthus sericeus*
16. Abaxial side of leaves with a wine red blotch . . . . . 17
16′. Abaxial side of leaves green (rarely wine red over the whole underside) . . . . . 19
17. Pedicels 2–4 cm, leaf blades widely ovate, corolla 4–5 cm long, yellow *Nematanthus fluminensis*
17′. Pedicels 0.5–2 cm, leaf blades elliptic to obovate, corolla <4 cm long, not yellow . . . . . 18
18. Abaxial side of leaves with well delineated blotch, corolla 2.3–3.2 cm long, cylindric for about half of its length, abruptly ventricose to-

wards its apex, pink with yellow lobes . . . . . *Nematanthus maculatus*

18′. Abaxial side of leaves with ill delineated blotch, corolla 3–4 cm long, cylindric for less than a third of its length, then becoming progressively ventricose, carmine with lobes concolor . . . . . *Nematanthus monanthos*

19. Pedicels 3–20 cm, corolla 4–5 cm long . . . 20

19′. Pedicels 0.5–2.5 cm, corolla 1.5–3 cm long . . . 22

20. Corolla yellow with wine red lines, sepals ca. 1.5 cm wide . . . . . *Nematanthus brasiliensis*

20′. Corolla red, sepals 0.2–0.8 cm wide . . . . . 21

21. Sepals 1–1.5 cm long, pedicels often longer than the leaves . . . . . *Nematanthus corticola*

21′. Sepals 1.5–3.5 cm long, pedicels usually shorter than the leaves . . . . . *Nematanthus crassifolius*

22. Petioles 1–12 mm, corolla glabrous or sparsely pubescent, non-resupinate (gibbosity on the lower side) . . . . . 23

22′. Petioles 10–70 mm, corolla pilose, resupinate (gibbosity on the upper side) . . . . . 27

23. Leaf blades 0.6–1.2 cm wide . . . . . 24

23′. Leaf blades 1.2–4 cm wide . . . . . 25

24. Sepals linear, ca. 1 mm wide, fruit bright orange . . . . . *Nematanthus wettsteinii*

24′. Sepals lanceolate, 4–6 mm wide, fruit wine red . . . . . *Nematanthus australis*

25. Leaves glabrescent, sepals green with reddish veins, corolla red, fruit white . . . . . *Nematanthus fornix*

25′. Leaves glabrous, sepals and corolla orange, fruit of another color . . . . . 26

26. Internodes 0.5–2 cm, leaves isophyllous, petioles 1–3 mm, green, blades 1.5–3 cm long, sepals ovate, fruit pale orange . . . . . *Nematanthus gregarius*

26′. Internodes 1–6 cm, leaves anisophyllous, petioles 5–12 mm, reddish, blades 2–7 cm long, sepals broadly trullate, fruit green . . . . . *Nematanthus kautskyi*

27. Pedicels 3–6 mm, petioles carmine . . . . . 28

27′. Pedicels 10–25 mm, petioles green, maroon or wine red . . . . . 29

28. Petioles 3–7 cm, sepals 1–2 cm long, calyx dark wine red and corolla yellow, rarely calyx green and corolla pink . . . . . *Nematanthus hirtellus*

28′. Petioles 2–4.5 cm long, sepals 0.5–1 cm long, calyx wine red, corolla orange-red, lobes yellow . . . . . *Nematanthus lanceolatus*

29. Corolla pure yellow, tube sigmoid dorsally . . . . . *Nematanthus jolyanus*

29′. Corolla yellow with maroon stripes, tube not sigmoid dorsally . . . . . 30

30. Calyx wine red, sepals 4–8 mm wide, margin irregularly toothed . . . . . *Nematanthus striatus*

30′. Calyx green to light maroon, sepals 8–12 mm wide, margin irregularly sinuate . . . . . *Nematanthus tessmannii*

## Acknowledgments

We are grateful to the curators and staff of the herbaria indicated in the text for courtesies extended while studying their collections and, in particular, Lucio Leoni in Carangola (GFJP); we also thank Maya Mossaz and Giovanna Steinman for their careful execution of most of the illustrations; Mathieu Perret gave his kind assistance in producing the map.

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