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NEW SPECIES OF *PORROGLOSSUM* (ORCHIDACEAE: PLEUROTHALLIDINAE) FROM ECUADOR

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ABSTRACT. Three new species of *Porroglossum* from Ecuador are described and illustrated. *Porroglossum miguelangelii* is compared to the Peruvian *P. lycinum*, from which it differs by the longer, narrower petals with margins that are not obtusely angled below the middle and the presence of stigmatic tooth-like processes. *Porroglossum merinoi* is distinctive in that it is the only species with densely pubescent sepals. *Porroglossum porphyreum* is similar to *P. schramii*, but differs in the sepals with a thickened tail abruptly inserted at their apex, the petals with teeth on both the upper and lower margin, and the labellum provided with a longer and broader basal callus.

KEW WORDS: Orchidaceae, Pleurothallidinae, *Porroglossum*, *P. miguelangelii*, *P. merinoi*, *P. porphyreum*, Ecuador, new species

Introduction. The genus *Porroglossum* Schltr. (Orchidaceae) includes 38 species restricted to Andean South America, where they range from Venezuela to Peru (Luer 1987). Ecuador is the genus's center of diversity with 23 species recorded (Dodson 2004). With 8 species, Colombia has the second highest species concentration. The first species described, *Porroglossum echidna* (Rchb.f.) Garay, was discovered in Colombia and was attributed to the genus *Masdevallia* Ruiz & Pav. based on its caespitose habit, short ramicauls, and sepals with long tails (Luer 1987). Rudolf Schlechter proposed the genus in 1920, based on *P. colombianum* [= *P. mordax* (Rchb.f.) Sweet] and *P. muscosum* (Rchb.f.) Schltr., mainly distinguishing *Porroglossum* from *Masdevallia* by the apical position of the anther and the presence of a long column foot with a free apex (Schlechter 1920). The unusually long column foot in *Porroglossum* functions to accommodate the active mobility of the labellum. The region of the labellum that rests against the

column foot is sensitive to tactile stimuli and responds to touch by relaxing the labellum's long strap-like claw. This allows the labellum to reflex backwards and (hypothetically) push the pollinator against the column (Bean 1887, Leavitt 1906, Luer 1987). Although the pollination system has been described in detail by Bean (1887), Oliver (1888) and Luer (1987), the specific pollinators and mechanism of the genus has not yet been recorded in nature.

Sensitive labella have evolved independently in other taxa of the subtribe Pleurothallidinae Lindl. (Luer 1987, 2000). Examples include *Acostaea* Schltr. and *Condylago* Luer species, now treated as members of the genus *Specklinia* Lindl., and *Masdevallia teaguei* Luer, which was once recognized as the monotypic genus *Jostia* Luer. The presence of an irritable lip was once thought to be a key character for generic circumscription. Recent phylogenetic analyses based on combined molecular evidence (Pridgeon *et al.* 2001) show that in some cases it is unsuitable as a character for generic

circumscription within the Pleurothallidinae because it creates paraphyletic groups. In contrast, lip motility observed in the well supported monophyletic clade of *Porroglossum* can be considered a synapomorphy of the genus. *Porroglossum* is the only currently accepted and recognized genus in the Pleurothallidinae that can be characterized as a whole by the presence of actively motile labella.

The systematics of *Porroglossum* was treated by Sweet (1970, 1972) and by Luer (1987). Luer recognizes two subgenera, subgen. *Eduardia* Luer and subgen. *Porroglossum*. Subgenus *Eduardia* is characterized by a repent growth habit and a simultaneously flowered inflorescence. The subgenus *Porroglossum* is composed of three sections: section *Echidnae* (Rchb.f.) Luer which contains species characterized by peduncle indumentums, section *Tortae* Luer which contains species characterized by non-resupinate flowers, and section *Porroglossum* which contains the rest of the species (Luer 1987). The species described here all belong to the section *Porroglossum*.

Luer (1987) attributed twenty-seven species names to the genus *Porroglossum*, considering *P. colombianum* and *P. xiphères* to be synonyms of *P. mordax* and *P. muscosum*, respectively. Since then, Luer has authored and co-authored thirteen new species, bringing the number of species names attributed to *Porroglossum* to forty and the number of species to thirty-eight (Luer 1988, 1989, 1991, 1994, 1995, 1998, 2004, 2006a, 2006b). In Ecuador, 23 species of *Porroglossum* have been previously recorded, representing over two thirds of the known species. In preparing a systematic revision of the Ecuadorian species of *Porroglossum*, we found three species that present enough morphological differences from the previously described species to be confidently proposed as new to science.

Porroglossum miguelangelii G.Merino, A.Doucette & Pupulin, *sp. nov.*

TYPE: Ecuador. Zamora Chinchipe: without specific locality, 1800 m, collected by Hugo Medina, November 1993, cultivated by Ecuagenera Orchid Nursery in Gualaceo, flowered in cultivation, 20 July 2008, *G. Merino 1* (holotype: QCNE; isotype: Andean Orchids Research Center (CIOA, by the initials in

Spanish), University Alfredo Pérez Guerrero, Spirit Collection No. 000845). FIG. 1, 4A.

A Porroglosso procul Luer foliis ellipticis obtusis, petalis lineari-ligulatis subfalcatis, in parte media leviter angustatis, lamina labelli late obtriangulari-obcuneata marginibus lateralibus incurvatis recedit.

Herb epiphytic, caespitose, 4 to 8 cm tall. *Roots* flexuous, 1 mm in diameter. *Ramicauls* terete, erect, abbreviated, blackish at the base 1 mm long, enclosed by 2 to 3 tubular sheaths. *Leaf* coriaceous, spatulate, elliptical-obovate 2-4 x 0.5-1.0 cm, narrowed at the base into a conduplicate petiole 1.5-2.0 cm long. *Inflorescence* a congested, successively flowered raceme 8-10 cm long; the peduncle glabrous, 5.0-9.5 cm long. *Floral bracts* tubular, 4 mm long. *Pedice*l 5 mm long. *Ovary* terete, minutely verrucose, 6-sulcate, 5 mm long. *Flowers* resupinate, held erect, without a detectable fragrance, the dorsal sepal yellow-green suffused with brown, with three brown veins, the lateral sepals yellow-green, the petals translucent, amber with a brown mid-vein, the lip white, spotted with dark brown, the column greenish-white with a cream anther cap. *Dorsal sepal* broadly ovate, concave, tricarinate, 9.5-10.0 x 5.0 mm, contracted into a thick, erect tail, connate to lateral sepals for about 3 mm. *Lateral sepals* subrectangular, tricarinate, 10-11 x 6 mm when spread, connate for about 4 mm to form a laterally compressed cup, contracted at apex into a thickened, horizontally outstretched tails. *Petals* linear-ligulate, the apex rounded and broader than middle portion, 6 x 1 mm. *Lip* unlobed, obcuneate-obtriangular, 4 x 5 mm at its widest portion, hinged to the column foot by a short rectangular strap, motile, with a sulcus running from the apex to the center of the blade, with a basal low, broad callus. *Column* short, stout, semiterete, fleshy, to 3 mm long, with two tooth like processes near the stigma. *Anther cap* transversely ovate, obtuse-apiculate. *Pollinia* droplet shaped, 2 in number, each with a glandular caudicle.

EPONYMY: Named to the memory of Miguel Ángel Soto Arenas, in recognition of his outstanding contributions to the knowledge of orchids.

DISTRIBUTION: Known only from southeastern Ecuador.

HABITAT AND ECOLOGY: Epiphytic in shade in premontane and lower montane cloud forests, usually

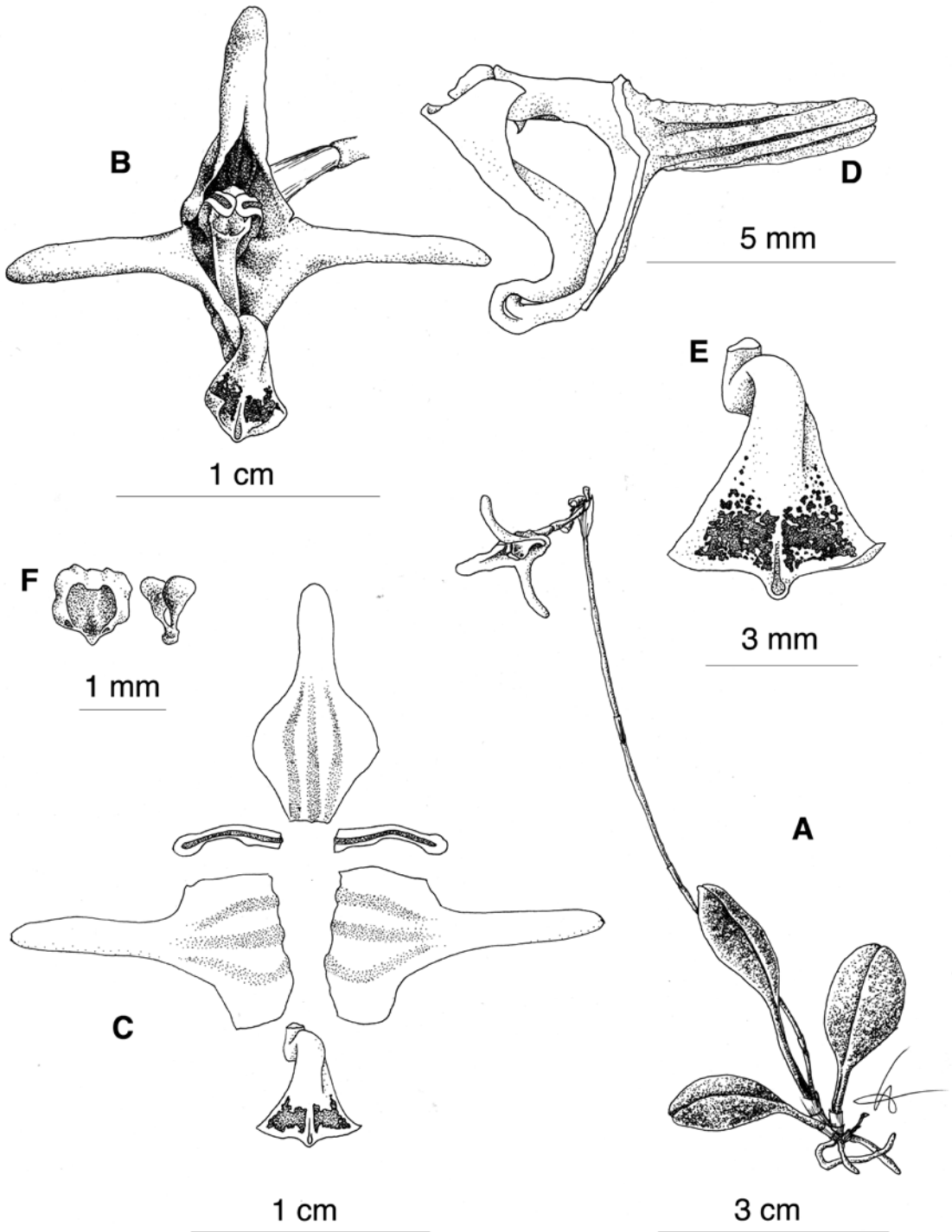


FIGURE 1. *Porroglossum miguelangelii* G.Merino, A.Doucette & Pupulin. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Anther cap and pollinarium. Drawn by A. Doucette from the holotype.

in windy areas, at elevations of 1800 meters, where the plants mostly establish on small trees covered by mosses and lichens.

Porroglossum miguelangelii is most similar to *P. lycinum* Luer from northern Peru, from which it differs by smaller plants, the longer, narrower petals with margins that are not obtusely angled below the middle, the presence of tooth-like processes before the stigma (absent in *P. lycinum*), the spreading, pale green sepals, suffused with yellow at their apices (vs. projected forwards, speckled and suffused with brown in *P. lycinum*). The two species have similarly shaped labella that are both pale green and heavily flecked with dark purple towards their apex.

Porroglossum merinoi Pupulin & A. Doucette, *sp. nov.*

TYPE: ECUADOR. Morona-Santiago: Tumbes, 1200 m, collected by Gilberto Merino, October 1993, flowered in cultivation, 12 June 2007, *G. Merino* 2 (holotype: QCNE; isotype: CIOA, Spirit Collection No. 000155). FIG. 2, 4B.

Species Porroglossum lycino Luer *similis*, *floribus expansis sepalo superno reflexo, caudis sepalorum brevioribus ligulato-rotundatis, petalis ligulatis dente triangulari margine infero instructis, labello obrullato obtuso glabro differt.*

Herb epiphytic, caespitose, to 6 cm tall. *Roots* flexuous, 1 mm diameter. *Ramicauls* erect, slender, 10--12 mm long, enclosed by 2 to 3 tubular, membraneous sheaths that become papery with age. *Leaf* erect, coriaceous, long-petiolate, the blade elliptic-oblancoate, sub-verrucose, 2.5-3.0 x 0.7-1.0 cm, narrowed at the base into a conduplicate petiole 2.6-3.0 cm long. *Inflorescence* a suberect, congested, successively few-flowered raceme to 15 cm long; the peduncle terete, slender, glabrous, provided with 4-5 widely spaced, tubular bracts to 7 mm long. *Floral bract* tubular, 5 mm long. *Pedicel* terete, 7-8 mm long. *Ovary* terete, subverrucose, 5 mm long. *Flowers* resupinate, partially spreading, lightly fragrant of cloves, the sepals greenish yellow, pubescent, flushed with solid yellow at the glabrous apexes, the nerves yellow, the dorsal sepal with a central, purplish flush at the base; the petals translucent yellowish white, with a central stripe and the apex purple-red; the lip

yellow, finely spotted with red; the column purple, with a yellowish white anther cap. *Dorsal sepal* lanceolate, narrowly obtuse, tricarinate, concave at the base, parallel to the column below the middle and gently deflexed above the middle, 6 x 3 mm, connate to the lateral sepals for about 1.5 mm to form a slightly, laterally-compressed cup. *Lateral sepals* transversely obtapezoidal, 3-veined, narrowed at the middle into thick, ligulate, narrowly obtuse-rounded, forwardly directed tails, 7.5 mm long x 8 mm at its widest portion when spread, basally connate for about 1.5 mm to the dorsal sepal, connate to each other and to the column foot about 5 mm to form a deep, subacute, rounded chin. *Petals* subfalcate, 1-nerved, the lower margin with a triangular tooth below the middle, rounded at apex 4.0 x 1.3 mm, *Lip* long-unguiculate, the blade obcuneate-spathulate, broadly obtuse, with a short, sulcate, rounded apiculum, 5.5 mm long x 3 mm at its widest portion, thickened at the base into the straplike claw, bent with tension toward the free apex of the column-foot. *Column* semiterete, truncate, 2.5 mm long, with narrowly triangular-subfalcate, descending substigmatic arms, produced at the base into a slender, curved foot about 6 mm long; the anther terminal, incumbent. *Anther cap* transversely ovate, obtuse-apiculate. *Pollinia* droplet shaped, 2 in number, each with a glandular caudicle.

EPONYMY: Named after Gilberto Merino, Ecuadorean orchid researcher with a strong interest in Pleurothallidinae, who first collected this species.

DISTRIBUTION: Collected once, known only from southeastern Ecuador.

HABITAT AND ECOLOGY: The type specimen of *P. merinoi* was found growing as a shade epiphyte on a small tree covered by mosses, in cloud forest at about 1800 m of elevation. In cultivation, it flowers from May to June.

Porroglossum merinoi is one of the most distinctive species in the genus. It is the only species with truly pubescent sepals. *P. hirtzii* bears minute hairs on its sepals but they are sparsely distributed. *P. merinoi* is allied to *P. andreetae*, from which it differs by the petals with entire margins (vs. contracted into acute apices near the middle), a slightly broader labellum, and puberulent sepals provided with a thickened, glabrous, yellow apex. Both species are lightly fragrant.

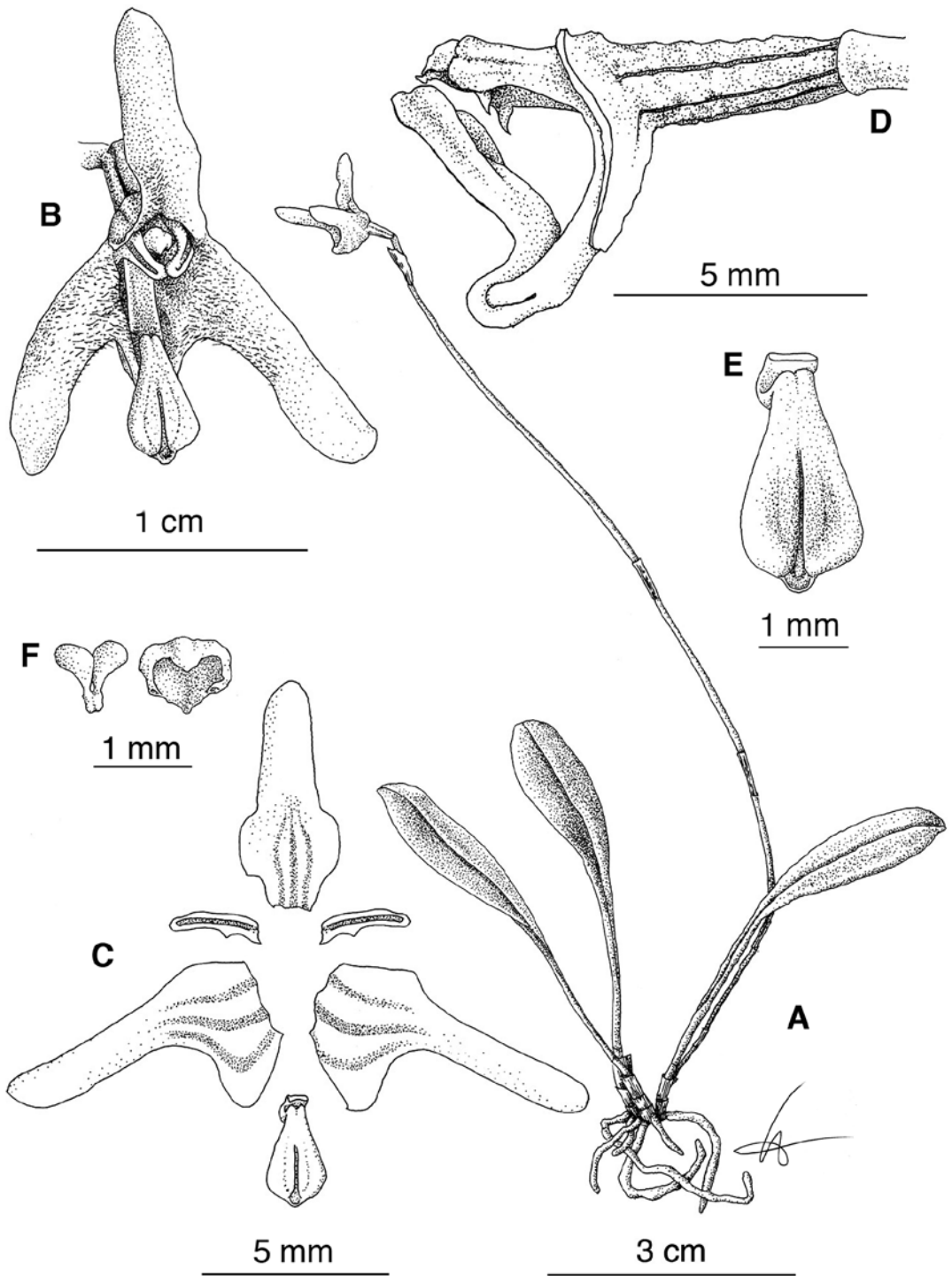


FIGURE 2. *Porroglossum merinoi* Pupulin & A.Doucette. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Pollinarium and anther cap. Drawn by A. Doucette from the holotype.

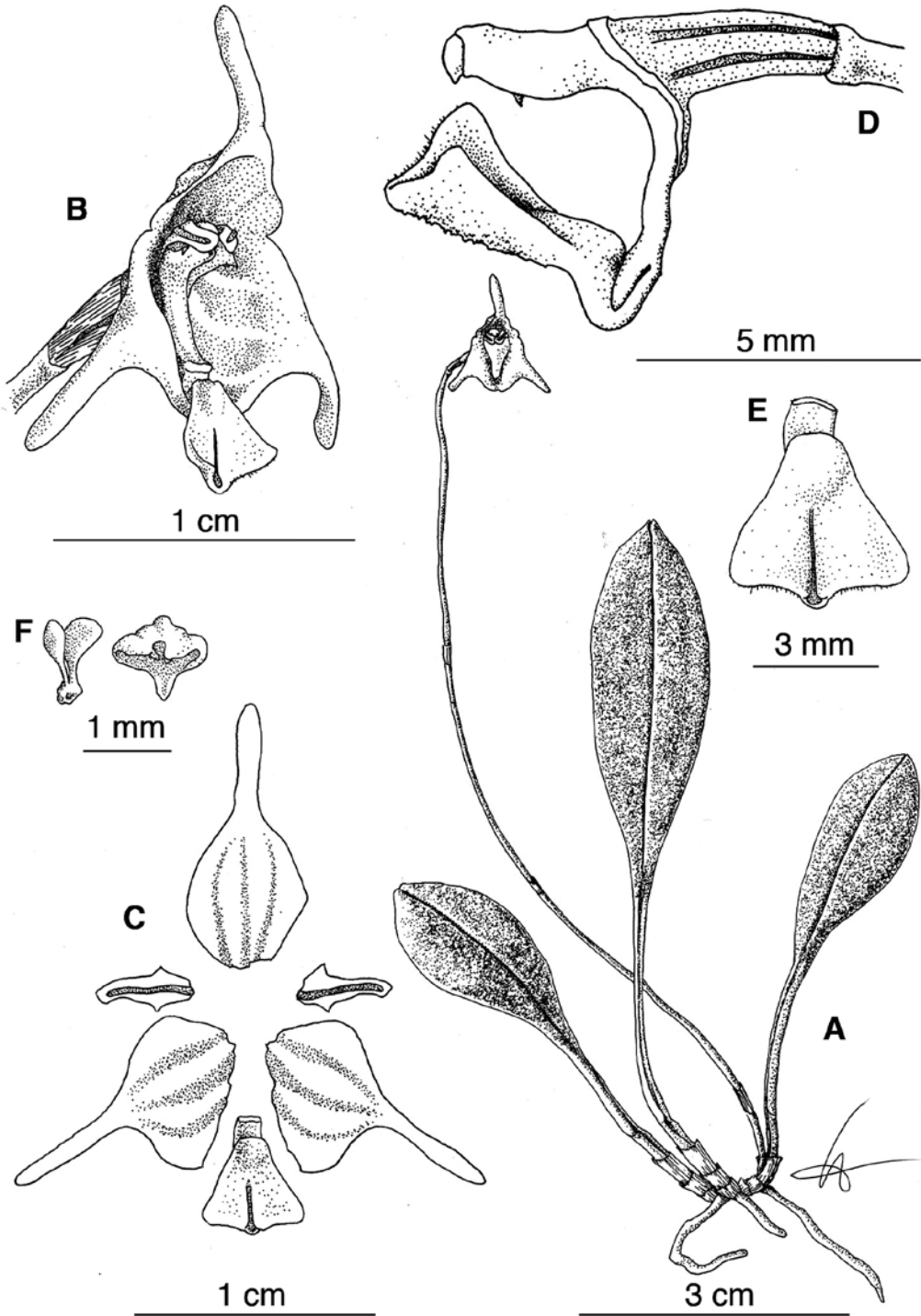


FIGURE 3. *Porroglossum porphyreum* G.Merino, A.Doucette & Pupulin. A — Habit. B — Flower. C — Dissected perianth. D — Column and lip, lateral view. E — Lip, spread. F — Pollinarium and anther cap. Drawn by A. Doucette from the holotype.

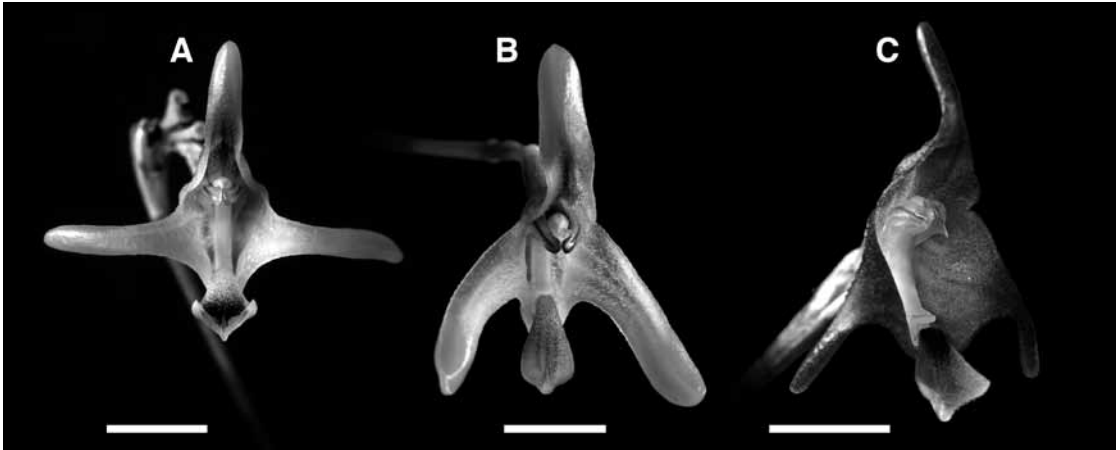


FIGURE 4. Pictures of holotype flowers of three new *Porroglossum* species. A — *Porroglossum miguelangelii*.. B — *P. merinoi*. C — *P. porphyreum*. Scale bars = 5 mm. Photographs by F. Pupulin.

Porroglossum porphyreum G.Merino, A.Doucette & Pupulin, *sp. nov.*

TYPE: ECUADOR. Morona-Santiago: El Aguacate, 1600 m, collected by Jinsop Medina, 1992, cultivated by Ecuagenera Orchid Nursery in Gualaceo, flowered in cultivation, 20 July 2008, *G. Merino* 3 (holotype: QCNE; isotype: CIOA, Spirit Collection No. 000743). FIG. 3, 4C.

A Porroglossos schramii Luer *caudis sepalorum brevioribus incrassatis, sepalis lateralibus transverse ellipticis cauda apicali abrupte instructis, petalis dente acuto margo inferno munitis, labello toto dense pubescenti callo basali magno latiore recedit.*

Herb epiphytic, caespitose. 6 to 10 cm tall. *Roots* flexuous, 1 mm in diameter. *Ramicauls* terete, erect, abbreviated, blackish at the base, 3--5 mm long, enclosed by 2 to 3 tubular, membraenous sheaths that become papery with age. *Leaf* coriaceous, elliptic-obovate, obtuse to acute, 3-5 x 1.5-2.0 cm, narrowed at the base into a conduplicate petiole 1--3 cm long. *Inflorescence* a congested, successively, few flowered raceme; the peduncle terete, slender, glabrous, 10-12 cm long. *Floral bract* tubular, 4mm long. *Pedicel* 5 mm long. *Ovary* terete, minutely verrucose, 6-sulcate, 6 mm long. *Flowers* resupinate, held erect to horizontally, without apparent fragrance, the sepals yellowish white heavily suffused with purple, the petals amber with a brown mid-vein, the lip white suffused with purple, the

column and the anther cap white. *Dorsal sepal* ovate, acute, concave, tricarinate, 6 x 3 mm, contracted at apex into an erect to forward projecting, thickened, linear tail, connate to lateral sepals for about 4 mm, the tails 1 mm in diameter. *Lateral sepals* ovate, slightly compressed, tricarinate, 10 x 5 mm wide when spread, connate at the base for about 7 mm, abruptly contracted at apex into thickened tails that may project forwards or slightly reflex backwards. *Petals* subfalcate, truncate, 4 x 2 mm, the margins present two triangular teeth below the middle. *Lip* entire, obcuneate, 4 x 5 mm at its widest portion, hinged by a short rectangular strap to the column foot, motile, microscopically pubescent, with a sulcus running from the apex to the center of the lip, the base with a low, broad callus. *Column* short, stout, semiterete, fleshy, 3 mm long, with two tooth-like processes close to the stigma. *Anther cap* transversely ovate, obtuse-apiculate. *Pollinia* droplet shaped, 2 in number, each with a glandular caudicle.

PARATYPES: Same locality as the holotype, flowered in cultivation at Ecuagenera Orchid Nursery in Gualaceo, 10 December 2008, accession No. CIOA-001373 (Centro de Investigación en Orquídeas de los Andes-Spirit); accession No. CIOA-001374 (Centro de Investigación en Orquídeas de los Andes-Spirit).

ETYMOLOGY: From the Greek *porphyreos*, purple, in allusion to the color of the flower.

DISTRIBUTION: Known only from southeastern Ecuador.

HABITAT AND ECOLOGY: Plants of *P. porphyreum* grow as shade epiphytes on the moss covered branches of shrubs, in the premontane forests of southern Andean Ecuador. In its natural habitat, *P. porphyreum* has been observed in flower from March to July; plants in cultivation flower most of the year.

Porroglossum porphyreum is similar to *P. schramii* Luer. *P. porphyreum* can be distinguished from *P. schramii* by having sepals that abruptly (rather than gradually) contract into thickened (rather than thin) sepaline tails. The petals of *P. porphyreum* have teeth below the middle on both margins while the petals of *P. schramii* only bear a tooth margin on the upper margin. The labellum of *P. porphyreum* has a basal callus that is longer and broader than the basal callus of *P. schramii*.

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