

ON THE IDENTITY OF *TRICHOCENTRUM ORTHOPLECTRON* (ORCHIDACEAE: ONCIDIINAE), WITH A NEW SPECIES FROM BOLIVIA

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Abstract. The species traditionally included under the synonymy of *Trichocentrum albococcineum* are re-evaluated, and *T. orthoplectron* is reinstated as a separate species. A new species of *Trichocentrum* from Bolivia, *T. morenorum*, is described and illustrated, and its relationships with other species of the genus are discussed. A key to the species of the *Trichocentrum fuscum* group is presented.

Keywords: Bolivia, Orchidaceae, *Trichocentrum*

Even when species of *Cohniella* Rchb.f. and *Lophiaris* Raf. are included in a broad concept of *Trichocentrum* Poepp. & Endl. (Williams et al., 2001; Chase, 2009; Neubig et al., 2012), members of *Trichocentrum* sensu stricto are easily recognized by the presence of a labellar, nonfunctional spur and the basal margins of the lip fused to the sides of the column, which altogether lacks a *tabula infrastigmatica* (Pupulin, 1995; Cetzal-Ix et al., 2016). Species of *Trichocentrum* with a long spur, often largely exceeding the length of the lip, are exclusively South American in distribution (Pupulin, 1995). Among them, the six species informally assigned to the *Trichocentrum pulchrum* group, uniquely characterized by their triquetrous ovary, are strictly Andean (Pupulin, 1995, 1998). Species of the *Trichocentrum fuscum* group (10 taxa, including the new species described here) are distributed throughout tropical South America, with a majority of taxa recorded in the Guyanese and coastal Brazilian regions (Pupulin, 1995; Cetzal-Ix et al., 2016). All the species of the latter group presents successive inflorescences and an ovary that is round in section (Pupulin, 1995).

Pupulin (1995), as well as Cetzal-Ix and collaborators (2016), treated *Trichocentrum albococcineum* Linden as a variable species with broad geographical distribution, ranging from northwestern Brazil, close to the Venezuelan border (where it should be also expected), to Peru and Bolivia. They included in its synonymy five heterotypic names, namely *T. amazonicum* Barb.Rodr. (from Brazil, Maranhão), *T. ionophthalmum* Rchb.f. (Amazon, without further data), *T. leeanum* Rchb.f. (dubiously from the western Cordillera of Equatorial America), *T. orthoplectron* Rchb.f. (origin unknown), and *T. porphyrium* Rchb.f. (origin unknown).

The synonymy of the well-known *Trichocentrum albopurpureum* Linden & Rchb.f. requires no discussion, as it was ostensibly based on the same material previously described by Linden in one of his catalogues on newly

introduced plants (Linden, 1865; Reichenbach f., 1866) (Fig. 1), and it has to be treated as a homotypic name (Pupulin, 1995). On the other hand, it was João Barbosa Rodrigues (1882) himself who synonymized his *T. amazonicum* (Barbosa Rodrigues, 1877), after comparing it with the description and the illustration of *T. albopurpureum* published by Joseph Dalton Hooker (1868) in the *Botanical Magazine*.

In the protologue of *Trichocentrum ionophthalmum*, Reichenbach f. (1876) compared it with *T. albococcineum* (as *T. albopurpureum*), mainly distinguishing it by the presence of two basal keels on the lip (instead of four). However, the “three projecting angles” described by Reichenbach could easily be interpreted as shorter, lateral keels, so becoming practically indistinguishable from the four major keels and the two lateral, short teeth of the latter species. The flower analysis of *T. ionophthalmum* published by Pabst and Dungs (1977: 314, fig. 2098), supposedly from Brazilian Amazonas and Mato Grosso, shows an obcordate lip, cuneate at the base, which does not match either the protologue (“*labelli ungue semilibero lamina pandurata, apice emarginata*,” Reichenbach f., 1876) or the drawing of the type. If not a form of the species similar to that described by Reichenbach f. as *T. porphyrio* (see discussion under), it could well be a still undescribed taxon from Brazil.

Trichocentrum leeanum was originally described from a plant flowered in the collection of William Lee of Downside, Leatherhead, Surrey (United Kingdom), where Reichenbach f. saw it in a living state. The origin of the specimen was dubiously indicated as the western Cordillera of Equatorial America (“*ex cordill. occid. Am. Aequat.*”). As the Andean mountain range splits into several branches only north of Ecuador, it is possible that type specimen was Colombian, and so it was treated by Dodson in his unpublished “Checklist of the Orchids of the Western Hemisphere” (C. H. Dodson, unpubl. manuscript). The occurrence of *T. albococcineum* in Colombia was confirmed by Ortiz (1995), who identified

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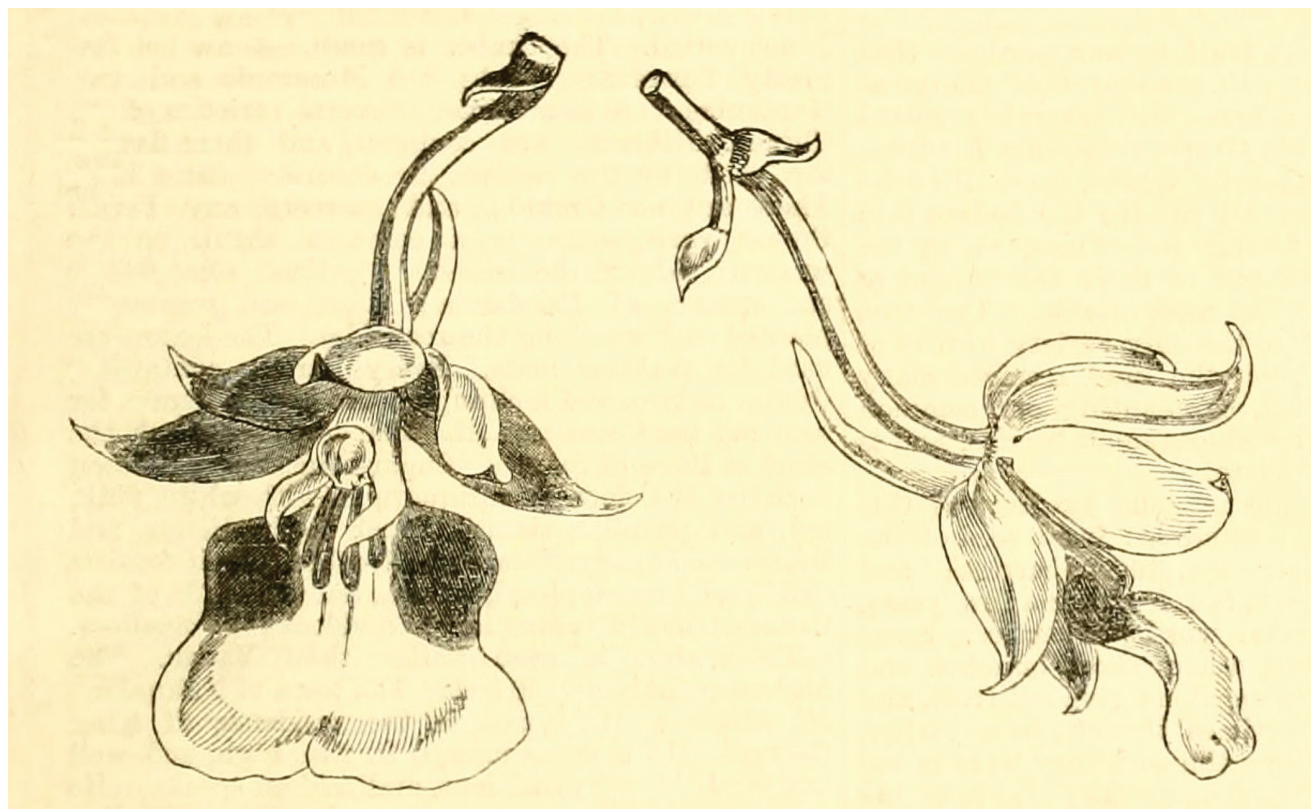


FIGURE 1. Illustration of the flowers of *Trichocentrum albopurpureum* (= *T. albococcineum*) from the plant that served as the type. *The Gardeners' Chronicle & Agricultural Gazette* 1866, page 219 (March 10, 1866).

it as *T. orthoplectron* (Bernal et al., 2016). Reichenbach f. mostly characterized *T. leeanum* by the solid purple lip with a bilobed white blotch at the base (Reichenbach f., 1886). The solid purple phase of *T. albococcineum* is apparently the most common in Peru (Schweinfurth, 1960; Zelenko and Bermúdez, 2009; American Orchid Society, 2018), where populations are usually found along the major rivers that drain the Amazonas. One of us (FP) examined living material from Peru (Fig. 2A) and found the flowers morphologically inseparable from those of populations from the Brazilian Amazonas. We also had the opportunity to study material from Bolivia, close to the border with Brazil (Santa Cruz: Noel Kempff National Park, *D. Ric & R. Vasquez s.n.*, not conserved) (Fig. 2B), and we can record the presence of the solid purple form also in this country.

Reichenbach f. described *Trichocentrum porphyrio* in 1884 from a plant without known origin and grown by Jean Linden, who had it illustrated for the *Illustration Horticole* (Reichenbach f., 1884) (Fig. 3). Even though the plant that served as the type has a distinctly obovate-subpandurate lip, the shape of the column and the purple coloration of the lip, blotched of whitish yellow at the base, are consistent with the solid purple phase of *T. albococcineum*. The flower analysis of *T. porphyrio* in Pabst and Dungs (1977: 315, fig. 2102) was probably traced from the original illustration, so the occurrence of a *Trichocentrum* species with these characters in the Brazilian Amazonas is questionable.

Upon a second examination, we thought that the concept of *Trichocentrum orthoplectron* deserves being treated as

a separate species. Reichenbach f. described the species in 1883 on the basis of another plant without known origin that he received from William Lee, who apparently had acquired it from the nurseries of Frederick Sander at St. Albans, Hertfordshire, England. The most prominent collectors working in South America for Sander were Benedict Roezl (1823–1885), who explored all the Andes from Colombia to Peru, and his nephews Eduard Klaboch (fl. 1870s) and Franz Klaboch (died 1879), who mainly collected in northern Andes (Cribb, 2010). Nevertheless, the firm of Sander came to employ over 20 collectors at the same time to search for new orchids in Asia and tropical America (Swinton, 1970), so that any attempt to guess the origin of the plant on the basis of Sander collectors' histories would be futile. Reichenbach f. compared *T. orthoplectron* with his *T. ionophthalmum* (= *T. albococcineum*), distinguishing it by cuneate petals (vs. hastate), the uncinat wings of the column, the “nearly obliterated” keels at the base of the lip, and the straight, not sigmoid spur shorter than the column. The drawing of the type kept in Vienna (W-R 42226) clearly shows the subquadrate lip and the “five [deep crimson-lake] stripes ... in lieu of genuine keels” described in the protologue (Fig. 4–5). The light cinnamon-colored sepals and petals are covered with cinnamon spots at the apex (Fig. 5). A photograph of a flower very nearly approaching the possible concept of *T. orthoplectron* was published electronically by Jean Claude George at Orchidorama (George, 2006) (Fig. 6). Even though no information about the original locality was available, the depicted flower shows

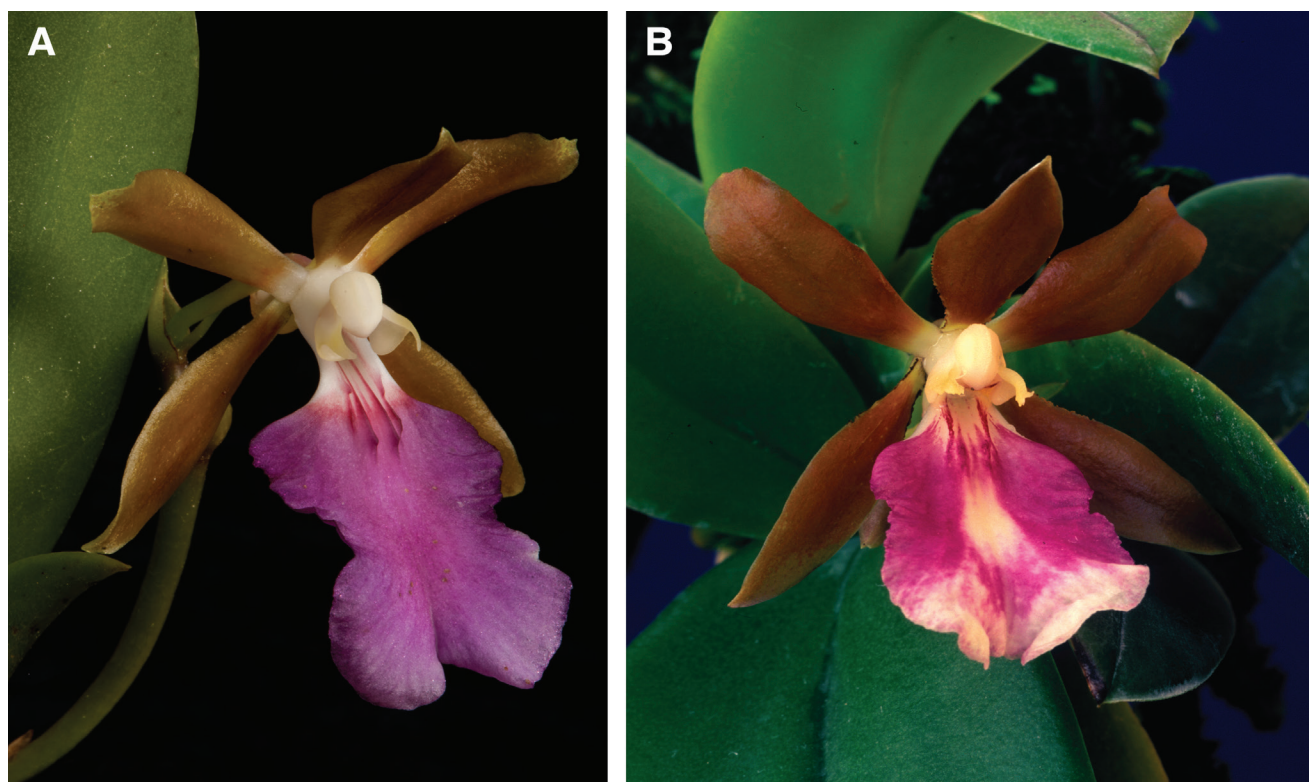


FIGURE 2. Flowers of *Trichocentrum albococcineum*. **A**, Peru: without specific locality, photographed in the orchid collection of Ecuagenera, Gualaceo, Ecuador, Oct. 2017; **B**, Bolivia: Parque Nacional Noel Kempff, border with Brazil, Jan. 1998, *D. Ric & R. Vásquez s.n.* Photographs by F. Pupulin.

the very low keels at the lip base, the uncinat wings, and the finely spotted sepals and petals matching Reichenbach f.'s description and drawing. Under the name of *T. orthoplectron*, Pabst and Dungs (1977: fig. 2101) presented the analysis of a flower that also corresponds quite closely to the concept of the species according to Reichenbach f. The Brazilian origin of the illustrated specimens was however dubious. The plant illustrated by John Nugent Fitch for Warner and Williams's *Orchid Album* (1887: pl. 272), under the name *T. orthoplectron*, represents instead a specimen of *T. albococcineum* with solid purple lip.

During the activities aimed at an inventory of the orchid flora of the surroundings of Amboró National Park and Integrated Management Natural Area in Santa Cruz, Bolivia, specimens of a unidentified species of *Trichocentrum* were collected, and studied upon flowering. The taxon is hereafter described as a species new to science:

Trichocentrum moreniorum Pupulin & Moreno-Pareja, *sp. nov.*

TYPE: Bolivia. Santa Cruz: Ichilo, Buena Vista, 17°28'S, 63°40'W, 400 m, epiphytic on *Albizia saman* (Fabaceae) tree, September 2013, flowered in cultivation in Santa Cruz de la Sierra, 22 February, 2017, *A. Moreno-Pareja s.n.* (Holotype: Herbario Germán Coímbra Sanz of the Jardín Botánico Municipal de Santa Cruz de la Sierra [HGCS, acronym not registered] [5600]). Fig. 7–8.

Species Trichocentro orthoplectro Rehb.f. *affinis sed sepalis petalisque non brunneo-punctatis, callo quinque*

lamellis erectis tenuibus altis e basi ad medium laminae labelli extensis duobusque dentibus brevis lateralibus formato, alis columnae triangularis truncatis apicaliter paulo denticulatis plerumque recedit.

An epiphytic, caespitose, suberect to pendent *herb* with short rhizome, forming clumps to 15–20 cm tall. *Roots* flexuous, thick, 2–3 mm diam., white with green tips, produced on the rhizome under the attachment of the pseudobulbs. Pseudobulbs obsolete, cylindrical-ellipsoid, ca. 6 × 4 mm, covered by 2–3 triangular, papyraceous sheaths to 7 mm long, monophyllous. *Leaves* fleshy, sessile, lanceolate, acute, abaxially minutely mucronate, curved, conduplicate at the base, 8.5–14.5 × 2.1–3.0 cm, green. *Inflorescence* lateral, a pendent, successive-flowered (up to at least 4 flowers) raceme shorter than the leaves, to 5 cm long; peduncle terete, to 3 cm long, with a papyraceous, brown, clasping, ovate bract ca. 5 mm long; rachis strongly flexuose. *Floral bracts* triangular-ovate, acute to acuminate, glumaceous, becoming dry-papyraceous when old, ca. 10 × 4 mm. Pedicellate *ovary* terete-subclavate, ca. 2.5 cm long, the ovary portion ca. 6–7 mm long. *Flowers* spreading; sepals and petals yellow, boldly blotched with light chestnut brown, the claw and the apex yellow; lip white, tinged with rose on the basal margins; ridges of the callus lined with purple, fading into a yellow blotch in front, up to the point where they merge to the blade; the column white, marked with 2 bright yellow blotches and a few purple strikes in the substigmatic area. *Dorsal sepal* elliptic, obtuse, apiculate, strongly conduplicate at apex, 10.0 × 4.5 mm. *Lateral sepals* obliquely oblanceolate,



FIGURE 3. Illustration of the type plant of *Trichocentrum porphyrio* (= *T. albococcineum*). L'Illustration Horticole 31: t. 508, 1884.

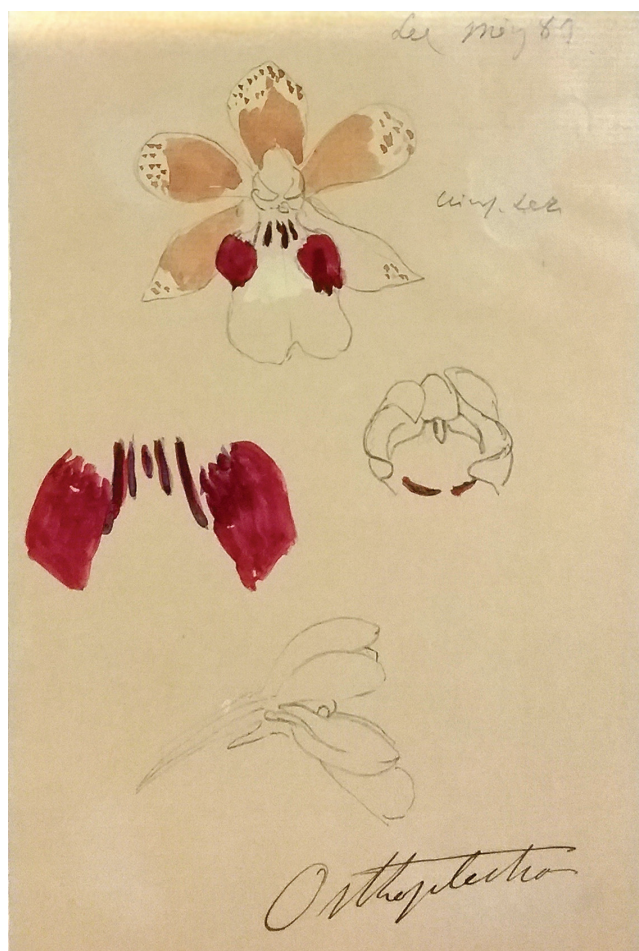


FIGURE 5. Detail of Reichenbach f. sketch of the type flower of *Trichocentrum orthoplectron* (W-R 42226). Courtesy of the Naturhistorisches Museums, Wien.

subacuminate, asymmetrical, 11×4 mm. *Petals* oblanceolate-elliptic, subobtuse to acute, strongly conduplicate at apex, 9.0×4.5 mm. *Lip* obovate-subcircular from a cuneate base, adnate to the base of the column, rounded and deeply notched at apex, the margins irregularly crenulate, waved, the apical portion deflexed, 14×12 mm excluding the spur, extended at the base into a conic, downcurved, internally papillose-hirsute spur, 8 mm long, 2 mm diam. at the base; callus on the disc composed by 2 lateral, acute, hirsutiuscule, elevated teeth running on the rear into the entrance of the spur, and 5 elevated, narrow, velutine keels, abruptly subtruncate before decurring into the lamina, the external ones longer, running to about the midpoint of the blade, radiating toward the apex, the central one shorter, straight. *Column* short, stout, hemiterete, ca. 7.5 mm long, rounded-truncate at the dilated apex, provided with two triangular, acute, incurved wings, the labellar margin subsigmoid, ca. 4 mm long. *Anther cap* elliptic, rounded-cucullate, finely hirsutiuscule, 2 celled, white; the anther incumbent, the stigma ventral, transversely broadly elliptic, large. *Pollinia* 2, ovate, complanate, ca. 1.0×0.7 mm, on a triangular, subtruncate stipe, the apical margins of the stipe incurving after the removal, dorsiventrally superposing the pollinia; viscidium elliptic, large, brown. *Fruit* not seen.

Eponymy: dedicated to the brothers Luis René and Oscar Moreno Suárez, from Santa Cruz, Bolivia, for their contribution to the study and knowledge of Bolivian orchids.

Distribution: known only from Bolivia.

Habitat and ecology: collected in urban area, growing epiphytically over *Albizia saman* and also observed over *Enterolobium contortisiliquum* (Fabaceae) trees in Buena Vista and surroundings, north of Amboró National Park and Integrated Management Natural Area, a region of convergence of Amazonian, Chaco, and Andean biomas; altitude 400 m; mean temperature 24.3°C ; annual average rainfall 2.563 mm.

Phenology: flowers from December to April.

Trichocentrum morenorum is a close ally of *T. albococcineum* and *T. orthoplectron*, with which it shares the short spur and the triangular column wings. It differs from both by the apically truncate, erose column wings (vs. pointed, entire). It is more similar to *T. orthoplectron*, with which it shares the sessile lip with a subquadrate blade, and the base of the column wing provided with a gibbous, rounded protuberance, but from which it is distinguished by the prominent, high keels running from the base to the middle of the lip blade (vs. obscure keels, restricted to the base of the lip). It is distinct from *T. albococcineum* mainly by the sessile lip (vs. clawed), provided with a subquadrate lamina (vs. rectangular-obovate, pandurate). *Primo visu*, *T. morenorum* is also very similar to *Trichocentrum fuscum* Lindl., but the short spur and the different column immediately distinguish the two taxa.



FIGURE 6. Flower of *Trichocentrum orthoplectron* (as *Trichocentrum albobuppureum*). Without collecting data. Photograph by J. C. George.

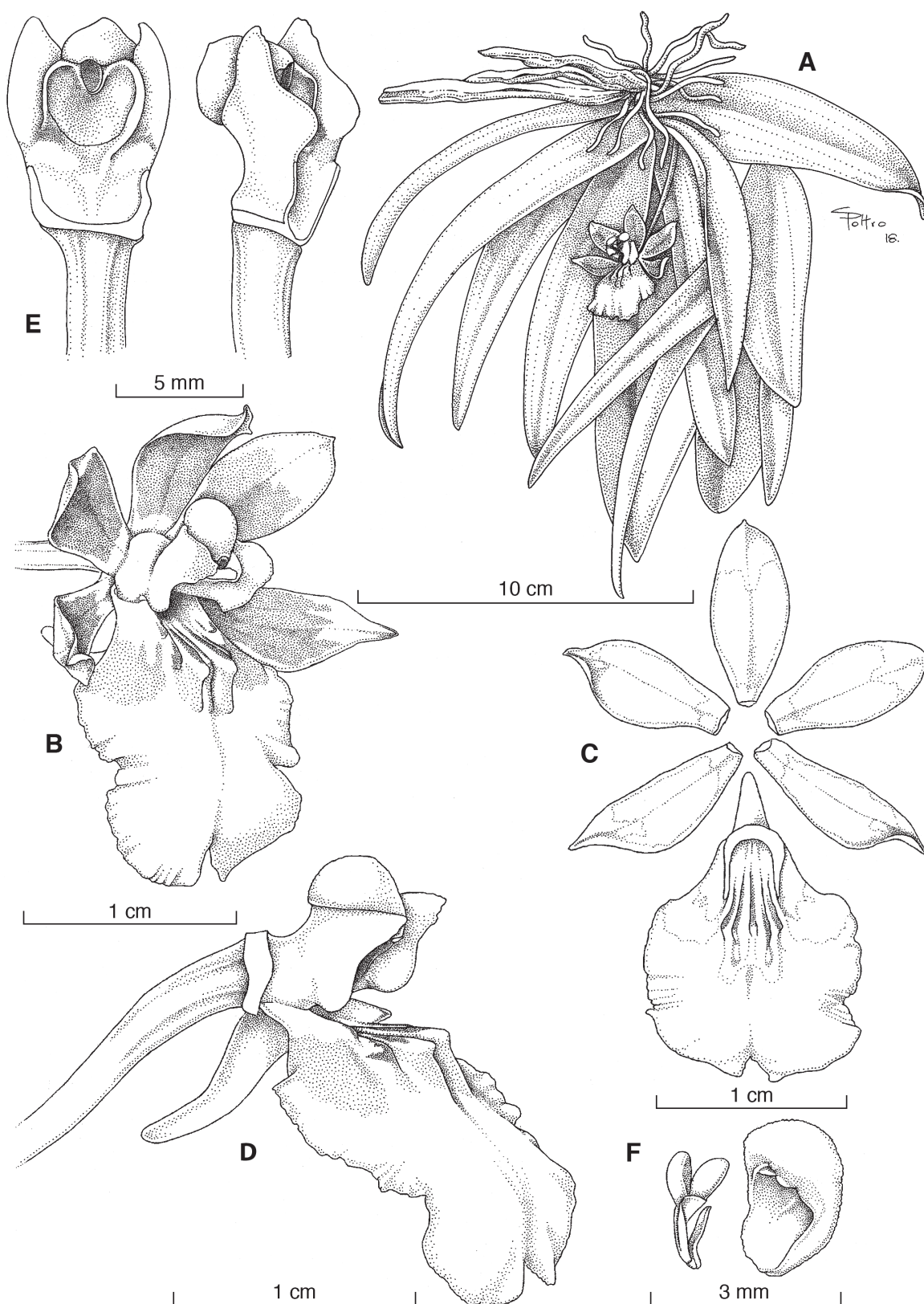


FIGURE 7. *Trichocentrum moreniorum*. A, habit; B, flower; C, dissected perianth; D, column and lip, three-quarters view; E, column, ventral and lateral views; F, pollinarium and anther cap. Illustration by F. Pupulin and S. Poltronieri.

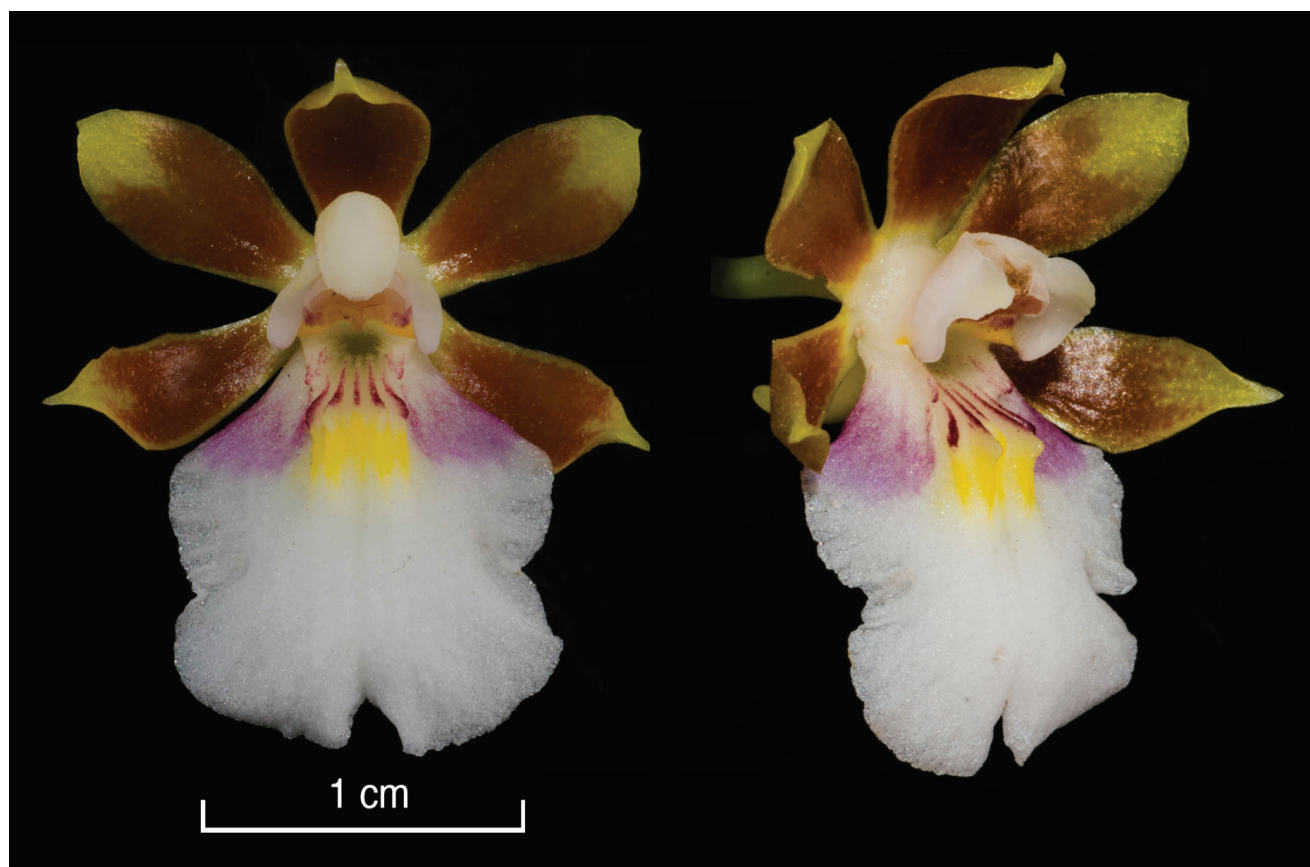


FIGURE 8. *Trichocentrum moreniorum*. Flowers from the holotype. Photographs by Cesar David Salazar.

KEY TO THE SPECIES OF THE *TRICHOCENTRUM FUSCUM* GROUP

- 1a. Spur shorter than the blade of the lip; wings of the column triangular, pointed 2
- 1b. Spur distinctly longer than the blade of the lip; wings of the column trapezoidal to dolabriform, rounded 4
- 2a. Lip clawed, the blade obovate-pandurate, gradually expanding from the cuneate claw; spur longer than the column *T. albococcineum*
- 2b. Lip sessile, the blade quadrate, abruptly expanding from the base; spur shorter than the column 3
- 3a. Keels at the base of the lip high, running to the middle of the blade; column wings straight, apically truncate, erose *T. moreniorum*
- 3b. Keels at the base of the lip low, obscure, restricted to the base of the blade; column wings uncinat, apically attenuate, entire *T. orthoplectron*
- 4a. Disc of the lip with 2 keels *T. popowianum*
- 4b. Disc of the lip with 4 or more keels 5
- 5a. Sepals and petals rose; the lip subquadrate *T. tenuiflorum*
- 5b. Sepals and petals pale chestnut brown, mostly faded light cinnamon toward the apex; the lip white, variously striped and/or blotched with purple; the lip obovate oblong or pandurate 6
- 6a. Flowers campanulate, not completely spreading 7
- 6b. Flowers with the perianth spreading 8
- 7a. The apex of the spur up-curved, hooked *T. recurvum*
- 7b. The spur sinuous, not apically hooked *T. panduratum*
- 8a. Spur about twice as long as the labellum *T. wagneri*
- 8b. Spur as long as the labellum or shorter 9
- 9a. Labellum obovate-oblong *T. purpureum*
- 9b. Labellum pandurate *T. fuscum*

LITERATURE CITED

- AMERICAN ORCHID SOCIETY. 2018. *Trt. albococcineum* 'Peru' CHM/AOS. Retrieved at: <http://www.aos.org/orchids/orchids-a-to-z/letter-t/trichocentrum.aspx>, (consulted June 2018).
- BARBOSA RODRIGUES, J. 1877. *Genera et species Orchidearum novarum quas collegit, descripsit et iconibus illustravit...1*. Imprimerie de C. et H. Fleiuss, Sebastianopolis.
- . 1882. *Genera et species Orchidearum novarum quas collegit, descripsit et iconibus illustravit...2*. Imprimerie de C. et H. Fleiuss, Sebastianopolis.
- BERNAL, R., S. R. GRADSTEIN, AND M. CELIS (eds.). 2016. *Catálogo de plantas y líquenes de Colombia. Volumen II. Magnoliaceae a Zygophyllaceae—Especies introducidas y cultivadas*. Universidad Nacional de Colombia, Bogotá.
- CETZAL-IX, G. CARNEVALI, AND G. ROMERO-GONZÁLEZ. 2016. Synopsis of the *Trichocentrum* clade (Orchidaceae, Oncidiinae). *Harvard Papers in Botany* 21(2): 141–169.
- CHASE, M. W. 2009. Subtribe Oncidiinae. Pages 211–220 in A. M. PRIDGEON, P. J. CRIBB, M. W. CHASE, AND T. N. RASSMUSSEN, EDS., *Genera Orchidacearum*. Vol. 5. Epidendroideae. Part II. Oxford University Press, Oxford.
- CRIBB, P. 2010. The orchid collections and illustrations of Consul Friedrich C. Lehmann. *Lankesteriana* 10(2–3): 1–217.
- GEORGE, J. C. 2006. *Trichocentrum alboburpureum* (=albococcineum). Retrieved: <http://orchidorama.free.fr/04-juillet-d%E9cembre/Trichocentrum%20albo-coccineum04.JPG> (consulted June 2018).
- HOOKE, J. D. 1868. *Trichocentrum albo-purpureum*. *Botanical Magazine* 94 (Ser. 3, 24): sub pl. 5688.
- LINDEN, J. 1865. Introductions nouvelles de M. J. Linden, a Bruxelles. *Belgique Horticole* 15: 98–104.
- NEUBIG, K. M., W. M. WHITTEN, N. H. WILLIAMS, M. A. BLANCO, L. ENDARA, J. G. BURLEIGH, K. SILVERA, J. C. CUSHMAN, AND M. W. CHASE. 2012. Generic recircumscriptions of Oncidiinae (Orchidaceae: Cymbidieae) based on maximum likelihood analysis of combined DNA datasets. *Botanical Journal of the Linnean Society* 168: 117–146.
- ORTIZ, P. 1995. *Orquídeas de Colombia*. 2a ed. Corporación Capitalina de Orquideología, Bogotá.
- PABST, G. F. AND F. DUNGS. 1977. *Orchidaceae Brasilienses Band II*. Schmersow, Hildesheim, Germany.
- PUPULIN, F. 1995. A revision of the genus *Trichocentrum* (Orchidaceae: Oncidiinae). *Lindleyana* 10: 183–210.
- . 1998. New species of *Trichocentrum* (Orchidaceae) from the Andes with a realignment of the *Trichocentrum pulchrum* group. *Novon* 8: 283–287.
- REICHENBACH F., H. G. 1866. New plants. *Gardeners' Chronicle* 1866: 218–219.
- . 1876. New garden plants. *Gardeners' Chronicle* n.s. 6: 218–219.
- . 1884. *Trichocentrum porphyrio*. *L'Illustration Horticole* 31: 9, pl. 508.
- . 1886. *Orchideae describuntur*. *Flora oder Botanische Zeitung* 69: 547–562.
- SCHWEINFURTH, C. 1960. Orchids of Peru. Part 3. *Fieldiana, Botany*, 30(3).
- SWINTON, A. 1970. *Frederick Sander: The Orchid King*. Hodder and Stoughton, London, England.
- WARNER, R. AND B. S. WILLIAMS. 1887. *The Orchid Album. Comprising Coloured Figures and Descriptions of New, Rare, and Beautiful Orchidaceous Plants*. Vol. 6. Victoria and Paradise Nurseries, London.
- WILLIAMS, N. H., M. W. CHASE, T. FULCHER, AND W. M. WHITTEN. 2001. Molecular systematics of the Oncidiinae based on evidence from four DNA sequence regions: Expanded circumscriptions of *Cyrtorchilum*, *Erycina*, *Otoglossum*, *Trichocentrum*, and a new genus (Orchidaceae). *Lindleyana* 16: 113–139.
- ZELENKO, H. AND P. BERMÚDEZ. 2009. *Orchids: Species of Peru*. ZAI Publications, Quito, Ecuador.