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Research

The genus *Myrosmodes* (Orchidaceae: Cranichidinae) in Argentina

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Descriptions, brief taxonomic notes and data on the ecology of the two species of *Myrosmodes* known from Argentina (*M. gymnandra* & *M. paludosa*) are provided. In addition, an identification key to *Myrosmodes* species known from the south–central Andes is given. The descriptions are complemented with illustrations and distribution maps.

Introduction

Myrosmodes Rchb.f. (Orchidaceae, Cranichidinae) comprises 12 species restricted to the high-mountains of the tropical and subtropical Andes (from Venezuela to Argentina and Chile), between 3100 and 5000 m a.s.l., which is the upper altitudinal limit of Andean orchid distributions (Mytnik-Ejsmont et al. 2012, Szlachetko et al. 2014, Trujillo et al. 2016, WCSP 2017). This genus comprises small geophytic plants found in Páramo, in high Andean bogs or swamps, and in the Puna ecoregion (Rundel 1994, Szlachetko et al. 2014).

Throughout its taxonomic history, the systematic status of *Myrosmodes* has been controversial (Trujillo et al. 2016). This genus was originally described by Reichenbach (1854), but was later synonymized under *Altensteinia* Kunth (1815) by himself (Reichenbach 1878). The taxonomy of these taxa remained uncertain for many years, until Schlechter's works (1912, 1920a, 1920b) that placed the species of *Myrosmodes* in either *Altensteinia* or *Aa*. Later, both *Aa* and *Myrosmodes* were synonymized under *Altensteinia* by Schweinfurth (1958), but the genus *Myrosmodes* was again revalidated by Garay (1978) and in recent literature these three genera are all recognized (Ortiz 1995, Vargas 1995, Trujillo and Vargas 2011, Novoa et al. 2015, Trujillo et al. 2016). Trujillo and Vargas (2011) suggested separating *Myrosmodes* from *Aa* and *Altensteinia* by having a short peduncle with infundibuliform scarious sheaths, a cucullate lip with moniliform hairs, a basipetal inflorescence with an accrescent peduncle and for being andromonoecious plants with male and hermaphrodite flowers of different sizes.



In addition, phylogenetic studies show that *Myrosmodes* is the sister group of *Aa* and both genera seem to be closely related to *Altensteinia* (Salazar et al. 2009, Álvarez-Molina and Cameron 2009).

The species of *Myrosmodes* from the Northern and Central Andes have been widely studied (Schlechter 1921, Ortiz 1995, Vargas 1995, Trujillo and Vargas 2011, Mytnik-Ejsmont et al. 2012, Szlachetko et al. 2014, Novoa et al. 2015, Trujillo et al. 2016), while the species from the southern Andes have never been the subject of taxonomic study. The recognition of the species is complicated by the fact that many species have similar vegetative characteristics and the flowers are tiny (Trujillo et al. 2016).

In this contribution, we confirm the occurrence of two species of *Myrosmodes* in Argentina and the southernmost distribution of this genus in South America. We provide morphological descriptions, taxonomic notes, and data on the ecology of the Argentinian species. Also, a taxonomic key of the South-Central Andean species, illustrations and distribution maps for Argentina are provided.

Methods

We examined specimens from the herbaria CORD, BA, LIL, SI, and digital images of specimens from AMES, BR, G, GH, GOET, K, MPU, NY, P, S-R and W available at the JSTOR website (<<http://plants.jstor.org>>), and at the websites of the mentioned herbaria. All specimens were compared with the type specimens, diagnoses, and original illustrations.

Morphological attributes were obtained by direct observation using a stereoscopic microscope. The morphological descriptions follow Font Quer (1953), Harris and Harris (2001), Beentje (2010), and AOS (2016).

Results

Historical treatment

Many specimens housed in the consulted herbaria had been identified as *Aa paludosa* (Rchb.f.) Schltr., but careful examination demonstrated that they actually belong to *Myrosmodes gymnandra* (Rchb.f.) C. A. Vargas and *Myrosmodes paludosa* (Rchb. f.) P. Ortiz.

The first record of *Aa paludosa* [now *Myrosmodes paludosa*] from Argentina was published by Hauman (1920), based on Jörgensen 1598 (LIL, SI!) from Catamarca and Hauman s.n. (BA!) from Jujuy. Trujillo et al. (2016) suggested that these specimens are *M. gymnandra*, and subsequently restricted the distribution of *M. paludosa* to Peru and Bolivia. Our observations confirmed that the material from Catamarca and Jujuy cited by Hauman (op. cit.) are, in fact, *M. gymnandra*. However, a first well-identified record of *M. paludosa* [= *Aa paludosa*] was given by Correa and Sánchez (2009) on the basis of the specimen Hunziker and Caso 4881 (BAB) from San Juan.

Finally, many specimens of *M. gymnandra* have been erroneously identified and cited as *Aa paludosa* in different Argentinian works (Williams 1939, Correa 1996, Novara 2003, Schinini et al. 2008, Cantero et al. 2015).

In order to clarify the identity of the Argentinian species of *Myrosmodes*, we map the occurrence of *M. gymnandra* and *M. paludosa* in this country, and include other similar species of *Myrosmodes* from south–central Andes in the following taxonomic treatment:

Key to *Myrosmodes* species from the South-Central Andes

1. Lip entire, midlobe absent *M. paludosa*
– Lip three-lobed, with conspicuous midlobe 2
2. Floral bracts with the upper margin crenulate; dorsal sepal oblong to oblong-elliptic or ligulate-obovate; petals with the upper margin lacerate-fimbriate *M. nubigena*
– Floral bracts with the margin entire or somewhat irregular; dorsal sepal panduriform; petals with the upper margin entire or erose 3
3. Lateral sepals oblong; petals lanceolate, with the upper margin irregular or slightly erose *M. gymnandra*
– Lateral sepals broadly linear and wider toward the apex; petals narrowly linear, with the upper margin entire *M. nervosa*

Myrosmodes gymnandra (Rchb.f.) C.A. Vargas, in Trujillo and Vargas (2011, p. 5) (Fig. 1)

Basionym: *Altensteinia gymnandra* Rchb.f. (1878, p. 18).

Based on the same type: *Aa gymnandra* (Rchb.f.) Schltr. (1912, p. 150).

Type: Bolivia. Larecaja, G. Mandon s.n. (holotype: W-23376).

Taxonomic synonyms: *Aa weberbaueri* Schltr. (1921, p. 53), based on the same type as *Altensteinia weberbaueri* (Schltr.) C. Schweinf. (1953, p. 2) and *Myrosmodes weberbaueri* (Schltr.) C.A.Vargas (1995, p. 6). **Type:** Peru. Lima [Junín], near Jauli [Yauli], 4400 m a.s.l., alpine mats of the Hacienda Arapa, A. Weberbauer 283 (holotype: B, destroyed).

Description

Plants 7.0–18.5 cm tall. Leaves 3–4 × 1.2–1.8 cm. Scape 7.3–11.6 cm long, covered by broad and hyaline sheaths 2.5–4.2 × 1.1–1.5 cm, with obtuse or mucronate apices. Inflorescences 5.3–6.5 cm long, a conic to cylindrical spike. Floral bracts 1.0–2.2 × 1.0–1.8 cm, shorter than the flowers, suborbicular-ovate, obtuse to rounded at apex, with entire margins. Flowers non-resupinate, small, greenish to white, hyaline. Dorsal sepal 8–11 × 2.0–2.5 mm, panduriform, straight, with obtuse or rounded apex, adnate to the column near the base; lateral sepals 8–12 × 3.0–4.5 mm, oblong, with obtuse to sub-acute apex, sometimes with a slightly erose margin at the apex, connate at the base. Petals

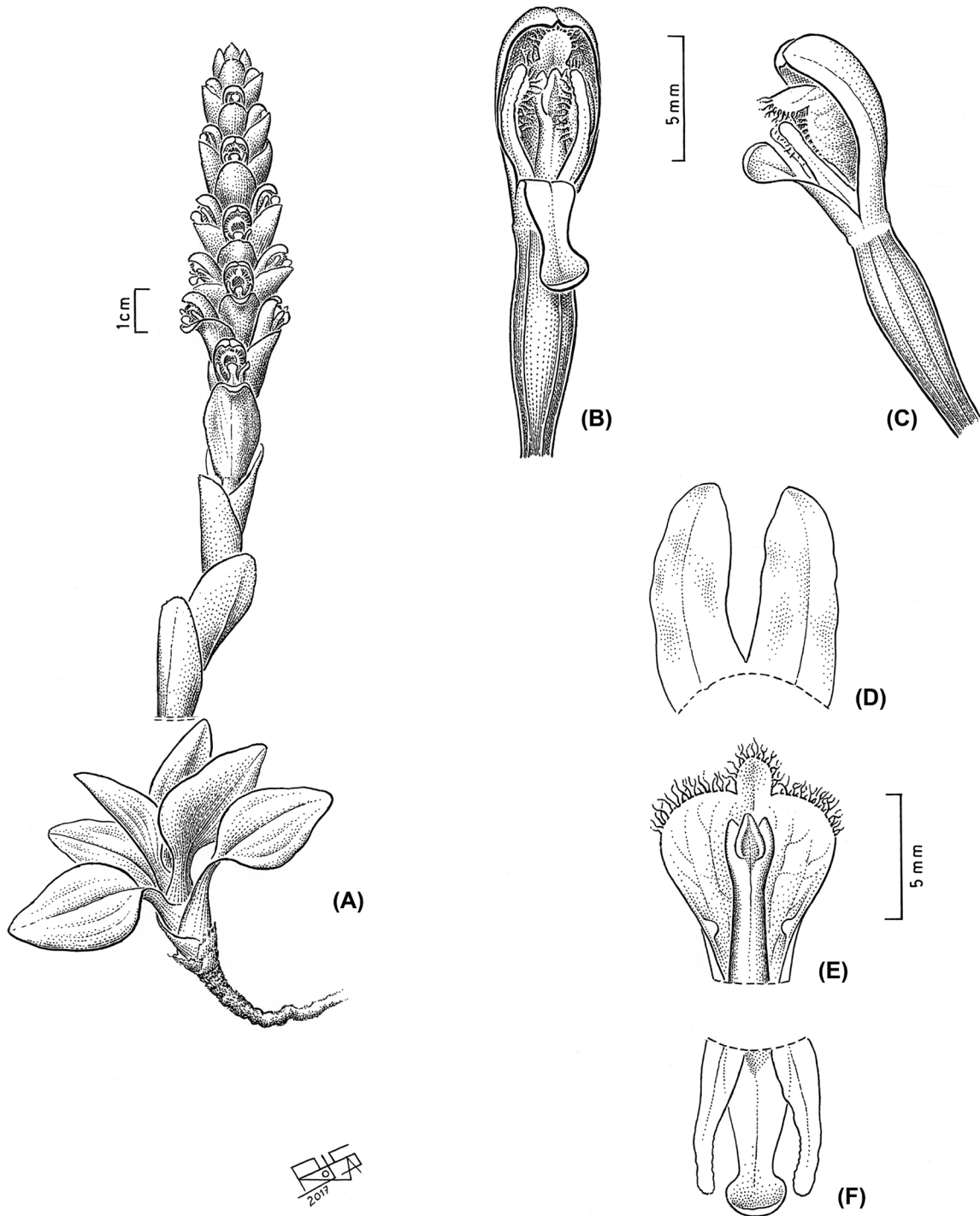


Figure 1. *Myrosmodes gymnantra*. (A) plant [from Jörgensen 1598 (SI)], (B) flower, frontal view, (C) flower, lateral view, (D) lateral sepals, (E) lip and column, (F) dorsal sepal and petals [from Barboza and Cantero 3886 (CORD)].

4.0–5.5 × 0.8–1.1 mm, straight, lanceolate, rounded to sub-acute at apex, at apex with an irregular or slightly erose margin; lip 6.0–9.8 × 5.5–9.5 mm, broadly ovate, cucullate, with slightly lacinate margin at the base, 3-lobed; midlobe 1–2 × 0.8–2.3 mm, with moniliform hairs at apex and two calli at the base; column erect, 3.0–7.8 mm long; rostellum emarginate to obtuse. Ovary 6–10 mm long, ellipsoid.

Phenology

Flowering plants have been recorded from December to March. Fruiting has been recorded in March.

Distribution

Myrosmodes gymnantra is known from Peru, Bolivia and Argentina. The few specimens from Argentina are from the

high Andes of the Catamarca, Jujuy, Tucumán and La Rioja provinces (Fig. 3). The species grows at about 3500–3800 m a.s.l. in peat bogs, swamps, flooded vegas and on the edge of streams of the Altoandina and Puna phytogeographical provinces.

Additional specimens examined

Argentina. Catamarca: Andalgalá, en vertientes Cerro Medanitos, 3500 m a.s.l., 3 Mar 1916, Jørgensen 1598 (SI). Santa María, Sierra Aconquija, Real de los Ojos de Agua-Quebrada El Zarzo, 3980 m a.s.l., 18 Dec 1933, Peirano s.n. (LIL). Jujuy: Yavi, La Quiaca, Feb 1916, Hauman s.n. (BA), Tucumán: [Tafi], entrada a Ciénaga Grande, camino de Infiernillo a Huaca Huasi-Cuambres Calchaquies, 3750 m a.s.l., 23 Feb 1979, Halloy A.683 (LIL). Infiernillo, Quebrada del Barón, 3800 m a.s.l., 3 Feb 1955, Sparre s.n. (LIL). La Rioja: Famatina, Ciénaga de la Cueva del Tocino (punto 198), 28°49'53"S, 67°50'42"W, 3695 m a.s.l., 1 Mar 2013, Barboza and Cantero 3886 (CORD).

***Myrosmodes paludosa* (Rchb. f.) P. Ortiz (1995, p. 286) (Fig. 2)**

Basionym: *Altensteinia paludosa* Rchb. f. (1878, p. 19).

Based on the same type: *Aa paludosa* (Rchb.f.) Schltr. (1912, p. 150). – *Myrosmodes paludosa* (Rchb. f.) C. Vargas (1995, p. 6, nom. illeg.)

Syntypes: Bolivia. Provincia Larecaja: Viciniis Sorata; Gualata, Cabezas de Chilcani: Vancuiré, in paludosis. Reg. alpine, 3600–4400 m a.s.l. Oct 1857–Apr 1858, G. Mandon 1169 (W-0065292 p.p.!, MPU-017164!) – Provincia Larecaja: Gualata, apachatas de Lacatia, de Chuchu, in paludosis. Reg. alpine 3700–4500 m a.s.l. Oct 1857–Apr 1858, G. Mandon 1169 (G-00168828!, GH-00000159!, K-000364532!, MPU-017165, mixed with *Aa* specimen!, NY-00008571!, P-00326294!, P-00326295!, S-R-218!, W-0065292p.p.!, W-0017504!) – Provincia Larecaja: Gualata, in jugis paludosis, 4200 m a.s.l., 19 Apr 1858, G. Mandon 1169 (BR-0000009973312, mixed with *Aa* specimen!, GOET-008362, mixed with *Aa* specimen!, NY 00008572!).

Taxonomic synonyms: *Aa pumilio* Schltr. (1921, p. 52), based on the same type as *Myrosmodes pumilio* (Schltr.) C.A. Vargas (1995, p. 6). **Type:** Peru. High Andes above Lima, 4500–4600 m a.s.l., Mar–Apr 1905, A. Weberbauer 5173 (holotype: B, destroyed).

— *Altensteinia inaequalis* Rchb.f. (1878, p. 19), based on the same type as *Aa inaequalis* (Rchb.f.) Schltr. (1912, p. 11) and *Myrosmodes inaequalis* (Rchb.f.) C. A. Vargas in Trujillo and Vargas (2011, p. 5). **Type:** Peru. Puno, Macusani in puna brava, June 1854, W. Lechler 1950 (holotype: W-23375, isotype: W, AMES-38004, G 00168908!, G 168909!, GOET 013941!, P 00326290!).

Description

Plants 2.2–5.0 cm tall. Leaves 2.0–2.4 × 0.8–1.2 cm. Scape 1.5–2.0 cm long, covered by broad, obtuse and hyaline sheaths 1.5–2.4 × 1.0–1.5 cm. Inflorescences 1.8–2.7 cm long, a cylindrical to cylindrical-conic spike. Floral bracts 0.5–1.1 × 0.4–0.8 cm, as long as or a little shorter than the flowers, obloid, with entire margins. Flowers non-resupinate, greenish to white, hyaline. Dorsal sepal 2.0–3.2 × 1.0–1.5 mm, oblong to lanceolate, rounded to subacute at apex, revolute; lateral sepals 3.0–4.2 × 1.2–2.0 mm, broadly oblong, with obtuse to rounded apex, with entire or slightly erose margin at the apex, basally connate. Petals 2.0–3.2 × 0.5–1.1 mm, oblong-lanceolate to linear, revolute, with obtuse to subacute apex, with erose margin at the apex; lips 2–3 × 2.2–3.3 mm, obloid, cucullate, with moniliform hairs along margin, and two calli at the base; column erect, 1.5–2.0 mm long; rostellum narrow emarginate. Ovary 3.0–4.3 mm long, ellipsoid.

Phenology

Flowering plants have been recorded from January to April. Fruiting has been recorded from January to March.

Distribution

Myrosmodes paludosa occur in the Andean highlands of Venezuela, Colombia, Peru, Bolivia, and Argentina (Jujuy, Salta and Tucumán provinces) (Fig. 3). The species grows about 3200–4600 m a.s.l. in peat bogs and swamps of the Altoandina and Puna phytogeographical provinces.

Notes

In the protologue of *Altensteinia paludosa*, Reichenbach (1854) cites two syntypes (McNeill et al. 2012, ICN, Art. 9.5): 1 = “Provincia Larecaja. Viciniis Soratae; Gualata, Cabezas de Chilcani in paludosis. Reg. alpina 3600–4400 Met. Octobri 1857–Aprili 1858. Nr 1169” and Alia Scheda: 2 = “Gualata apachatas de Lacatia, de Chuchu un paludosis. Regio alpina 3700–4500 Met. Octobri 1857–Aprili 1858. Nr. 1169”.

In Reichenbach’s herbarium, housed at W, a single sheet (W-0065292!) was found with two labels of Mandon 1169 which represent the two syntypes described in the protologue. On this sheet, there is no separation of material with the respective collection labels, whereby the original material is considered to be mixed. Clearly, Reichenbach used this material when describing *A. paludosa* since this sheet bears the original description’s drawings of the species made by the author and a stamp with the inscription “HERB. MUS. PALAT. VINDOB. Reichenbach: Herb. Orchid. Nr. 620”. However, another sheet (W-0017504!) was found, which agrees exactly with the collection data provided in the protologue of the syntype ‘2’. In addition, several specimens were found in other herbaria that coincide with the locality and altitude given in the syntype ‘2’.

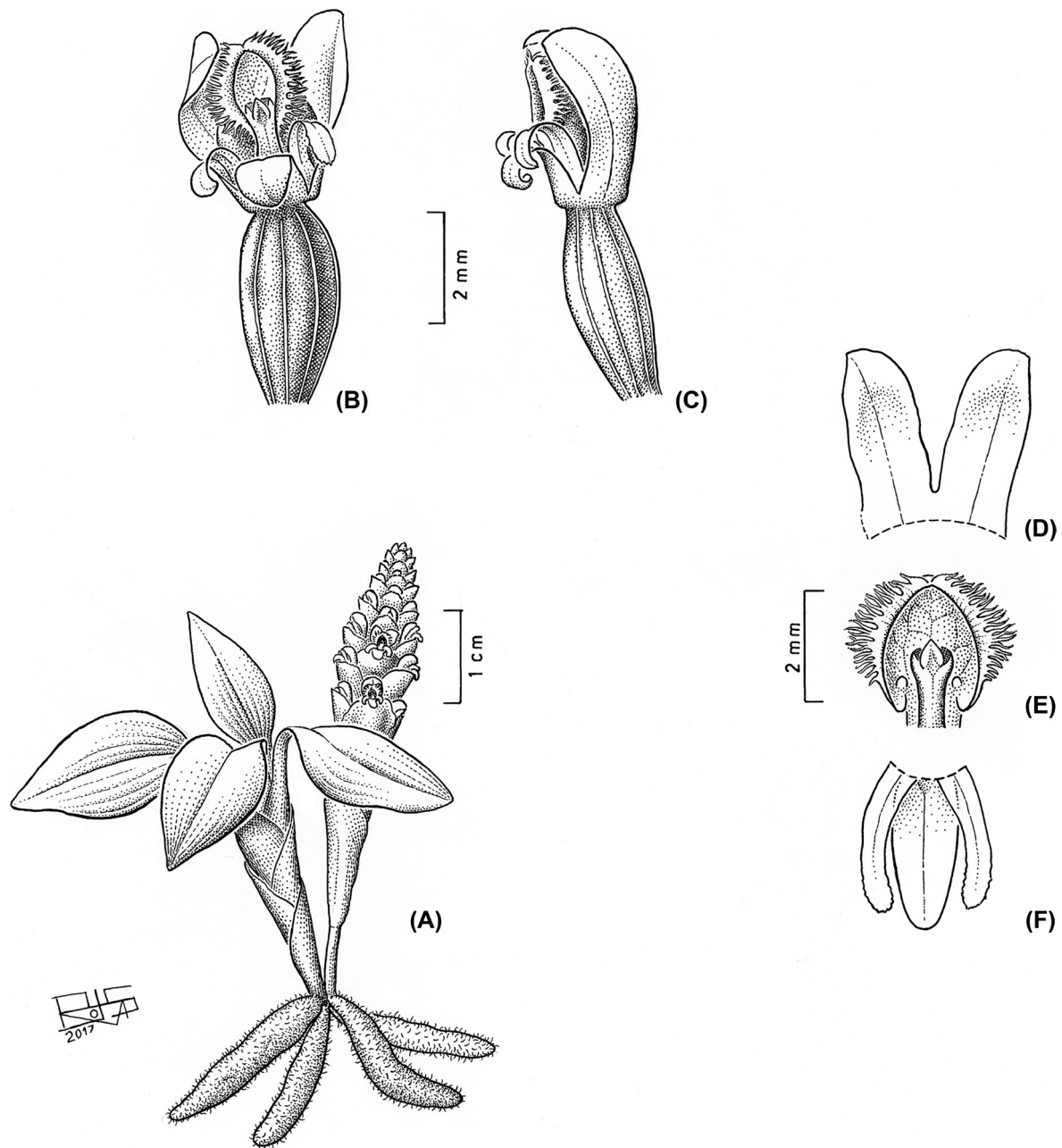


Figure 2. *Myrosmodes paludosa*. (A) plant, (B) flower, frontal view, (C) flower, lateral view, (D) lateral sepals, (E) lip and column, (F) dorsal sepal and petals [from Burkart and Troncoso s.n. (SI-11827)].

Apart from this problem, there are several specimens of Mandon 1169 in different herbaria, which do not precisely agree with the localities, altitudes and dates given for the two syntypes in the protologue: –MPU 017164!, the collection label has the locality given in the syntype ‘1’, with the addition of the locality ‘Vancuire’ and with the altitude described in syntype ‘2’.

–MPU 017165!, the locality is ambiguous, since it cites “Larecaja, prope Sorata, in paludosis”, but by the altitude (‘3700-4500 m’) could be assigned to syntype ‘2’. In addition, this sheet contains a specimen of *Aa* sp. –G 00168828!,

has the location described in syntype ‘2’, but without date or altitude. –GH 00000159!, the locality is ambiguous, as it only cites ‘Larecaja’ but by altitude ‘3700-4500’ it could be assigned to syntype ‘2’.

There are also other specimens that can not be assigned to any of the two syntypes described in the protologue: –BR 0000009973312!, GOET 008362! and NY 00008572!, these three specimens have ambiguous localities and altitudes: “Larecaja: Gualata, in jugis paludosis, alt. 4200”. In addition, the sheets of BR and GOET are mixed with a specimen of *Aa* sp. Finally, there is a collection of Mandon 1169, deposited

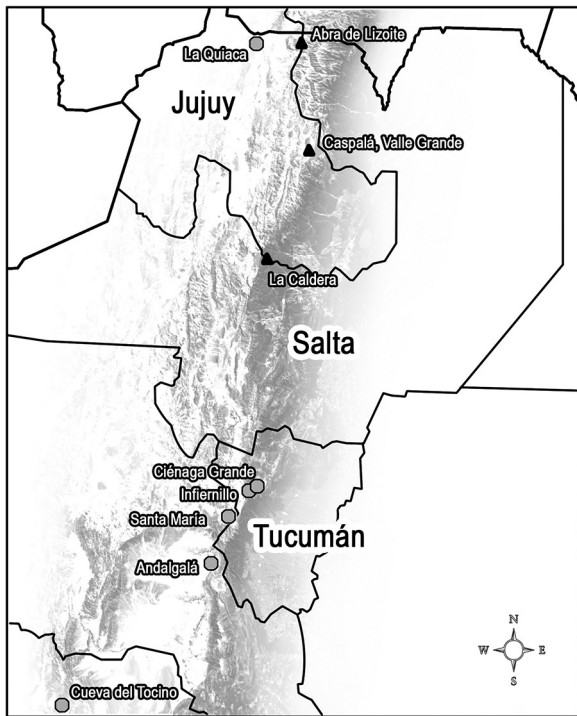


Figure 3. Map of the distribution of *Myrosmodes* species recorded from Argentina. Circle: *M. gymnandra*. Triangle: *M. paludosa* (see localities in material examined).

in G, G 00168829!, which should be excluded from the original material of *Myrosmodes paludosa* [= *Aa paludosa*], since it corresponds to a specimen of *Aa* sp.

Additional specimens examined

Argentina. Jujuy: Valle Grande, Caspalá, césped de las ciénagas, 4500 m a.s.l., 3 Mar 1940, Burkart and Troncoso s.n. (SI). Yavi, Abra de Lizoite, Ruta Provincial no. 5, 4558 m a.s.l., 18 Mar 2003, Cocucci et al. 2693 (CORD). Salta: Capital, La Caldera, subida al Nevado del Castillo, La Ciénaga, fl. Blanca, 3950 m a.s.l., 15 Mar 1952, Sleumer and Vervoort 2909 (LIL, US). Tucumán: Tafí, Calchaquies-Quebrada Honda, 3200–3300 m a.s.l., 24 Jan 1952, Sparre 9282 (LIL) (not shown on the map).

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