THE ANDEAN GENUS *MYROSMODES* (ORNIDACEAE, CRANICHIDAE) IN PERU

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**Abstract.** A revision of *Myrosmodes* from Peru is presented. Seven species are recognized for the country. Each species is described and illustrated on the basis of a revision of type material, protologues and Peruvian specimens. Its distribution within the country is assessed. *Myrosmodes nervosa* is recorded for first time in Peru. New synonyms are proposed: *M. cleefii* is included under *M. nubigena*, *M. inaequalis* and *M. pumilio* under *M. paludosa*, *M. weberbaueri* under *M. gymnandra*, and *M. cochlearis* under *M. rhynchocarpa*. A key to identify the seven recognized species is also provided. A lectotype is designated for *Aa chiogena*.

**Resumen:** Se presenta una revisión de *Myrosmodes* del Perú. Se aceptan siete especies para el país. Se describe e ilustra cada especie con base en la revisión del material tipo, protólogos y material peruano. Se evalúa su distribución en el país. *Myrosmodes nervosa* se registra por primera vez para el Perú. Se proponen nuevos sinónimos: *M. cleefii* es incluido bajo la sinonimia de *M. nubigena*, *M. inaequalis* y *M. pumilio* bajo *M. paludosa*, *M. weberbaueri* bajo *M. gymnandra* y *M. cochlearis* bajo *M. rhynchocarpa*. También se proporciona una clave para identificar las especies reconocidas. Se designa un lectotipo para *Aa chiogena*.

**Keywords:** *Myrosmodes*, High Andean, orchids, lectotype

Reichenbach (1854) described *Myrosmodes* based on *Myrosmodes nubigena* Rchb.f. In subsequent works, the genus was considered as a synonym of *Altensteinia* Kunth (Reichenbach 1878, Schweinfurth 1958) or *Aa* Rchb.f. (Schlechter 1912, 1920a, 1920b, 1921, 1922). After one century of confusion, Garay (1978) reinstated *Myrosmodes*, transferring some species of *Aa* and *Altensteinia* to *Myrosmodes* and describing a new species. Since then, more species were transferred to *Myrosmodes* (Ortiz 1995, Vargas 1995, Trujillo & Vargas 2011, Novoa et al. 2015). At the moment, without considering the heterotypic synonyms, 17 names are referable to *Myrosmodes*.

*Myrosmodes* is distinguished from *Aa* and *Altensteinia* based on morphological characters (Trujillo & Vargas 2011). Notwithstanding, species determination could be problematic, particularly in herbaria. The difficulties are mainly because species have uniform vegetative features, exhibit quite similar tiny flowers except for some features able to be seen only under the stereomicroscope. Also, original descriptions of some species have limited diagnostic features and several type specimens were destroyed during the Second World War.

Molecular phylogenetic analysis conducted by Álvarez-Molina & Cameron (2009) indicates that *Myrosmodes* and *Aa* belong to the *Altensteinia* clade (Cranichideae), together with the predominantly Andean genera: *Altensteinia*, *Gompichis* Lindl., *Porphyrostachys* Rchb.f., and *Stenoptera* C.Presl. The study also indicates that *Myrosmodes* may be embedded within *Aa*; however, as pointed out by the authors, a better sampled phylogenetic analysis is needed to clarify the generic limits.

The present contribution aims to provide additional information on morphology that helps species identification in *Myrosmodes*. Although here we emphasize on species occurring in Peru, we include comments on distribution in other Andean countries.

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**Myrosmodes** Rchb.f., *Xenia Orchid.* 1: 19. 1854.

**Type species:** *Myrosmodes nubigena* Rchb.f.

**Plant** small, 1.2–6.8 cm tall. **Roots** fleshy, fasciculate, fusiform (Fig. 1A). **Leaves** 3–7, fleshy, forming a basal rosette, petiolate, sheathing base, blades elliptic-lanceolate or ovate, acute or shortly acuminate (Fig. 1B), up to 2.0 × 1.5 cm, shorter than the scape. **Inflorescence** lateral and andromonoecious (producing both hermaphroditic and female-sterile flowers); **peduncle** thick, acrescent, completely enclosed by imbricate, infundibuliform, hyaline, sheaths, 2.0–8.0 cm long (but it elongates up to 17 cm long during fruit maturation); spike conic to cylindrical, densely many-flowered, with flowers of different size along its length (increasing in size towards the base) (Fig. 1C-D). **Floral bracts** elliptic-oblong to suborbicular-ovate, hyaline, brownish apex, same size or little shorter than the flower. **Flowers** small, non-resupinate, glabrous, white and green. **Sepals** oblong to ovate, obtuse to rounded at apex; dorsal sepal adnate to the column near the base; lateral sepals oblique, slightly connate at the base to up half their length. **Petals** linear, falcate, shortly adnate to the column near the base. **Lip** cucullate, with the margins irregularly erose or with moniliform hairs (Fig. 1E), with two calli at the base, finely papillose on the posterior surface above. **Column** erect, dilated above. **Anther** dorsal, erect, elliptic to ovate, enclosed in the clinandrium. **Stigma** elliptic, reniform or quadrate. **Pollinia** four, sessile on a prominent viscidium. **Ovary** glabrous, empty in the apical flowers of the inflorescence (functional male flowers).


**Habitat and Ecology:** Geophytes growing between 3100 to 4900 m of elevation (up to 5100 m, H. Trinidad pers. obs.) in wet places in the puna and paramo; plants of this genus are the only orchids growing in the high Andean wetlands.

Vargas (1995) proposed two subgenera in *Myrosmodes*: subgenus *Myrosmodes* and subgenus *Rhynchocarpaea* (Schltr.) C. Vargas. He suggested five floral characters to define the subgenus; however, here we consider that only three are reliable: perianth insertion on ovary, ovary morphology and lip morphology (perianth morphology and direction of petals and dorsal sepal are not useful features). Thus, subgenus *Rhynchocarpaea* has a perianth with oblique insertion on the ovary, ovary apex not rostrate and the lip sessile with a cuneate base. The Peruvian species included here are: *Myrosmodes brevis* (Schltr.) Garay and *Myrosmodes rhynchocarpa* (Schltr.) Garay (with its synonym here proposed: *Myrosmodes cochlearis* Garay). On the other hand, subgenus *Myrosmodes* does not have the perianth obliquely inserted on the ovary, apex of the ovary not rostrate and the lip sessile with a cuneate base. The Peruvian species included here are: *Myrosmodes chiogena* (Schltr.) C.A.Vargas, *Myrosmodes gymnandra* (Rchb.f.) C.A.Vargas, (with...
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**Figure 1.** Vegetative and floral characters of *Myrosmodes*. A. Plant. B. Leaf. C. Inflorescence and flowers of different size, smaller from the apex and larger from the base. D. Dry flowers taken from a single inflorescence, smaller from the apex and larger from the base. E. Lip margin with moniliform hairs. F. Flowers with rostrate ovary (left) and a not rostrate ovary (right). Photographs A, C-F by D. Trujillo; B by P. Gonzáles. A, D, F-left *Myrosmodes rhynchocarpa*. C-*Myrosmodes paludosa*. E, F-right *Myrosmodes gymnandra*. 

its synonym here proposed: Myrosmodes weberbaueri (Schltr.) C.A.Vargas, Myrosmodes paludosa (Rchb.f.) P.Ortiz (with its synonyms here proposed: Myrosmodes inaequalis (Rchb.f.) C.A.Vargas and Myrosmodes pumilio (Schltr.) C.A.Vargas), Myrosmodes nubigena (Rehb.f. (with its synonym here proposed: Myrosmodes cleeftii Szlach., Mytnik & S.Nowak,) and Myrosmodes nervosa (Kraenzl.) Novoa, C.A.Vargas & Cisternas.

**Key to the Peruvian species of Myrosmodes**

1. Ovary long-rostrate at apex; lip clawed with a cordate base; perianth with oblique insertion on ovary 2

2. Column 3.0 x 0.75 mm; lip base distinctly clawed

2a. Column 1.5-3.0 x 1.0-1.8 mm; lip base shortly clawed

**M. brevis**

3a. Ovary not rostrate at apex; lip with a cuneate base; perianth insertion on ovary not oblique 3

3. Floral bract with the upper margin crenulate; petals with the upper margin lacerate-fimbriate; lip shallowly 3-lobed in front (or with a conspicuous midlobe); clinandrium margin dentate to lacerate

**M. nubigena**

3a. Floral bract with the margin entire, undulate or somewhat irregular; petals entire or erose; lip simple or with a short midlobe; clinandrium margin entire

4. Lip with a short subquadrate midlobe

5. Dorsal sepal and petals revolute; dorsal sepal oblong; petals entire; lip elliptic to orbicular-ovate in outline; lip upper margins irregularly erose to shortly lacerate-fimbriate

**M. chiogena**

5a. Dorsal sepal and petals straight; dorsal sepal usually constricted in the middle; petals toward the apex; lip obovate to subquadrate in outline; lip upper margin with moniliform hairs

**M. gymnandra**

4a. Lip simple without a short midlobe

6. Dorsal sepal narrowly oblong; petals entire; lip elliptical-ovobivate in outline

**M. nervosa**

6a. Dorsal sepal oblong to ovate-oblong; petals erose toward the apex; lip suborbicular in outline

**M. paludosa**

**Species descriptions**

The following diagnoses were based upon the revision of type material, original description and illustrations, and the Peruvian specimens examined.


TYPE: Peru. Lima [Junín, Prov. Yauli], alpine mats near Oroya, at the end of the Lima-Oroya Railway, [4000-] 4300 m., flowered November 1902. *A. Weberbauer* 1715 (holotype: B destroyed; lectotype: MOL-8281!, designated by Vargas 1995). (Fig. 2, 3).

*Plants* small, 3 cm tall. *Inflorescence* 4.0-5.5 cm long, scape short, completely enclosed by densely imbricating, funnel-shaped sheaths; spike conical, 1.4–1.6 cm long. *Floral bracts* hyaline, sub-imbricate, suborbicular, irregular margin, little shorter than the flowers. *Flowers* minute. *Dorsal sepal* oblong, obtuse to rounded at apex, 3.3–4.0 × 1.2–1.5 mm; lateral sepals basally connate, obliquely oblong-elliptic, obtuse, 4.0–5.0 × 1.3–2.0 mm. *Petals* oblong-ligulate, acute to obtuse, margin irregular subdente (as was, cited), 3.0–4.0 × 0.8–1.0 mm. *Lip* cuculate, clawed base, rhombic to orbicular-ovate when expanded (subquadrate in the original description), margin with moniliform hairs; two calli at the base, up to 3.5 × 3.0 mm. *Column* 3.0 × 0.75 mm; rostellum truncate; stigma subquadrate. *Ovary* ellipsoidal, long-rostrate, up to 4 mm long.

**Distribution:** Ecuador and Peru. In Peru it is known only from La Oroya in the Department of Junín (Fig. 4), between 4000 and 4300 m of elevation. This species was reported from Ecuador in the Provinces of Pichincha and Chimborazo, between 3600 and 3900 m of elevation (Garay 1978).

**Habitat and Ecology:** This species has been reported in wetlands. Flowering in November.

The illustration of the lectotype showed here is based on one of the flowers kept in the envelope of the herbarium sheet (Fig. 2, 3). The flower illustrated...
Figure 2. *Myrosmodes brevis* (Schltr.) Garay. Lectotype at MOL (A. Weberbauer 1715), by permission of the Keeper, Herbarium MOL, Biology Department, Universidad Nacional Agraria La Molina.
from the lectotype (Fig. 3) showed three differences with the flower illustrated by Schlechter (published in Mansfeld 1929, plate 105, nr. 410): the petals margins are not irregular dentate (just slightly irregular on the apex), the calli on the base of lip are not evident and lip is orbicular-ovate instead of rhombic.

Schweinfurth (1958) placed this species as a synonym of Altensteinia [Myrosmodes] paludosa Rchb.f.: however, they represent different species. Myrosmodes brevis can be distinguished from M. paludosa by its long-rostrate ovary, clawed base lip, and a thin and relatively longer column (3.0 mm long vs. 2.2 mm in M. paludosa).

Myrosmodes brevis is similar to M. rhynchocarpa (both belong to the subgenus Rhynchocarpacea) from which it differs by its long and thin column, and lip base distinctly clawed.


**TYPE:** Bolivia. La Paz, in Chacaltaya, 30 km from La Paz, 4800 m, February 1908. *O. Buchtien* 1289 (holotype: B, destroyed; isotype: HBG-500204, photo seen, designated here as the lectotype).

*Plant* small, 1.8–5.0 cm tall. *Inflorescence* 3.5–7.8 cm long (up to 10 cm during fruit maturation), scape completely enclosed by hyaline imbricating, loosely infundibuliform sheaths; spike cylindrical-conic, 1.2–3.0 cm long, 13–18 flowers. *Floral bracts* hyaline, suborbicular-ovate, obtuse to rounded at the apex, with irregular margins, subequaling the flowers. *Flowers* small, white with green (Fig. 5A). *Dorsal sepal* oblong, obtuse or rounded at the apex, revolute, 3.5–5.4 × 1.2–2.8 mm. *Lateral sepals* basally connate, obliquely oblong, obtuse, 4.4–7.5 × 1.2–2.9 mm. *Petal* linear, obtuse to rounded at the apex, more or less falcate, revolute, with the upper margin entire or irregular, 3.0–6.0 × 0.3–1.0 mm. *Lip* cucullate, cuneate at base, hemispheric-ovate, elliptic to orbicular-ovate when expanded, with a short subquadrate midlobe (rarely absent), the upper margins irregularly erose to shortly lacerate-fimbriate, with two small calli at the base, 3.9–7.0 × 3.2–5.5 mm, midlobe 0.3–1.0 × 1.6 mm. *Column* short, dilated above, 2.0–3.5 × 1.0–1.9 mm; rostellum truncate, slightly emarginate; stigma oblong-quadrangular to transverse (in old flowers examined). *Ovary* elliptic, 5.0–8.0 mm long (Fig. 6).


**OTHER RECORDS:** Peru. **[Cusco]**, Piñasniocj, Panticalla Pass, about 3600 m, 18 Jun 1915, *Cook & Gilbert 1306* (US, not seen; photo at AMES) (cited by Schweinfurth 1958).
**Distribution:** Peru and Bolivia. In Peru it is known in the Departments of Ancash, Lima, Junin, Huancavelica, Cusco and Puno (Fig. 4), between 3600 and 4900 m elevation. In Bolivia it is known only from La Paz (the type locality).

**Habitat and ecology:** Plants of this species grow on rocky hillsides with loam soil, grasslands, wetland and in cryoturbated soils (high Andean mixing of soil due to frequent freezing and thawing). Flowering from February to May.


_TYPE_: Bolivia. Prov. Larecaja, G. Mandon s.n. (holotype: W-23376!).


*Plant* small, 3.0–6.8 cm tall. _Inflorescence_ 4.3–8.0 cm long (10.0–17.0 cm long during fruit maturation), scape covered by broad hyaline sheaths, obverse, somewhat mucronate, spike conic to cylindrical-conic, 1.0–4.0 cm long, 14–27 flowers. _Floral bracts_ suborbicular-ovate, obtuse to rounded at the apex, with entire margins, shorter than the flowers, 10.7–18.0 × 10–18 mm. _Flowers_ small, sepals and petals white-hyaline with the apex turning brown, lip green with white at the base and margin (Fig. 1E, 5D). _Dorsal sepal_ adnate to the column near the base, straight, oblong, usually slightly constricted in or above the middle, obtuse or rounded at the apex, 5.0–8.0 × 1.4–2.6 mm. _Lateral sepals_ connate at the base (slightly to up half their length), oblong, concave, obtuse to subacute, sometimes apex slightly erose, somewhat carinate, 6.0–9.5 × 2.0–4.5 mm. _Petals_ straight, linear, subacute, more or less falcate, with upper margin erose, 5.0–8.5 × 0.6–1.1 mm. _Lip_ cucullate, obovate to subquadrate with a short subquadrate midlobe, the upper margin with moniliform hairs, two calli at the base, 5.8–9.5 × 5.0–9.5 mm, midlobe 0.8–1.0 × 0.8–1.0 mm. _Column_ erect, 3.0–7.5 × 1.0–2.0 mm. _Anther_ 0.9-1.8 mm long, sometimes exceeding the apex of the stigma; rostellum narrow emarginate (sometimes triangular and obtuse); stigma elliptic to oblong-quadrate. _Ovary_ ellipsoid, 5–11 mm long (Fig. 7).


Distribution: Peru, Bolivia and Argentina. In Peru it is known in the Departments of Ancash, Huánuco, Lima, Pasco, Junín, Huancavelica, Arequipa, Cusco, Puno and Moquegua (Fig. 8); between 3990 and 4800 m elevation. In Bolivia it is known only from the Province of Larecaja (the type locality). In Argentina, Provinces of Jujuy and Catamarca, it seems that this species has been erroneously determined as M. paludosa (see notes below, on M. paludosa).

Habitat and ecology: Plants of this species grow in wetland dominated by Distichia muscoides, Oxychloe andina, or Plantago rigida; and occasionally in grasslands of gentle and steep slopes. Flowering plants have been recorded from February to April and from June to October, and fruiting between May to July.

Variations in the width of sepals and length of the midlobe of the lip have been observed in the Peruvian specimens of M. gymnandra. This species can be easily distinguished from all other species of the genus by the long column, the straight dorsal sepal (never revolute) and lip with a narrow opening.

Myrosmodes weberbaueri was described from the Central Peru by Schlechter (1921). Although the holotype (A. Weberbauer 283) was lost when part of Berlin herbarium was destroyed in the Second World War, an illustration by Schlechter based on the type was published by Mansfeld (1929, plate 105, nr 413). The illustration shows a tridentate rostellum. However, in the original description, Schlechter cited “rostelo, alto, oblongo” but not tridentate. Hence, here we assume that this is an artifact. Except for the rostellum, M. weberbaueri resembles to M. gymnandra. We therefore refer this taxon to the synonymy of M. gymnandra.

A specimen of the Wilkes Expedition from Peru (determined as M. gymnandra by Reichenbach) is mounted together with the holotype (Mandon s.n.) on

TYPE: Chile. Prov. Tarapacá, Taruguire, 3750 m, R. Pohlmann s.n. (holotype: B destroyed; lectotype: SGO-01328, designated by Novoa et al. (2015).


Plant small, 2.5–5.0 cm tall. Inflorescence 3.0 cm long (up to 16.0 cm long during fruit maturation), scape covered by broad hyaline sheaths, spike thick, conic, 1.4 cm long (up to 4.0 cm long during fruit maturation), around 21 flowers. Floral bracts ovate to oblong, acute, with entire margin, same size or little shorter than the flowers, 15.2–15.6 × 11.2–12.8 mm. Flower small, white-hyaline with green (Fig. 5F). Dorsal sepal narrowly oblong, obtuse or rounded at the apex, deflexed, 4.5–5.2 × 1.3–1.4 mm. Lateral sepals basally connate for one-quarter their length, oblong, obtuse, 5.0–5.4 × 1.3–1.8 mm. Petals linear, obtuse to subacute, 4.3–4.8 × 0.7–0.8 mm. Lip slightly cucullate-concave, elliptical-ovabate in outline, the upper margin with moniliform hairs, two calli at the base, 4.5–6.0 × 2.8–3.5 mm. Column 2.9–3.0 × 1.0 mm. Anther 1.2–1.7 mm long; rostellum truncate, slightly emarginate; stigma quadrate. Ovary ellipsoid, 7.0–10.5 mm long (Fig. 9).


Other records: Peru. Arequipa, 4900 m, Sept 2012, H. Trinidad s.n.

Distribution: Peru and Chile. In Peru it has been recorded in the Departments of Arequipa and Tacna (Fig. 4), between 3100 and 4900 m elevation. In Chile it is known in the Regions of Arica and Parinacota, Tarapacá and Antofagasta (Novoa et al. 2015).

Habitat and Ecology: Plants of this species grow in wetland. Flowering from September to November, and fruiting in December.

This is the first record of M. nervosa for Peru, which was recorded in the past only for Northern Chile (Novoa et al. 2015).


Plant small, 1.7–3.5 cm tall. Inflorescence 3.0–8.0 cm long (up to 13.0 cm long during fruit maturation), scape covered by tubular hyaline sheaths which are obtuse and somewhat carinate, spike conic or cylindric-conic, 1.0–2.4 cm long (up to 3 cm long during fruit maturation), around 13 to 29 flowers (Fig. 5B). Floral bracts oblong, acute, crenulate above, a little shorter than the flowers, 10.0–12.0 × 7.0–8.6 mm. Flowers small. Dorsal sepal adnate to the column near the base, deflexed, 3.3–5.4 × 1.0–2.4 mm. Lateral sepals basally connate, obliquely oblong, acute, apex minutely erose, somewhat carinate, 3.6–7.0 × 1.0–3.0 mm. Petals obliquely linear or linear-spatulate, with the upper margins lacerate-fimbriate, 2.8–5.8 × 0.6–1.2 mm. Lip cucullate, cuneate, quadrate in outline when expanded, shallowly 3-lobed in front with rounded infolded lateral lobes and suborbicular-ovate midlobe, the anterior margins with dense moniliform hairs; two calli at the base, 4.0–5.6 × 2.5–5.6 mm, midlobe 0.8–0.9 × 0.5–1.0 mm. Column slender, dilated above, 2.5–3.5 × 0.6–1.3 mm, clinandrium winged, wings (margin) dentate to lacerate; rostellum truncate; stigma subquadrate. Ovary 4.6–7.0 mm long (Fig. 10).


**Distribution:** Venezuela (Foldats 1969), Colombia, Ecuador, Peru and Bolivia (Vásquez et al. 2014). In Peru it has been recorded in the Departments of Cajamarca, Ancash, Lima and Cusco (Fig. 8), between 3700 and 4700 m elevation. In Ecuador it is known in the Provinces of Imbabura, Pichincha, Cotopaxi, Chimborazo and Napo (Garay 1978). In Colombia it is known in the Department of Meta (see below on notes about *M. cleefii*).

**Habitat and Ecology:** Plants of this species grow in wetland and grasslands. Flowering plants have been recorded from May to August, and fruiting in September.

This species is distinguished by the 3-lobed lip, lacerate-fimbriate petals, the presence of clinandrium wings and the carinate sheaths that cover the scape of the inflorescence. These floral features were also showed in the illustration of the original publication (Reichenbach 1854, see plate 8, I, II, figs 1.10). The illustration of *M. nubigena* published in a recent work of *Myrosmodes* in Colombia in our opinion does not fully represent the features of the species (Szlachetko et al. 2014, see Figure 10): the lip has oblique thickenings, petals with ciliate margins at the apex and the sepals with entire margin at the apex. Although the plant and inflorescence agree with the species (in fact, these last drawings were taken from Reichenbach 1854).

Mytnik-Ejsmont et al. (2012) recently described *Myrosmodes cleefii* from Colombia. They proposed this tentative new species based on these features: “the lip is two times larger, widest in the middle, obtrullate in outline, lateral sepals cochleate with erose margins, dorsal sepal oblong-elliptic with keeled apex”. Except for the apparently larger lip, this proposed taxon agrees with *M. nubigena*. We therefore refer this recently described taxon to the synonymy of *M. nubigena*.

There is a specimen of *Jameson 816* at W (Rchb. Orch. 602), however this is not an isotype because it has a different date of preparation (November 1855).

**Myrosmodes paludosa** (Rchb.f.) P.Ortiz, Orquideas Colombia ed. 2: 286. 1995.


_Aa paludosa_ (Rchb.f.) Schltr., Repert. Spec. Nov. Regni Veg. 11: 150. 1912 (Fig. 11).


*Plant* small, 1.4–4.8 cm tall. _Inflorescence_ 2.6–8.5 cm long (up to 10.0 cm long during fruit maturation), scape concealed by loosely, hyaline, imbricating sheaths with obtuse and brownish apex, spike cylindrical to cylindrical-conic, 1.0–2.6 cm long, 8 to 19 flowers (Fig. 1C, 5E). _Floral bracts_ suborbicular, entire to undulate margin, hyaline, same size or little shorter than the flowers, brownish to blackish apex, 3.5–10.2 × 4.6–8.8 mm. _Flowers_ small, sepal and petals white-hyaline with light green nerve, lip green with white at the margin, column green, anther brown. _Dorsal sepal_ oblong to ovate-oblong, rounded to obtuse at the apex, revolute, 2.0–4.4 × 1.0–1.9 mm. _Lateral sepals_ basally connate, broadly oblong, oblique, obtuse, apex entire or slightly erose, 2.6–5.5 × 1.0–2.2 mm. _Petals_ obliquely oblong to linear-spatulate, obtuse to subacute, revolute, with the upper margin erose, 1.8–4.2 × 0.5–1.2 mm. _Lip_ cucullate, apex revolute, suborbicular in outline when expanded, margin with moniliform hairs, two calli at the base, 2.0–
4.3 × 2.3–4.3 mm. **Column** short, dilated above, 1.5-2.2 × 1.0-1.7 mm; rostellum truncate, shortly emarginate; stigma transverse, 0.5-0.9 × 0.8-1.4 mm. **Anther** 0.6-1.2 mm long. **Ovary** 3.0-5.6 mm long (Fig. 11.).


**Distribution:** Peru and Bolivia. In Peru it has been recorded in the Departments of Lima, Junín, Huancavelica, Apurímac, Cusco and Puno (Fig. 8), between 4100 and 4900 m elevation. In Bolivia it is known in the Department of La Paz, Cochabamba, Potosí and Tarija (Vásquez et al. 2014).

**Habitat and ecology:** Plants of this species grow in wetland dominated by *Distichia muscoides*, *Plantago tubulosa*, *Calamagrostis vicunum*, *Poa aequiglumus* and *Wernaria caespitosa*, grasslands and in cryoturbated soils. Flowering plants have been recorded from March to June.

In the protologue of *Altsteinenia paludosa*, Reichenbach (1854) cited two specimens of *G. Mandon 1169 mounted in different sheets (he wrote “Allia scheda”) with different collection data: “… Gualata, Cabezas de Chilcani, [vancuiré] in paludosis. Reg. alpina, 3600-4400 m” and “… Gualata, apachetas de Lacatia de Chuchu in paludosis. Reg. alpina, 3700-4500 m”. They represent syntypes (McNeill et al. 2012, ICN Art. 9.5). In Reichenbach’s herbarium housed at W, it was found one single sheet composed of several dry plants, a drawing, handwritten notes of
Reichenbach and two labels of G. Mandon 1169. The labels have different collection data which matches with each of the syntypes. Therefore, presumably, at some point after the species description, the material of both syntypes were mixed and mounted on a single sheet. An additional specimen of G. Mandon 1169 was found at W (no.17504); however, it was not part of the Reichenbach collection (this was originally at the Herbarium of the Musei Caesarei Vindobonensis). Several specimens of G. Mandon 1169 were located in different herbaria: BR, G, GH, GOET, K, MPU, NY, P and S. Nonetheless, the collection data are not the same in all the specimens and only a few fully agree with one of the syntypes.

The specimens of G. Mandon 1169, with the following herbarium acronym and accession number have collection data that do not fully agree with the syntypes: BR-997331 (photo seen, mixed with an Aa specimen), G-168828 (photo seen), GOET-8362 (photo seen), MPU-17164 (photo seen), NY-8572 (photo seen), P-326294 (photo seen) and P-326296 (photo seen).

Schweinfurth (1958) in his work Orchids of Peru placed to Aa [Myrosmodes] brevis and Aa [Myrosmodes] pumilio as synonyms of Altensteinia [Myrosmodes] paludosa. Here, we consider to M. brevis as a distinct species (see notes of M. brevis) but agree in considering M. pumilio as a synonym. Vargas (1995) placed M. pumilio in subgenus Rhynchocarpaea (Schltr.) C. Vargas. Members of this subgenus are recognized by displaying a rostrate ovary and a clawed lip with a cordate base; however, we do not find those features in the original description or illustration (Mansfeld 1929, plate 105, nr. 412) of the species. Hence, M. pumilio belong to subgenus Myrosmodes.

After examination of the type material of M. inaequalis at W (see illustration in Trujillo & Vargas 2012), we did not find morphological differences with M. paludosa. Therefore, it is here proposed as a synonym of the M. paludosa.

Based on the Peruvian specimens studied here, there is no record of M. paludosa for Northern Peru; (apparently Lima is the northern limit). The species has not been recorded yet in Ecuador. Foldats (1969) and Szlachetko et al. (2012) reported this species for Venezuela and Colombia, respectively. However, the illustration shown in the work of Foldats (fig. 152, page 408) and one (of the four) specimen cited there (J. Steyermark 55667, AMES-64406, photo seen) do not represent M. paludosa (it is M. cf. rostrata). Therefore, it is uncertain if this species really occurs in Venezuela. A careful examination of the Colombian and Venezuelan specimens, determined as M. paludosa, are necessary in order to confirm if this species really occurs in those countries.

Hauman (1920) recorded Aa [Myrosmodes] paludosa for Argentina based on the examination of two specimens: Hauman s.n. (Prov. of Jujuy) and Jörgensen 1598, LIL, [AMES-49216, photo seen] (Prov. of Catamarca). However, the floral features described in that work do not agree with M. paludosa: petals narrowly linear, lateral sepals carinate, lip obscurely 3-lobed with a short midlobe and floral segments from 6.0 to 8.0 mm long. These features agree with M. gymnandra. Hence, it seems that the Myrosmodes species that occurs in Argentina is M. gymnandra but not M. paludosa.


Plant small, 1.2–3.5 cm tall. Inflorescence 2.5–8.0 cm long (up to 12.0 cm long during fruit maturation), scape concealed by loosely, hyaline, imbricate sheaths with obtuse apex, spike conic (cylindric-conic during fruit maturation), 1.5–3.5 [4.0] cm long, 1.3–2.5 cm diameter, 13 to 55 flowers (Fig. 1A, 5C). Floral bracts ovate-elliptic, obtuse, hyaline, somewhat shorter than the flower, 7.2–16.0 × 2.5–9.8 mm (Fig. 1D, F). Flowers small, sepals and petals white-hyaline, lip green with white at the margin, column green, anther brown (Fig. 12). Dorsal sepal oblong to ovate,
obtuse, revolute, 2.0–4.3 × 1.1–2.2 mm. Lateral sepals basally connate (up one-quarter their length), oblong to ovate-oblong, obtuse, concave, 2.8–4.4 × 1.1–2.6 mm. Petals more or less obliquely oblong, obtuse, revolute, the upper margin entire to slightly irregular, 2.0–4.4 × 0.8–1.2 mm. Lip cucullate, apex revolute, shortly clawed, base cordate, suborbicular to ovate or obscurely 3-lobed in outline when expanded, margin with dense moniliform hairs, two oblong calli at the base (slightly oblique and oriented towards the center), 3.0–5.0 × 2.8–5.5 mm. Column short, dilated above, 1.5–3.0 × 1.0–1.8 mm; rostellum truncate, emarginate; stigma transverse, 0.4–1.0 × 0.6–1.2 mm. Anther 0.7–1.5 mm long. Ovary ellipsoid to oblong, long-rostrate at apex, 4.4–24 × 0.8–4.0 mm (Fig. 12, 13).


Other records: Peru. *Apurimac*, Prov. Cotabambas. Distrito Chalhuahuayo, Cuchuhuacho, 4143 m, hierba terrestre, que se desarrolla en el bofedal, flores secas, rizoma con bulbos blancos de 3-5 cm, tallo de 5-10 cm, 27 Aug 2015, *E. Briceño 2026*.

Distribution: Colombia (Szlachetko et al. 2012), Ecuador and Peru. In Peru it has been recorded in
the Departments of La Libertad, Ancash, Junín, and Apurimac (Fig. 4), between 3850 and 4500 m elevation. In Ecuador it is known in the Provinces of Carchi (as *Myrosmodes cochlearis*, see below), Pichincha and Cotopaxi (Garay 1978).

**Habitat and Ecology:** Plants of this species grow in wetland, grasslands, hillsides with some shrubs or in patches with *Polylepis* trees. Flowering plants have been recorded from February to July, and fruiting between May to September.

Dunsterville & Garay (1966) recorded and illustrated (see page 27) a specimen from Venezuela as *Altensteinia* [Myrosmodes] rostrata; although they pointed out the locality where the plants were recorded, they did not cite a voucher. This Venezuelan specimen differs from the type of *M. rostrata* by having a spade-like rostellum (as was, cited) and short anther instead of having a 3-lobed rostellum and the anther exceeding the apex of the stigma.

In 1978, Garay described *Myrosmodes cochlearis* as a new species for Ecuador and Venezuela. In this publication, Garay used the same illustration of Dunsterville & Garay (1966), instead of a drawing based on the holotype: *A.S. Hitchcock 20927* (AMES). In the protologue, Garay cited two additional specimens from Ecuador but not from Venezuela, he only indicated “Also Venezuela”. Drawings of dissected flowers of *A.S. Hitchcock 20927* are housed at AMES and K (here, a copy a Garay’s drawing). After the revision of the drawings (of *A.S. Hitchcock 20927*) and the original description of *M. cochlearis*, we did not find distinctive features that distinguish it from *M. rhynchocarpa*. We therefore refer *M. cochlearis* to the synonymy of *M. rhynchocarpa*.

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