

## ***Aloina obliquifolia* (Pottiaceae, Bryophyta) new to South America, and new reports of *Aloina* in the Neotropics**

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**Abstract** – *Aloina obliquifolia* is newly reported for South America from Ecuador and Peru. This species has been known previously only from China and Europe. In addition, *A. catillum* is reported new to Chile and Ecuador and *A. bifrons* is reported for the first time from Ecuador. The diagnostic characters, habitat preferences, illustrations and updated ranges of the treated species are included, as well as an identification key to the known species of *Aloina* in South America.

### ***Aloina* / Pottiaceae / Distribution / South America / Neotropic**

**Resumen** – *Aloina obliquifolia* se cita por primera vez para Sudamérica de Ecuador y Perú. Previamente esta especie se conocía sólo de Europa y China. Además, *A. catillum* es novedad para Chile y Ecuador y *A. bifrons* para Ecuador. Se aportan datos sobre los caracteres diagnósticos, hábitat, ilustraciones y distribución de las especies tratadas, así como una clave de identificación de las especies de *Aloina* en Sudamérica.

### ***Aloina* / Pottiaceae / Distribución / Sudamérica / Neotrópico**

## **INTRODUCTION**

*Aloina* Kindb. (Pottiaceae) is a rather widely distributed genus that usually grows on open soils and soil-covered rocks in dry places from the sea level to high, open ranges. The world revision of Delgadillo (1975) recognized 12 taxa. Gallego *et al.* (1998) described a new species, *Aloina humilis* M.T. Gallego, M.J. Cano & Ros, from the Canary Islands. Later, Gallego *et al.* (1999) synonymized *A. rigida* var. *mucronulata* (Bruch & Schimp.) Limpr. with *A. rigida* var. *obliquifolia* (Müll. Hal.) Delgad., the latter recognized at species level (*A. obliquifolia* (Müll. Hal.) Broth.). According to Delgadillo (1975) and Delgadillo & Schianove (2004), *Aloina* has been infrequently collected in South America and only four species have been reported from there: *A. catillum* (Müll. Hal.) Broth. (Argentina, and Peru), *A. bifrons* (De Not.) Delgad. (Chile),

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*A. roseae* (Williams) Delgad. (Chile, and Peru), and *A. rigida*. (Hedw.) Limpr. (Argentina, Bolivia, Ecuador, and Peru). In addition, two insufficiently known species, *A. recurvipatula* (Müll. Hal.) Broth. and *A. sedifolia* (Müll. Hal.) Broth., have been described from Argentina, although type specimens are no longer available (Delgadillo & Schianove, 2004).

During bryological expeditions carried out by the authors in different South American countries, a set of significant specimens of *Aloina* was collected. One sample did not match any previously known species of this genus in South America. We identified this specimen as *Aloina obliquifolia* that until now has only been known from Europe and China (Gallego *et al.*, 1999). In addition, *A. bifrons* and *A. catillum* are reported for the first time for certain countries in the New World, and the distribution of the former is extended in Chile.

## MATERIAL AND METHODS

As a part of the study of the family Pottiaceae in South America, field trips to Chile (from November 2001 to January 2002), Peru (March-April 2005) and Ecuador (July-August 2006) were made by the authors. All the specimens are deposited at MUB, with duplicate in CONC, USM and LOJA. To confirm the identification of the *Aloina* specimens, the type material of each species and certain collections at NY were studied.

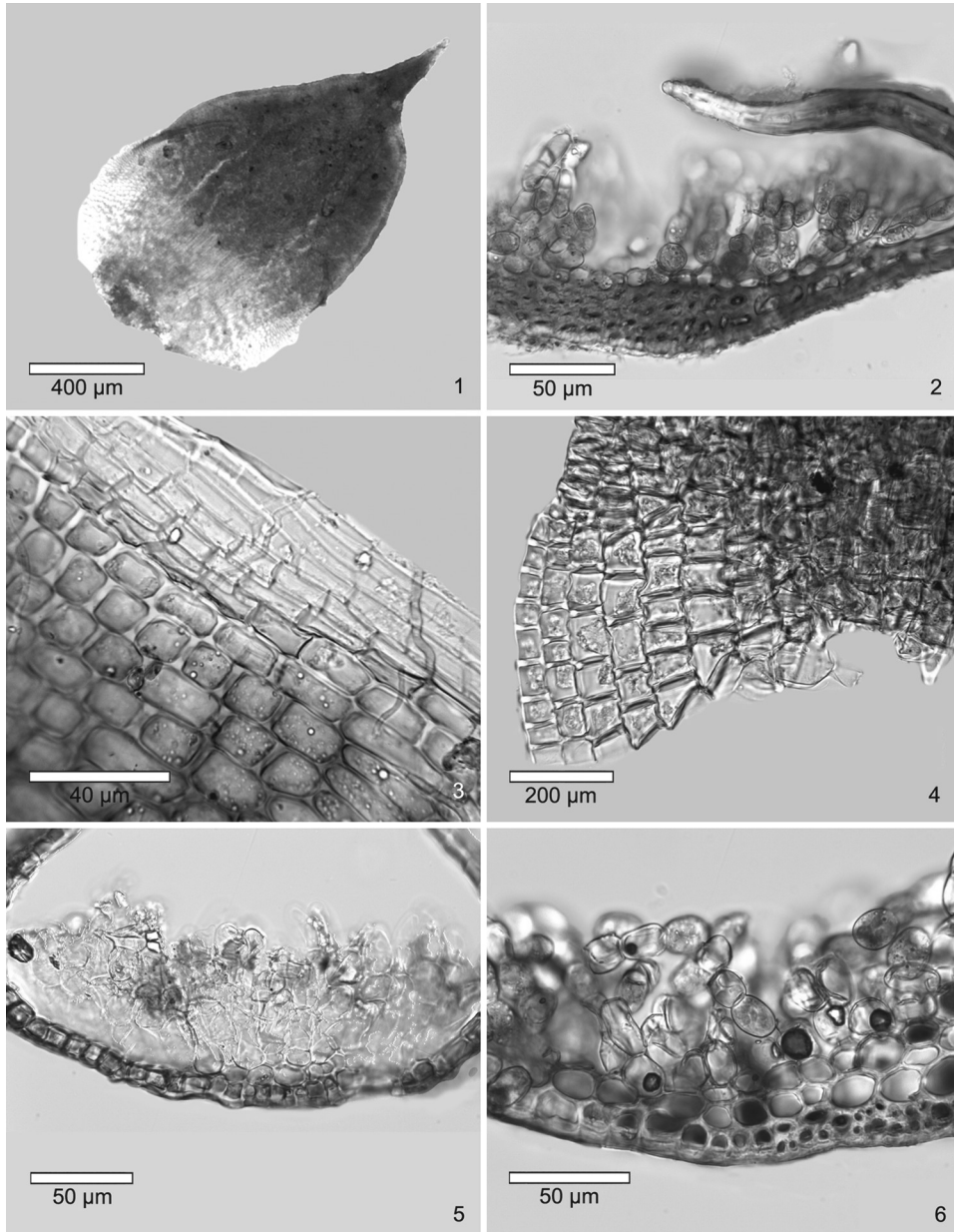
Microscopic examinations and measurements were taken with an Olympus-BH2 light microscope, while microphotographs were obtained with a Spot insight 3.5 camera mounted on this microscope.

## RESULTS

*Aloina obliquifolia* (Müll. Hal.) Broth. (Figs 1-3)

**New localities.** – ECUADOR. Azuay: entre Zhumir y Ushupud, 02°48'59"S, 78°46'48"W, *Cano et al. 2814b* (MUB 20352); Imbabura: pr. Ibarra, 00°24'22"N 78°08'15"W, *Cano 3200b* (MUB 22585). PERU. Junín: pr. Tarma, 11°25'19"S, 75°43'20"W, *Cano 2069* (MUB 20352).

**Diagnostic characters and differentiation.** – *Aloina obliquifolia* is mainly recognized by its leaf costa excurrent as a long mucro, with open apex, and the apical margin vanishing at base of the mucro. In addition, the marginal leaf border is differentiated by thin-walled hyaline cells. The South American material studied has smaller (1.1-1.3 × 0.6-0.9 mm) and more ovate leaves than the European (2.2-3 × 0.5-0.8 mm); however it is possible to find ovate to ovate-lingulate leaves in the type material of this species. *Aloina obliquifolia* is close to *A. cornifolia* Delgad. known from China, because both species have long mucronate leaves, with bordered margins of hyaline and thin-walled cells and costa with 3-5 dorsal stereid layers. However, *A. cornifolia* is distinguished by its suborbicular leaves and leaf apex broadly cucullate, with the mucro developing from the dorsal side of a hood-like apex (in *A. obliquifolia* the leaf apex is open with the apical margin vanishing at base of mucro). In addition, *Aloina obliquifolia* is clearly related to *A. rigida*, but both differ in the shape of the leaves



Figs 1-6. *Aloina obliquifolia* (from Cano 2069). **1.** Leaf. **2.** Cross section of the costa at midleaf. **3.** Basal laminal cells. *Aloina bifrons* (from Cano 2708b). **4.** Basal laminal cells. **5.** Cross section of the costa at midleaf. *Aloina catillum* (from Cano 2353). **6.** Cross section of the costa at midleaf.

(usually ovate-lingulate in *A. obliquifolia*; mostly lingulate in *A. rigida*) and the costa (excurrent into a long mucro in *A. obliquifolia*; usually percurrent in *A. rigida*). The American specimens of *A. obliquifolia* lack sporophytes, but the gametophytic characters are unmistakable. A complete description and illustrations of this species are given by Delgadillo (1975), Gallego *et al.* (1999) and Li *et al.* (2001).

**Distribution and habitat.** – *Aloina obliquifolia* was described by Müller (1898) from a single gathering from China. Gallego *et al.* (1999) synonymized *A. rigida* var. *mucronifolia* with the former, and the distribution of this taxon was extended to Europe (Austria, Belgium, Czech Republic, France, Germany, Great Britain, Hungary, Ireland, Italy, Poland, Serbia, Sweden, Switzerland, Russia; according to Delgadillo, 1975; Gallego *et al.*, 1999 and Sabovljević, 2003). The samples from Ecuador and Peru comprise the first report of this taxon for the American continent. These specimens were found in interandean valleys. The Ecuadorian specimens grew in dry and exposed slopes in a “quebrada” with *Dodonea* sp. at 2320 m elevation and in an *Acacia* formation at 1960 m elevation. The Peruvian specimen also grew in a dry and exposed slope at 3200 m elevation.

***Aloina bifrons*** (De Not.) Delgad. (Figs 4, 5)

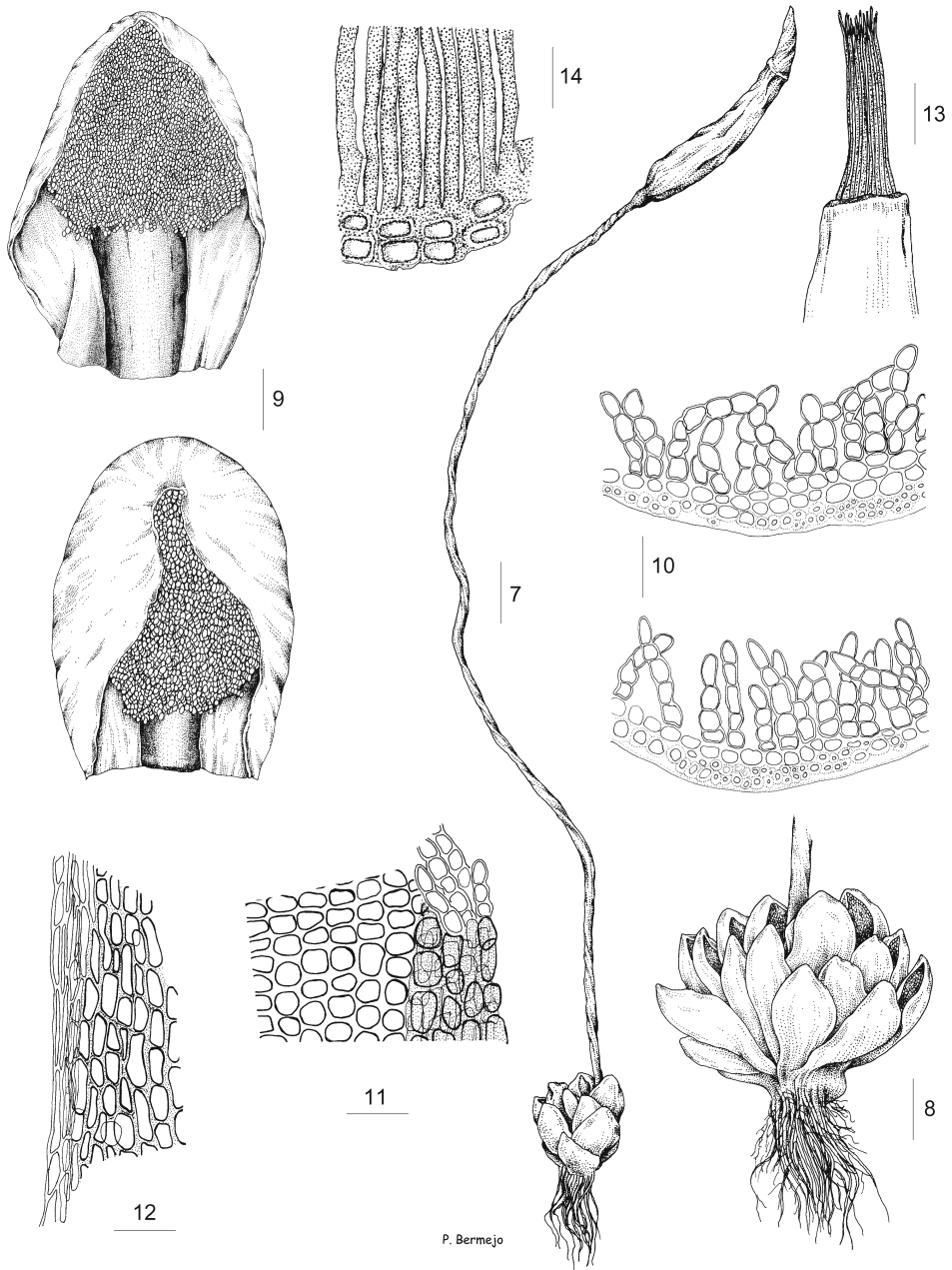
**New localities.** – CHILE. Región IV (Coquimbo): pr. Hurtado, 30°04'53"S, 70°43'39"W, *Cano 163* (MUB 22310). Región Metropolitana Santiago: Baños de Colina, 33°11'05"S, 70°36'02"W, *Cano 33* (MUB 22311). ECUADOR. Pichincha: carretera hacia la reserva de Yanacocha, 00°06'16"S, 78°31'52"W, *Cano 2708b* (MUB 22312).

**Diagnostic characters and differentiation.** – This species is easily distinguished by its piliferous apex and poorly developed costa. Only the South American *A. roseae* resembles this species in having a leaf hair-point; however both species can be largely distinguished by a well-differentiated costa with 2-3 dorsal stereid layers in *A. roseae* and undifferentiated costa or with only one layer of dorsal stereids differentiated in *A. bifrons*. In addition, Delgadillo (1975) gave as differential characters between both taxa the presence of the auricular area in *A. roseae* and peristome teeth and operculum shorter than *A. bifrons*. Descriptions and illustrations of this species are given by Delgadillo (1975), Gallego *et al.* (1999), and Gallego & Cano (2006).

**Distribution and habitat.** – According to Delgadillo (2007), *Aloina bifrons* is distributed in northern and southern South America, southern Europe, southwestern Asia, north and southern Africa, New Zealand and Australia. In South America, it was reported by Weber (1979) from a locality of Coquimbo (Chile). The Ecuadorian specimen was collected in a dry and exposed talus at 3220 m elevation, and it is the first record for this country. The new Chilean collections of this species were collected in exposed slopes in Cactaceae and *Puya* sp. formations between 890 to 945 m elevation.

***Aloina catillum*** (Müll. Hal.) Broth. (Figs 6-14)

**New localities.** – CHILE. Tarapacá (I Región): pr. Putre, 18°12'05"S, 69°32'34"W, *Cano 223* (MUB 12711). ECUADOR. Azuay: entre Zhumir y Ushupud, 02°48'59"S, 78°46'48"W, *Cano et al. 2814a* (MUB 22313); Páramo del Cajas, Chuspipuña, 02°48'09"S, 78°13'06"W, *Cano & Gallego 2903a* (MUB 22314). Chimborazo: pr. Palmira, 02°05'20"S, 79°44'32"W, *Cano 3083c* (MUB 22315); pr. Palmira, 02°07'49"S, 79°44'29"W, *Cano 3077b* (MUB 22316). Loja: pr. Catamayo, 04°05'47"S, 79°21'20"W, *Cano & Gallego 3015* (MUB 22317); pr. Catamayo, 04°02'11"S, 79°22'20"W, *Cano & Gallego 3003b* (MUB 22318). PERU. Arequipa: pr. Chivay, 15°37'14"S, 71°35'34"W, *Cano 2125b* (MUB 20591); pr. Maca, 15°37'50"S, 71°49'07"W, *Cano 2176* (MUB 20394). Puno: pr. Zaraquri, 16°16'28"S, 70°09'55"W, *Cano 2353* (MUB 20586).



Figs 7-14. *Aloina catillum* (from Cano 2353). **7.** Habit when dry. **8.** Habit when moist. **9.** Leaves. **10.** Cross sections of the costa at midleaf. **11.** Middle laminal cells. **12.** Basal laminal cells. **13.** Capsule. **14.** Detail of the peristome. Scale bars: 7 = 0.8 mm; 8 = 0.4 mm; 9 = 0.1 mm; 10-13 = 45  $\mu$ m; 14 = 0.2 mm.

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**Diagnostic characters and differentiation.** – *Aloina catillum* was described by Müller (1879) from a single Argentine specimen. Delgadillo (1975) recognized tentatively this species, hoping that more collections were available. According to Delgadillo (1975) the suborbicular leaves and the long ovoid-cylindrical capsules were perhaps the primary distinctive characters of this species, although most of characters of *A. catillum* showed considerable overlap with those of *A. rigida*. Most of *Aloina* specimens collected by us in the Neotropics had suborbicular to widely lingulate leaves, costa usually with 1-3 substereid layers, differentiated leaf margins of thin-walled and hyaline cells, seta twisted to the left throughout, urn ovoid-cylindrical, and basal membrane of the peristome very short with only 1-2 layers of cells. The shape of the leaves and the number of stereid layers can vary in the same population, even within the same plant. Thus, plants with lower suborbicular leaves and upper lingulate leaves, which resemble those of *Aloina rigida*, can be found. However, from the South American and European material studied by us of *Aloina rigida*, *A. catillum* could be distinguished by more suborbicular leaves, the seta twisted to the left throughout and shorter basal membrane of the peristome. A description and drawings of leaves of this species were made by Delgadillo (1975).

**Distribution and habitat.** – According to Delgadillo (1975) and Churchill *et al.* (2000), *Aloina catillum* is known from Argentina and Peru. Therefore, it is here reported for the first time from Chile and Ecuador. The Ecuadorian specimens grew in exposed soils and taluses in interandean valleys from 825 to 3800 m elevation. The Chilean material was collected at 3700 m elevation in a partially protected slope in puna formation and the Peruvian specimens in taluses, soil-covered rocks and walls, mainly in puna formations at 2550 m and 4690 m elevation.

### KEY TO SPECIES OF *ALOINA* IN SOUTH AMERICA

1. Leaf apex with a hyaline hair-point; leaf basal marginal cells undifferentiated. . . 2
1. Leaf apex mucicous or mucronate; leaf basal marginal cells differentiated. . . . 3
  2. Leaf costa undifferentiated or with 1 stereid layer . . . . . *A. bifrons*
  2. Leaf costa differentiated, with 2-3 stereid layers. . . . . *A. roseae*
3. Leaf costa excurrent into a mucro; ovate to ovate-lanceolate leaves. . . . .
  - . . . . . *A. obliquifolia*
3. Leaf costa percurrent or ending below apex; ligulate, lingulate or suborbicular leaves . . . . . 4
  4. Leaves suborbicular to short-lingulate; costa with 1-3 stereid or substereid layers; seta twisted to the left throughout; basal membrane of the peristome with 1-2 rows of cells . . . . . *A. catillum*
  4. Leaves lingulate to ligulate; costa with 3-6 stereid layers; seta twisted to the right in the upper part and slightly to the left below; basal membrane of the peristome with 3-4 rows of cells . . . . . *A. rigida*

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