



Pohlia Hedw. section *Pohlia* (Bryaceae) in Central and South America

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With 5 figures and 3 maps

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Abstract: *Pohlia* section *Pohlia* is taxonomically revised for Central and South America. Five species are recognized in the study area (*P. cruda*, *P. elongata*, *P. longicollis*, *P. nutans*, and *P. oerstediana*). Seven new synonyms are proposed. *Pohlia leptopoda*, *Webera grammocarpa*, and *W. crassicostata* from Brazil, *P. rusbyana*, and *P. subleptopoda* from Bolivia, and *P. leptodontium* from Colombia are synonyms of *P. elongata*. *P. elatior* from New Zealand is a synonym of *P. nutans*. Eight new lectotypes are designated. *Pohlia oerstediana* is a new record to South America and the extension ranges of Latin American species are presented. All Neotropical species of Section *Pohlia* are described and illustrated and distribution maps are given.

Keywords: Latin America, Neotropics, *Pohlia* section *Pohlia*, *Webera*.

Introduction

Pohlia Hedw. includes approximately 125 species distributed throughout the world (Suárez 2008, Frey & Stech 2009); 38 of them are found in the Americas (Suárez & Schiavone 2010). The genus is easily recognized by the acrocarpous habit, with simple stems or branching by 1–4 subfloral innovations, the leaves are usually lanceolate [linear-lanceolate in *P. tenuifolia* (A.Jaeger) Broth.] with the apices generally serrate to serrulate, and the laminal cells are wide-rhomboidal [in *P. wahlenbergii* (F.Weber & D.Mohr) A.L.Andrews] to more commonly linear-rhomboidal, with firm, thin to slightly thickened walls [in *P. nutans* (Hedw.) Lindb., *P. magnifica* (Herzog) S.He, *P. lonchochaete* (Dusén) Broth., and *P. elongata* Hedw.]. The species are usually dioicous or paroicous depending on the species, although some species are polyoicous (Suárez & Schiavone 2008). The sporophyte consists of a long seta

and an operculate capsule. The capsule can be erect, but it is generally horizontal. The peristome is diplolepidous and typically double, with endostome and exostome well differentiated or exceptionally absent [*P. bequaertii* (Dixon & Naveau) A.J.Shaw].

In contrast to *Brachymenium* Schwägr. and *Bryum* Hedw., *Pohlia* has leaves without differentiated marginal cells and with a usually percurrent costa, which can exceptionally be short-excurrent [*P. nutans* (Hedw.) Lindb.] or excurrent [*P. magnifica* (Herzog) S.He]. *Pohlia* is distinguished from *Schizymenium* Harv. by its terminal inflorescence and its normally well-developed double peristome.

Shaw (1984a), in a revision of the Central and North American species, divided *Pohlia* into three subgenera: *Pohlia*, *Nyholmiella* A.J.Shaw and *Mniobryum* (Limpr.) Ochyra. Subsequently, Hill et al. (2006) and Guerra (2007) recognized three sections: *Pohlia*, *Cacodon* Broth. and *Apalodictyon* (Müll.Hal.) Ochyra. The phylogenetic hypotheses recently proposed by Suárez (2008) agree with the sections previously erected by Hill et al. (2006) and are here accepted.

Pohlia section *Pohlia* includes nine species in Europe, eight species in North America, and five species have been included in this section for the Neotropics (Suárez 2008). There is limited knowledge about the genus in the Neotropics, so this work aims to clarify the diversity of species of *Pohlia* section *Pohlia* in Central and South America. We present descriptions, illustrations and distribution maps of the taxa represented in the study area.

Material and methods

We studied 48 types and 786 further specimens from B, BA, BM, C, CM, CONC, CR, FH, FR, G, H, HUA, IMBIV, JE, L, LPB, LPS, MICH, MO, NY, PC, TENN, UB, and W, in addition to our own collections. The specimens were studied by conventional light microscopy using material mounted in water-glycerin-phenol or Hoyer's solution (Anderson 1954).

The species are presented alphabetically. Each one includes the specific name and basonym, and all synonyms recognized. We have cited only a representative selection of regional specimens (other specimens studied can be found in Suárez 2008).

Historical treatment of *Pohlia* (with emphasis on Neotropical and southern South American species)

Pohlia was erected by Hedwig (1801) to accommodate a single species, *P. elongata*. Simultaneously he described *Webera* Hedw. and recognized *Webera nutans* Hedw., *W. pyriforme* Hedw. and *W. longicollis* Hedw. He characterized *Webera* as having "a double peristome with reduced endostome" and distinguished from *Pohlia* by the absence of cilia. According to this criterion, some species originally described in the genus *Mnium* Hedw. (*M. crudum* Hedw.) and *Bryum* (*B. annotinum* Hedw.) are currently included in *Pohlia*. Bridel (1797, 1803) following the approach of Hedwig, distinguished *Webera* from *Pohlia* by sexuality. Montagne (1850) transferred the Chilean species of *Pohlia* to *Bryum*, and created *Leptochlaena* Mont. characterized by a "peristome double and endostome complete" to accommodate *L. chilensis* Mont. Schimper (1860) delimited the Bryaceae Schwägr. genera, based on leaf morphology.

He recognized *Webera* as valid and distinguished it from other Bryaceae by "leaves lanceolate, not bordered, costa percurrent and long leaf cells". He proposed two subgenera according to the morphology of the capsule and endostome: *Pohlia* (with reduced cilia and erect capsules) and *Webera* (with well-developed cilia and pendulous capsules). Mitten (1869) adopted Schimper's system and treated *Bryum* in a broad sense, including *Webera* as one of two sections. His section *Webera* included *B. oerstedianum* Müll.Hal., *B. crudum* and *B. nutans*. Adopting the same approach, Müller (1879, 1897) recognized the species from Colombia, Bolivia, Argentina and Brazil as *Bryum*. Many of these species are now considered to be conspecific with previously described species of *Pohlia*.

Lindberg (1878, 1879) presented an amended concept of *Pohlia* and thus, by implication, of *Webera*. Since Lindberg's publications there has been a general consensus about the application of the generic name *Pohlia*.

Lindberg (1882), proposed the subgenus *Cacodon* ("capsule erect and endostome reduced") to include a species of *Pohlia*. Bruch, Schimper & GümbeI (1851) informally suggested that some species of *Bryum* (e.g., *Bryum wahlenbergii*) would be better included in the genus *Mniobryum*. Limpricht (1892) accepted this idea and erected the genus *Mniobryum* "small capsules without annulus and immersed stomata". Later, Amann (1893) reduced *Mniobryum* to a subgenus of *Webera*. Brotherus (1909, 1924) recognized both *Mniobryum* and *Pohlia* at the generic level and considered *Webera* a synonym of *Pohlia* and *Pohlia* was divided into three sections: *Cacodon*, *Eupohlia* and *Lamprophyllum*.

Although the name *Webera* was a younger illegitimate homonym, some authors continued to using *Webera* (Jensen 1939). Brotherus (in Herzog 1916), recognized *Webera* (instead of *Pohlia*) to include the Bolivian species [*W. apolensis* (R.S. Williams) Broth., *W. papillosa* (Müll.Hal. ex A. Jaeger) Herzog, *W. cruda* (Hedw.) Füllr., *W. spectabilis* (Müll.Hal.) Besch., and described *W. subleptopoda* Broth., *W. clavicaulis* Broth., *W. loriformis* Herzog and *M. bolivianum* Broth.]. Bartram (1949) included species from Guatemala in *Pohlia* and *Mniobryum*, using criteria accepted in other regional floras.

Since the 1980s, Shaw has been studying *Pohlia* species from the Northern Hemisphere in taxonomic and phylogenetic terms, and the name *Pohlia* has had wide acceptance. In 1982, Shaw reduced the genus *Mniobryum* and section *Lamprophyllum* to synonyms of *Pohlia* s. str., and defined the latter as plants with lanceolate leaves, without differentiated marginal cells, and elongate laminal cells. In this paper, following the criteria proposed by Hill et al. (2006) and the recent contributions of Suárez (2008) we recognize three sections (*Pohlia*, *Cacodon* and *Apalodyction*) within *Pohlia*. One of them, section *Pohlia*, is revised in the following treatment.

Taxonomic treatment

Pohlia Hedw., Spec. Musc. 171. 1801.

≡ *Bryum* Hedw. subgen. *Pohlia* (Hedw.) Bruch & Schimp. in Bruch, Schimp. & W. GümbeI, Bryol. Eur. 4: 91. 1839 [Fasc. 6–9 Monogr.: 21]. ≡ *Webera* Hedw. sect. *Pohlia* (Hedw.) Schimp., Coroll.

Bryol. Eur.: 64. 1856. ≡ *Webera* subgen. *Pohlia* (Hedw.) Milde Bryol. Siles.: 200. 1869. Type: *Pohlia elongata* Hedw.

Webera Hedw., Spec. Musc.: 168. 1801, hom. illeg., non *Webera* Schreb., Genera Plantarum 794. 1791. (Rubiaceae, Magnoliophyta) ≡ *Bryum* sect. *Webera* Relh., Fl. Cantabr. Ed. 2: 425. 1802. ≡ *Bryum* subgen. *Webera* (Relh.) Bruch & Schimp. in Bruch, Schimp. & W. Gümbel, Bryol. Eur. 4: 102. 1839 [Fasc. 6–9 Monogr.: 32]. ≡ *Pohlia* sect. *Webera* (Relh.) Margad., Lindbergia 1: 129. 1972. – Lectotype (vide Margadant 1972: p. 129): *Webera nutans* Hedw. [*Pohlia nutans* (Hedw.) Lindb.].

Lamprophyllum Lindb., Öfvers. Förh. Kongl. Svenska Vetensk.-Akad. 20: 394. 1863, hom. illeg., non *Lamprophyllum* Miers, Trans. Linn. Soc. London 21: 338. 1855 (Clusiaceae, Magnoliophyta), non *Lamprophyllum* Schimp. ex Broth., Nat. Pflanzenfam 1(3): 963. 1907 (Hookeriaceae, Bryophyta) ≡ *Pohlia* [unranked] *Lamprophyllum* Lindb., Musci Scand.: 17. 1879. ≡ *Webera* sect. *Lamprophyllum* (Lindb.) Sakurai, Bot. Mag. (Tokyo) 53: 288. 1939. ≡ *Pohlia* sect. *Lamprophyllum* (Lindb.) Ochi, Rev. Bry. Japan: 23. 1959. – Lectotype (vide Margadant 1972: p. 129): *Lamprophyllum nutans* (Hedw.) Lindb. [*Pohlia nutans* (Hedw.) Lindb.].

Kaurinia Lindb. in Bryhn, Nyt Mag. Naturvidensk. 32: 124. 1891, nom. nud.

Mniobryum Schimp. ex Limpr., Laubm. Deutschl. 2: 272. 1892, nom. cons. [*Bryum* Hedw. (unranked) *Mniobryum* Schimp. in Bruch, Schimp. & W. Gümbel, Bryol. Eur. 4: 1. 1851 (Fasc. 46–47 Consp. Vol. 4: iii), nom. nud.]. ≡ *Webera* subgen. *Mniobryum* (Limpr.) J.J. Amann, Rev. Bryol. 20: 43. 1893. ≡ *Webera* sect. *Mniobryum* (Limpr.) Cardot, Wiss. Erg. Schwed. Südpolar-Exp. 4 (8): 132. 1908. ≡ *Pohlia* sect. *Mniobryum* (Limpr.) Ochi, Rev. Bry. Japan: 40. 1959, nom. illeg. incl. lectotyp. sect. prior. [*Pohlia* sect. *Mniobryum* (Limpr.) Nyholm, Moss Fl. Fennoscandia. II. Musci 3: 195. 1958, publ. basion. non citat.]. ≡ *Pohlia* subgen. *Mniobryum* (Limpr.) Ochyra in Ochyra, arnowiec & Bednarek-Ochyra, Cens. Cat. Polish Mosses: 158. 2003. Lectotype (vide Lanjou et al. 1956: p. 216): *Mniobryum carneum* (F. Weber & D. Mohr) Limpr., nom. illeg. [= *Pohlia melanodon* (Brid.) A.J. Shaw]. First synonymized by Andrews (1935: p. 188).

Wollnya Herzog, Beih. Bot. Centralbl. 26: 69. 1910. Type (vide Ochyra et al. 2008: p. 427): *Wollnya stellata* Herzog [*Pohlia wilsonii* (Mitt.) Ochyra].

PLANTS small to robust, green to yellowish green, occasionally reddish brown to reddish, glossy or dull, forming small or large populations, lax or dense, pure or occasionally mixed with other mosses. STEMS erect, simple or branched by innovations, in cross section rounded to pentagonal, central strand present, cortical region of 4–8 rows of cells, cell walls slightly thickened, sclerodermis of 1–4 rows of cells. AXILLARY HAIRS approximately 100 µm long, with 1–2 brown basal cells and 2–4 distal hyaline cells. LEAVES equally distributed along the stem or comose, loose or imbricate, flexuose to crispate when dry, usually extended when wet, lanceolate to ovate-lanceolate, rarely linear (in *P. tenuifolia*); apex acute, rarely rounded; margins plane to slightly recurved, exceptionally revolute, entire or serrate to serrulate at apex; COSTA robust, percurrent, exceptionally short-excurrent or excurrent, red, green, yellowish-brown, sometimes only colored at base, in cross section with dorsal and ventral epidermis, with 2–4 guide cells, dorsal hydroids present, with a well-developed dorsal stereid band and a few ventral stereids; UPPER LAMINAL CELLS hexagonal to linear, large and lax, thin- to thick-walled, becoming short-rectangular at the leaf base, occasionally thick-walled. PROPAGULES sometimes present in the leaf axils, single or multiple, the body formed by isodiametric to linear, thin-walled cells; leaf primordia laminar or uncinat (absent in *P. lonchochaete*), restricted to apex or scattered. DIOICOUS or PAROICOUS (synoicous in *P. lonchochaete*). PERICHAETIA and PERIGONIA terminal; perichaetial leaves similar to vegetative ones but larger, perigonial leaves oblong-acuminate, small. SETAE 1–4 per perichaetium, straight or flexuose

and twisted, yellowish to reddish-brown; CAPSULES erect to inclined, elongate, pyriform or urceolate, with a well-developed neck; EXOTHECIAL CELLS isodiametric to short- or long-rectangular, flat (or bulging mammillose in *P. papillosa* and *P. richardsii*), thick- or thin-walled; STOMATA usually numerous in the neck of the capsule, cryptoporous, or intermediate phaneroporous; ANNULUS of 1–4 rows of vesicular cells, dehiscence irregular or revolute, sometimes rudimentary or absent (*P. wahlenbergii*); PERISTOME double, well developed (absent in *P. bequaertii*); EXOSTOME TEETH yellowish brown to brown, apex blunt or acute, papillose, bordered or not, trabeculate or not, free or fused at the base; ENDOSTOME hyaline, slightly papillose, basal membrane high or low, cilia long and well developed, short and rudimentary or absent, segments generally elongate and keeled, broadly to narrowly perforate; OPERCULUM conic to convex, acute, apiculate, umbonate or rarely rostrate; SPORES finely papillose to almost smooth.

TYPE SPECIES: *Pohlia elongata* Hedw., Sp. Musc. Frond. 171. 1801.

DISTRIBUTION AND HABITAT: *Pohlia* is distributed worldwide, with its highest diversity in the Northern Hemisphere. In the Neotropics most species occur along the Andes from Colombia to Cape Horn, with fewer species in the West Indies and the Amazon Basin.

While a few species are found down to sea level, the altitudinal range extends mainly between 2200–4400 meters. *Pohlia elongata* and *P. papillosa* reach 6000 m on the Volcán Socompa in Argentina, the upper altitudinal limit known for bryophytes. *Pohlia* species are terrestrial plants, which can withstand extreme drought conditions, but they rarely grow in sites exposed to direct sunlight.

Key to the sections of *Pohlia*

- 1 PLANTS robust. CAPSULE elongated, cylindrical, NECK distinct, of the same size as the urn or larger; EXOTHECIAL CELLS long rectangular, with straight walls..... Section *Pohlia*
- 1' PLANTS small to medium-size. CAPSULE urceolate or pyriform, NECK scarcely differentiated; EXOTHECIAL CELLS short, isodiametric, with sinuose or less often straight walls..... 2
- 2 LEAVES lanceolate to ovate lanceolate; COSTA red. PROPAGULA lacking (except *P. lonchochaete*). PERICHAETIAL LEAVES scarcely differentiated from vegetative ones. EXOTHECIAL CELLS with strongly sinuose walls; ENDOSTOME hyaline..... Section *Apalodictyon*
- 2' LEAVES lanceolate; COSTA red only at base. PROPAGULA present. PERICHAETIAL LEAVES differentiated from vegetative ones. EXOTHECIAL CELLS with straight to slightly sinuose, often bulging walls; ENDOSTOME white to hyaline..... Section *Cacodon*

Section *Pohlia*

PLANTS robust (higher than 15 mm). LEAVES lanceolate, distributed along the stem; costa red; axillary propagules mostly lacking. PAROICOUS or DIOICOUS. PERICHAETIAL LEAVES distinct from the vegetative leaves. SETAE single, rarely multiple, straight, elongate; CAPSULE elongate, cylindrical, neck distinct, of the same size as the urn or larger; EXOTHECIAL CELLS long, STOMATA phaneroporous; EXOSTOME teeth sharp-edged, trabeculate; ENDOSTOME segments narrowly to broadly perforate, cilia present, long or short, nodulose, or rudimentary.

Key to the species of *Pohlia* section *Pohlia* from Central and South America (sterile plants)

- 1 Plants with leaf cells thick-walled (more than 3 µm)..... 2
- 1' Plants with leaf cells thin-walled..... 3
- 2 Leaves lanceolate to oblong-lanceolate; costa ending before the apex..... *P. elongata*
- 2' Leaves oval-lanceolate; costa percurrent or rarely short-excurrent..... *P. nutans*
- 3 Leaf apex straight; costa red..... *P. cruda*
- 3' Leaf apex twisted; costa green..... 4
- 4 Leaf apex setaceous; costa ending 5–7 cells before apex..... *P. longicollis*
- 4' Leaf apex secund; costa percurrent..... *P. oerstediana*

Key to the species of *Pohlia* section *Pohlia* from Central and South America ("fertile" plants)

- 1 Capsule cylindrical pyriform, short-elongate (1–3 mm)..... *P. nutans*
- 1' Capsule cylindrical, long-elongate (3–6 mm)..... 2
- 2 Endostome segments broadly perforate..... 3
- 2' Endostome segments entire to slightly perforate..... 4
- 3 Plants not secund; costa red..... *P. cruda*
- 3' Plants secund; costa green..... *P. oerstediana*
- 4 Cilia long; nodulose; basal membrane low (2/5 the length of the endostome)..... *P. elongata*
- 4' Cilia short; basal membrane high (1/2 length endostome)..... *P. longicollis*

Pohlia cruda (Hedw.) Lindb., Musci Scand. 18. 1879.

Fig. 1, Map 1

≡ *Mnium crudum* Hedw., Sp. Musc. Frond. 189. 1801. Type: Hedwig s/n (Lectotype (vide Ochyra et al. 2008): G!).

Bryum erythrocaule Hampe, Linnaea 37: 516. 1872. Type: Australia. New South Wales, Blue Mountains, Hampe (LECTOTYPE DESIGNATED HERE: BM!, Isolectotype: H!).

Webera austro-cruda (Müll.Hal.) Kindb., Enum. Bryin. Exot., Suppl. 196. 1889. ≡ *Bryum austrocrudum* Müll.Hal., Bot. Jahrb. Syst. 5: 78. 1883 (Lectotype: H!). First synonymized by Wijk et al. (1959).

PLANTS medium to robust, yellowish green, glossy. STEMS 4–50 mm long, reddish, simple or branched by innovations; in cross section with central strand well developed. AXILLARY HAIRS 40–270 µm long, with 2–4 basal brown cells and 4 distal hyaline cells. LEAVES distributed along the stem, exceptionally comose or imbricate, 1.0–3.0 × 0.5–1.2 mm, lanceolate, ovate-lanceolate to elliptic; apex acute to wide-acuminate; margins flat to weakly reflexed, serrate to serrulate at the apex; COSTA robust, percurrent to subpercurrent, red; UPPER LAMINAL CELLS thin-walled, apical cells short to long-rhomboidal, 40–80(–110) × 6–13 µm; MEDIAN CELLS rectangular to long fusiform, 85–170 × 8–14 µm; BASAL CELLS short to long rectangular, 30–95(–115) × 7–20 µm. PAROICOUS OR DIOICOUS. PERICHAETIAL LEAVES linear-lanceolate, 3.0–6.0 × 0.3–1.0 mm; apex strongly serrate. SETAE 1–3(–4) per perichaetium, 18–35 mm long, straight, yellowish-brown to brownish red. CAPSULES slightly inclined, pyriform-cylindrical, 3.0–6.0 × 1.0–1.5 mm, with distinct necks; EXOTHECIAL CELLS firm-walled, rectangular, elongate, 45–115 × 20–40 µm; STOMATA phaneroporous and cryptoporous, numerous in the neck; ANNULUS of 2–3 rows of vesicular cells, revolvable; EXOSTOME

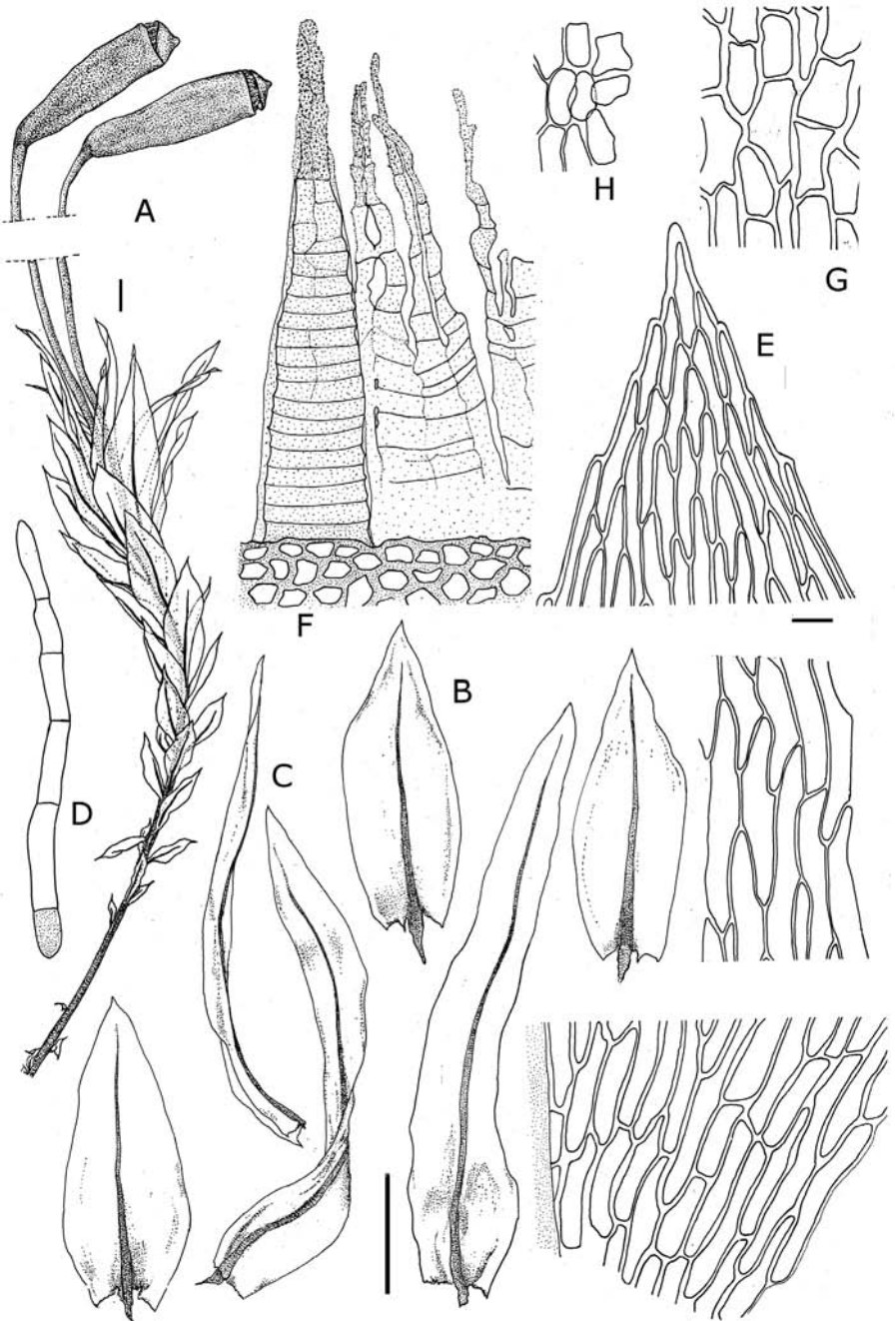
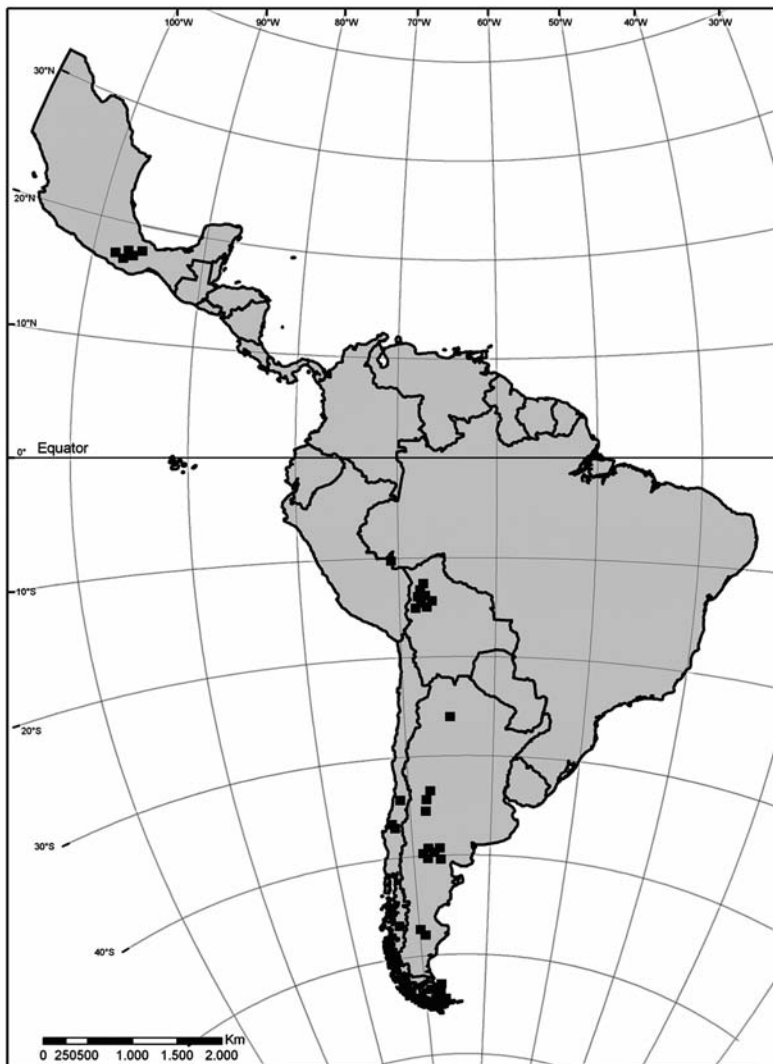


Fig. 1. *Pohlia cruda*. A. Habit, wet. B. Leaves. C. Perichaetial leaves. D. Axillary hair. E. Upper, median and basal laminal cells. F. Peristome. G. Exothecial cells. H. Stoma. Scale bars: A–C = 1 mm; D–H = 25 μ m. (From Kühnemann 5229 MO.)



Map 1. Known distribution of *Pohlia cruda* in Central and South America.

TEETH brownish yellow to reddish, 370–450 μm long, bordered, trabeculate, papillose; ENDOSTOME hyaline, 320–400 μm long, with a high basal membrane (half the length of the segments), widely perforate segments, and long nodulose cilia; OPERCULA conic. SPORES 18–26 μm diameter, papillose.

SELECTED SPECIMENS EXAMINED: MEXICO. IXLACCIHUATL: Jan 1904, C.Purpus 9367a (FH); MEXICO: Canoas altas, ladera W de la sierra de Tlaloc, 19°26'N, 98°45'W, 3420–3460 m, Bosque de *Abies* con algunos individuos de *Ribes senecio* y gramíneas amacolladas, sobre suelo, lugares sombreados y húmedos, 13 Nov 1987, A.Cardenas 4761 (MO); PUEBLA: Campamento de Tlamacas, faldas del

Popocatepetl 19°03'N; 98°38'W, 4000 m, 30 Jan 1966, Rzedowski (MO). SOUTH AMERICA. ARGENTINA. CHUBUT: Lago Menéndez, 4 Dec 1940, O.Kühnemann 5229 (MO), 5262 (B); MENDOZA: Tunuyan, camino al paso del Portillo mendocino, entre paso de los puntanos y El Guindo, 7 Dec 1947, R.Leal 11429 (FH); Las Heras, Quebrada del Potrero Puerta, 30 Mar 1947, R.Leal 10750 (FH); RIO NEGRO: Glacial Le Martial, 600–900 m, 54°45'S, 68°29'W, 15 Feb 1985, M.Schiavone & C.Matteri 2786 (MO, CM); SANTA CRUZ: Southernmost end of Lago Argentino, in mature forest on W side of Laguna Fría; forest dominated by *Nothofagus pumilio* with *N. betuloides* and *N. antarctica* in places, 51°S, 73°W, 15–18 Mar 1972, P.Cantino M-4 (MO); TIERRA DEL FUEGO: Tierra de Graham, Pto. Paraíso, punta Popa, 21 Feb 1952, Z.Popovici 9203 (MO); TUCUMÁN: Carapunco, Infiernillo, 2800 m, 19 Nov 1947, M.Lamb 5382 (FH). CHILE. BÍO-BÍO: Lago del Laja (detrás del refugio) sobre tierra, 21 Jan 1969, C.Matteri 312 (B); CORDILLERA: Santiago, La Parva, al E de los andariveles, plano de gramíneas, en el roquerío, suelo húmedo, 3250 m, 11 Apr 1978, M.Mahú 11686 (B); MAGALLANES: Punta Arenas, 22 Nov 1895, P.Dusén 43 (L); ÑUBLE: Recinto Las Trancas, ad ruptes, 12 Apr 1929, H.Roivainen 1602 (FH); ÚLTIMA ESPERANZA: (Región XII), Parque Nacional Torres del Paine, 2 km NW Refugio Pingo and Río Pingo, 51°06'S, 73°06'W, 260 m, 17 Feb 2001, W.Frey & F.Schaumann 01-28a (MO). BOLIVIA. Felspalten bei der Saittu Laguna, 4200 m, Jun 1911, Th.Herzog 2657 (L, JE); COCHABAMBA: An Felsen des Cerro Tunari, 4600 m, May 1911, Th.Herzog (JE); LA PAZ: Prov. Inquisivi, Estancia Sayaquira, NE side of río Sayaquira between jachara Punta and Cerro Saythokho Punta ca 2–4 km NW of Estancia Sayaquira, semi-arid high Andean grassland and cliffs, heavily, grazed, in direct sun, 67°16'W, 17°03'S, 4600–4650 m, Jul 1987, M.Lewis 87625 (MO), Prov. Inquisivi Cumbre Sayaquira, Headwaters of Río Sayaquira, 2.5 km S of Estancia Huaña Cota, 67°17'W, 17°03'S, 4650 m, 28 Apr 1987, M.Lewis 87364 (MO, MICH), Prov. Los Andes, "Laguna Tuni", along trail between Laguna Tuni and pass between cerro Jisthaña and Nevado Huayna Potosí, 62 km N of La Ceja del Alto La Paz, 16°14'S, 68°13'N, 4700 m, 14 Dec 1982, M.Lewis 82-353 (FH, L, MO), Prov. Loayza, Río Aracoma Chuma (waterfall camp) along the Río Atoroma Chuma in the grand expansive bog where the Viloco-Caxata Road crosses the river, and along the large water fall, seep under hummock, 16°55'S, 67°26'W, 4720 m, 24 Dec 1987, M.Lewis 87-1799 (MO).

DISTRIBUTION AND HABITAT: In accordance with Ochyra et al. (2008), *Pohlia cruda* is a typical bipolar species with few localities in the Tropics. It grows on soil or granitic rock in the Andean region, usually near areas of glacial melting.

Pohlia cruda shows a great variability in plant size, arrangement of leaves (comose or along the stem), and the development of one or more sporophytes per plant (Suárez & Schiavone 2008). However, characters such as the metallic sheen of the plants, red stems and leaf costa, leaf margins slightly serrate, leaf cells thin-walled, sexual condition (dioicous or paroicous), and the pyriform-cylindrical capsules define the species. Among the species found in the Neotropics, *P. oerstediana* could be confused with *P. cruda*, but it is clearly distinguished by its green stems and costa, and second leaf apices. In the Austral region, *P. cruda* is sympatric with *P. wahlenbergii* and *P. nutans* and is sometimes confused with both. Although *P. cruda* has reddish stems and costae like *P. wahlenbergii*, serrate margins and urceolate capsules distinguish it from *P. cruda*. *P. nutans* differs from *P. cruda* by the dull-green plants with thick-walled leaf cells.

NOMENCLATURE: *Pohlia cruda* is well established since 1801 by Hedwig, based on European specimens. The lectotype selected by Ochyra et al. (2008), deposited in G (complete medium size plants), agrees with the original description. No further synonyms were found during this study that could be added to the few synonyms proposed earlier, with which we agree. Two isotypes of *Bryum erythrocaule* Hampe were studied (BM! and H!), and based on the condition of the specimen, as well as the site of Hampe's original herbarium, we propose the BM specimen as the lectotype.

- Pohlia cylindrica* (Dicks.) Hornsch., Flora 2(1): 93. 1819. = *Bryum cylindricum* Dicks., Fasc. Pl. Crypt. Brit. 4: 12 11 f 4. 1801. (LECTOTYPE: BM!). First synonymized by Shaw (1982).
- Pohlia acuminata* Hoppe & Hornsch., Flora 2: 94. 1819. (Isotype: BM!). First synonymized by Shaw (1982).
- Pohlia spectabilis* (Müll.Hal.) Broth. in Engler & Prantl., Nat. Pflanzenfam. I(3): 547. 1903. = *Webera spectabilis* (Müll.Hal.) Besch., Mém. Soc. Sci. Nat. de Cherbourg 16: 196. 1872. = *Bryum spectabile* Müll.Hal., Syn. Musc. Frond. 2: 583. 1851. Type: COSTA RICA. América centralis, elevatione 5000–8000', Feb. et Apr. 1847. A.Oersted 157b (Lectotype: H-BR!, Isolectotype: BM!, C!, JE!). First synonymized by Shaw (1982).
- Webera cylindrica* Schimp. ex Besch., Mém. Soc. Sci. Nat. Cherbourg 16: 196. 1872. Type: MÉXICO. (LECTOTYPE DESIGNATED HERE: BM!). First synonymized by Shaw (1982).
- Bryum cylindricum* Mont., Mém. Soc. Sci. Nat. Cherbourg 16: 196. 1872.
- Pohlia gracilicarpa* (Hampe) Broth. Die Nat. Pflanzenfam. I(3): 547. 1903. = *Webera gracilicarpa* Hampe, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn ser. 3, 6: 149. 1875. Type: BRAZIL. Rio de Janeiro, A.Glaziou 7049 (LECTOTYPE DESIGNATED HERE: H!, Isolectotype: S!). First synonymized by Shaw (1982).
- Pohlia crassicostata* (Müll.Hal.) Broth. in Engler & Prantl, Nat. Pflanzenfam. I (3): 547. 1903. = *Webera crassicostata* (Müll.Hal.) Paris, Index Bryol. Suppl. 327. 1900. = *Bryum crassicostatum* Müll.Hal., Bull. Herb. Boissier 6: 31. 1898. Type: BRAZIL, Serra Itatiaia, 2000 m. altum, in declivibus, Martio 1894, E. Ule 1775 (LECTOTYPE DESIGNATED HERE: H!), SYN. NOV.
- Pohlia leptopoda* (Hampe) Broth. in Engler & Prantl, Nat. Pflanzenfam. I (3): 547. 1903. = *Webera leptopoda* Hampe, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn ser. 3, 6: 149. 1875. Type: BRAZIL. Rio de Janeiro, Glaziou 7048 (LECTOTYPE DESIGNATED HERE: BM!, Isolectotypes: B!, S!), SYN. NOV.
- Pohlia integridens* (Müll.Hal.) Broth. in Engler & Prantl, Nat. Pflanzenfam. I(3): 547. 1903. = *Bryum integridens* Müll.Hal., Syn. Musc. Frond. 1: 338. 1848. First synonymized by Shaw (1984b).
- Pohlia leptodontium* (Mitt.) Broth. in Engler & Prantl, Nat. Pflanzenfam. I(3): 548. 1903. = *Bryum leptodontium* Mitt., J. Linn. Soc., Bot. 12: 293. 1869. Type: COLOMBIA. Andes Bogotensis, Bogota, alt. 8700, 22 11 41, J. Weir 218 (LECTOTYPE DESIGNATED HERE: NY!, Isolectotype: S!), SYN. NOV.
- Pohlia muelleriana* (Schimp. ex Besch.) Broth. in Engler & Prantl, Nat. Pflanzenfam. I(3): 547. 1903. = *Bryum muellerianum* (Schimp. ex Besch.) Müll.Hal., Gen. Musc. Frond. 220. 1900. = *Webera muelleriana* Schimp. ex Besch., Mém. Soc. Sci. Nat. Cherbourg 16: 196. 1872. Type: MÉXICO. Mueller (BM!). First synonymized by Shaw (1984b).
- Pohlia rusbyana* (Müll.Hal. ex E. Britton) Broth. in Engler & Prantl, Nat. Pflanzenfam. I(3): 547. 1903. = *Bryum rusbyanum* Müll.Hal. ex E.Britton, Bull. Torrey Bot. Club 23: 48. 1896. Type: BOLIVIA, near Yungas, 6000 ft., 1885, H.Rusby 3148 (NY!), SYN. NOV.
- Webera enselini* Rehmman, Bull. Misc. Inform. Kew 1923: 205. 1923, nom nud. Based on: "AFRICA AUSTRALIS. In montibus supra Wareester", 1875–77, A.Rehmman 223 (BM!).
- Webera grammocarpa* (Müll.Hal.) Broth. in Engler, Nat. Pflanzenfam., Zweite Auflage 10: 358. 1924. = *Pohlia grammocarpa* (Müll.Hal.) Broth. in Engler & Prantl, Nat. Pflanzenfam., I(3): 547. 1903. = *Bryum grammocarpum* Müll.Hal., Bull. Herb. Boissier 6: 32. 1892. Type: BRAZIL. Brasilia, Serra Itatiaia, 2100 m, in terra, Febr 1894, E.Ule 1771 (H!), first synonymized by Shaw (2006).
- Webera novae-seelandiae* (Dixon) Broth. in Engler, Nat. Pflanzenfam., 10: 359. 1924. = *Pohlia novae-seelandiae* Dixon, Bull. Torrey Bot. Club 42: 102. 9 f. 8. 1915. Type: NEW ZEALAND. Evans Flat, Juapeka Co., Otago, Oct. 1891, D.Petrie (BM!). SYN. NOV.
- Webera zacatecana* (R.S.Williams) Thér., Smithsonian Misc. Collect. 81(1): 7. 1928; *Pohlia zacatecana* R.S.Williams, Bryologist 26: 33 4. 1933. First synonymized by Shaw (1984b).

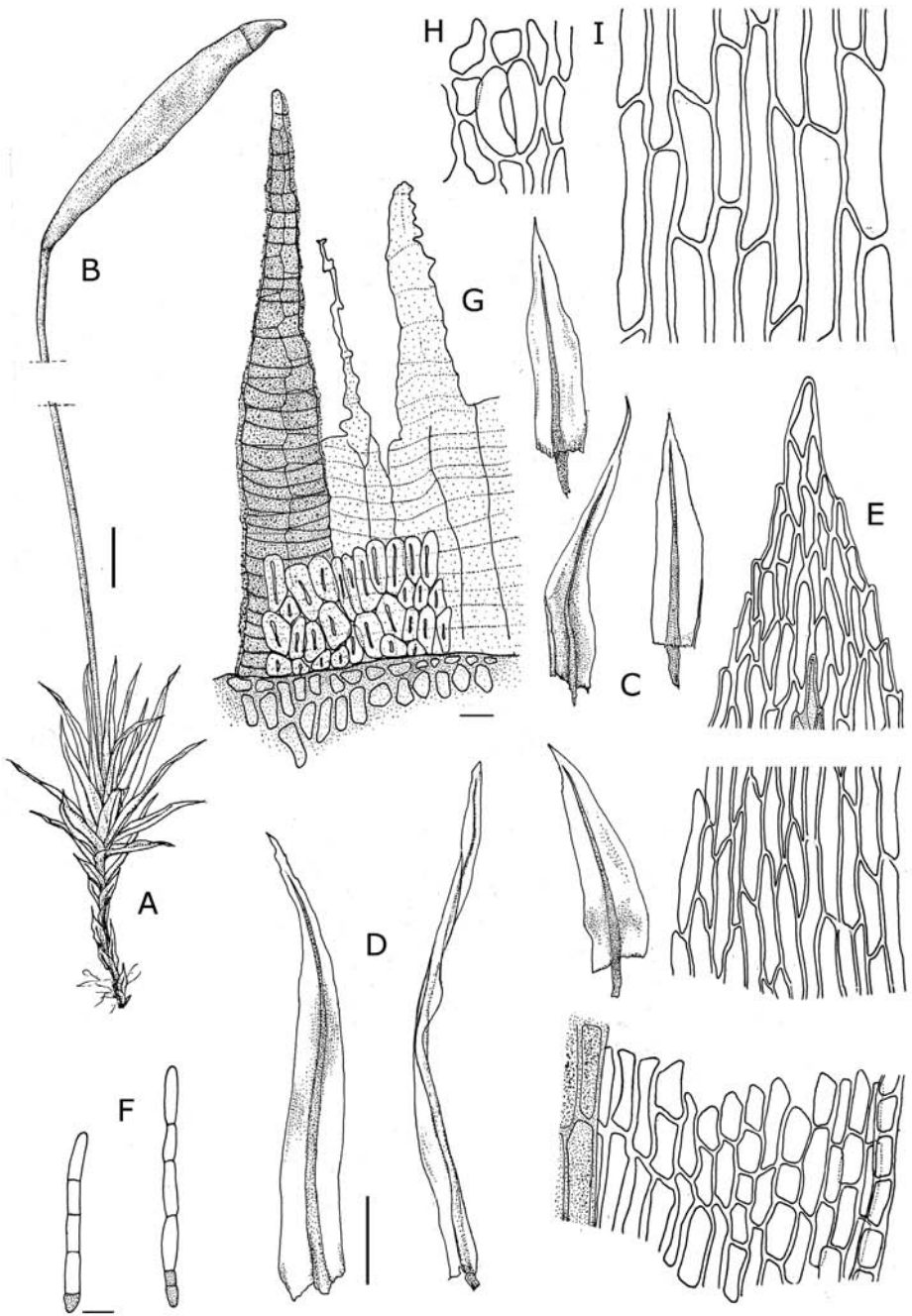
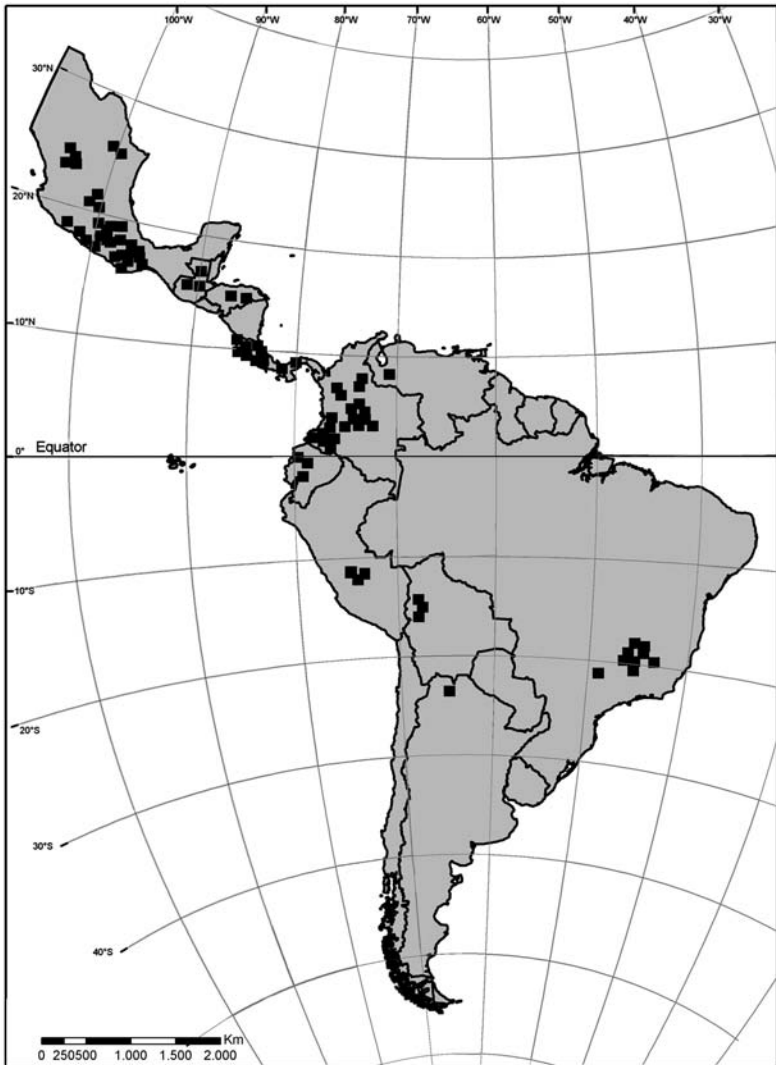


Fig. 2. *Pohlia elongata*. A. Habit, wet. B. Sporophyte. C. Leaves. D. Perichaetial leaves. E. Upper, median and basal laminal cells. F. Axillary hairs. G. Peristome. H. Stoma. I. Exothecial cells. Scale bars: A–D = 1 mm; E–I = 25 μ m. (From G.Suárez 504 LIL.)



Map 2. Known distribution of *Pohlia elongata* in Central and South America.

Webera crassidentiformis Dixon ex Ochi, A Rev. Bry. Japan 22. 1959 (BM!).

Pohlia subleptopoda (Broth.) F.J.Herm., Bryologist 79: 142. 1976. ≡ *Webera subleptopoda* Broth. in Herzog, Biblioth. Bot. 87: 79. 1916. Type: BOLIVIA. Waldgrenze über Tablas, 3400 m, 5 1911, Th.Herzog 2862 (LECTOTYPE DESIGNATED HERE: B!, Isolectotypes: L!, JE!). SYN. NOV.

PLANTS medium to robust, yellowish-brown, dull, forming loose, pure or mixed turf. STEMS 5–30 mm in length, dark red, simple or branched by 2(–4) innovations, in cross section rounded, central strand present. AXILLARY HAIRS 100–140 μm long,

with 1–2 brown basal cells and 1–4 distal hyaline cells. LEAVES appressed, flexuose when dry, spreading to erect-spreading when wet, 0.5–2.5 × 0.2–0.5 mm, lanceolate to oblong-lanceolate; margins recurved, serrate towards the apex; COSTA strong, ending before the apex; LAMINAL CELLS thick-walled, UPPER LAMINAL CELLS long-rhomboidal to fusiform, 30–60 × 5–10 µm, MEDIAN CELLS the same as the apical ones, 35–80 × 6–11 µm, BASAL CELLS short-rectangular, 20–40(–60) × 6–20 µm. PAROICOUS. PERICHAETIAL LEAVES long-lanceolate, 2.5–3.5 mm long. SETAE 1 per perichaetium, straight, yellowish-brown to brownish red; CAPSULES erect to slightly inclined, long-elliptical to elongate, 3.0–7.0 mm long, EXOTHECIAL CELLS thick-walled, short to long, rectangular, flexuose, 56–160 × 12–25 µm; STOMATA phaneroporous; ANNULUS of 2–3 rows of vesicular cells, revolute; EXOSTOME TEETH brown to yellowish-white, 102 µm long, trabeculate, scarcely bordered, densely papillose towards apex; ENDOSTOME hyaline to yellowish-white, 75–90 µm long, with a low basal membrane (2/5 the length of the endostome), densely papillose to spinulose, and long nodulose cilia, papillose; OPERCULA mucronate (but blunt). SPORES 15–19 µm in diameter, papillose.

SELECTED SPECIMENS EXAMINED: MEXICO. AGUAS CALIENTES: Sierra del Laurel, about 10 miles SE of Calvillo, 8000 ft., 4 Nov 1959, W.Koelz 34015 (MICH); BAJA CALIFORNIA: Sierra San Pedro Mártir, 31°02'N, 115°27'W, 2800 m, E slope on Cerro "2828", on E rim, 24 Aug 1968, R.Moran 15417 (MICH); CHIAPAS: prope San Cristobal "Los Llanos or Huistian", in terra, 2500 m, 21 Dec 1907, G.Münch (NY); DISTRITO FEDERAL: Ojos de Agua, Nevado de Toluca, on soil at base of pine trees, 12,800 ft., 1938, E.Balls 4093 (B); DURANGO: along Hwy. 40, W of Durango, near km sign 45, 23°55'N, 104°57'W, 2300 m, 1 Oct 2004, R.Merrill King & R.Garvey B308 (MO, NY); HIDALGO: near Honey Station, on banks and walls, 22 Oct 1908, Pringle 10643 (NY); JALISCO: Slopes of La Ferrería, above Manantlán, 7500 ft., oak forest, on oak, 24 Jul 1949, H.Crum 950 (NY); MICHOACÁN: San Juan Nuevo, Patzingo, on soil along road in rather open montane pine-oak forest, 6 Oct 2004, M.Burghart 4516 (MO, NY); MORELOS: 9500 ft, 27 Jul 1947, Patrick 241 (MO); NUEVO LEÓN: Main road up Cerro Potosí 2.7 mi above lower microwave tower; ca. 17 km NW northwest of Gallana, 3400 m, 100°14'W, 24°52'N, 26 Jul 1985, A.Whittemore 3200 (MO); OAXACA: 20 km NNE de Tlacolula, 3000 m, 30 Jan 1966, C.Delgadillo 74 (MO, MICH); PUEBLA: on base of pine-tree, E-side, common, pine forest (*Pinus hartwegii*) on Popocatepetl, 300 m SE from Tlamacas, 3900 m, 19 Apr 1973, J. den Held & F. van Rhijn HM2 (MO); TLACOTEPEC: cerro Teotepec, about 40 km N of Coyuca de Benitez, 3200–3500 m, pine forest, 5 Dec 1963, J. Dieterle #3247 (MO); ZACATECAS: 14 km N de Valparaíso, municipio de Valapraíso, 22°51'N, 103°31'W, bosque de *Quercus* con *Pinus*, *Juniperus*, *Yucca*, *Opuntia* y compuestas, sobre suelo, lugares secos y sombreados, 22 May 1980, A.Cárdenas 812, 816 (MICH). CENTRAL AMERICA. COSTA RICA. ALAJUELA: Parque Nacional Volcán Poas, 10°11'N, 84°14'W, 2500 m, 2 Jul 2005, G.Suárez 525, 526 (LIL); CARTAGO: Cordillera Talamanca, Villa Mills, Station "Siberia" Interam. S km 100, 2700 m, 6 Mar 2000, I.Holz CR 00–0615 (MO); SAN JOSÉ: Cantón Dota, cerro de la Muerte, paramo, 9°33'27"N, 83°45'10"W, 2100 m, 12 Jun 2005, F.Michelangeli & G.Suárez 1088 (LIL), 9°33'27"N, 83°48'29"W, 2100 m, 12 Jun 2005, F.Michelangeli & G.Suárez 1086, 1087 (LIL). GUATEMALA. QUETZAL-TENANGO: above chiquival, 8000 ft., on *Cupressus* log, 24 Jan 1945, A.Sharp 2113 (MO); SOLOLÁ and TONONICAPÁN: 5–10 km of Los Encuentros, Cerro María Tecum, Sierra Madre Mountains, 2900–3100 m, on decaying tree, in forest, 24 Dec 1972, L.Williams, A.Molina & T.Williams 41751 (MO). PANAMA. CHIRIQUI: along road from gatehouse to summit of Volcán Baru, 1800–3400 m, 8°45'N, 82°30'W, on soil and trunk of tree, 13 May 1990, B.Allen 9071 (MO, NY). DOMINICAN REPUBLIC. LA VEGA: Pyramids site, 40 km S of Constanza, humid forest of *Pinus occidentalis*, on rotten pine log, 18°45'N, 70°37'W, 7600 ft., 3 Apr 1981, W.Reese 15772, 15775 (MO). HONDURAS. LEMPIRA: Montaña de Celaque, filo seco, 13 km SW of Gracias, 14°32'N, 88°41'W, 2700–2730 m, on rotting pine stump, 14 May 1992, B.Allen 12088 (NY). SOUTH AMERICA. ARGENTINA. SALTA: limite entre Argentina y Chile, Volcán Socompa, 24°25'S, 68°15'W, 6030 m, en "punto caliente" (warmspot) n°5, Nov–Dec 1984, S Halloy s/n (LIL). BOLIVIA. LA PAZ: Prov. Nor Yungas, 30 km NE of La Paz, along abandoned roadway, 16°19'S, 67°50'W, 3300 m, 14 Feb 1980, M.Crosby 13571 (MO). PERU. AGUAS CALIENTES: Machu-Picchu, 13°09'S, 72°30'W, 2700 m,

sobre roca, 25 Jan 2006, G.Suárez 504 (LIL); HUANUCO: vicinity of Mito, about 20 km N of Huanuco, about 9000 feet, open hillside-Mountain above Mito, Apr 1923, G.Bryan 359, 265 (MO, NY). COLOMBIA. ANTIOQUIA: Municipio de Santa Rosa de Osos, ca. 3 km oeste de El Chaquiro, Bosque Montano con *Quercus y Clusia*, 6°46'N, 75°31'W, 2650–2750 m, 30 Apr 1991, S.Churchill & A.Franco 17842 (MO, NY, HUA); BOYACÁ: carretera Villa de Leiva-Arcabuco, robledales cerca de la capilla, criptógamas terrícolas, 2600 m, 2 Dic 1972, A.Cleef 7526 (MO); CAUCA: 28 km E of Totoró, 02°33'N, 76°10'W, 3075 m, Subpáramo slopes with abundant *Chusquea*, growing on rocks, 6 May 1984, J.Luteyn 10191a (NY); CUNDINAMARCA: along trail NE from Bogotá (via La Calera) to Mundo Nuevo, Cordillera Oriental, 8500–10000 ft, 29 Jan 1943, W.Steere 1118, 1130 (NY); NARIÑO: Mpio de Pasto, norte de Pasto, sobre la carretera hacia chachagüi al km 17, cerca de Daza, ca. 1°15'N, 77°17'W, bosque Montano secundario con *Quercus humboldtii*, 2380–2440 m, 9 May 1990, S.Churchill & A.Franco 16626 (HUA, MO, NY). BRAZIL. ESPÍRITO SANTO: Parque Nacional Caparaó, along trail from Terreirão to the summit of Pico da Bandeira, 2350–2890 m, dry rocky hill sides with small streams, shrubs and small trees, 16 Sep 1984, D.Vital & W.Buck 11798 (SP, NY); MINAS GERAIS: Parque Nacional do Itatiaia, along entry road near border of Rio de Janeiro, between km 1.5 and km 3, 1700–1900 m, 22°22'S, 44°45'W, humid montane forest, 4 Jul 1991, D.Vital & W.Buck 19463 (NY, SP); SÃO PAULO: Munich, Piquete, Trilha de acesso ao Pico dos Marins, 2200 m, mata atlântica, solo da trilha, margen da trilha, 15 Jun 2006, D.Peralta 3634 (SP). ECUADOR. CHIMBORAZO: Tungurahua, Panamerican Highway 20 km N of Riobamba, bunch-grass páramo, partly cultivated, 3450 m, in shade in ditch, 28 Nov 1980, H.Balslev 1050 (NY); IMBABURA: at exact meeting of páramo and forest, W slope of Cordillera Occidental, on old trail to Intag, via Selva Alegre region, 11000 ft, 24 Nov 1943, W.Steere 9217 (NY); NAPO: Cordillera Oriental, just E of summit, Páramo de Guamami, N of Quito-Baeza road, 4200 m, on soil, 16 Jun 1981, W.Steere E-266 (NY).

DISTRIBUTION AND HABITAT: *Pohlia elongata* is widely distributed in temperate, tropical and subtropical regions of the world. In the Neotropics the distribution extends from Mexico to Brazil and along the Andean corridor to Salta province, northwestern Argentina. This species can be found under several environmental conditions, from the páramos of Costa Rica, through the Peruvian jungle, and reaching to 6000 m on the Volcán Socompa in the province of Salta (Argentina). It is a new record to Argentina, Peru and Ecuador.

This species has contorted leaves when dry, thick-walled leaf cells, a paroicous sexual condition (exceptionally autoicous), the capsules are long (about 3–7 mm), with a distinct neck, and the endostome segments are weakly perforate.

NOMENCLATURE: *Pohlia elongata* is the type species of the genus, erected by Hedwig (1801) based on European specimens. It's has been studied by Shaw (1982) during his revision of the genus for North and Central America. The most visible characters that differentiate this species from the remaining species of *Pohlia* are the shape and size of the capsule. Based on these characters *P. spectabilis*, a species from Central and South America, with exceptionally long and narrowly cylindrical capsules, was synonymized by Shaw (1982), with which we agree after reviewing the isotypes (BM!, C!, H!, JE!). During the development of this work, the original material of some established synonymous were revised, and six new synonyms of Neotropical species were proposed. Most specimens revised are in a perfect state of preservation, resulting in unambiguous identification. The new synonyms proposed are the following: *P. crassicostata* (Ule 1775 H!), *P. leptopoda* (Glaziou 7048 BM!) and *P. grammocarpa* (Ule 1771 H!) from Brazil; *P. leptodontium* (Wier 218 NY!) from Colombia; *P. rusbyana* (Rusby 3148 NY!) and *P. subleptopoda* (Herzog 2862 B!) from Bolivia.

In S the type of *B. grammocarpum*, and a syntype of *B. crassicostatum* are deposited, and in FH there are three samples from Brazil, determined by Bartram as *P. grammocarpa* (Kuhlman32, Rizzini 1167 and Bandeira 336). These plants are almost identical to the plants from Mexico and Central America, with narrow and cylindrical capsules. However the isotype of *P. leptopoda*, from Brazil (B, BM, L; the one at BM designated as the lectotype) and *P. subleptopoda* from Bolivia (B, JE, L; the one at B designated as the lectotype), has the capsules shorter and wider than the typical form of *P. elongata*. The protologue of both species was based only on differences of operculum form, a character that we believe does not have any diagnostic value, for this reason we decided to include them as synonyms of *P. elongata*. *Pohlia leptodontium* from Colombia is characterized in the original description by elongate capsules; all isotypes of the species found in NY, S and BM, consisted in scanty material, but the specimens at NY are the best preserved and were designated here as the lectotype. The type of *P. rusbyana* (= *P. elongata*) from Bolivia, deposited in NY, has only a few shoots but define very well the synonymy proposed here.

Pohlia novae-seelandiae presents variability in the perforations of the segments of the endostome, while the most common form is represented by no perforate segments. However small perforations are in some type and non-type material of *P. novae-seelandiae* (BM!), but this is considered, based on our observations, within the range of variation of *P. elongata*.

Pohlia pretoriensis (BM) from South Africa and *P. madagassa* (H) of central Madagascar, both herbarium names, correspond to *P. elongata*, extending the distributional range to these countries.

***Pohlia longicollis* (Hedw.) Lindb., Musci Scand. 18. 1879.** Fig. 3, Map 3

≡ *Webera longicollis* Hedw., Sp. Musc. Frond. 169, 41 f. 1–5. 1801, Type: SUECIA. In fidduris rupium umbrosis montosarum regionum Vermelandiae in Suecia, O.Swartz (G!).

Webera formosana Dixon ex Ochi, Rev. Bry. Japan 17. 1959. Type: JAPÓN. Formosa: Daibu, 25 May 1918, H.Matsuda B1252 (BM!).

PLANTS robust, green to yellowish-green, forming small turfs. STEMS 8–30 mm long, red, simple, eventually branching by innovations, in cross section rounded, with well-developed central strand. AXILLARY HAIRS 70–85 µm long, with 1–2 brown basal cells and 2–3 distal hyaline cells. LEAVES distributed along the stem, flexuose when dry, erect to erect-spreading when wet, 1.5–2.7 × 0.5–1.0 mm, lanceolate; apex setaceous, spirally twisted; margins flat to slightly recurved, entire to serrulate towards apex; COSTA robust, ending before acumen, darker at the base only; LEAF CELLS thin-walled, UPPER LAMINAL CELLS rhomboidal to fusiform, 45–90 × 7–12 µm; MEDIAN CELLS rhomboidal to fusiform, 90–150 × 10–14 µm; BASAL CELLS short to long rectangular, 8–14 × 35–80 µm. PAROICOUS. PERICHAETIAL LEAVES longer than vegetative ones, to 4 mm long. SETAE red, 1 per perichaetium, 10–20 mm long; CAPSULES inclined, elongate, 3–6 mm long, with distinct necks as long as the urn, seldom short; EXOTHECIALS CELLS long-rectangular, walls flexuose, 50–90 µm long; STOMATA numerous, phaneroporous; ANNULUS of 2–3 rows of vesicular cells, revoluble; EXOSTOME TEETH yellow-brown to yellowish, 350–400 µm long, bordered, trabeculate, strongly papillose near the apex; ENDOSTOME hyaline, 350–390 µm long, with a high

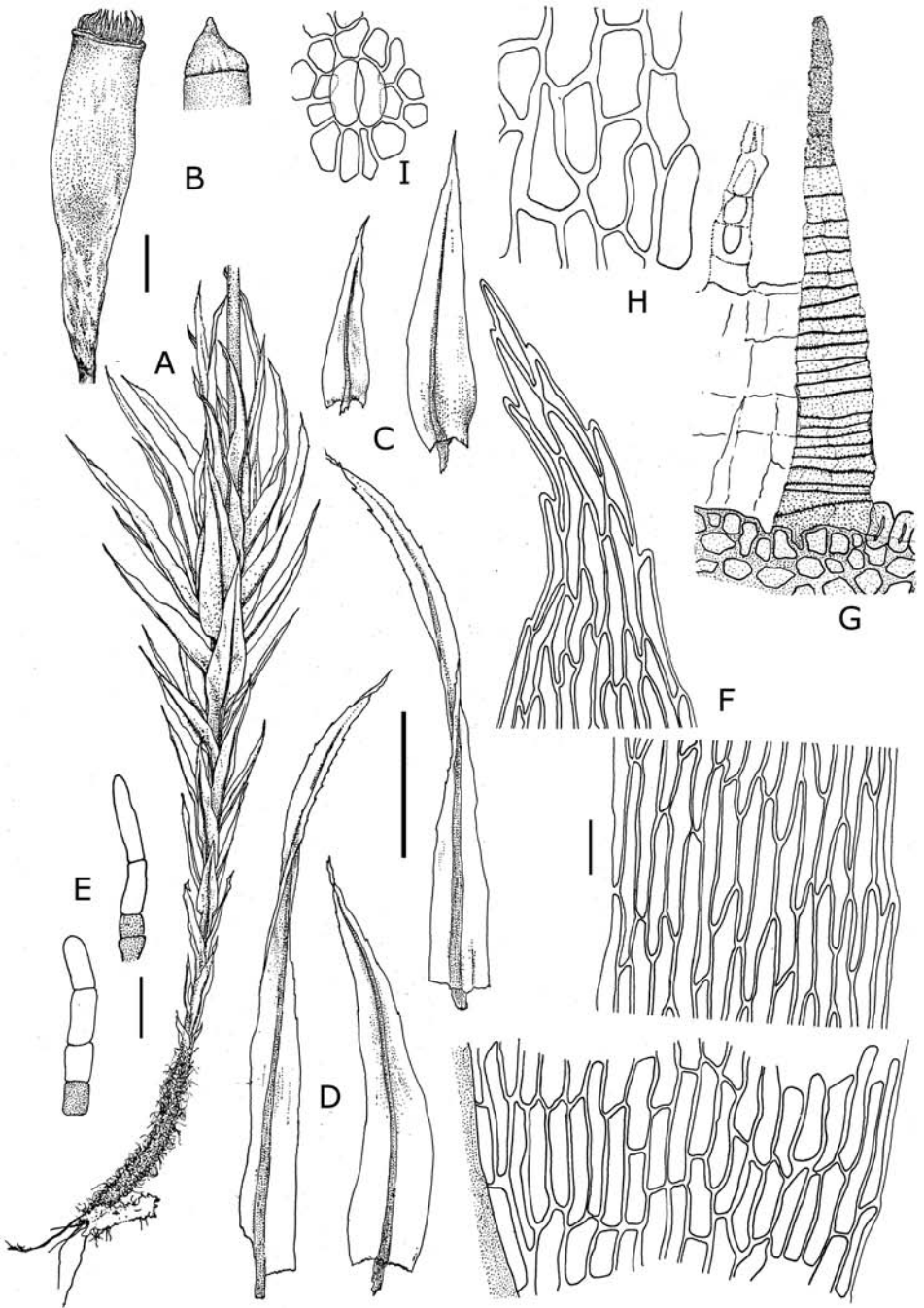


Fig. 3. *Pohlia longicollis*. A. Habit, wet. B. Sporophyte. C. Leaves. D. Perichaetial leaves. E. Axillary hairs. F. Upper, median and basal laminal cells. G. Peristome. H. Exothecial cells. I. Stoma. Scale bars: A–D = 1 mm; E–I = 25 μ m. (From P. & E. Hegewald 7675 MO.)



Map 3. Known distribution of *Pohlia longicollis* (■), *P. nutans* (●) and *P. oerstediana* (▲) in Central and South America.

basal membrane (1/2 length endostome), segments keeled, slightly perforate, and short cilia; opercula conic, usually apiculate. SPORES 16–24 μm in diameter, strongly papillose.

SELECTED SPECIMENS STUDIED: SOUTH AMERICA. BOLIVIA. LA PAZ: Prov. Los Andes, Laguna Tuni, along trail between Laguna Tuni and pass between Cerro Jisthana and Nevado Huayna Potosí, 32 km N of La Ceja de El Alto La Paz, 16°14'S, 68°13'W, 4700 m, arid, high Andean habit, various humid boggy places, 14 Dec 1982, M.Lewis 82–353 (B). ECUADOR. IMBABURA: Lago San

Marcos, Cayambe Mountain, 13,500', mud on underside of rocks by stream, 16 Dec 1961, P.Cazalet & T.Pennington 96 (B). PERU. ANCASH: Recuay, Querococha, 09.43°S, 77.26°W, 4000 m, 18 Oct 1973, P. & E.Hegewald 7675 (MO).

DISTRIBUTION AND HABITAT: *Pohlia longicollis* is known from Africa, Europe, India, Japan, and North America (Delgadillo et al. 1995), and South America, where it is registered only from Peru (Menzel 1992). Here we extend the distributional range to Ecuador; Bolivia is its southernmost limit in the Americas. According to herbarium records from South America, the plants grow in marshy lands above 4000 m.

Pohlia longicollis is characterized by the intense brightness of the plants, the setaceous leaf apex, recurved, relatively short costa, and the relatively high basal membrane. However, it shares with *P. elongata* and *P. bolanderi* the narrowly perforate segments of the endostome. In turn, plants of *P. longicollis* with capsules as long as *P. elongata*, differ by the length of the basal membrane of the endostome.

NOMENCLATURE: This species was originally described as *Webera longicollis* by Hedwig (1801), and transferred to the genus *Pohlia* by Lindberg (1879). The original material from G is well-preserved and fertile plants, where we were able to observe all the diagnostic characters of *P. longicollis*. Based on the material studied, the "herbarium names" are considered only to extend or confirm the distribution of the species.

Pohlia brachymenioides has been assigned to a plant collected by Bahadin (4358 H) in the northwestern Himalayas. This material is identical to the gametophytes of *P. longicollis*, but some plants are polysetous, for this reason we have not proposed it under synonymy. *Pohlia laevidens* is the name of a plant from Kumoon near Yoling Kan in India, collected by Khan at 5488 m and *P. saprophiloides* is the name assigned to a plant collected in Natsnzawa, Japan by Jishiba. These two specimens belong to *P. longicollis*, confirming their distribution in these countries.

Pohlia nutans (Hedw.) Lindb., Musci Scand. 18. 1879. Fig. 4, Map 3

≡ *Webera nutans* Hedw., Sp. Musc. Frond. 168. 1801. Type: st. cr. I. 4. p. 9, Hedwig (Lectotype: G!).

Webera eckloniana (Müll.Hal.) A.Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1873–74: 138 (Gen. Sp. Musc. 1: 600). 1875. ≡ *Bryum ecklonianum* Müll.Hal., Bot. Zeitung (Berlin) 13: 752. 1855. Type: AFRICA. Distrito Calderón, Nov. 1825, Ecklon 203 (H!) First synonymized by Magill (1987).

Bryum longifolium Müll.Hal. & Hampe, Linnaea 28: 205. 1856, hom. illeg. Type: in Monte Cobboras in Sphagnetis, F.Mueller (LECTOTYPE DESIGNATED HERE: H!, Isolectotype: BM!) First synonymized by Wijk et al. (1959).

Bryum compactum Austin, Botanical Gazette 2: 111. 1877. (Lectotype: NY!) First synonymized by Shaw (1982).

Bryum pulvinatum Müll.Hal., Int. Polarforsch., Deutsch. Exped. 1882–1883, Die Deutschen Expeditionen 2: 297. 1890. Type: AUSTRO GEORGIA, ad rupes am Ausgange des Brockenthales mit *Blindia*, 23 Jan 1883, H.Will (Lectotype: H!) First synonymized by Clarke (1973).

Webera austro-nutans (Müll.Hal.) Kindb., Enum. Bryin. Exot. 79. 1888. ≡ *Bryum austronutans* Müll.Hal., Bot. Jahrb. Syst. 5: 78. 1883. Type: AFRICA. Montagn pass, A.Rehmann 221 (BM!) First synonymized by Wijk et al. (1959).

Webera duriuscula Broth., Philipp. J. Sci. 8: 71. 1913. Type: NEGROS, Canloan Volcano, ravine in slopes of the new cone, about 2000 m, Merrill 6814 (H!) First synonymized by Wijk et al. (1959).

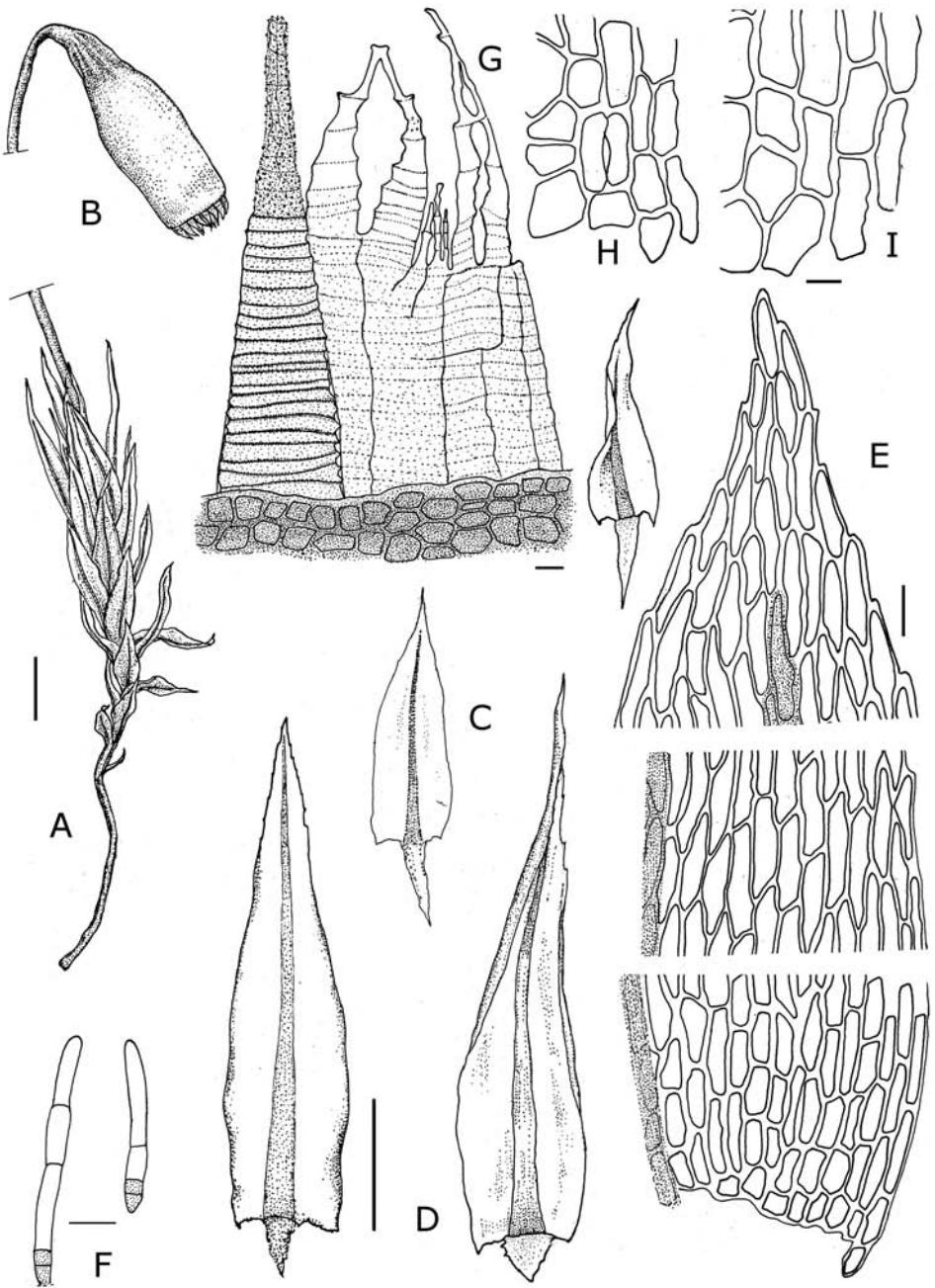


Fig. 4. *Pohlia nutans*. A. Habit, wet. B. Sporophyte. C. Leaves. D. Perichaetial leaves. E. Upper, medial and basal laminal cells. F. Axillary hairs. G. Peristome. H. Stoma. I. Exothecial cells. Scale bars: A, B = 1mm; C, D = 0.5 mm; E-I = 25 μ m. (From Kühnemann 5112 B.)

Pohlia elatior (Dixon & Sainsbury) Sainsbury, Rev. Bryol. Lichénol. 21: 219. 1952. ≡ *Webera elatior* Dixon & Sainsbury, Trans. & Proc. Roy. Soc. New Zealand 75: 179. 1945. Type: NEW ZEALAND, Mt. Girdlestone, Iongariro National Park, 8000 ft., on volcanic rock, Apr 1939, G.Sainsbury 966 (BM!) SYN. NOV.

PLANTS small to medium-sized, yellowish-green, forming pure or mixed turf. STEMS simple or branched by innovations, 4–30 mm long, in cross section rounded, with well-developed central strand. AXILLARY HAIRS 90–100 µm long, 1–2 brown basal cells and 2–4 distal hyaline cells. LEAVES distributed along the stem or exceptionally comose, slightly flexuose when dry (mainly distal), spreading when wet, 0.8–2.6 × 0.5–1.0 mm, oval-lanceolate; margins recurved, toothed towards the apex; COSTA robust, percurrent to exceptionally short-excurrent; leaf cells firm-walled, UPPER LAMINAL CELLS short to long fusiform, 35–57 × 5–7.5 µm; MEDIAN CELLS short to long-rectangular, 30–80 × 8–14 µm; BASAL CELLS short rectangular, 30–80 × 13–24 µm. PAROICOUS. PERICHAETIAL LEAVES longer than vegetative ones, 4 mm long. SETAE yellowish brown to reddish brown, 1 per perichaetium, 13–46 mm long; CAPSULE pendulous, cylindrical-pyriform, 1–3 × 0.5–1.5 mm, with distinct necks, equal or shorter than the urn; EXOTHECIALS CELLS short- to long-rectangular, walls straight, 40–80 × 10–35 µm; STOMATA phaneroporous; ANNULUS of 2–3 rows of vesicular cells, revolvable; EXOSTOME TEETH yellow-orange, 400 µm long, acute-triangular, trabeculate, bordered, heavily papillose near the apex; ENDOSTOME hyaline, 350–380 µm long, with a high basal membrane, segments broadly perforate, nodulose cilia. OPERCULA conic. SPORES 10–20 µm in diameter, papillose.

SELECTED SPECIMENS STUDIED. SOUTH AMERICA. ARGENTINA. CHUBUT: Lago Menéndez, 01 Jul 1940, Kühnemann 5112 (B); TIERRA DEL FUEGO: Depto. Río Grande, aserradero Pepón (20 km N del Lago Fagnano) turbera degradada, invadida por pastizales 54°26'S, 67°21'W, 12 Feb 1988, C.Matteri & M.Schiavone 5189b (MO); ISLAS MALVINAS: oeste de Malvinas, 22 Feb 1907, T.Hall 6338 (MO), Cordillera, on dead trees, 1896–97, J.Hatcher 90 (NY); Isla Soledad, Puerto Argentino, Jan 1981, O.Kühnemann 5290 (BA). CHILE. ANTÁRTICA CHILENA: antarct Exp. 1839–1843, J.Hooker 0411128 (L), Hermite Island, Cape Horn, Antarct. Exp., 1839–1843, J.Hooker 0411129 (L); ARAUCO: Región VIII, road from Curanilahue to Trongol, 29 km SE of Curanilahue, 37°36'S, 73°09'W, 750 m, 30 Oct 2001, R.Ireland & G.Bellolio 33057a (MO); CAUTIN: Araucanía (Región IX), Parque Nacional Conguillio, Bosque de Ñires al norte de las cabañas, en el suelo, 1130 m, 08 Jan 1976, M.Mahú & H.Mahú 10876 (MO); CORDILLERA: Santiago, NE de la Disputada, Estero El Plomo, en la vega, 3500 m, 09 Apr 1983, M.Kalim 20422, 20427 (MO); MAGALLANES: Open marshy lowland, near Magallanes, 12 km, 01 Apr 1936, Y.Mexía 7975 (B, MO, NY); ULTIMA ESPERANZA: margen occidental de Puerto Toro, glacial del Cerro Balmaceda, 51°25'S, 73°06'W, sobre morenas frontales, 20 Jan 1977, C.Matteri 40269 (BA). COLOMBIA. EL CAUCA: Mount Purace, Cordillera Central, 3600–3700 m, 12 Jun 1922, F.Pennell & E.Killip 6656 (NY).

DISTRIBUTION AND HABITAT: *Pohlia nutans* has a worldwide distribution in cool and cold regions. In the Americas it presents a disjunct distribution, from Canada to northern Mexico, with one record from Colombia, and then becoming common and frequent in the south of Chile and Argentina. According to our observations, the species grows in *Nothofagus betuloides* and *Drimys winterii* forests in southern South America.

This species is distinguished by robust plants, usually fertile, rectangular thick-walled leaf cells, relatively short red-orange capsules (ca. 3.5 mm), with the neck well differentiated, and exothecial cells with flexuose walls.

Due to the aspect of the plants and the leaf cells, this species can be confused with *P. elongata*, but it differs in shape and size of the capsules, with reach up to 7 mm length in *P. elongata*.

NOMENCLATURE: This species was erected as *Webera* by Hedwig (1801), and Lindberg in 1879 made the current combination. The type specimen (G) is a robust plant, well-preserved, and complete, which allowed us rapid identification. From studies on samples at the BM, H and NY, new synonyms are proposed and already established synonyms are corroborated. *Pohlia elatior* (Dixon & Sainsbury) Sainsbury was described as *Webera* from New Zealand by Sainsbury in 1945, and transferred to the genus *Pohlia* in 1952. The type specimen (BM) consists mostly of sterile plants with only a few sporophytes. The morphology of the sporophyte and the thick-walled leaf cells has been the basis for the proposed synonymy.

Types of some names synonymized by Shaw (1982) were reviewed with the following observations: *Bryum longifolium* Müll.Hal. & Hampe has two isotypes (BM, H); the specimen of H is here designed as lectotype; on the same sheet there are two groups of plants numbered as 551 and 221, only the latter correspond to the type specimen of *Bryum austro-nutans* Müll.Hal. (BM); seven groups of plants with a few sporophyte labeled as the isotype of *W. strangulata* (BM), are all *P. nutans*. In H is the isotype *B. pulvinatum*, a synonym suggested by Clarke (1973), and the type of *B. ecklonianum* whose synonymy was proposed by Magill (1987). *Bryum pulvinatum* is represented by a few plants which are fertile, whereas in the type of *B. ecklonianum* sporophytes are abundant. These observations are consistent with the previously proposed synonymies.

Pohlia oerstediana (Müll.Hal.) A.J.Shaw, Contr. Univ. Michigan Herb. 15: 238. 1982. Fig. 5, Map 3

≡ *Webera oerstediana* (Müll.Hal.) A.Jaeger, Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1873–74: 128 (Gen. Sp. Musc. 1: 590). 1875. ≡ *Bryum oerstedianum* Müll.Hal., Syn. Musc. Frond. 2: 583. 1851. Type: COSTA RICA, region montañosa, elev. 5000–8000', mens Feb et Apr 1847, A.Oersted (Lectotype (vide Shaw 1982 p. 238): H-BR!, Isotypes: BM!, C!, JE!).

Pohlia seleri (Müll.Hal.) Broth. in Engler & Prantl, Nat. Pflanzenfam. I (3): 548. 1903. ≡ *Bryum seleri* Müll.Hal., Bull. Herb. Boissier 5: 181. 1897. Type: GUATEMALA, Chimaltenango, Sierra Santa Elena, 3000 m, 27 Sep 1896, E.Seler 2354a (H-BR!) First synonymized by Shaw (1982).

Webera orizabensis Cardot, Rev. Bryol. 40: 38. 1913. First synonymized by Shaw (1982).

PLANTS robust, pale green to yellowish green, glossy. STEMS 10–30 mm long, simple or sometimes branched by innovations, in cross-section irregularly rounded to elliptical, central strand well developed. AXILLARY HAIRS 150–210 µm long, with 1–2 brown basal cells and 3–5 distal hyaline cells. LEAVES densely distributed along the stem, erect when dry, erect-spreading when wet, secund, lanceolate to oval-lanceolate, 0.5–2.6 × 0.3–0.7(–0.9) mm; apex acute; margins strongly serrate towards the apex; COSTA strong, ending 1–5 cells below the apex, yellowish; leaf cells with walls slightly thickened, UPPER LAMINAL CELLS linear-rhomboidal to fusiform, 58–93 × 7–15 µm; MEDIAN CELLS long-rhomboidal to long-hexagonal, 90–170 × 8–15 µm; BASAL CELLS short-rectangular, 27–80 (–87) × 15–25 µm. PAROICOUS. PERICHAETIAL LEAVES elongate

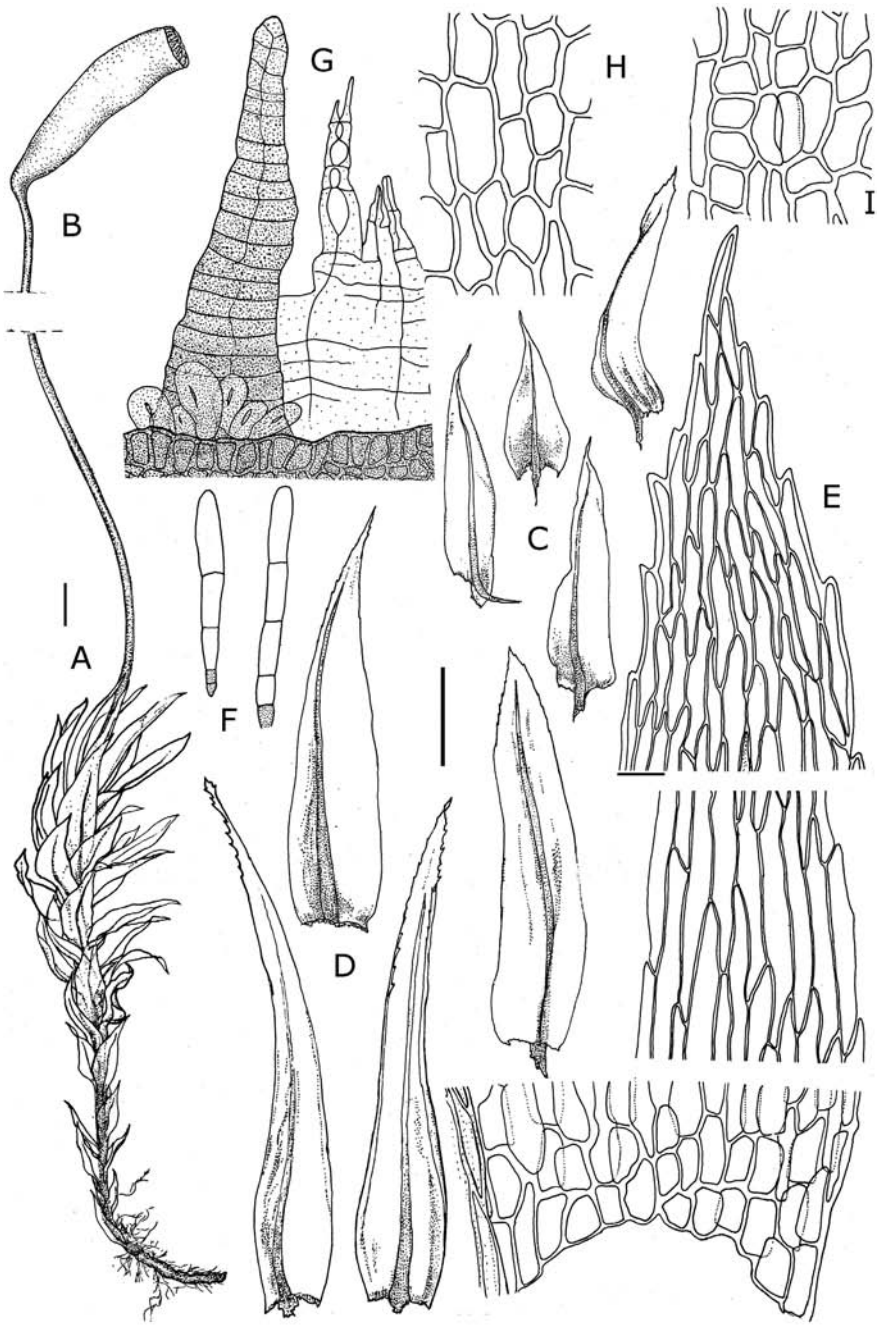


Fig. 5. *Pohlia oerstediana*. A. Habit, wet. B. Sporophyte. C. Leaves. D. Perichaetial leaves. E. Upper, median and basal laminal cells. F. Axillary hairs. G. Peristome. H. Exothecial cells. I. Stoma. Scale bars: A–D = 1 mm; E–I = 25 μ m. (From J.Oersted isotype: C.)

gradually towards the apex, 2.8–3.1 × 0.3–0.8 mm. SETAE 1(–2) per perichaetium, 11–25 mm long, yellowish red; CAPSULES inclined, cylindrical, 3–6 × 1–2 mm, with neck developed; EXOTHECIAL CELLS rectangular, walls flexuose, 25–63 × 11–40 µm; STOMATA phaneroporous; ANNULUS of 2–3 rows of vesicular cells, partially fugacious; EXOSTOME TEETH reddish brown, 300–305 µm long, trabeculate, bordered, papillose; ENDOSTOME hyaline, 250–280 µm long, with a high basal membrane (1/2 length of endostome), segments broadly perforate, cilia sometimes nodulose. OPERCULA conic. SPORES 18–25 µm in diameter, papillose.

SELECTED SPECIMENS STUDIED: MEXICO. IXTACCIHUATT: near glacier, Jan 1909, C.Purpus 9344 (FH); MÉXICO: 13,500 ft., 29 Jul 1947, Patrick 286 (MO) as *P. cruda*, Nevado de Toluca, volcano, on shores of lake, 100 yds. from edge of water, 13500 ft., 29 Jul 1947, R.Patrick 286 (FH); POOCATEPETL: 10800 ft, 16 Apr 1938, E.Balls 4236 (FH) . CENTRAL AMERICA. COSTA RICA. ALAJUELA: Vicinity of crater of Volcán Poás, along trail from parking area to lagoon, Ericaceous shrub vegetation, 32 km NW of N of city center of San José, 2500 m, 10° 11' N, 84° 14' W, 24 Mar 1973, on rotting log, M. & C.Crosby 6282 (MO); CARTAGO: S side of Volcán Irazú, below summit, on base of tree trunk, 3030 m, 25 Apr 1969, I.Lamb & U.Metzger (FH). GUATEMALA. TOTONICAPAN: On logs and tree trunks, 10,500 ft., E of Tonicapan, 15 Feb 1945, A.Sharp 2617 (MO, NY); Region of Desconsuelo, damp bank, 3000–3240 m, 15 Jan 1939, P.Standley 62724 (FH); SAN MARCOS: Volcán Tajumulco, between San Sebastian and summit of Volcán Tajumulco, 3800–4600 m, 13 Feb 1940, J.Steyermark 35482 (FH); upper slopes Volcán Tacaná, 4100–4400 m, 19 Feb 1940, J.Steyermark 36085 (FH); QUEZALTENANGO: Volcán Santa María, upper NE-facing slopes to summit of volcano, 3000–4200 m, 13 Jan 1940, J.Steyermark 34254 (FH). SOUTH AMERICA. ARGENTINA. TUCUMÁN: Depto. Tafí, Infiernillo, subida al cerro Negrito, 3500 m, en la quebrada cerca del arroyo arriba del rancho de Felipe Díaz, 24 May 1951, H.Sleumer 1978 (B). BOLIVIA. LA PAZ: Prov. Los Andes, Laguna Tuní, along trail between Laguna Tuní and pass, 16° 14' S 68° 13' W, 4700 m, M.Lewis 82–353 (FH).

DISTRIBUTION AND HABITAT: *Pohlia oerstediana* is widely distributed in Central America (Costa Rica and Guatemala). Here it is recorded for the first time for Bolivia and Argentina, mostly on granitic soil in volcanic areas.

Pohlia oerstediana is characterized by its second leaves with the apex heavily serrate, and basal cells markedly distinct. These characters have also been observed in *P. claviformis* (Hampe) Broth. from Australia, which is known only from the type, and differs from *P. oerstediana* in its polysetous condition. Studying the isotypes of *P. oerstediana*, deposited in C, JE and BM, we observed that the sample at C has some polysetous plants, not mentioned in the original description. One might imagine that, like *P. cruda*, *P. oerstediana* is partially polysetous, and furthermore *P. claviformis* also could be a synonym of *P. oerstediana*. This could be clarified with future collections and/or studies.

NOMENCLATURE: *Pohlia oerstediana* was erected as *Bryum oerstedianum* by C.Müller (1851). The lectotype (BM) and two isotypes (C, JE) are all in an excellent preservation condition.

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