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***Aulonemia ximena* (Poaceae: Bambusoideae), a new northern  
 Andean species with fimbriate sheath margins**

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A number of the estimated 60 species in *Aulonemia* have pectinately-fimbriate overlapping sheath margins on both culm and foliage leaves. A new species in this group, *Aulonemia ximena*, from the Andes of Colombia and western Venezuela, is described and illustrated and its distribution is mapped. It is distinguished by the presence of pectinate fimbriae along the full length of the overlapping sheath margins. *Aulonemia ximena* is compared with *A. subpectinata* and *A. trianae*, the two most similar species in the same region. A key to the species of *Aulonemia* with fimbriate sheath margins is also included.

Existen aproximadamente 60 especies en el género *Aulonemia*, y algunas poseen fimbrias pectinadas en los márgenes sobreponientes de las vainas en las hojas caulinares y las hojas del follaje. Se describe e ilustra una nueva especie de este grupo, *Aulonemia ximena*, de los Andes de Colombia y el oeste de Venezuela, y se presenta un mapa de su distribución. La especie nueva se distingue por la presencia de fimbrias pectinadas a lo largo de toda la margen sobreponiente. Se compara *Aulonemia ximena* con *A. subpectinata* y *A. trianae*, las dos especies más parecidas en esta región. Una clave de las especies de *Aulonemia* con fimbrias marginales está incluida.

*Aulonemia* Goudot is an Andean-centered genus including 33 described species (plus one new species in press) (Clark & Londoño 1990; Clark et al. 1997; Judziewicz et al. 1999; Judziewicz 2004) and is classified within subtribe Arthrostylidiinae of the woody bamboos (Bambuseae). Work toward a revision of *Aulonemia* by Judziewicz has led to the discovery of a number of species new to science, raising the total diversity in *Aulonemia* to an estimated 60 species. This work has also confirmed the importance of fimbria morphology and distribution on the culm and foliage leaf sheaths in distinguishing among species in the genus. Using these and other characters, Judziewicz (unpubl.) has divided *Aulonemia* into several informal groups, including one group defined by the presence of fimbriate

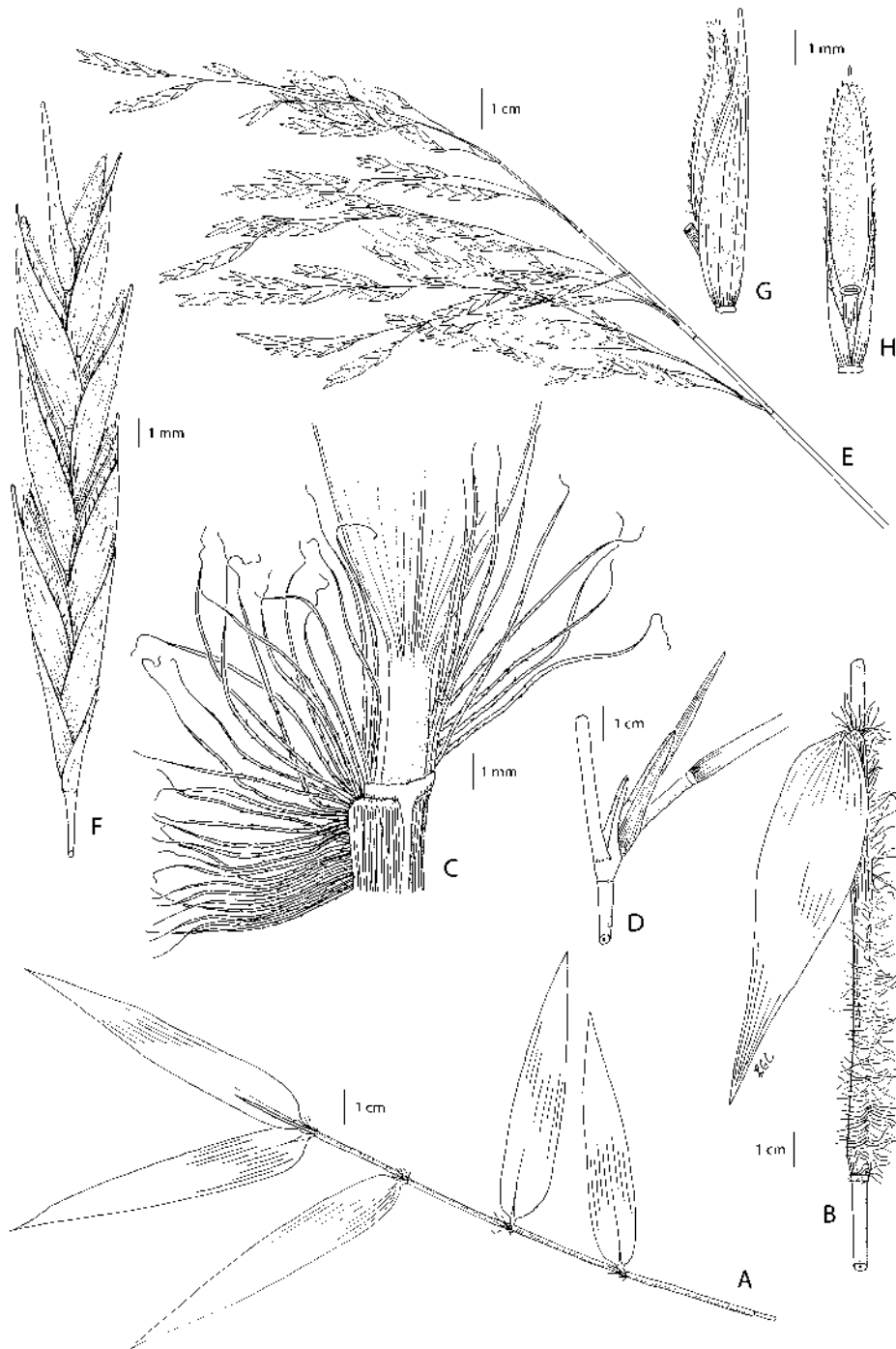


Figure 1. *Aulonemia ximena*. A. Branch with foliage leaves. B. Culm leaf. C. Foliage leaf ligular area showing apical and marginal fimbriae. D. Branch complement showing one dominant branch and a developing secondary branch. E. Synflorescence. F. Spikelet. G. Floret, lateral view. H. Floret, adaxial view showing rachilla internode and broad sulcus of the palea. (A based on Clark et al. 528; B based on Clark et al. 537; C based on Londoño & Clark 482; D based on Clark et al. 558; E-H based on Clark et al. 531.) Illustration by Lynn G. Clark.

sheath margins. Among the members of this group is a new species from Colombia and Venezuela with pectinately fimbriate sheath margins that we describe and illustrate in this paper. We also present a key to the species of *Aulonemia* with fimbriate sheath margins.

**Key to the species of *Aulonemia* with fimbriate sheath margins**

1. Foliage leaf blades 4-13.5 cm wide.
  2. Spikelets 11-16 mm long; northeastern Colombia and northwestern Venezuela. ....*A. robusta* L.G. Clark & Londoño
  2. Spikelets (20-)24-38 mm long.
    3. Spikelets with florets 8-12 mm long, each lemma with an awn 1-4(-7) mm long; Colombia to Peru.....*A. patula* (Pilg.) McClure
    3. Spikelets with florets 5-6 mm long, lemmas awnless; Venezuelan coastal cordillera .....*A. subpectinata* (O. Kuntze) McClure
1. Foliage leaf blades 1-3.5 cm wide.
  4. Spikelets 8-15 mm long, 2-4(-5)-flowered; leaf blades linear-lanceolate; Peru.....*A. humillima* (Pilg.) McClure
  4. Spikelets 13-36 mm long, (4-)5-9-flowered; leaf blades lanceolate or ovate-lanceolate; Colombia and Venezuela.
    5. Foliage leaf blades 17-26 cm long, (2.7-) 3.5-5.7(-7.5) cm wide, broadly lanceolate to narrowly ovate; sheath summit fimbriae 15-20(-30) mm long; sheath margins with fimbriae extending about three-fourths of the length, with the basal fourth ciliate; spikelets with lemmas awnless; Venezuelan coastal range .....*A. subpectinata* (O. Kuntze) McClure
    5. Foliage leaf blades 8-15(-17) cm long, 1-2.5 (-2.8) cm wide, lanceolate; sheath summit fimbriae 7-15 mm long; sheath margins with fimbriae extending along the full length of the sheath; spikelets with lemmas awnless to awned; Colombia and western Venezuela .....*A. ximenae* L.G. Clark, Judz. & C.D. Tyrrell

***Aulonemia ximenae* L.G. Clark, Judz. & C.D. Tyrrell sp. nov.** (Figure 1) TYPE. VENEZUELA. MÉRIDA: Dttto. Tovar, vía Las Colorados - Santa Cruz de Mora, Páramo de Los Colorados, 2690 m, 8°18.5'N, 71°35'W, 14 June 1989 (fl), L.G. Clark, J. Gaviria & G. Adamo 531 (holotype: MERC not seen, isotypes: ISC, K, MO, NY, US).



Figure 2. Distribution of *Aulonemia ximenae*.

Culmi usque ad 2(-5) m alti, 3-6(-10) mm diametro, erecti ad basim, scandentes ad apicem. Vaginae foliorum striatae, nonauriculatae, marginibus superpositis plene fimbriatis; fimbriae 3-5(-10) mm longae; laminae foliorum 8-15 (-17) cm longae, 1-2.5(-2.8) cm latae, reflexae. Synflorescentia paniculata 15-20 cm longa. Spiculae 13-36 mm longae, puberulentes, (4-) 5-9 flosculos continentes; glumae 2, acutae vel aristatae; gluma I 4-5.5(-12) mm longa, gluma II 6-8.5 mm longa; lemmata fertilia 8-12.5 mm longa, acuta vel aristata.

Bamboo with culms up to 2(-5) m tall, 3-6 (-10) mm in diameter, erect at first then climbing or scandent, freely branching and often forming an intricate mass; internodes all approximately the same length, 10-26 cm long, greenish and maculate when young, with a small lumen, each glabrous below and sparingly appressed-hispid near the summit. Culm leaves tardily deciduous; sheaths 10-18 cm long, 1.2-2.2 cm wide, somewhat inflated near the base, abaxially sparsely hispid with glassy hairs 1-2 mm long or glabrous, overlapping margins bearing pectinate fimbriae 4-11 mm long for the full length, the summit bearing erect fimbriae 7-15 mm long, all fimbriae antrorsely scabrous; pseudopetioles 1-2 mm long, minutely pubescent on both sides; blades 3-10 cm long, 0.8-2.5 cm wide, lanceolate, pseudopetiolate, strongly reflexed, deciduous. Branching intravaginal; usually one branch per node, occasionally one or two smaller secondary branches developing from the base of the dominant branch; promontory

absent. Foliage leaves few per complement, widely spaced; leaf sheaths striate, glabrous below, glabrous to puberulent to sparingly appressed-hispid near the summit, the overlapping margins entirely fringed with spreading to upwardly arching, papillose-based pectinate fimbriae 3-5 (-10) mm long, fimbriae at sheath summit 7-15 mm long, abundant, erect, curly at their apices, all fimbriae antrorsely scabrous; auricles absent; outer ligule 0.3-0.5 mm long, ciliolate; inner ligule an inconspicuous rim to 0.5 mm long; pseudopetioles 2-5 mm long, usually minutely pubescent adaxially and abaxially, sometimes glabrous abaxially, often also with a coating of white wax adaxially and abaxially; blades 8-15(-17) cm long, 1-2.5(-2.8) cm wide, lanceolate, reflexed, adaxially glabrous, abaxially glabrous to puberulent, the margins antrorsely scabrous and slightly cartilaginous. Peduncles up to 7 cm long, usually exerted but sometimes retained within the subtending leaf sheath. Synflorescences paniculate, 15-20 cm long, 4-10 cm wide, with lax, capillary, smooth to scaberulous, triquetrous branches. Spikelets 13-36 mm long, 3-5.5 mm wide, greenish to stramineous to plumbeous or dull purplish-brown when mature, puberulent and antrorsely scabrous throughout or rarely glabrous, (4-)5-9-flowered; glumes lanceolate to rarely linear-subulate, acute to awned; lower glume 4-5.5 (-12) mm long, 1-3(-5)-nerved; upper glume 6-8.5 mm long, 3-5(-7)-nerved; lowermost floret lacking a palea, sterile, about as long as the lemmas; lemmas 8-12.5 mm long, lanceolate, acute or with an awn 1.5-3(-5) mm long, 7-11-nerved; palea slightly shorter than to slightly protruding from the lemma, apex rounded and bifid, bicarinate, the keels each with a cartilaginous, serrulate wing to 0.1 mm wide at the apex, the sulcus broad, 0.8-1 mm wide, scabrous-pubescent toward the apex; uppermost floret reduced and sterile. Flowers [based on Pohl & Giraldo 15363] with lodicules 3, 1-1.4 mm long, one oblanceolate and the other two obovate, acute, finely 2-4-nerved, tipped with erect ciliola 0.2-0.4 mm long; stamens 3, the anthers 3-4 mm long, purple-brown when dry; pistil with 2 hispid stigmas. Fruit not seen.

We take great pleasure in naming this bamboo after Ximena Londoño de la Pava of the Valle del Cauca Scientific Research

Institute (INCIVA), Cali, Colombia, world expert on the genus *Guadua Kunth* and other bamboos, and collector of many of the specimens of this new species. *Aulonemia ximena* grows at elevations from about 2400 to 3100 meters (the Garcia-Barriga & Jaramillo 19708 elevation of 3700 to 3960 m seems to be an error) in the Andes of Colombia (Cordillera Occidental, Cordillera Central, Cordillera Oriental, and Sierra de Perijá) and adjacent Venezuela (Cordillera de Mérida) in upper montane forest and subpáramo, persisting in secondary vegetation. It is distinguished by the following combination of characters: pectinate fimbriae present all along the overlapping margins of the leaf sheaths; absence of auricles; foliage leaf blades 8-17 cm long and 1-2.8 cm wide; and spikelets 13-36 mm long with (4-)5-9 acute to short-aristate, scabrously puberulent florets. It most closely resembles *A. trianae* (Munro) McClure (Table 1), but that species completely lacks pectinate fimbriae all along the overlapping foliage leaf sheath margins. Among putatively related species of *Aulonemia* with fimbriate leaf sheath margins, *A. ximena* differs from *A. subpectinata* (O. Kuntze) McClure in its narrower leaf blades, fully fimbriate overlapping sheath margins, and typically smaller spikelets (Table 1), and from *A. robusta* L.G. Clark & Londoño in its much smaller stature, leaf size, and fimbria length and density.

Two collections of *A. ximena* exhibit some deviation from normal variation in spikelet size and awn development on the lemmas. Londoño & Clark 470, from the Serranía de Perijá, has significantly larger (30-36 mm long) spikelets than those of other flowering populations, with stramineous florets whose lemma apices are attenuated into erect, 1.5-3 mm long awns. Wood 4527, from the northern Cordillera Oriental, has plumbeous spikelets 25-30 mm long with noticeably recurved spikelet bracts including linear-subulate glumes and long-awned (5 mm) lemmas. For the present, we retain these two collections in *A. ximena* but suggest that they deserve further study once additional collections are available from northern Colombia.

*Additional collections examined:* COLOMBIA. ANTIOQUÍA: Mun. Santa Rosa, Medellín-Yarumal-Caucasia road, above Santa

Table 1. Morphological comparison of *A. ximenae*, *A. subpectinata* and *A. trianae*.

Character	<i>A. ximenae</i>	<i>A. subpectinata</i>	<i>A. trianae</i>
Plant height (m)	to 2(-5)	0.5-3	0.5-2(-5)
Culm diameter (mm)	3-6(-10)	5-10	5-10
Sheath marginal fimbriae presence and distribution	present along the full length	present along the upper three-fourths of the length	absent
Sheath summit fimbriae length (mm)	7-15	15-20(-30)	7-15
Foliage leaf blade length (cm)	8-15(-17)	17-26	8-15
Foliage leaf blade width (cm)	1-2.5(-2.8)	(2.7-)3.5-5.7 (-7.5)	1.1-2.5
Spikelet length (mm)	13-30(-36)	(20-)25-36	10-18(-22)
Spikelet width (mm)	3-5.5	2-3	3-5
Number of florets	(4-)5-9	6-9	5-7(-9)
Lemma length (mm)	8-12.5	7-9	6.5-8
Lemma awns	absent to present and 1.5-5 mm long	absent	absent
Distribution	Venezuela (southwestern Andean) and throughout Andean Colombia	Venezuela (coastal cordillera)	Venezuela (southwestern Andean); throughout Andean Colombia

Rosa, Vereda Cimitarra, ca. 6°40'N, 75°30'W, 2670 m, 1 Mar. 1988, *Londoño & Clark 411* (ISC, MO, NY, TULV, US); Mun. Urrao, al faldo de la carretera que conduce a Caicedo, arriba de Quebrada Las Juntas, 2750 m, crece en arbustos debajo de la carretera en boque primario, 9 Sept. 1986, *Pohl & Betancur 15472* (ISC, MO, TULV); Prov. Medellín, Cerro de Padre Amaya, cerca de las torres de televisión, 2950 m, subpáramo, solamente una mata florecida, 5 Aug. 1986 (fl), *Pohl & Girardo 15363* (ISC, MO, TULV, US). BOYACÁ: Mun. Guacamayas/San Mateo, vía Guacamayas-San Mateo, 6°27'N, 72°34'W, 2830 m, upper montane forest/subpáramo, culms erect to scandent and climbing, culms more or less erect and shorter in cut-over parts, 31 July 1989, *Londoño & Clark 483* (ISC, MO, NY, TULV, US). CAUCA: km 29 vía El Tambo-Cerro de Munchique, 2°30'N, 77°51'W [sic, for 76°51'W the given longitude is too far west and in a lowland habitat], 2770 m, 28 June 1989, *Londoño & Zuloaga 453* (MO, US). CESAR: Mun. Manaure, Serranía de Perijá, vía Manaure-Sabana Rubia near Venezuelan border, ca. 21 km from Manaure, between El Cinco and Sabana Rubia, 10°23'N,

72°56'W, 2720 m, one big patch with many new shoots found, some old inflorescences seen, one branch with fresh inflorescences, 24 July 1989 (fl), *Londoño & Clark 470* (COL, ISC, MO, NY, TULV). CUNDINAMARCA: Páramo de Une, 2480 m, 15 Feb. 1991, *Barbosa & Kobayashi 6808* (COL, ISC); ca. 1 km S of summit on the Ubaté-Zipacquirá Rd, 3000 m, 12 Apr. 1986 (fl), abundant and subdominant in a scrub-filled gully, gregarious, an intricate mass of wiry stems scrambling over vegetation, to 1 m, *Wood 5403* (K, US); Mun. Cabrera, vereda Nuñez, 14 km por la vía Cabrera-Nuñez, Quebrada Negra, 2380 m, 15 Mar. 1989, *Londoño 436* (MO, TULV, US). HUILA/CAQUETÁ divide: 20 km SE of Gigante, Huila, 10,300 ft. [= 3140 m], paramillo, bamboo 1-2 m high, not the common bamboo of the páramo, 20 Sept. 1944, *Little 8682* (MO, US). NORTE DE SANTANDER: Páramo de Tamá, vertiente de Samaria, 2600-2900 m, 29 Oct. 1941 (fl), *Cuatrecasas et al. 12744* (COL, F); N border of Santander and Cesar, 20 km S of Abrego, Las Jurisdicciones (Cerro de Oroque), 3700-3960 m, 19-21 May 1969, *García-Barriga & Jaramillo 19708*

(US); Mun. Abrego, Hacienda La María, ca. 43 km sobre la vía Abrego-Jurisdicciones, 2490 m, 17 Apr. 1994, bosque nublado con robles, sietecucos, ericáceas, helechos y chusques, *Londoño et al. 870* (NY, TULV, US); Páramo de Las Jurisdicciones, SW of Ocaña, 8 July 1984 (fl), 2800-3100 m, enormously abundant at upper edges of cloud forest where it scrambles over bushes and trees, reaching 5 m in height, *Wood 4527* (K, MO, US). SANTANDER: Mun. San Andres, vía San Andres – Málaga, beyond Pangote, 6°45'N, 72°47'W, 2620 m, 30 July 1989, *Londoño & Clark 482* (ISC, MO, NY, TULV); Mun. Tona/Floridablanca, vía Bucaramanga-Berlin-Pamplona, between La Corcova and Berlin, 3.8 km from Bucaramanga, 7°07'N, 73°00'W, 2700 m, *Londoño & Clark 479* (ISC, MO, TULV); Gold mine valley above California, 2700 m, forming an intricate mass of low, scrambling stems, 14 Sept 1985, Wood 5064 (K). VENEZUELA. LARA/TRUJILLO: Páramo de Los Ñepes, ridge above La Peña, ca. 2740 m, 24-25 Dec. 1959, heavy low growth in open areas, *Barclay & Juajibioy 10308* (MO, US). MÉRIDA: Dto. Pinto Salinas, Páramo de Las Coloradas, 2800 m, 27 Sep. 1985 (fl), *Briceño & Adamo 1380* (ISC, MERC); Dto. Sucre, vía Estanquez-Las Coloradas, El Molino-Canaguá, past turnout to Las Labranzas, 8°20'N, 71°35'W, 2470 m, 14 June 1989, 2460-2810 m, 8°13-21'N, 71°34-52'W, *Clark et al. 526* (ISC, MERC, MO, NY, US), 528 (ISC, MERC, MO); Dto. Arzobispo Chacón, vía Canaguá-El Molino, 8°10.5'N, 71°29'45"W, 2510 m, 15 June 1989, tangled decumbent mats, *Clark et al. 537* (ISC, MERC, MO, NY); Dto. Rivas Dávila, vía La Grita-Tovar, towards Bailadores, Páramo El Portachuelo, 8°12.5'N, 71°53'W, 2800 m, *Clark et al. 557* (ISC, K, MERC, MO, NY); Dto. Rivas Dávila, vía La Grita-Tovar, towards Bailadores, Páramo El Portachuelo, 8°13'N, 71°52'W, 2790 m, 18 June 1989 (fl), *Clark et al. 558* (ISC, K, MERC, MO, NY). TÁCHIRA: Swampy meadow in paramito below Quebrada del Palmar and Quebrada de Palmito, base of Páramo de Tamá, 2 km above Betania and 7 km above Villapaez, 2500 m, 14 July 1944, *Steyermark 57207* (F). TRUJILLO: Mun. Boconó, Páramo del Pumar y alrededores [ca. 9°15'N, 70°15'W], 2700 m, 19 Nov. 2004 (fl), 90-120 cm, formando densas colonias y domi-

nantes en el sùbparamo y páramo, a orillas del bosque paramero se comparte como trepador decumbente, alcanzando hasta 4 m de altura, *Niño 1572* (MO, US); Mun. Boconó, Páramo del Pumar, Parque Nacional Guaramacal (UTM: 19-364614E; 1021651N), on Roberto's finca near Pozo Verde at 1950 m and páramo at 2600 m, on old mule trail to caserío de Guaramacal, in transition to páramo, scandent bamboo, 27 Dec. 2000, *Dorr et al. 8658* (US).

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#### LITERATURE CITED

- Clark, L. G. & X. Londoño. 1990. Three new Andean species of *Aulonemia* (Poaceae: Bambusoideae). *Annals of the Missouri Botanical Garden* 77: 353-358.
- , ——— & M. Kobayashi. 1997. *Aulonemia bogotensis* (Poaceae: Bambusoideae), a new species from the Cordillera Oriental of Colombia. *Brittonia* 49: 503-507.
- Judziewicz, E. J. 2004. *Aulonemia*. Pp. 40-45 in Steyermark, J.A., P.E. Berry, K. Yatskievych & B.K. Holst, eds.: *Flora of the Venezuelan Guayana*, Vol. 8: Poaceae-Rubiaceae. Missouri Botanical Garden Press, St. Louis. xiii + 874 pp.
- , L.G. Clark, X. Londoño & M.J. Stern. 1999. *American Bamboos*. Smithsonian Institution Press, Washington, DC. vii + 392 pp.