DARWINIANA 46(2): 328-334. 2008 ISSN 0011-6793

TWO NEW SPECIES OF *ANDROPOGON* (POACEAE, PANICOIDEAE) FROM CUBA

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Abstract. Norrmann, G. A.; U. Swenson & I. Caponio. 2008. Two new species of *Andropogon* (Poaceae, Panicoideae) from Cuba. *Darwiniana* 46(2): 328-334.

Two new species of *Andropogon* (Poaceae) from Cuba, *A. ekmanii* and *A. canaliglumis*, are described and illustrated. Both belong to the *¨A. lateralis¨* species complex (sect. Leptopogon Stapf) and are the first members of this complex endemic to the West Indies.

Keywords. *Andropogon*, Cuba, Erik L. Ekman, Poaceae.

Resumen. Norrmann, G. A.; U. Swenson & I. Caponio. 2008. Dos nuevas especies de *Andropogon* (Poaceae, Panicoideae) de Cuba. *Darwiniana* 46(2): 328-334.

Dos nuevas especies de *Andropogon* (Poaceae) de Cuba, *A. ekmanii* y *A. canaliglumis*, son descritas e ilustradas. Ambas pertenecen al complejo *¨A. lateralis¨* (sect. Leptopogon Stapf) y son los primeros miembros del complejo endémicos de las Antillas Occidentales.

Palabras clave. *Andropogon*, Cuba, Erik L. Ekman, Poaceae.

INTRODUCTION

Andropogon L. is a pantropical genus of grasses estimated to contain 100 (Clayton & Renvoize, 1986) to 120 species (Campbell & Windisch, 1986), distributed mainly in grasslands of Africa and the Americas. Considered in the strict sense, i.e. excluding allied genera such as *Bothriochloa* Kuntze, *Dichanthium* Willemet and *Schizachyrium* Nees, the genus in America remains somewhat heterogeneous (Gould, 1967; Clayton, 1964; Norrmann, 1985; Kellogg & Campbell, 1987). Stapf (1919) delineated four taxonomical sectional names for African species, from which three can also be applied for the New World species (Clayton & Renvoize, 1986): (i) Sect. Andropogon, which includes the ecologically important big bluestem *A. gerardii* Vitman from North America; (ii) Sect Notosolen Stapf, represented by *A. exaratus* Hack. and *A. pohlianus* Hack. among others, and (iii) the highly evolved Sect. Leptopogon Stapf, with species such as *A. virginicus* Nash and *A. lateralis* Nees.

Within Andropogon and its sections there are tight groups with well defined morphological and cytogenetical characters. One such a group is the *¨A. lateralis¨* complex within section Leptopogon. This informal group comprises a dozen species from South America with a general resemblance to its emblematic member *A. lateralis*.

The group cohesiveness was first noted by Austrian agrostologist E. Hackel (1889), who treated a few entities as *A. incanus* and its varieties. The group has since then been clearly, though informally, recognized and defined based on reproductive features of the sessile spikelets (Campbell, 1983; Campbell & Windisch, 1986). These authors found that the anther size and number of pollen grains in fertile sessile spikelets was strongly reduced compared to those of pedicellate spikelets. Hence, they have dimorphic anthers that are a diagnostic synapomorphy for a complex composed entirely of American species. Anthers in sessile spikelets are so reduced in *A. lateralis* and its sister species *A. hypogynus* that stamens look like

Original recibido el 4 de marzo de 2008; aceptado el 11 de agosto de 2008

staminoids, carry almost no pollen grains and lack dehiscence, making the spikelet functionally female and the plant monoecious (Norrmann & Quarin, 1991). This floral array favors natural hybridization within the complex (Norrmann, in press).

As far as known, all studied species of the complex are sexually reproducing hexaploids. These are considered to have originated through allopolyploidy (Norrmann, 1985, 1999 and in press), because their members share variants of a basic set of three genomes, one of which has been related to the genome of *A. selloanus* (Norrmann et al., 2004).

The *Andropogon lateralis* complex is tentatively composed of the following taxa:

A. arenarius Hack., *A. bicornis* L., *A. coloratus* Hack., *A. glaziovii* Hack., *A. hypogynus* Hack., *A. lateralis* Nees (including several varieties), *A. lindmanii* Hack. and *A. multiflorus* Renvoize. Species are distributed from NE Argentina and N Uruguay to Bolivia and Brazil, and a few species reach Central America (*A. bicornis*, *A. hypogynus*, *A. lateralis*).

Hybridization within the group has been reported twice (Campbell & Windisch 1987; Norrmann, in press), which provides evidence to consider the group as a complex of both species and hybrids.

Erik Leonard Ekman (1883-1931), a Swedish botanist, made extensive collections during his 17 years in Cuba. Between 1921 and 1923 he worked in the Province of Pinar del Río, where he gathered several specimens of *Andropogon*. Ekman was apparently familiar with these entities and provided them with the provisional names *A. jensenii* and *A. canaliculatus*, possibly to distinguish them from each other and/or congeners.

Ekman as well as Ignatz Urban (1848-1931), who processed and published much of Ekman's scientific result, passed away almost simultaneously and the specimens were never studied in detail. These specimens, now distributed in the herbaria of Stockholm (S), Kew (K) and Geneve (G), were recently brought to our attention and it is clear that both entities deserve species rank. Both are members of the *A. lateralis* complex as defined by Campbell (1983), using size and number of pollen grains compared between the sessile versus the pedicellate spikelets, besides a general morphological resemblance to *A. lateralis*.

TAXONOMIC TREATMENT

1. Andropogon ekmanii Norrmann, Swenson & Caponio, sp. nov. TYPE: Cuba, Prov. Pinar del Río, Remates, Laguna Jobero, 19-VI-1920, *Ekman 11361* (holotype S!, isotype K!). Figs. 1, 2A, 3.

Andropogon lateralis similis sed articulo pedicelloque spicule masculae parce ciliatis, ciliis albidis circiter 2 mm longis et lamina cylindrica differt.

Perennial, densely tufted, pale green foliage. Sheaths embracing the stalks, 8 mm wide, nerves prominent, glabrous, the margins auriculate. Auricules overpass the ligule up to 5 mm. Ligule a membranaceous rim, the tip laciniate, 1.5-3 mm long, truncate, glabrous, sometimes with a V-cut. Blades erect, cylindrical in cross section due to reduction of adaxial surface, up to 70 cm long, 2 mm wide, long attenuate, the apex acute, glabrous on both surfaces. Flowering stalks erect, 1.6-2 m tall with glabrous nodes and yellowish internodes. Brown ring below each node. Each node with 2-3 simple rames; each rame terminating into a spathe and a digitate group of racemes. Synflorescence a false panicle made by 2-5 digitate racemes per peduncle, well exserted from the spathe. Racemes erect mostly 4-5 cm long, each with 7-15 pairs of spikelets. Rachis joints and pedicels filiform, widening slightly towards the apex; glabriuscule, with scattered hairs of 1-2 mm long on the margins increasing towards the apex. Callus well developed with a dense crown of hairs up to 2 mm long. Spathe lanceolate, short, 3-4 cm long. Spikelets 2 at each node of the raceme, one sessile, the other pedicellate. Sessile spikelet (4-) 5 (-6) mm long, linear-lanceolate. First glume chartaceous, 2-keeled, 2-nerved, 1.3-2 mm wide, flat to slightly concave, glabrous, the tip scabrous, the margins inflexed, firmly clasping the second glume. Second glume slightly shorter than the first, 3-nerved, strongly keeled, the keel antrorsely scabrous the margins finely ciliolate towards the apex. Sterile lemma 2 keeled. Fertile lemma bifid at the apex, awned from between the lobes, the margins ciliolate. The awn (5-) 7 (-9) mm long, measured from the tip of the first glume. Palea a thin, membranous scale, about as long as the sterile lemma. Stamens 3, anthers 1 mm long, functional. Stigmata whitish. Cariopsis dark brown 3 mm long. Pedicel

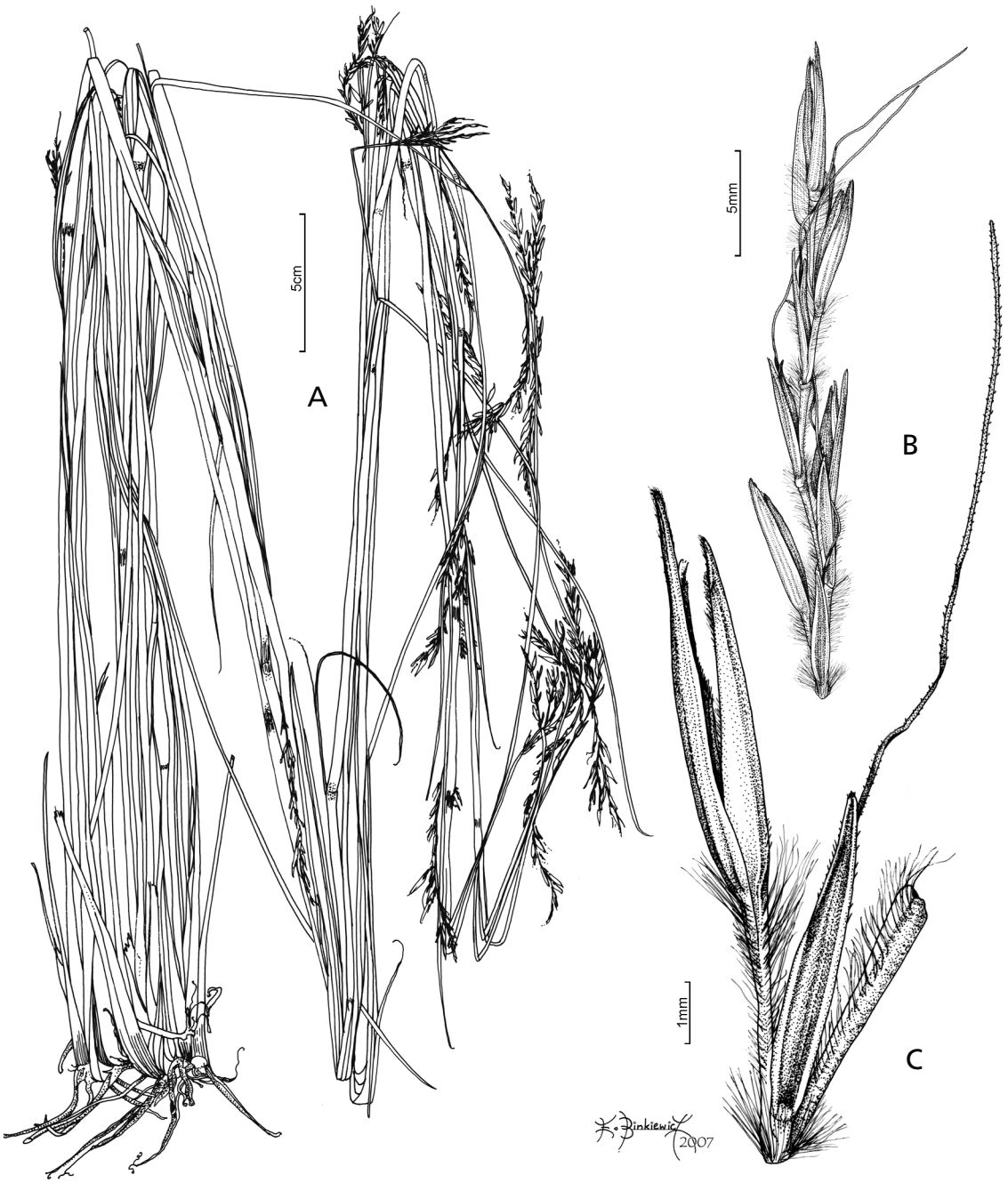

Fig. 1. *Andropogon ekmanii.* **A,** habit. **B,** piece of a raceme showing 5 pairs of spikelets. **C,** one sessile (middle) and one pedicellate (left) spikelet. From *Ekman 11361* (S).

of the pedicellate spikelet (3-)3,7(-4,2) mm long. Pedicellate spikelets attached to the racemes, slightly longer than the sessile one, male, lanceolate, awnless. Glume I 5-nerved, the median nerve well developed, acute. Glume II hairy in the margins and scabrous towards the apex. Stamens 3, the anthers 3 mm long.

Etymology. *Andropogon ekmanii* is named in honor of the Swedish botanist Erik Leonard

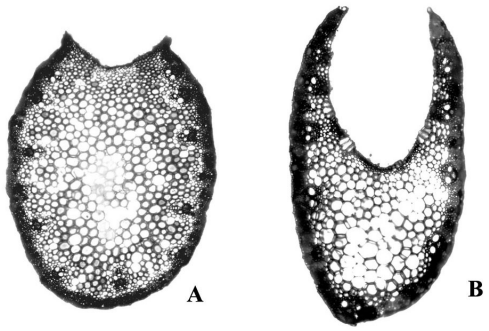

Fig. 2. Transversal sections of a leaf blade. **A,** *Andropogon ekmanii* (from *Ekman 11361*). **B,** *A. canaliglumis* (from *Ekman 11362*).

Ekman (1883-1931), for his contribution to the knowledge of the flora of Cuba.

Distribution and habitat. *Andropogon ekmanii* grows in a narrow belt that borders small lakes. It is distributed (Fig 3) from Bahia de Guadiana in the north (Laguna Blanquizales, near La Fe), eastwards to Albufera de Cortes, passing through Laguna Jobero or Jovero (type location), and Laguna Larguita de Yarua; then northeast towards Laguna Santa Maria in the south of Pinar del Rio city.

Observations. *Andropogon ekmanii* has cylindrical erect leaves (Fig. 2A), a feature seldom seen in American species, so far only reported in *A. durifolius* Renvoize from Bahia, Brazil (Zanin, 2001). In both *A. ekmanii* and *A. durifolius* the shape is made up by the reduction of the upper epidermis surface to a minimum.

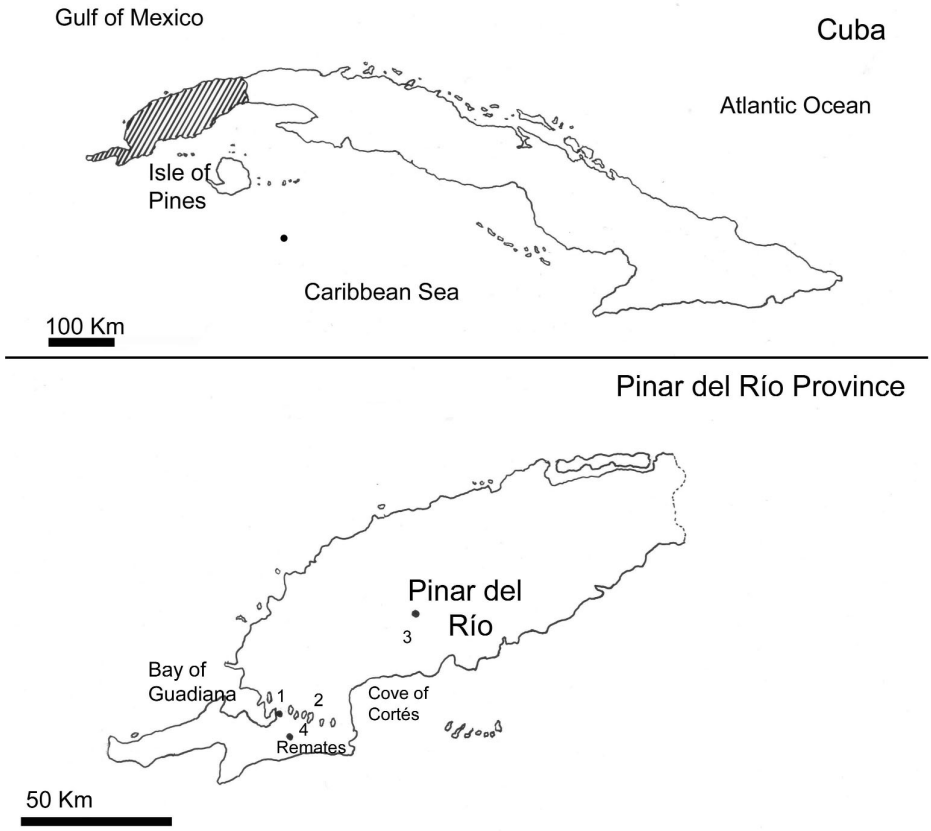

Fig. 3. Distribution of *A. ekmanii* and *A. canaliglumis*. Small lakes: Blanquizales (1), Jobero (2), Larguita de Yarua (3) and Santa Maria (4).

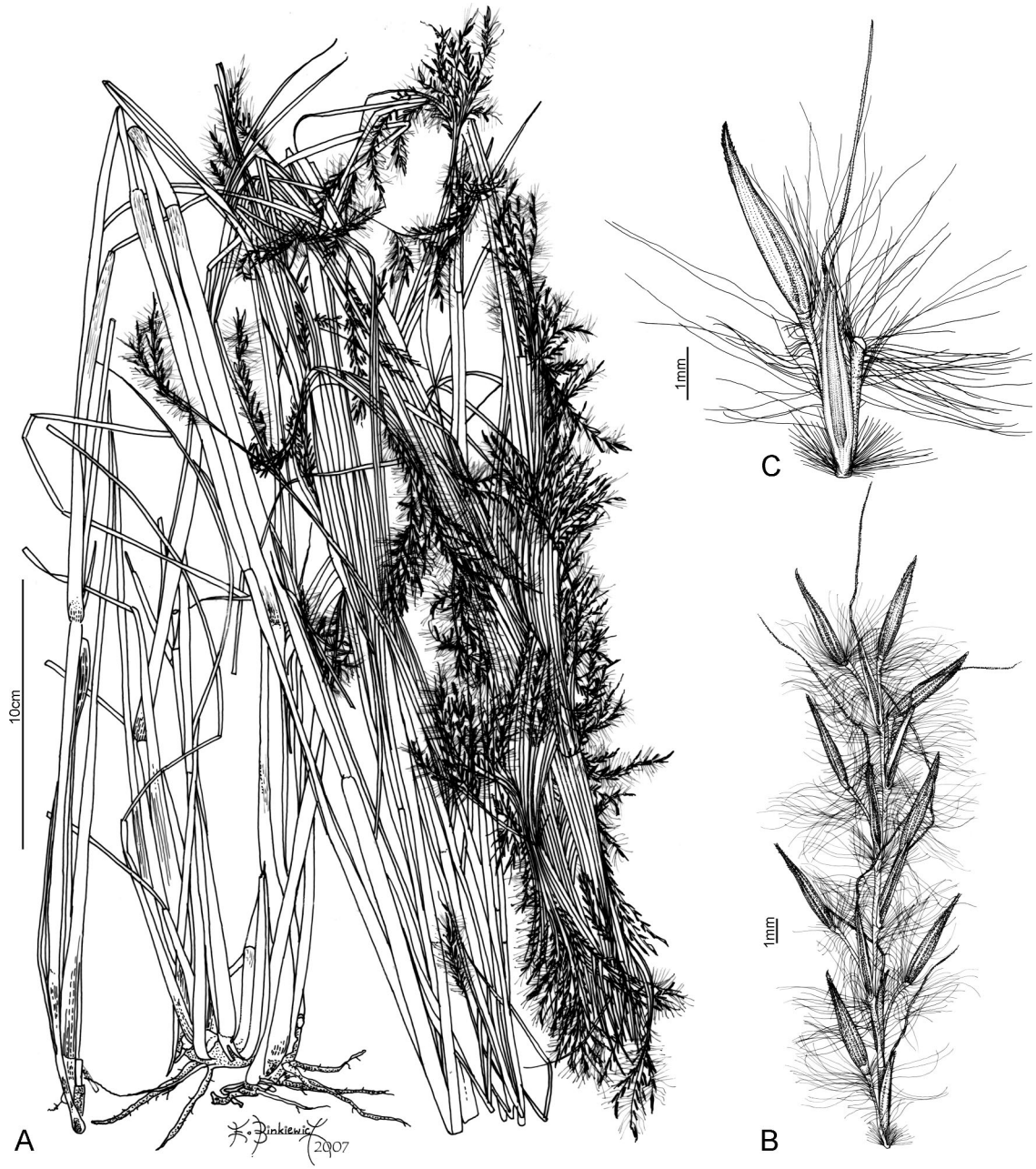

Fig. 4. *Andropogon canaliglumis*. **A,** habit. **B,** piece of a raceme showing 7 pairs of spikelets. **C,** one sessile (middle) and one pedicellate (left) spikelet. From *Ekman 11362* (S).

Smith et al. (1997) reviewed the adaptive origin of cylindrical leaves in relation to photosynthesis. According to these authors, cylindrical leaves appeared as a response to conditions of high sun plus stress caused by other factors. High sun conditions are undoubtedly present in the habitat of *A. ekmanii*, and additional stress may be addressed to its habitat, on side of lakes, supporting periods of drought, flood and fire. Besides that, its erect leaves might be an adaptation to wet places, keeping them outside water when flooded. But the species is not found in other lake shores of Cuba, so per-

haps other eco- physiological factors such as soils are also responsible for the restricted distribution. This rare endemism of western Cuba broadens the distribution of the *A. lateralis* complex core, once thought to be placed in southern Brazil. *A. ekmanii*, in spite of its narrow distribution, stands as a well defined species, very easy to discriminate from other members of the complex. Clearly, further field research is needed to address actual distribution, reproductive biology, cytogenetic pattern and relationship to other members of the group.

Additional specimens examined

CUBA. **Pinar del Río.** La Fe, Laguna Blanquizales. 17-VI-1920, *Ekman 11327* (S, K); Remates, Laguna Larguita de Yarua, 19-VI-1920, *Ekman 11334* (S, K, G); Laguna Santa Maria, 23-VIII-1923, *Ekman 17264* (S).

2. Andropogon canaliglumis Norrmann, Swenson & Caponio, sp. nov. TYPE: Cuba. Pinar del Río. Remates, at Laguna Jobero 19-VI-1920, *Ekman 11362* (holotype S!, isotype K!). Figs. 2B, 3, 4.

Andropogon lateralis similis sed gluma prima inter nervos sulco longitudinali profunde canaliculata praedita, laminae ensiformes et spicula pedicellata brunnea differt.

Perennial, densely tufted, green foliage. Sheaths glabrous, with prominent nerves, margins auriculate. Ligule a membranous rim, the tip laciniate, 1.5-2 mm long, truncate, glabrous. Blades slender, with parallel margins from the base to the apex , 40-60 cm long, glabrous on both surfaces, sparse hairs near the base, cross section ellipsoid. Flowering stalks erect, 1.6 m tall with glabrous nodes and yellowish internodes. Brown ring below each node. Each node with 2 to 4 rames that may ramify into 2 to 4 new rames each carries a pair of spatheate racemes. Synflorescence a false panicle made by 2 (seldom 3) paired racemes per peduncle, mostly included into the spathe. Racemes slender, mostly 4-5 cm long, each with 9-14 pairs of spikelets. Rachis joints and pedicels filiform, hairy, with hairs on the margins increasing towards the apex, up to 4.5 mm long. Callus well developed with a dense crown of hairs up to 3 mm long. Spathe lanceolate, as long as the racemes. Spikelets 2 at each node of the raceme, one sessile, the other pedicellate. Sessile spikelet (3.5-) 4(-5) mm long, pale, narrow, linear-lanceolate, 0.4-0.5 mm wide. First glume 2-keeled, 2-nerved, with a deep longitudinal channel between the keels, glabrous, the tip slightly scabrous. Second glume slightly shorter than the first, 3-nerved, strongly keeled, the keel antrorsely scabrous. Sterile lemma 2-keeled, the margins finely ciliolate towards the apex. Fertile lemma bifid at the apex, awned from between the lobes, the margins ciliolate. The awn 7 to 9 mm long, measured from the tip of the first glume. Palea a thin, membranous scale, about as long as the sterile lemma. Stamens 3, the anthers 1 mm long, functional. Stigmata whitish. Cariopsis not seen. Pedicellate spikelets developed or sometimes reduced in the same raceme. When reduced, a dark brown glumiform appendix as long as sessile spikelet. When developed, slightly longer than the sessile one, (4-)4,5(-6) mm long, male, lanceolate, awnless, deep brown and in 45 degrees angle with respect to racemes. Glume I 5 nerved, the median nerve developed acute. Glume II average hairy in the margins and scabrous to the apex. Stamens 3, the anthers 3 mm long. Small callus in the base with hairs up to 1 mm long.

Etymology. The specific epithet alludes to the characteristic channel seen between two consecutive nerves on Glume 1.

Distribution and habitat. The species is known from a single collection at Laguna Jobero (sic), in Remates, Cuba (Fig. 3).

Observations. *Andropogon canaliglumis* has ensiform leaves and the transversal section of the blade shows an ellipsoid figure (Fig. 2B). This trait and the shape of glume I generate a unique combination in the complex. *A. canaliglumis* flowering habit resembles other *Andropogon* natural hybrids that share the highly repetitive branching system of *A. bicornis*, such as those generated with *A. lateralis*, *A. glaziovii*, *A. arenarius* and *A. hypogynus* (see Norrmann, in press). Because of its rareness and intermediacy among cylindrical and v -shaped leaves, it would be tempting to address *A.*

canaliglumis to a single hybridization process involving *A. bicornis* and *A. ekmanii*. To answer this question ideally living material from *A. canaliglumis* and *A. ekmanii* should be analyzed to determine their specific cytogenetic and reproductive status. These facts plus the tectonic relatedness of this area to continental America (see Cobiella-Reguera, 2003), makes the conservation of these species a goal worth to accomplish.

Key to members of the *A. lateralis* complex living in Cuba

A key to discriminate the new described species from other important members of the *A. lateralis* complex in Cuba follows.

1. Pedicellate spikelets developed, male, aprox. same size than the sessile ones 2
1. Pedicellate spikelets reduced to glumiform apendixes, except for the apical twins . . . . . *A. bicornis*
2(1). Hairs of rachis joints and pedicels less than 2 mm long. Leaves cylindrical in cross section. Glume I flat to slightly concave . . . . . *A. ekmanii*
2. Hairs of rachis joints and pedicels 3.5 mm or longer 3
3(2). Glume I with a deep channel. Leaves ensiform in cross section. Pedicellate spikelets dark brown, sessile spikelets pale green . . . . . *A. canaliglumis*
3. Glume I slightly concave. Leaves V-shaped in cross section. Pedicellate and sessile spikelets of the same color . . . . . *A. lateralis*

ACKNOWLEDGEMENTS

We are especially grateful to Elizabeth Binkiewicz who draw the illustrations, Jens Klackenberg who helped us with the Latin diagnoses and to F. Zuloaga who critically read the manuscript. Institutional acknowledgments correspond to Mellon Fundation grant (2001-2002) and Myndel Fundation (2005) grant to G. A. Norrmann that allowed visits to European herbaria. We thank CONICET (Argentina), Universidad Nacional del Nordeste (UNNE) and Facultad de Ciencias Agrarias (FCA-UNNE) for financial support and laboratory facilities.

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