

Chorological and nomenclatural notes on Peruvian *Carex* (Cyperaceae)

Notas corológicas y nomenclaturales sobre *Carex* (Cyperaceae) del Perú

Pedro Jiménez-Mejías¹ | J. José Alegría-Olivera^{2,3} | Hamilton W. Beltrán⁴ | Asunción Cano^{4,5} | Arturo Granda-Paucar⁶ | Mónica S. Maldonado Fonkén³ | Sebastián Riva-Regalado⁴ | Barbara Ruthsatz⁶ | Marcial Escudero^{7*}

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ABSTRACT

Here we present relevant records of nine species of the genus *Carex* (Cyperaceae) new for Peru: *C. amicta*, *C. brehmeri*, *C. camptoglochin*, *C. enneastachya*, *C. livida*, *C. maritima*, *C. ownbeyi*, *C. ruthsatzae*, and *C. vallis-pulchrae*. We perform the lectotypification of the names *Carex camptoglochin*, *C. amicta* and *C. confertospicata*.

Keywords. *Carex*, Chorology, Cyperaceae, Peru, systematics, taxonomy

RESUMEN

En este estudio se reconocen nueve registros nuevos de especies del género *Carex* (Cyperaceae) para la flora del Perú: *C. amicta*, *C. brehmeri*, *C. camptoglochin*, *C. enneastachya*, *C. livida*, *C. maritima*, *C. ownbeyi*, *C. ruthsatzae* y *C. vallis-pulchrae*. También hemos realizado la lectotipificación de los nombres *Carex camptoglochin*, *C. amicta* y *C. confertospicata*.

Palabras clave. *Carex*, Corología, Cyperaceae, Perú, sistemática, taxonomía

¹ Department of Biology (Botany), Universidad Autónoma de Madrid, Madrid, Spain pjimmej@gmail.com

² Herbario del Departamento de Biología, Facultad de Ciencias, Universidad Nacional Agraria La Molina, Av. La Molina s/n, apartado 12-056, Lima 12, Perú. grmnjj@gmail.com, lamiaster@hotmail.com

³ División de Ecología Vegetal - CORBIDI, Lima, Perú. mmaldonado@corbidi.org

⁴ Universidad Nacional Mayor de San Marcos, Museo de Historia Natural, Lima, Perú hbeltrans_ac@unmsm.edu.pe, acano@unmsm.edu.pe, sebastianriva@gmail.com

⁵ Universidad Nacional Mayor de San Marcos, Instituto de Investigación de Ciencias Biológicas Antonio Raimondi, Lima, Perú.

⁶ Universität Trier-FB VI Geobotanik, D 54286, Trier, Germany. ruthsatz@uni-trier.de

^{7*} Department of Plant Biology and Ecology, University of Seville, Seville, Spain. amesclir@gmail.com

* Autor para correspondencia



INTRODUCTION

Carex is one of the largest genera of angiosperms with ca. 2000 species (e.g., Global *Carex* Group 2015, 2016, Martín-Bravo *et al.* 2019). It has mainly a circumboreal distribution with about 200 species reaching the South American continent. Recent works on taxonomy, chorology, and nomenclature of the Neotropical species of the genus *Carex* have resulted in significant changes on the species delimitation or distribution of quite a few taxa (Jiménez-Mejías and Escudero 2016, Jiménez-Mejías and Roalson 2016, Jiménez-Mejías *et al.* 2016a, 2018, Poin-dexter *et al.* 2017, Jiménez-Mejías and Reznicek 2018, Jiménez-Mejías *et al.* in press).

This publication is the result of an extensive study of specimens in the main Peruvian herbarium collections. Here we present relevant chorological and nomenclatural data for nine species new for Peru, as well as taxonomic notes on some species.

MATERIALS AND METHODS

Material of the following Peruvian herbaria was studied: CPUN, HSP, HUT, MOL, and USM (acronyms according to Index Herbariorum; Thiers 2019). High resolution images of type material available on the Internet were studied from the collections of BM, K, LPB, and SGO. In addition, a few type specimens were studied directly during visits to the collections of MICH, NY, and US.

Specimens were determined using the specialized taxonomic literature cited under each taxon. The species are presented in alphabetical order following the names accepted in the World Checklist of Cyperaceae (Govaerts *et al.* 2019). The terminology of the inflorescence prophylls (utricles and cladoprophylls) follows the suggestions in Jiménez-Mejías *et al.* (2016b).

RESULTS AND DISCUSSION

Carex amicta Boott, Ill. Gen. *Carex* 4: 131. 1867.

Lectotype (here designated): Paramo de Cuchero [Páramo de Cachirí], N. Granada 1845, *W. Purdie s.n.* (*Herbarium Hookerianum*) (K barcode 000584609 digital image!; *isolectotype*: K barcode 000584608 digital image!).

Iconography: Boott (1867: tab. 421)

Material studied. PERU. **Cajamarca:** Celendín, Laguna Azul, 3706 m, 6 Apr 1994, *G. Vilcapoma & J.J. Alegría 7380* (MOL-15907).

Notes: *Carex amicta* is an Andean endemic species previously known from Venezuela to Ecuador. Here we cite it for the first time for the department of Cajamarca in Peru, which becomes the southernmost limit of the species range. The dwarf *Carex amicta*, a species that dwell in páramos, is an atypical member of the formerly recognized subgenus *Vigneastra* (now known to be nested within subgenus *Carex*; Global *Carex* Group (2016) and references therein), mainly constituted by large species from tropical humid forests with open panicle-like inflorescences and fertile cladoprophylls.

We conclude that the type locality of this species, Páramo de Cuchero, belongs to some place in Colombia following Ewan (1948) whom describes the travel itinerary of Purdie between 1845 and 1846 indicating that he visited the northern part of the country with no reference to Venezuela or Ecuador or any other place south to Bogotá. This locality is listed as Colombia, Santander by the Missouri Botanical Garden database (Magill *et al.* 2019) without any further information and does not appear in the official colombian gazeteer (IGAC 1996).

Carex brehmeri Boeckeler, Allg. Bot. Z. Syst. 2: 190. 1896.

Lectotype (designated by Jiménez-Mejías *et al.* 2016a): BOLIVIA. Larecacha, vicinis Sorata, Cochipata, 3200 m, Dec 1884, *G. Mandon 1427* (NY barcode 00011459!; *isolectotypes*: MICH barcode 1109115!, NY barcode 00011460!).

Material studied. PERU. **Cajamarca:** Cajamarca, Quebrada Pampa Larga, al Norte de las Minas Yanacocha, 4950 m, 5 Mar 1994, *I. Sánchez & M. Cabanillas 6829* (CPUN-12486).

Notes: Specimens cited here, belonging to section *Phacocystis*, are dwarf sedges with stems much shorter than the leaves. *Carex* sect. *Phacocystis* was previously unrecorded from Peru and has a quite confusing taxonomy in South America that has often led to wrong taxonomic determinations and misapplication of names, e.g. see the cases of *C. azuayae* Steyererm. and *C. enneastachya* C.B. Clarke

in Wheeler (1998), and *C. decidua* Boott and *C. brehmeri* in Dragon and Barrington (2009). While more biosystematic data is available, we consider that the application of the name *C. brehmeri* to these dwarf plants is the best possible solution (see also the record of *C. brehmeri* in Jiménez-Mejías *et al.* 2016a).

There is a discrepancy between the altitude indicated in the protologue (“3100”) by Boeckeler (1896) and that provided on the type collection labels (“3200”). Beyond that, the specimens selected as types are certainly original materials of *C. brehmeri*.

Carex camptoglochin V.I. Krecz., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 34. 1937.

Carex oligantha Boott, Ill. Gen. Carex 4: 174. 1867, nom. subs., non *C. oligantha* Steud., Syn. Pl. Glumac. 2: 203. 1855.

Lectotype (first step lectotypification designated by Wheeler and Guaglianone 2003): CHILE. Orange Harbour, Fuegia, Capt. Wilkes Exploring Expedition s.n.; second-step lectotypification (here performed): K barcode 000098447 digital image!; *isolectotypes*: GH barcode 00101839 digital image!; K barcode 000999226 digital image!; LE barcode 00010338 digital image!; US barcode 00087249 digital image!).

Iconography: Wheeler and Guaglianone (2003: 196, fig. 1).

Material studied. PERU. **Cajamarca:** Celendín, Minas Conga, sector El Águila, 3700-3800 m, 04 Oct 2005, A. Granda 2511 (MOL); Celendín, Minas Conga, Cocañes, 3880-3900 m, 04 Oct 2005, A. Granda 2504 (MOL); Celendín, Minas Conga, Huaylamachay, 3650-3700 m, 1 Oct 2005, A. Granda 2474 (MOL); Celendín, Laguna Azul, 3600-3700 m, 5 Oct 2005, J.J. Alegría 2051 (MOL); Celendín, Laguna Azul, 3600-3700 m, 6 Oct 2005, J.J. Alegría 2065 (MOL).

Notes: A South American endemic species previously believed to be closely related to the superficially resembling *C. microglochin* Wahlenb. Recent phylogenetic studies (Escudero *et al.* 2010, Gehrke *et al.* 2010, Global Carex Group 2016) have demonstrated that *C. camptoglochin* is allied to the species belonging to the sections *Aciculares* and *Junciformes*, two groups that are mainly distributed

in South America and with a few disjunct species in New Zealand (Global Carex Group 2016).

Carex enneastachya C.B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 70. 1908.

Holotype: COLOMBIA [“Columbia”], Jameson 2 (K barcode 000584607 digital image!).

Material studied. PERU. **Áncash:** Recuay, Laguna de Querococha, 4050 m, 23 May 1970, A. López & A. Sagástegui 7516 (HUT). **Cajamarca:** Hualgayoc, entre Cajamarca y Hualgayoc, 3750 m, 16 Nov 1974, I. Sánchez Vega & J. Sánchez Vega 1339 (CPUN-670).

Notes: *Carex enneastachya* is another species of the section *Phacocystis* new for the Peruvian flora. Its presence in Peru has geographical sense since this species had already been recorded in Ecuador and Bolivia (Govaerts *et al.* 2019). In contrast with the materials that we cited above under *C. brehmeri*, these specimens are tall plants with elongated stems and several cylindrical spikes, and therefore easily identified as *C. enneastachya*.

Carex livida (Wahlenb.) Willd., Sp. Pl. 4: 285. 1805.

Carex limosa var. *livida* Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 162. 1803.

Lectotype (designated by Moberg and Nilsson 1991): Lapponia Tornensis, paroc. Enontekis, 1800, G. Wahlenberg s.n. (UPS barcode V-050198 digital image!); *isolectotypes*: BM 001067075 digital image!; LD barcode 1776619 digital image!; LE barcode 00010280, barcode 00010281, barcode 00010282 digital image!; UPS barcode V-135399 not seen).

=*Carex confertospicata* Boeckeler, Bot. Jahrb. Syst. 8: 206. 1887.

Lectotype (here designated): COLOMBIA. Am Bordoncillo, 3200 m, 20 Feb 1881, F. C. Lehmann 573 (BM barcode 000617145 digital image!).

Iconography: Ball and Reznicek (2002: 429).

Material studied. PERU. **Huánuco:** Lauricocha, San Miguel de Caurí, Oconal de Añaspampa, 3915 m, 8 Oct 2002, F. Salvador *et al.* 474 (USM). **La Libertad:** Patatz, Puerta del Monte, ruta de Huaylillas, 3200 m,

22 May 1961, *A. López & A. Sagástegui* 3453 (HUT); Patataz, Parcoy, cercanías del puesto de vigilancia de Ventanas, 3770-3950 m, 6 Jun 2001, *B. León et al.* 5043 (USM). **San Martín:** Mariscal Cáceres, Huicungo, valle de Ruibarbos, 3600-3640 m, 7° 58' 30" S 77° 22' 8" W, 12 Jun 2001, *B. León & K. Young* 5178 (USM); Mariscal Cáceres, Pastizales de La Empedrada, 3750-3785 m, 27 Jul 2000, *B. León & K. Young* 4582 (USM); Mariscal Cáceres, Puerta del Monte, NW corner of Río Abiseo National Park, 3450 m, 10 Jul 1987, *K. Young & B. León* 4338 (USM); Mariscal Cáceres, campamento chochos y laguna de Chochos y alrededores en el P. N. del Río Abiseo, 3200-3600 m, 27 Jun 1996, *A. Cano et al.* 7345 (USM).

Notes: A mainly circumboreal species showing a striking trans-Caribbean disjunction, being present in the mountains of Panama and northern South America. This remarkable disjunction pattern is shared with four other species of *Carex*, i.e., *C. buxbaumii* Wahlenb., *C. leptalea* Wahlenb., *C. limosa* L., and *C. lurida* Wahlenb. (Jiménez-Mejías *et al.* 2018). Here we present the southernmost records of the species, confirming its presence in Peru.

The Neotropical populations of *C. livida* were considered a different species called *C. confertospicata* (Govaerts and Simpson 2007). However, the careful comparison with Northern Hemisphere materials of *C. livida* reveals that there are no differences between the Boreal and Neotropical populations (Reznicek pers. comm., Jiménez-Mejías pers. obs.). Accordingly, we agree in considering the name *C. confertospicata* as a heterotypic synonym of *C. livida*.

Carex maritima Gunnerus, *Fl. Norveg.* 2: 131. 1776.

Lectotype (designated by Jørgensen 2012: 1090): Oeder, *Fl. Dan.* 3(8): t. 432. 1769. *Epytype* (designated by Bakken *et al.* 2011: 122): NORWAY. Finnmark, Måsøy, Maasøe, 27 Jun 1767, *J. E. Gunnerus s.n.* (TRH V-44006 photo!).

Iconography: Barros (1969: 17, sub *C. incurva* Lightf.); Wheeler (2009: 330).

Material studied. PERU. **Arequipa:** Laguna Las Salinas, 16° 20.95' S, 71° 8.67' W, 4315 m, 3 Nov 1998, *H. Beltrán et al.* 3173 (USM-200014).

Notes: *Carex maritima* is a bipolar species present at high latitudes of both the Northern and Southern Hemispheres, whose remarkable disjunction seems to date back to the Pleistocene (Escudero *et al.* 2010, Villaverde *et al.* 2015).

Our records from Peru constitute the new northernmost occurrences of the species in the Southern Hemisphere.

Carex ownbeyi G.A.Wheeler, *Darwiniana* 40: 200. 2002.

Holotype: BOLIVIA, Cochabamba, Quillacollo Prov., “camino Sipe Sipe-Lipichi”, 3800 m, 9 Apr 1990, *I. Hensen* 731 (MIN; *isotype:* LPB barcode 0000242 digital image!).

Iconography: Wheeler (2002a: 202, fig. 2C-D).

Material studied. PERU. **Ayacucho:** Cangallo, Dist. Los Morocuchos, a 8.6 km al SO de Condorcocha, 3380 m, *C. Tejada* 287 (HSP). **Junín:** Yauli, La Oroya, Paccha, 4207 m, 7 May 2011, *H. Beltrán* 7160 (USM).

Notes: Until recently, *C. ownbeyi* was known only from its type locality / the *locus classicus* in Bolivia (Wheeler 2002a). The additional records from northern Argentina (Jiménez-Mejías *et al.* 2016a), Colombia (Jiménez-Mejías *et al.* 2018), and now Peru confirm that this species is much more widespread through the Andes than previously believed and much under-collected.

Carex ruthsatziae G.A.Wheeler, *Darwiniana* 40: 191. 2002. [“ruthsatzae”]

Holotype: BOLIVIA, Dpto. Oruro, Prov. Sajama, Payachatas, 4420 m, 27 Jan 1999, *B. Ruthsatz & S. Budde* 10216 (MIN not seen; *isotype:* LPB barcode 0000244 digital image!).

Iconography: Wheeler (2002b: 194, fig. 2A, Bf, C).

Material studied. PERU. **Pasco:** Pasco, along the road between Carhuamayo and Cerro de Pasco, 4100 m, *W. Morawetz & B. Wallnöfer* 44-16985 (USM).

Notes: Third species of section *Abditispicae* reported for Peru, after *C. collumanthus* (Steyerm.) G.A. Wheeler (Wheeler 2002b) and *C. humahuacaensis* G.A. Wheeler (Salvador *et al.* 2009). *Carex* section *Abditispicae* comprises dwarf sedges growing at high altitudes in the Andes or Southern Patagonia. Its complex taxonomy strongly hinders the identification of the individuals. The occurrence of *C. ruthsatziae* in Peru is not surprising since it was known from a Bolivian locality pretty close to the Peruvian border.

Carex ruthsatziae closely resembles *C. humahuacaensis*, from which it can easily be distinguished by its glumes (dark reddish-brown, obtuse to acute glumes in *C. ruth-*

satziae vs. orange to stramineous with acuminate tips in *C. humahuacaensis*) and its narrower leaves (up to 1.5 mm in *C. ruthsatziae* vs. 1.2-3.5 mm in *C. humahuacaensis*) (Wheeler 2002b).

Despite *C. ruthsatziae* was synonymized with *C. maritima* Gunn. by Jørgensen *et al.* (2014), molecular data (Martín-Bravo *et al.* 2019) has shown both species as distinct (Jiménez-Mejías *et al.* in press).

Carex vallis-pulchrae Phil., *Anales Univ. Chile* 93: 487. 1896.

Lectotype (designated by Wheeler 1989): CHILE, Valle Hermoso, 1872, *P. Ortega s.n.*, (SGO barcode 000000893, digital image!; **islectotype**: SGO barcode 000000894 digital image!); **syntypes**: CHILE, Cordillera de Colchagua, 1888, *R.A. Philippi s.n.* (K barcode 000584710 digital image!; US barcode 02141441!).

Iconography: Barros (1969: 74).

Material studied. PERU. **Arequipa:** Chivay, Tutin a Ram Ram, 13 Jan 1999, *B. Ruthsatz 10105* (Herbarium Trier University!; LPB!, UPOS!). **Huancavelica:** Huancavelica, Tucumachay, bofedal de Lachoce, 4300 m, 23 Oct 2018, *J. Curasma s.n.* (MOL). **Lima:** Huarochirí, San Lorenzo de Quinti, sector Huachipampa, 4633 m, 30 Mar 2018, *M. S. Maldonado Fonkén s.n.* (MOL).

Notes: *Carex vallis-pulchrae* is a species belonging to the taxonomically complex group known as section *Aciculares*. The species is disjunctly distributed in Southern Patagonia (including Tierra del Fuego), the High Andes of central Chile and Argentina, and the Central Andes

of Bolivia and Peru (Wheeler 1989, Wheeler and Beck 2011). Wheeler (1989) established two varieties, i.e., var. *vallis-pulchrae* restricted to High Andean territories and var. *barrosiana* G.A.Wheeler for Patagonian populations, both distinguished by minor features of the utricles (more or less abruptly contracted into the beak vs. gradually attenuated). Remarkably, the Bolivian and Peruvian populations seem to be morphologically close to var. *barrosiana* (the utricle is tapered into the beak). Further studies are necessary to figure out if these Central Andean populations actually belong to var. *barrosiana* or if those constitute a new variety.

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AUTHOR'S CONTRIBUTION

PJM and ME planned and coordinate this study; PJM and ME studied plant materials with additional contributions from the rest of the authors; JJAO, PJM and ME drafted the manuscript. All authors contributed to improving the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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