



Two new species and synopsis of *Chusquea* subg. *Platonía* (Poaceae: Bambusoideae: Chusqueinae) in Bolivia and a new record for Peru

CAROLINA GUERREIRO^{1*}, J. JOSÉ ALEGRÍA OLIVERA², ZULMA. E. RÚGOLO DE AGRASAR¹, STEPHAN G. BECK³ & ANDREA S. VEGA⁴

¹ Instituto de Botánica Darwinion, Labardén 200, C.C. 22, San Isidro, B1642HYD, Buenos Aires, Argentina.

² Herbario del Departamento de Biología, Facultad de Ciencias, Universidad Nacional Agraria La Molina, Av. La Molina s/n, Apartado 12-056, La Molina, Lima 12, Perú.

³ Herbario Nacional de Bolivia, Instituto de Ecología, Universidad Mayor de San Andrés, Correo Central 10077, La Paz, Bolivia.

⁴ Cátedra de Botánica General, Facultad de Agronomía, Universidad de Buenos Aires, Av. San Martín 4453, C1417DSE, Buenos Aires, Argentina.

* Author for correspondence: cguerreiro@darwin.edu.ar

Abstract

The present study describes and illustrates two new species of *Chusquea* subg. *Platonía*, *C. parodii* and *C. paucispiculata*. *Chusquea laegaardii* is cited for the first time in Bolivia and *C. asymmetrica* for Peru. Two keys for the identification of the species, mainly based on vegetative or reproductive characters, and a comparative table with micromorphological diagnostic features of foliage leaf blades are included. Finally, some remarks about the characteristics of the phytogeographical regions and the ecology of these new species are given.

Resumen

El presente trabajo describe e ilustra dos nuevas especies de *Chusquea* subgénero *Platonía*, *C. parodii* y *C. paucispiculata*. *Chusquea laegaardii* se cita por primera vez en Bolivia y *C. asymmetrica* en Perú. Se incluyen dos claves para la identificación de las especies basadas principalmente en caracteres vegetativos o reproductivos y una tabla comparativa con los caracteres micromorfológicos diagnósticos de las hojas del follaje. Se incorporan observaciones acerca de las características de las regiones fitogeográficas y la ecología de las nuevas especies.

Key words: Bambuseae, Central Andes, Micromorphology, Morphology, New taxa, New report, Taxonomy

The subtribe *Chusqueinae* Soderstrom & Ellis (1987: 235) is a monophyletic group, endemic to the New World, previously composed of two genera: *Neurolepis* Meisner (1843: 426) and *Chusquea* Kunth (1822: 151; Judziewicz & Clark 2007). This subtribe comprises 64% of Andean woody bamboo diversity (Clark 2001).

Neurolepis has been characterized by the absence of aerial branching and by the longest leaves known of all genera of Bambusoideae. Spikelet characteristics unify *Neurolepis* and *Chusquea* (Clayton & Renvoize 1986). The three flowered spikelets with two glumes, two sterile lemmas and one fertile floret, no rachilla extension, papillate subsidiary cells of the stomatal apparatus and seedling morphology of some species indicate its affinity with *Chusquea* (Clark 1995).

According to molecular-based phylogenetic studies, *Neurolepis* may be sister (Clark *et al.* 1995, Clark 2001) or paraphyletic to *Chusquea* (Clark *et al.* 2007, Judziewicz & Clark 2007). In a recent phylogenetic analysis based on chloroplast sequence data (Fisher *et al.* 2009, Fisher *et al.* 2014), *Neurolepis* was paraphyletic with respect to *Chusquea* and all its species were transferred to *Chusquea* (Fisher *et al.* 2009, León *et al.* 2010, Dorr 2012). Currently, *Chusquea* s.l. is equivalent to the subtribe *Chusqueinae*. As presently circumscribed the genus *Chusquea* Kunth, in a wide sense, comprises subg. *Rettbergia* (Raddi 1823: 17) Clark (1997: 41) with 13 species, subg. *Chusquea* with 88 species, subg. *Swallenochloa* (McClure 1973: 106) Clark (1997: 42) with 30 species, subg. *Platonía* Fisher & L.G. Clark in Fisher *et al.* (2014: 841) with 11 species and subg. *Magnifoliae* L.G. Clark & Fisher in Fisher *et al.* (2014: 841) with 10 species (Fisher *et al.* 2014, Mota *et al.* 2014).

References

- Beck, S.G. (1998) Ecología y fitogeografía de las gramíneas en Bolivia. *In*: Renvoize, S. (Ed.) *Gramíneas de Bolivia*. The Royal Botanic Gardens, Kew, pp. 1–11.
- Cabrera, A.L. (1982) Dos compuestas nuevas de Bolivia. *Hickenia* 1: 281–284.
- Camus, E.G. (1913) *Les Bambusées: monographie, biologie, culture, principaux usages*. Lechevalier, Paris, 100 pp.
- Clark, L.G. (1995) Diversity and distribution of the Andean woody bamboos (Poaceae: Bambuseae). *In*: Churchill, S.P., Balslev, H., Luteyn, J.L. & Forero, E. (Eds.) *Biodiversity and conservation of Neotropical montane forests*. New York Botanical Garden, New York, pp. 501–512
- Clark, L.G. (1996) Six new species of *Neurolepis* (Poaceae: Bambusoideae: Bambuseae) from Ecuador and Peru. *Novon* 6: 335–350.
[HTTP://DX.DOI.ORG/10.2307/3392038](http://dx.doi.org/10.2307/3392038)
- Clark, L.G. (1997) Diversity, biogeography and evolution of *Chusquea*. *In*: Chapman, G. (Ed.) *The bamboos*. Academic Press, London, pp. 33–44.
- Clark, L.G. (2000) *Neurolepis*. *In*: Judziewicz, E.J., Soreng, R.J., Davidse, G., Peterson, P.M., Filgueiras, T.S. & Zuloaga, F.O. (Eds.) *Catalogue of New World Grasses (Poaceae): I. Subfamilies Anomochlooideae, Bambusoideae, Ehrhartoideae, and Pharoideae. Contributions from the United States National Herbarium* 39: 1–128.
- Clark, L.G. (2001) Diversification and endemism in Andean woody bamboos (Poaceae: Bambusoideae). *Bamboo Science & Culture: The Journal of the American Bamboo Society* 15: 14–19.
- Clark, L.G. (2003) A new species of *Chusquea* sect. *Swallenochloa* (Poaceae: Bambusoideae) from Bolivia. *Bamboo Science & Culture: The Journal of the American Bamboo Society* 17: 55–58.
- Clark, L.G., Zhang, W. & Wendel, J.F. (1995) A phylogeny of the grass family (Poaceae) based on *ndhF* sequence data. *Systematic Botany* 20: 436–460.
<http://dx.doi.org/10.2307/2419803>
- Clark, L.G., Dransfield, S., Triplett, J. & Sánchez-Ken, J.G. (2007) Phylogenetic relationships among the one-flowered, determinate genera of Bambuseae (Poaceae: Bambusoideae). *In*: Columbus, J.T., Friar, E.A., Porter, J.M., Prince, L.M. & Simpson, M.G. (Eds.) *Monocots: comparative biology and evolution – Poales*. Rancho Santa Ana Botanic Garden, California, pp. 315–332.
- Clayton, W.D. & Renvoize, S.A. (1986) Genera Graminum. *Kew Bulletin Additional Series* 13: 1–389.
- D'Ambrogio de Argüeso, A. (1986) *Manual de técnicas en histología vegetal*. Hemisferio Sur, Buenos Aires, 83 pp.
- Davidse, G. & Huber, O. (1979) Notes on the flowering and life history of *Neurolepis pittieri* (Gramineae, Bambusoideae). *Annals of the Missouri Botanical Garden* 66: 900–902.
<http://dx.doi.org/10.2307/2398931>
- Dorr, L.J. (2012) A new combination in *Chusquea* (Poaceae: Bambusoideae). *Phytoneuron* 23: 1–2.
- Ellis, R.P. (1976) A procedure for standardizing comparative leaf anatomy in the Poaceae. I. The leaf blade as viewed in transverse section. *Bothalia* 12: 65–109.
- Fisher, A.E., Triplett, J.K., Ho, C., Schiller, A.D., Oltrogge, K.A., Schroder, E.S., Kelchner, S.A. & Clark, L.G. (2009) Paraphyly in the bamboo subtribe Chusqueinae (Poaceae: Bambusoideae) and a revised infrageneric classification for *Chusquea*. *Systematic Botany* 34: 673–683.
<http://dx.doi.org/10.1600/036364409790139790>
- Fisher, A.E., Clark, L.G. & Kelchner, S.A. (2014) Molecular phylogeny estimation of the bamboo genus *Chusquea* (Poaceae: Bambusoideae: Bambuseae) and description of two new subgenera. *Systematic Botany* 39: 829–844.
<http://dx.doi.org/10.600/036364414X681554>
- Foster, R.C. (1958) A catalogue of the ferns and flowering plants of Bolivia. *Contributions from the Gray Herbarium of Harvard University* 184: 1–223.
- Gerold, G., Schawe, M. & Bach, K. (2008) Hydrometeorologic, pedologic and vegetation patterns along an elevational transect in the montane forest of the Bolivian Yungas. Special Issue: Fog research. *Die Erde* 139: 141–168.
- Hitchcock, A.S. (1927) The grasses of Ecuador, Peru, and Bolivia. *Contributions from the United States National Herbarium* 24: 291–556.
- Jørgensen, P.M., Macía Barco, M.J., Fuentes Claros, A.F., Beck, S.G., Kessler, M., Paniagua Zambrana, N.Y., Seidel, R., Maldonado Goyzueta, C.B., Araujo Murakami, A., Cayola Pérez, L.E., Consiglio, T., Killeen, T.J., Cabrera Condarco, W.H., Bascopé Sarué, S.F., De la Quintana, D., Miranda Gonzales, T.B., Canqui Magne, F. & Cardona Peña, V. (2005) Lista anotada de las plantas vasculares registradas en la región de Madidi. *Ecología en Bolivia* 40: 70–169.
- Judziewicz, E.J. & Clark, L.G. (2007) Classification and biogeography of New World grasses: Anomochlooideae, Pharoideae, Ehrhartoideae, and Bambusoideae. *Aliso* 23: 303–314.
<http://dx.doi.org/10.5642/aliso.20072301.25>

- Kunth, K.S. (1822) Notice sur le genre Bambusa. *Journal de Physique, de Chimie, d'Histoire Naturelle et des Arts* 95: 148–151.
- León, B., Young, K.R., Roque, J. & Cano, A. (2010) Nuevos registros de plantas de la zona alta del Parque Nacional Río Abiseo, Perú. *Arnaldoa* 17: 51–83.
- Linnaeus, C. (1753) *Species plantarum :exhibentes plantas rite cognitatas, ad genera relatas, cum differentiis specificis, nominibus trivialibus, synonymis selectis, locis natalibus, secundum systema sexuale digestas*. Laurentii Salvii, Stockholm, 560 pp.
<http://dx.doi.org/10.5962/bhl.title.669>
- Linnaeus, C. (1759) *Systema naturae per regna tria naturae :secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Laurentii Salvii, Stockholm, 1384 pp.
<http://dx.doi.org/10.5962/bhl.title.542>
- Loesener, L.E.T. (1901) Monographia Loasacearum. *Nova Acta Academiae Caesareae Leopoldino-Carolinae Germanicae Naturae Curiosorum* 78: 1–598.
- McClure, F.A. (1942) New bamboos from Venezuela and Colombia. *Journal of the Washington Academy of Sciences* 32: 167–183.
- McClure, F.A. (1973) Genera of bamboos native to the New World (Gramineae: Bambusoideae). *Smithsonian Contributions to Botany* 9: 1–148.
<http://dx.doi.org/10.5479/si.0081024x.9>
- Meisner, C.F. (1843) *Plantarum vascularium genera: secundum ordines naturales digesta eorumque differentiae et affinitates tabulis diagnostacis expositae*. Libraria Weidmannia, Leipzig, 442 pp.
- Mota, A.C., Jiménez Pérez, I., De Oliveira, R.P., & Clark, L.G. (2014) *Chusquea yungasensis* (Bambusoideae, Poaceae): a new species of woody bamboo from South America and the first record of subgenus *Rettbergia* in Bolivia. *Phytotaxa* 161: 211–218.
<http://dx.doi.org/10.11646/phytotaxa.161.3.4>
- Persoon, C.H. (1807) *Synopsis plantarum, seu Enchiridium botanicum, complectens enumerationem systematicam specierum hucusque cognitarum*. C.F. Cramer, Paris, 656 pp.
- Pilger, R. (1921) Drei neue andine Gräser. *Repertorium Specierum Novarum Regni Vegetabilis* 17: 445–448.
<http://dx.doi.org/10.1002/fedr.19210171933>
- Raddi, G. (1823) *Agrostografia Brasiliensis: sive enumeratio plantarum ad familias naturales Graminum et ciperoidarum spectantium, quas in Brasilia collegit et descripsit*. G. Nericì, Lucca, 58 pp.
- Renvoize, S.A. (1998) *Gramineas de Bolivia*. The Royal Botanic Gardens, Kew, 588 pp.
- Rusby, H.H. (1893) An enumeration of the plants collected in Bolivia by Miguel Bang, with descriptions of new genera and species. *Memoirs of the Torrey Botanical Club* 3: 1–67.
- Ståhl, B. (1994) The genus *Symplocos* (Symplocaceae) in Bolivia. *Candollea* 49: 369–388.
- Soderstrom, T.R. & Ellis, R.P. (1987) The position of bamboo genera and allies in a system of grass classification. In: Soderstrom, T.R., Hilu, K.W., Campbell, C.S. & Barkworth, M.E. (Eds.) *Grass Systematics and Evolution*. Smithsonian Institution Press, Washington, DC, pp. 225–238.
- Thiers, B. (2014) *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/> (accessed 25 January 2014).
- Triana, J.J. (1858) Choix de plantes de la Nouvelle Grenade. *Annales des Sciences Naturelles. Botanique* 4: 36–52.
- Vahl, M.H. (1805) *Enumeratio plantarum el ab aliis, vel, ab ipso observatum, cum earum differenttis specificis, synonymis selectis et descriptionibus succinctis*. J.H. Schubothe, Copenhagen, 423 pp.
<http://dx.doi.org/10.5962/bhl.title.7564>
- Willdenow, C.L. (1805) *Synopsis plantarum, seu Enchiridium botanicum, complectens enumerationem systematicam specierum hucusque cognitarum*. G.C. Nauk, Berlin, 629 pp.