



## Three new species of *Aulonemia* (Poaceae: Bambusoideae) from the Brazilian Atlantic rainforest

PEDRO L. VIANA<sup>1,3</sup> & TARCISO S. FILGUEIRAS<sup>2</sup>

<sup>1</sup>Museu Paraense Emílio Goeldi. Avenida Magalhães Barata, 376, São Braz, Belém - PA, 66040-170, Brazil

<sup>2</sup>Núcleo de Pesquisa e Curadoria do Herbário, Instituto de Botânica, Caixa Postal 68041, São Paulo, Brazil

<sup>3</sup>Author for correspondence: [pedroviana@museu-goeldi.br](mailto:pedroviana@museu-goeldi.br)

### Abstract

Three new Brazilian species of *Aulonemia*, a Neotropical woody bamboo genus, are described and illustrated: *Aulonemia cincta*, with its distinctive corky girdles; *Aulonemia prolifera*, characterized, among other Brazilian congeners, by its fimbriate leaf sheaths; and *Aulonemia soderstromii*, with its conspicuous cluster of spreading fimbriae. These new species all propagate by amphipodial rhizomes, an unusual feature shared with the Brazilian species *A. aristulata*, with which they are morphologically compared. Comments about habitat, distribution, phenology, and conservation status for each species are provided, as well as photographs taken in the wild.

**Key words:** Arthrotyliidiinae, *Aulonemia aristulata*, Brazil, woody bamboos, grasses, Gramineae

### Resumo

Três novas espécies de bambus lenhosos neotropicais do gênero *Aulonemia*, nativas do Brasil, são aqui descritas e ilustradas: *Aulonemia cincta*, com seu característico cinto corticoso; *Aulonemia prolifera*, caracterizada, dentre outras congêneres brasileiras, pelas bainhas foliares fimbriadas; e *Aulonemia soderstromii*, com seu vistoso conjunto de fimbrias efusas. As três espécies compartilham com *Aulonemia aristulata*, com a qual são morfológicamente comparadas, a incomum propagação por rizomas anfipodiais. Comentários sobre habitat, distribuição, fenologia e estado de conservação são fornecidos para cada espécie, assim como fotografias das plantas em seu habitat natural.

**Palavras-chave:** Arthrotyliidiinae, *Aulonemia aristulata*, bambus lenhosos, Brasil, gramíneas, Gramineae

### Introduction

The Atlantic rainforest is one of the most important hotspots of bamboo diversity in the world (Soderstrom *et al.* 1988, Judziewicz *et al.* 1999). At least 160 species in 25 genera, corresponding to approximately 15% and 30%, respectively, of worldwide known bamboo taxonomic richness, are known to occur in this biome. It is the main center of diversity for the distinctive herbaceous bamboos (tribe Olyreae) and also includes several endemic species of important woody bamboos genera (tribe Bambuseae), such as *Chusquea* Kunth (1822: 151), *Merostachys* Sprengel (1824: 132), *Guadua* Kunth (1822: 150) and *Aulonemia* Goudot (1846: 75) (Viana *et al.* 2009, Filgueiras *et al.* 2013). The biome is, however, critically threatened by human activities, and only less than 8% of its land area remains in its native vegetation (Mittermeier *et al.* 2004, Ribeiro *et al.* 2009, Stehmann *et al.* 2009).

*Aulonemia* is a genus with about 50 described species, distributed from Mexico to southern Brazil, occurring in high elevation forests of the Andes, Guiana Shield, Central Brazil and in the Atlantic rainforest. It belongs to the Neotropical woody bamboo clade (part of the tribe Bambuseae) and is included in the subtribe Arthrotyliidiinae (Judziewicz *et al.* 1999, Sungkaew *et al.* 2009, Tyrrell *et al.* 2012, Kelchner *et al.* 2013). The morphological

## References

- Clark, L.G. (2004) New species of *Aulonemia* and *Chusquea* (Poaceae: Bambusoideae: Bambuseae) from southeastern Brazil. *Revista Brasileira de Botânica* 27: 31–36.
- Clark, L.G., Judziewicz, E.J. & Tyrrell C.D. (2007) *Aulonemia ximena* (Poaceae: Bambusoideae), a new northern Andean species with fimbriate sheath margins. *The Journal of the American Bamboo Society* 20: 1–6.
- Clark, L.G. & Londoño, X. (1990) Three new Andean species of *Aulonemia* (Poaceae-Bambusoideae). *Annals of the Missouri Botanical Garden* 77: 353–358.
- Doell, J.C. (1880) Tribe 11, Bambusaceae. In: von Martius, C.F.P. (ed.), *Flora Brasiliensis*. Munich, Vienna, pp. 161–220.
- Filgueiras, T.S., Longhi-Wagner, H.M., Viana, P.L., Zanin, A., Oliveira, R.C. de, Canto-Dorow, T.S., Shirasuna, R.T., Valls, J.F.M., Oliveira, R.P., Rodrigues, R.S., Santos-Gonçalves, A.P. & Welker, C.A.D. (2013) Poaceae In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB193> (accessed: 09 Sep 2013)
- Goudot, J. 1846. *Aulonemia*, nouveau genre de la tribu des Bambusées. *Annales des Sciences Naturelles (Botanique)* 3: 75–77.
- IUCN (2013) *Guidelines for Using the IUCN Red List Categories and Criteria: Version 10*. Prepared by the Standards of Petitions Subcommittee, 87 pp.
- Judziewicz, E.J. (1992) A Revision of *Atractantha* (Poaceae: Bambusoideae: Bambuseae). *Annals of the Missouri Botanical Garden* 79: 160–183.
- Judziewicz, E.J. (2005) *Aulonemia nitida* (Poaceae: Bambusoideae), a new species from Guyana. *Sida* 21: 1263–1267.
- Judziewicz, E.J., Clark, L.G., Londoño, X. & Stern, M.J. (1999) *American Bamboos*. Smithsonian Institution Press, Washington, D. C., 391 pp.
- Judziewicz, E.J. & Clark, L.G. (1993) A revision of the South American species of *Arthrostylidium* (Poaceae: Bambuseae). *Systematic Botany* 18: 80–99.
- Judziewicz, E.J. & Riina, R. (2005) *Aulonemia dinirensis* (Poaceae: Bambusoideae: Bambuseae), a new dwarf Venezuelan species from the easternmost Andean páramos. *The Journal of the American Bamboo Society* 19: 11–15.
- Judziewicz, E.J. & Tyrrell, C.D. (2007) *Aulonemia yanachagensis* (Poaceae: Bambusoideae: Bambuseae): A new species from central Peru. *Brittonia* 59: 83–87.  
[http://dx.doi.org/10.1663/0007-196X\(2007\)59\[83:AYPBBA\]2.0.CO;2](http://dx.doi.org/10.1663/0007-196X(2007)59[83:AYPBBA]2.0.CO;2)
- Judziewicz, E.J., Geisthardt, E.J., Waas, C.M. & Sepsenwol, S. (2013a) *Aulonemia david-smithii* and *A. rubraligulata* (Poaceae: Bambusoideae: Bambuseae: Arthrostylidiinae): two new small-flowered species from Peru. *Journal of the Botanical Research Institute of Texas* 7: 129–136.
- Judziewicz, E.J., Londoño, X. & Clark, L.G. (2013b) Two new Northern Andean species of *Aulonemia* (Poaceae: Bambusoideae: Bambuseae: Arthrostylidiinae) with verrucose culms. *Journal of the Botanical Research Institute of Texas* 7: 137–143.
- Judziewicz, E.J., Shea, E.L. & Wayda, T.M. (2010) Two new Bolivian species of *Aulonemia*. *Journal of the Botanical Research Institute of Texas* 4: 569–579.
- Kelchner, S.A., Clark, L.G. & Bamboo Phylogeny Group (2013) Higher level phylogenetic relationships within the bamboos (Poaceae, Bambusoideae) based on five plastid markers. *Molecular Phylogenetics and Evolution* 67: 404–413.  
<http://dx.doi.org/10.1016/j.ympev.2013.02.005>
- Kunth, C.S. (1822) Sur le genre bambusa. *Journal de Physique, de Chimie, d'Histoire Naturelle et des Arts* 95: 148–151.
- Kuntze, C.E.O. (1891) *Revisio Generum Plantarum, pars II*. A. Felix, Leipzig, pp. 377–1011.  
<http://dx.doi.org/10.5962/bhl.title.327>
- McClure, F.A. (1964) Bambusoideae. In: Maguire, B. & Wurdak, J.J. (eds.) *Botany of the Guayana Highlands, part V. Memoirs of the New York Botanical Garden* 10: 2–4.
- 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>
- Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamourex, J. & Fonseca, G.A.B. (2004). *Hotspots revisited*. CEMEX, Mexico City, 392 pp.
- Pilger, R. (1898) Plantae Stübelianae Novae. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 25: 709–721.
- Pilger, R. (1905) Beiträge zur Flora des Hylaea nach den Sammlungen von E. Ule. *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 47: 100–191.
- Ribeiro, M.C., Metzger J.P., Martensen, A.C., Ponzoni, F.J. & Hirota, M. (2009) The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation. *Biological Conservation* 142: 1144–1156.  
<http://dx.doi.org/10.1016/j.biocon.2009.02.021>
- Ruiz-Sanchez, E., Sosa, V. & Mejía-Saules, T. (2011) Molecular phylogenetics of the Mesoamerican bamboo *Olmeca* (Poaceae, Bambuseae): Implications for taxonomy. *Taxon* 60: 89–98.
- Soderstrom, T.R. (1988) *Aulonemia fulgor* (Poaceae: Bambusoideae), a new species from Mexico. *Brittonia* 40: 22–31.  
<http://dx.doi.org/10.2307/2806870>
- Soderstrom, T.R., Judziewicz, E.J. & Clark, L.G. (1988) Distribution patterns of neotropical bamboos. In: Vanzolini, P.E. &

- Heyer, W.R. (eds.), *Proceedings of a workshop on neotropical distribution patterns*. Academia Brasileira de Ciências. Rio de Janeiro, pp. 121–157.
- Sprengel, K.P. (1824) *Systema Vegetabilium*. Sumtibus Librariae Dieterichianae, Göttingae. 992 pp.  
<http://dx.doi.org/10.5962/bhl.title.822>
- Stehmann, J.R., Forzza, R.C., Salino, A., Sobral, M., Costa, D.P. & Kamino, L.H.Y. (2009) *Plantas da Floresta Atlântica*. Jardim Botânico do Rio de Janeiro, Rio de Janeiro, 516 pp.
- Sungkaew, S., Stapleton, C.M.A., Salamin, N. & Trevor, R.H. (2009) Non-monophyly of the woody bamboos (Bambuseae; Poaceae): a multi-gene region phylogenetic analysis of Bambusoideae s.s. *Journal of Plant Research* 122: 95–108.  
<http://dx.doi.org/10.1007/s10265-008-0192-6>
- Thiers, B. 2013. *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: 09 September 2013)
- Tyrrell, C.D., Santos-Gonçalves, A.P., Londoño, X. & Clark, L.G. (2012) Molecular phylogeny of the arthrotyliidioid bamboos (Poaceae: Bambusoideae: Bambuseae: Arthrotyliidiinae) and new genus *Didymogonyx*. *Molecular Phylogenetics and Evolution* 65: 136–148.  
<http://dx.doi.org/10.1016/j.ympev.2012.05.033>
- Viana, P.L. (2010) O gênero *Aulonemia* (Poaceae: Bambusoideae: Bambuseae) no Brasil. PhD Thesis. Universidade Federal de Minas Gerais, Belo Horizonte, 272 pp.
- Viana, P.L., Ferreira, F.M. & Filgueiras, T.S. (2009) Poaceae. In: Stehmann, J.R., Forzza, R. C., Salino, A., Sobral, M., Costa, D.P. & Kamino, L.H.Y. (eds.) *Plantas da Floresta Atlântica*. Jardim Botânico do Rio de Janeiro, Rio de Janeiro, pp. 419–438.
- Viana, P.L., Filgueiras, T.S. & Clark, L.G. (2013a) *Cambajuva* (Poaceae: Bambusoideae: Bambuseae: Arthrotyliidiinae), a new woody bamboo genus from Southern Brazil. *Systematic Botany* 38: 97–103.  
<http://dx.doi.org/10.1600/036364413X662097>
- Viana, P.L., Filgueiras, T.S. & Graciano-Ribeiro, D. (2013b) A new woody bamboo (Poaceae, Bambusoideae) from Central Brazil, *Aulonemia xerophylla*. *Novon* 22: 371–376.  
<http://dx.doi.org/10.3417/2010044>
- Viana, P.L., Filgueiras, T.S. & Paiva, E.A.S. (2010) A new combination in *Aulonemia* (Poaceae: Bambusoideae: Bambuseae) based on floral analysis, anatomical features, and distribution. *Brittonia* 63: 102–112.  
<http://dx.doi.org/10.1007/s12228-010-9138-0>