Podostemaceae Rich. ex Kunth

Claudia Petean Bove

Universidade Federal do Rio de Janeiro - Museu Nacional; cpbove@hotmail.com

Marco Octávio de Oliveira Pellegrini

Universidade de São Paulo; marcooctavio.pellegrini@gmail.com

Thomas C. Philbrick

Connecticut State University; philbrickt@wcsu.edu

This treatment is composed of the following taxa: Podostemaceae, *Apinagia*, *Castelnavia*, *Ceratolacis*, *Cipoia*, *Diamantina*, *Lophogyne*, *Marathrum*, *Mourera*, *Oserya*, *Podostemum*, *Rhyncholacis*, *Tristicha*, *Weddellina*, *Wettsteiniola*.

HOW TO CITE

Bove, C.P., Pellegrini, M.O.O., Philbrick, C.T. 2020. Podostemaceae *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB194.

Has as synonym
heterotypic *Podostemonaceae* Lindl.
heterotypic *Tristichaceae* Willis

DESCRIPTION

Herbs annual or perennial, firmly attached to rocks and other solid substrates in seasonally strong currents of rivers and streams. **Roots** linear, prostate and flattened, green, branched or not, with an asymmetric root cap and attached to solid substrates via holdfasts (haptera) and adhesive hairs or roots lacking. **Stems** prostrate, tightly attached to substrate throughout its length or arising along flanks of roots, opposite or sub-opposite, disk-shaped (holdfast-like) or upright. **Leaves** distichous- or tristichous-alternate, arising from stem margins, or projecting from an upright stem, petiolate or sessile; petioles terete to flattened, sometimes winged, mono- or dithecous; blades variable, simple, lobed, repeatedly pinnately or dichotomously compound; when divided, ultimate divisions hair-like or flattened, blunt or acute at apex. **Inflorescences** axillary, 1–many-flowered, fasciculate or in 2-sided spiciform monochasia, pedunculate or not. **Flowers** bisexual, actinomorphic or zygomorphic; enclosed in a sac-like spathella or spathella lacking; pedicel commonly elongating in fruit, rarely not; tepals 0–20, in a complete or incomplete whorl, free or basally connate, linear, lanceolate or triangular; stamens 1–40, free or fused basally, in 1–2–3 complete whorls, or confined to one side of the flower, or borne at the apex of an andropodium; filaments elongating during anthesis (most common) or not, anthers basifixed, dehiscing introrsely, latrorsely or extrorsely; pollen in monads, dyads or tetrads, tricolporate, tricolpate or pantopate; ovary 2–3-carpellate superior, sometimes borne on a short gynophore at anthesis; placenta fleshy, axillary; ovules axile, anatropous, bitegmic, tenuinucellate; stigmas 1–2–3, free or fused basally. **Fruits** capsular, 1–3-locular, 2–3-valved, longitudinally septifragal, smooth, ribbed, keeled or winged; valves equal or unequal, both valves persistent or one deciduous; suture margins thickened or not. **Seeds** ca. 1–2 mm long, numerous, becoming sticky upon wetting, without endosperm; embryo straight.

COMMENTS

Plants grow firmly attached to rocks or other solid substrates in strong currents of river-rapids and waterfalls, usually in sunny places. Flowering and seed production occurs when the plants become exposed, during seasonally-low water levels. They are remarkably variable in form, and some are lichen- or algae-like in their overall appearance. The presence of a sac-like cover (i.e., spathella) that encloses the young flower (absent in *Tristicha* and *Weddellina*) is unique among the Angiosperms.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest, Pampa

Vegetation Types
Caatinga (stricto sensu), Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Mixed Ombrophyllous Forest, Amazonian Savanna, Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)
Central-west (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)
Possible ocurrences
North (Pará, Rondônia, Roraima)
Northeast (Alagoas, Maranhão, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)
Central-west (Mato Grosso)

IDENTIFICATION KEY

1. Tepals broad and imbricate, oblanceolate to ovate, 3– 6, free or united below, enclosing the young flowers; young flowers may be enveloped by a few leaves but are never enclosed in a spathella; ovary 2- or 3-locular ……..……. 2
1'.Tepals filamentous, subulate or scale-like, free, 2–20, not enclosing young flowers; young flowers totally enclosed in a spathella (a sack-like cover); ovary 2-locular…….....…… 3
2. Tepals 5 or rarely 4 or 6; stamens 5–25; capsule opening by 2 valves .....……. *Weddellina*
2'. Tepals 3; stamens 1, 2 or rarely 3; capsule opening by 3 valves …….…….……. *Tristicha*
3. Flowers not in 2-sided, raceme-like inflorescences; leaves not rough, without wart-like and prickle-like processes on the upper surface …….....…… 4
3'.Flowers in 2-sided, simple or branched, raceme-like inflorescences; leaves with (more rarely, without) warts and/or prickles on the upper surface .....… *Mourera*
4. Flowers horizontally oriented, partially surrounded by stem tissue ….....……. *Castelnavia*
4'.Flowers vertically oriented, not surrounded by stem tissue …….....…….…….…… 5
5. Leaves bearing 3–8 digitally arranged segments on expanded and sheathing bases ..…. *Diamantina*
5'.Leaves simple or forked, never digitate …….....….... 6
6. Flowers with andropodium …….....……. 7
6'. Flowers without andropodium …….....……. 8
7. Capsules with 2 unequal valves …….....……. *Podostemum*
7'. Capsules with 2 equal valves …….....… *Ceratolacis*
8. Ovary enclosed within the ruptured spathella during anthesis, only stigmas and stamens projecting .. ..…….....……. *Cipoia*
8'. Ovary emerging above the ruptured spathella during anthesis 9
9. Capsules slightly flattened; midrib of each capsule valve winged, the remaining ribs unwinged …... ..... *Rhyncholacis*
9'. Capsules terete or strongly flattened; midrib of the capsule valves not winged or, if winged, then other ribs also winged 10
10. Stamens in whorls …….....……..… 11
10'.Stamens in one side …….....……..… 12
11. Prostate stems …….....…….…… *Marathrum*
11'.Erect stems …….....…….. *Apinagia*
12. Leaves with intrapetiolar stipule; capsule valves each with 5-7 non suture ribs ….....…… 13

12'.Leaves without intrapetiolar stipule; capsule valves each with 3 non suture ribs .....…….…. 14
13 Flowers fasciculate; capsule valves each with 5 non suture ribs …….....…..…. *Wettsteiniola*
13'. Flowers isolate; capsule valves each with 6-7 non suture ribs …….....…… *Oserya*
14. Silica bodies present from the leaves ……..…….....……. *Apinagia*
14'. Silica bodies absent from the leaves ……...….....……. *Lophogyne*

FIELD IMAGES / ILLUSTRATIONS

Figure 1: **Podostemaceae** Rich. ex Kunth

Figure 2: **Podostemaceae** Rich. ex Kunth

Figure 3: **Podostemaceae** Rich. ex Kunth

Figure 4: **Podostemaceae** Rich. ex Kunth

Figure 5: **Podostemaceae** Rich. ex Kunth

Figure 6: **Podostemaceae** Rich. ex Kunth

Figure 7: **Podostemaceae** Rich. ex Kunth

REFERENCE

Bove, C.P. 2006. Podostemaceae. *In*: Barbosa, M.R.V., Sothers, C., Mayo, S., Gamarra-Rojas, C.F.L., Mesquita, A.C. (orgs.). *Checklist das Plantas do Nordeste Brasileiro: Angiospermas e Gymnospermas*. Ministério de Ciência e Tecnologia, Brasília. p.132.
Bove, C.P. 2013. Podostemaceae in Coelho, M.A.N. (org.). Checklist da Flora do Rio de Janeiro. Disponível em http:www.jbrj.gov.br/pesquisa/div_tax/acessobd.php.
Bove, C.P. 2014. Podostemaceae. Catálogo das espécies de plantas vasculares e briófitas do Estado do Rio de Janeiro. Rio de Janeiro: Instituto de Pesquisas Jardim Botânico do Rio de Janeiro. Disponível em: http://florariojaneiro.jbrj.gov.br
BOVE, C.P. 2018. Checklist da família Podostemaceae do Estado do Mato Grosso do Sul. Iheringia, série Botânica 73: 329-334.
Bove, C.P.; Amaro, R., Moraes, L., Amorim, T. & Wimmer, F. 2018. Podostemaceae In: M art i n e l l i , G., M art i n s , E., M o ra e s , M., L oyo la ,R., A mar o , R. (orgs.). *Livro Vermelho da Flora Endêmicas do Estado do Rio de Janeiro.* Jardim Botânico do Rio de Janeiro: SEA – Secretaria de Estado do Ambiente: Andrea Jakobsson Estúdio. 394-395p.
Bove, C.P. & Philbrick, C.T. 2008. Podostemaceae. *In*: Stehmann, J.R.; Forzza, R.C. & Kamino, L.H.Y. Lista da flora vascular da Mata Atlântica. Belo Horizonte. Disponível em http://sagui.icb.ufmg.br/bot/mataarlantica/listagem.php. Acesso em 17 julho. 2011.
Bove, C.P. & Philbrick, C.T. 2009. Podostemaceae. *In*: Stehman, J.R; Forza, 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. p.438-439.
Bove, C.P. & Philbrick, C. T. 2010. Podostemaceae. *In*: Neotropikey Interactive key to the flowering plants of the Neotropics. Royal Botanic Garden, Kew.

Bove, C.P. & Philbrick, C. T. 2013. Neotropical Podostemaceae: Castelnavia, Ceratolacis and Cipoia. Field Museum Color Guide. Disponível em http://fieldguides.fieldmuseum.org/guides/guide/465
Bove, C.P. & Philbrick, C. T. 2014. Rediscovery of a neotropical rheophyte (Podostemaceae) after 160 years: impacts on conservation unit boundaries (Tocantins, Brazil). Checklist 10 (5): 1170-1173. DOI: 10.15560/10.5.1170
Bove, C.P., Philbrick, C.T. and Costa, J.E.M. 2011. Distribution and emended description of the Neotropical Podostemacean genus *Lophogyne*. Brittonia 63(1):156-160. DOI10.1007/s12228-010-9143-3.
Bove, C.P. & Philbrick, C. T.; Da Costa, F.G.C.M.. 2019. *Corrigendum to*: Nomenclatural changes allow for a broadened circumscription of *Lophogyne*Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). Phytotaxa: 420: 89-90.
Cook, C.D.K. and R. Rutishauser. 2007. Podostemaceae, pp. 304-344. In: Kubitzki, K. (ed.), The Families and Genera of Vascular Plants vol. 9. Springer-Verlag, Berlin.
Costa, F.G.C.M.; Bove, C.P.; Arruda, R.C.O. & Philbrick, C.T. 2011. Silica bodies and their systematic implications at the subfamily level in Podostemaceae. *Rodriguésia* 62(4): 937-942.
Costa, F.G.C.M., D.E. Klein, C.T. Philbrick & C.P. Bove. 2018. Silica bodies in leaves of neotropical Podostemaceae: taxonomic and phylogenetic perspectives. Ann. Bot. 122(7): 1187–1201.
Engler, H.G.A. 1927. Podostemonaceae americanae novae. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie. Leipzig 61 (138): 1–9, t. 8.
Goebel, K.I.E. 1893. Pflanzenbiologische Schilderungen 2: 331–354, 374–380, t. 26–30.
Jäger-Zürn, I. & Grubert, M. 2000. Podostemaceae depend on sticky biofilms with respect to attachment to rocks in waterfalls. *Int. J. Plant Sci. 161* (4): 599-607.
Jäger-Zürn, I.; Spies, M.; Philbrick, C.T.; Bove, C.P. & Mora-Olivo, A. 2013. True galls in neotropical Podostemaceae induced by larvae of Chironomidae. *Spixiana 36* (1): 97-112.
Kita, Y. & Kato, M. 2001. Infrafamilial phylogeny of the aquatic angiosperm Podostemaceae inferred from the nucleotide sequence of the *mat*K gene. *Pl. Biol. 3*: 156-163.
Koi S.; Kita Y.; Hirayama Y.; Rutishauser R.; Huber K.A. & Kato M. 2012. Molecular phylogenetic analysis of Podostemaceae: implications for taxonomy of major groups. *Bot. J. Linn. Soc.* 169: 461–492.
Les, D.H.; Philbrick, C.T. & Novelo, A. 1997. The phylogenetic position of river-weeds (Podostemaceae): insights from *rbc*L sequence data. *Aquat. Bot. 57*: 5-27.
Matthiesen, F. 1908. Beiträge zur Kenntnis der Podostemaceen. Bibliotheca Botanica 15 (68): 3–9: 48, t. 1, 5–6, f. 81–90C.
Mello, A.S., Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. *Rodrigésia 62*(4): 867-885.
Philbrick, C.T., Bove, C.P. 2019. Nomenclatural changes allow for a broadened circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). Phytotaxa (on-line) 400: 81 - 86.
Philbrick, C.T., Bove, C.P. and Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany 34(4): 715-729.
Philbrick, C.T., Bove, C.P. and Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. Annals of the Missouri Botanical Garden, 97: 425-456. DOI:10.3417/2008087
Philbrick, C.T. & Les, D.H. 1996. Evolution of Aquatic angiosperms reproductive systems. *Bioscience 46:* 813-826.
Philbrick C.T. & Novelo, A. 1993. River-weeds: a fascinating family of aquatic flowering plants. *Aquaphyte 13(*1): 1-7.
Philbrick, C.T. and Novelo R., A. 2004. Monograph of *Podostemum* (Podostemaceae). Systematic Botany Monographs 70: 1-106.
Philbrick, C.T., Novelo R., A. and Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Systematic Botany 29: 109-117.
Philbrick, C.T.; Philbrick, P.K.B. & Bove, C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56. DOI: 10.3417/2016023
Philbrick, C.T., Ruhfel, B. and Bove, C. P. 2018. Contributions to the taxonomy of *Rhyncholacis* (Podostemaceae): Evidence of monophyly, description of a new species, and transfer of the monotypic *Macarenia.* Phytotaxa (on-line) 357: 107 - 116.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.
Royen, P. van. 1953. The Podostemaceae of the New World. Part II. Acta Botanica Neerlandica 2(1): 1-20.
Royen, P. van. 1954. The Podostemaceae of the New World. Part III. Acta Botanica Neerlandica 3: 215-263.
Ruhfel, B.R.; Bove, C.P.; Philbrick, C.T. & Davis, C.C. 2016. Dispersal largely explains the Gondwanan distribution of the ancient tropical clusioid plant clade. *Amer. J. Bot.*103 (6): 1-12. DOI:10.3732/ajb.1500537

Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutishauser, R.; Xi, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. *Amer. J. Bot.* 98: 306-325. DOI:10.3732/ajb.1000354.
Rutishauser, R. 1997. Structural and developmental diversity in Podostemaceae (river-weeds). *Aquat. Bot. 57*: 29-70.
Rutishauser, R.; Grob, V.; Pfeifer, E. 2008. Plants are used to having identity crises. In: Minelli, A. & Fusco, G. Key *In: Themes in evolutionary developmental biology.* Cambridge University Press, Cambridge. Pp. 194 – 213.

Silva-Batista, I.C. & Bove, C.P. 2018. Podostemaceae of Chapada dos Veadeiros National Park, Goiás, Brazil. *In*: Field Museum Rapid Color Field Guides. Disponível em https://fieldguides.fieldmuseum.org/guides/guide/1003
Tavares, A.S. 1997. *Podostemaceae de alguns rios de água preta do estado do Amazonas.* Tese de Doutorado. Instituto Nacional de Pesquisas da Amazônia (INPA/UA). Manaus. Brasil.
Tippery, N. P.; Philbrick, C. T.; Bove, C. P. & Les, D. H. 2011. Systematics and phylogeny of neotropical Podostemaceae. Systematic Botany, 36(1): 105–118. DOI: 10.1600/036364411X553180.
Tulasne, L.R. 1849. Podostemacearum sinopsis monographica. Annales des sciences naturelles, Botanique 11: 87–114.
Tulasne, L.R. 1852. Monographia Podostemacearum. Archives du museum d'histoire naturelle 6: 1–208. https://doi.org/10.5962/bhl.title.50495
Tulasne, L.R. 1863. Podostemaceae. *In*: Martius, C.F.P. von; Eichler, A.W. & Urban, I. (eds*.) Flora brasiliensis…,München, Wien, Leipzig, v.4* part 1, p.231-276, pls. 73-76.
Weddell, H.A. (1873) Podostemaceae. In: de Candolle, A. (Ed.) Prodomus systematis naturalis regni Vegetabilis. Vol. 17. G. Masson, Paris, pp. 39–89.
Willis, J.C. 1902. Studies in the morphology and ecology of the Podostemaceae of Ceylon and India. *Ann. Roy. Bot. Gard. Peradenyia 1*: 267-465.

Apinagia Tul.

This treatment is composed of the following taxa: *Apinagia*, *Apinagia aripecuruensis*, *Apinagia batrachifolia*, *Apinagia brejoagrestinensis*, *Apinagia digitata*, *Apinagia divaricata*, *Apinagia glaziovii*, *Apinagia guyanensis*, *Apinagia latifolia*, *Apinagia longifolia*, *Apinagia richardiana*, *Apinagia riedelii*, *Apinagia tenuifolia*.

HOW TO CITE

Bove, C.P., Pellegrini, M.O.O., Philbrick, C.T. 2020. Apinagia *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13663.

Has as synonym
heterotypic *Blandowia* Willd.
heterotypic *Ligea* Poit. ex Tul.
heterotypic *Neolacis* Wedd.
heterotypic *Oenone* Tul.

DESCRIPTION

Aquatic annual or facultative perennial herbs, attached to rocks and other solid substrata (e.g., submerged tree trunks) in river-rapids and waterfalls. **Roots** prostrate, elongate, flattened or elliptical in cross-section, green when young, presumably photosynthetic, branched with an asymmetric root cap, attached via adhesive hairs. **Stems** arising opposite, sub-opposite or individually along the flanks of roots, stem base expanded and flattened onto the surface, hold-fast like (hapteron), a hapteron is the single attachment point for 'upright' stems; hapteron can also expand laterally and become a short prostrate stem; branched or unbranched, erect, flattened or elliptical in cross section. **Leaves** distichous, upright, arising in ca. 180# distichous arrangement, simple, pinnately or palmately lobed, or pinnately compound (most common), base of leaf with a single basal sheath (monothecous) or with two sheaths (dithecous), lamina with or without nerves, with or without tufts of multicelular filaments on the abaxial surface; petiolate or petiole absent, petiole elliptical to flattened in cross section, transition between leaf base and stem obscure. **Flowers** 1 to many per stem, axillary to leaves, monochlamydeous, hermaphroditic, actinomorphic or zygomorphic, pedicellate, covered by a sac-like covering (spathella); spathella clavate, apex rounded with trichomes or white short lines present or not, rupturing apically into several irregularly shaped segments; tepals 3 to many, scale-like, linear or triangular, one to several on either side of a stamen; stamens 2 to many, in 1 or more whorls, whorls complete or incomplete, deciduous or persisting, not indurate, stamen filaments elongating during anthesis, anthers basifixed, quadrangular or triangular, thecae parallel sided or projecting outward toward the base, apices of the thecae rounded. Pollen in monads, small, prolate, tricolpate, spinullate; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, with 6 longitudinal dark lines or lines absent, 2 narrow dark suture lines transverse longitudinally from between the stigmas to the base, ovules numerous, placentation axile; stigmas 2, free or fused basally, entire, filiform or subulate, papillate, divergent and elongating during anthesis; pedicel elongating during anthesis, expanded at the apex; expanded laterally where stamens attached resulting in a distinct ridge, ridge completely encircling capsule (complete stamen whorl) or on one side (incomplete stamen whorl). **Fruit** a capsule, 2-locular, with two equal valves (isolobous), both valves persisting after dehiscence; each valve with 1-3 non-suture ribs (additional complete or incomplete ribs in some species) or ribs absent (smooth), ribs raised or not, equal width above and below the middle or expanding apically, lighter or darker than the surface of the capsule; suture margins thickened and rib-like or not; seeds numerous, ovoid, outer integument becoming expanded and sticky when wetted.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco)
Central-west (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)
Possible ocurrences
North (Rondônia)
Northeast (Alagoas, Maranhão, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)

IDENTIFICATION KEY

1. Upright stems 5
   Prostrate stems 2
2. Leaves pinnately lobed, secti or tifid 3
   Leaves digitately/palmately lobbed, secti or tifid ..... *A. latifolia*
3. Leaves up to 10 cm long..... 4
   Leaves ca. 70 cm long ..... *A. guyanensis*
4. Flower with 19-32 stamens, stigma up to 1.5 mm long .... *A. batrachifolia* f. *batrachifolia*
   Flower with 7-22 stamens, stigma 2-2.3 mm long ..... *A. batrachifolia* f. *longistyla*
5. Flowers with an incomplete whorl of stamens …..... 6
   Flowers with a complete whorl of stamens …..... 9
6. Capsules with 3-7 complete non suture ribs per valve (ribs can be ramified or not) 7
   Capsules with 1 complete non suture rib per valve, 2 lateral incomplete ribs may occur at the base of the ovary ……..... *A. richardiana*
7. Leaves digitately/palmately lobbed, secti or tifid ..... *A. divaricata*
   Leaves entire, pinnately lobed, secti or tifid ……..... 8
8. Spathella without trichomes at the apex; tepals linear to lanceolate up to or surpassing half of the ovary ..... *A. riedelii*
   Spathella with trichomes; tepals ovate to triangular at the base of the ovary, never reaching half of the ovary..... …… *A.brejoagrestinensis*
9. Leaves palmatinerved ……..…….……. 10
   Leaves not palmatinerved ……..……. 11
10. Flowers with gynophore, capsules with 3 non suture ribs per valve ….. *A. aripecuruensis*
    Flowers without gynophore, capsules with 1 non suture rib per valve, 2 lateral incomplete ribs may occur at the base of ovary ……..... *A. digitata*
11. Capsules with 3 non suture ribs per valve 12
    Capsules with 1 non suture rib per valve, 2 lateral incomplete ribs may occur at the base of ovary ..... *A. longifolia*
12. Many branched stems (stem without a main axis); flowers with liner tepals, 5-8 stamens ……..…….…….... *A. glaziovii*
    Unbranched or few branched stems (stem with a main axis); flowers with triangular tepals, 15-20 stamens ……..……. *A. tenuifolia*

REFERENCE

Bove, C. P. & Philbrick, C. T. 2016. (2487) Proposal to conserve the name *Lacis riedelii* (*Apinagia riedelii*) against *L. fucoides* (*A. fucoides*) (Podostemaceae). Taxon 65(6): 1432–1433.

Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. Annals of the Missouri Botanical Garden, 97: 425-456.

Philbrick, C.T.; Philbrick, P.K.B. & Bove, C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51–56.

Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.

Apinagia aripecuruensis P.Royen

DESCRIPTION

Stem: axis main absent; **orientation** erect. **Leaf: type** palmate. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** linear; **stamen disposition** in cycle complete; **stamen number** 7/8/9; **gynophore** present. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Stems upright, branched. **Leaves** 2-5 cm long, distichous, petiolate, palmately compound or repeatedly forked; lamina palminerved, without tufts of multicelular filaments on the abaxial surface; ultimate segments linear, nerverless. **Flowers** many per stem, axillary to leaves, actinomorphic; pedicel 1.4-5.5 cm long, tepals 7-9, linear, 0.5 mm long, on either side of a stamen; stamens 7-9, in a complete whorl, 3-4.5 mm long; thecae projecting outward toward the base; gynophore 0.5-1 mm long; ovary 2-carpellate, 2-locular, 2.0-3.5 x 1 mm, 6 longitudinal dark lines, 2 narrow dark suture lines; stigmas 2, 1-2 mm long, papillate. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle, lighter than the surface of the capsule; suture margins thickened and rib-like.

COMMENTS

Only the type is known.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

A. Ducke, 15025, CGE, MG (MG015025), Pará, **Typus**

REFERENCE

Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl. 3(2): 215-263.

Apinagia batrachifolia (Mildbr.) P.Royen

This treatment is composed of the following taxa: *Apinagia batrachifolia*, *Apinagia batrachifolia f. batrachifolia*, *Apinagia batrachifolia f. longistyla*.

Has as synonym
basionym *Oenone batrachifolia* Mildbr.

DESCRIPTION

Stem: axis main absent; **orientation** prostrate. **Leaf: type** pinnatifid. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** linear/triangular; **stamen disposition** in cycle complete; **stamen number** 7/32; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Stems prostate. **Leaves** repeatedly pinnately compound, nerveless; petiolate. **Flowers** many per stem, axillary to leaves, actinomorphic ; pedicel 3-8 cm long, idened at the apex; tepals linear or triangular; stamens in 1 or 2 whorls; filaments sometimes forked; ovary 2-carpellate, 2-locular, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia)

IDENTIFICATION KEY

1. Flower with 19-32 stamens, stigma up to 1.5 mm long ..... *A. batrachifolia* f. *batrachifolia*
   Flower with 7-22 stamens, stigma 2-2.3 mm long ..... *A. batrachifolia* f. *longistyla*

HERBARIUM MATERIAL

H.S. Irwin, 48624, RB, Amazonas
E.H.G. Ule, 6113, B (B 10 0242110), MG (MG005991), L, L 0204526, (NL-L0204526), L, L 0204527, (NL-L0204527), L, L 0204528, (NL-L0204528), G, G00074176, (G00074176), Amazonas, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Apinagia batrachi f. *lia* P.Royen

DESCRIPTION

Herbs up to 12 cm high. **Stems** prostate. **Leaves** repeatedly pinnately compound, 4-9 cm long, nerveless; petiolate. **Flowers** many per stem, axillary to leaves, actinomorphic ; pedicel 3-8 cm long, idened at the apex; tepals 9-19, linear; stamens 7-22, in 1 or 2 whorls; filaments sometimes forked; ovary 2-carpellate, 2-locular, 3-4.5 x 1.5-2 mm, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, 2-2.3 mm long. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amapá)

HERBARIUM MATERIAL

P. Luetzelberg, 20301, R, 61627, L (L.1858166), Amapá, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Apinagia batrachifolia f. longistyla* P.Royen

Figure 2: *Apinagia batrachifolia f. longistyla* P.Royen

Figure 3: *Apinagia batrachifolia f. longistyla* P.Royen

Apinagia batrachi (Mildbr.) P.Royen f. *lia*

DESCRIPTION

Herbs up to 12 cm high. **Stems** prostate. **Leaves** repeatedly pinnately compound, 4-9 cm long, nerveless; petiolate. **Flowers** many per stem, axillary to leaves, actinomorphic ; pedicel 3-8 cm long, idened at the apex; tepals 9-19, triangular; stamens 19-32, in 1 or 2 whorls; filaments sometimes forked; ovary 2-carpellate, 2-locular, 3-4.5 x 1.5-2 mm, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, up to 1.5 mm long. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará)

HERBARIUM MATERIAL

E. E. Ule, 6113, B, **Typus**
E. H. G. Ule, 6113, B (B 10 0242110), **Typus**
Ule, E., 6113, MG (MG005991), Amazonas, **Typus**
Ule, E., 6113, MG (MG005991), Amazonas, **Typus**
R. E. Schultes, 6521, US, (US00365127), Amazonas

Apinagia brejoagrestinensis A.S.Tav. & Sobral-Leite

DESCRIPTION

Stem: axis main present; **orientation** erect. **Leaf: type** pinnatifid. **Flower: spathella indumentum** pilose; **flower symmetry** zygomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** linear; **stamen disposition** lateral; **stamen number** 3/5; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs 15–50 cm high. **Stems** upright, branched, flattened in cross section, 10–30 x 0.5–1 cm. **Leaves** distichous, repeatedly pinnately compound; petiole cylindrical, 3–5 cm long; lamina filamentous. **Flowers** many per stem, in fascicles, zygomorphic; spathella clavate, 2.7–7.5 x 1–3 mm, apex rounded with trichomes; pedicel, 6–14 mm long; tepals 5–8, 1–1.5 x 0.5 mm, linear, in a complete whorl; 3-5 stamens, 5–7 mm long, , in a incomplete whorl, anthers quadrangular, thecae projecting outward toward the base; ovary 2-carpellate, 2-locular, 2.5–3 x 1–2 mm, oval in outline, round to oval in cross section, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, fused basally, ovules 280–512 per ovary. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs; suture margins thickened and rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Northeast (Pernambuco)

HERBARIUM MATERIAL

M. Sobral-Leite, 527, FLOR, 57647, (FLOR0057647), Pernambuco, **Typus**

REFERENCE

Tavares, A.S. & Sobral-Leite, M. 2015. Apinagia brejoagrestinensis (Podostemaceae): a new rheophyte from the Atlantic Forest of northeastern Brazil. Phyotaxa 220 (1): 061–068. http://dx.doi.org/10.11646/phytotaxa.220.1.5

Apinagia digitata P.Royen

Has as synonym
heterotypic *Apinagia platystigma* P.Royen

DESCRIPTION

Stem: axis main absent; **orientation** erect. **Leaf: type** entire/pinnate/palmate/lobate. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** in cycle complete; **stamen number** 7/14; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 1; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 20 cm high. **Stems** upright, branched. **Leaves** distichous, up to 10 cm long, rhombiform, lanceolate or spathulalte, pinnately compound; lamina palmatinerved with tufts of multicelular filaments on the abaxial surface; petiole cuneate, 10-35 x 1-4 mm. **Flowers** many per stem, axillary to leaves, actinomorphic; spathella clavate, up to 2.5 cm long; pedicel 4-7 cm long; tepals 9-12, triangular, 0.5 mm long; stamens 8-14, in 1complete whorl, 4-5.5 mm long, anthers 2-2.5 mm long; ovary 2-carpellate, 2-locular, oval in outline, 3-3.5 x 1.5-2 mm, with 1 longitudinal light line in the middle of each carpel, 2 narrow dark suture lines, stigmas 2, 1-1.5 mm long, fused basally, papillate. **Capsule** 2-locular, with two equal persistent valves, each valve with 1 non-suture rib, 2 additional incomplete ribs at the base of the ovary can occur, ribs lighter than the surface of the capsule, suture line not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amapá, Pará)

HERBARIUM MATERIAL

Sagot, 1112, P (P00167928), **Typus**
C.P. Bove, 2463, R, 222972, Amapá

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Apinagia digitata* P.Royen

Figure 2: *Apinagia digitata* P.Royen

Figure 3: *Apinagia digitata* P.Royen

Figure 4: *Apinagia digitata* P.Royen

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P.1951. The Podostemaceae of the new world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Apinagia divaricata Tul. & Wedd.

DESCRIPTION

Stem: axis main absent; **orientation** erect. **Leaf: type** palmate. **Flower: spathella indumentum** glabrate; **flower symmetry** zygomorphic; **tepal(s) size** unknown; **tepal(s) form** unknown; **stamen disposition** lateral; **stamen number** 2/3; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3 - 7; **costa type** branched/basal/of the base to apex.

ADDITIONAL DESCRIPTION

Herbs ca. 5 cm high. **Stems** upright, branched at the base, elliptical in cross section. **Leaves** distichous, simple, palmately lobed to partite; lamina without nerves; petiole absent. **Flowers** many per stem, axillary to leaves, zygomorphic; pedicel up to 4.5 m long; tepals unknown; stamens 2-3, lateral; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, stigmas unknown. **Capsule** 2-locular, with two equal persistent valves, each valve with 3-7 complete non suture ribs per valve (ribs can be ramified or not), lighter than the surface of the capsule; suture margins thickened and rib-like.

COMMENTS

Known only by the type. Type without flowers

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)

HERBARIUM MATERIAL

Weddell, s.n., K (K000584963), **Typus**
Weddell H.A., s.n. (P00167934), Tocantins, **Typus**
Weddell H.A., s.n. (P00167932), **Typus**
Weddell, H.A., s.n., P, Goiás, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Apinagia glaziovii (Warm.) P.Royen

Has as synonym
basionym *Oenone glaziovii* Warm.

DESCRIPTION

Stem: axis main present; **orientation** erect. **Leaf: type** pinnatifid. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** lateral; **stamen number** 5/6/7/8; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 30 cm high. **Stems** upright, branched, elliptical in cross section. **Leaves** distichous, simple, pinnately compound, up to 12 cm long; lamina filiform, without nerves; petiolate. **Flowers** 1 to many per stem, axillary to leaves, actinomorphic; tepals 5-8, triangular, one on either side of a stamen; stamens 5-8, in 1 complete whorl, ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, with 6 longitudinal lines, stigmas 2, free or fused basally. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle, lighter than the surface of the capsule; suture margins thickened and rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.P. Bove, 730, R, Minas Gerais
A.F.M. Glaziou, 15444 (P00167919), Minas Gerais, **Typus**
A.F.M. Glaziou, 15444, K, (K000584968), Minas Gerais, **Typus**
A.F.M. Glaziou, 15444, P (P00167920), **Typus**
A.F.M. Glaziou, 15444, K (K000584968), Minas Gerais, **Typus**
A.F.M. Glaziou, 15444, P (P00167919), **Typus**
A.F.M. Glaziou, 15444, P (P00167921), **Typus**
A.F.M. Glaziou, 15444 (P00167921), **Typus**
A.F.M. Glaziou, 15444 (P00167920), **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Apinagia guyanensis (Pulle) P.Royen

Has as synonym
basionym *Oenone guyanensis* Pulle

DESCRIPTION

Stem: axis main present; **orientation** prostrate. **Leaf: type** pinnatifid. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** in cycle complete; **stamen number** 7/23; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 1m high. **Stems** prostate, branched. **Leaves** distichous, simple, up to 80cm long, pinnately compound; lamina pinnatifid, with nerves; petiolate. **Flowers** many per stem, solitary or in fascicles, actinomorphic; spathella clavate, apex rounded, 12-18 mm; tepals 8-24, triangular, one to several on either side of a stamen; stamens 7-23, in 1 or 2 complete whorls, 4-7 mm long; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, 2.5-4 x 1.5-2 mm, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, fused basally. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture ribs, ribs raised, equal width above and below the middle, lighter than the surface of the capsule; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará)
Possible ocurrences
North (Rondônia)

HERBARIUM MATERIAL

J.M. Pires, 50389, NY (NY01921542), Amapá
C.P. Bove, 2447, R
W.A. Egler, 46471, NY, (NY01921567), Amapá
G.M. Versteeg, 808, K, **Typus**
C. Ferreira, 1259, INPA, Amazonas
G.T. Prance, 14562, NY (NY01921563), Amazonas
J.M. Pires, 52497A, NY (NY01921559), Amapá

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Apinagia guyanensis* (Pulle) P.Royen

Figure 2: *Apinagia guyanensis* (Pulle) P.Royen

Figure 3: *Apinagia guyanensis* (Pulle) P.Royen

Figure 4: *Apinagia guyanensis* (Pulle) P.Royen

Figure 5: *Apinagia guyanensis* (Pulle) P.Royen

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Apinagia latifolia (K.I.Goebel) P.Royen

Has as synonym
basionym *Oenone latifolia* K.I.Goebel
heterotypic *Apinagia imthurnii* (K.I.Goebel) P.Royen
heterotypic *Oenone imthurnii* K.I.Goebel

DESCRIPTION

Stem: axis main absent; **orientation** prostrate. **Leaf: type** palmate. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** in cycle complete; **stamen number** 7; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs ca. 20 cm high. **Stems** prostate, unbranched, flattened to elliptical in cross section. **Leaves** distichous, simple, palmately lobed; lamina up to 10 cm long, lanceolate to spathulate, palmatinerved, with tufts of multicelular filaments on the abaxial surface; petiole 2.5 x 0.4 cm. **Flowers** many per stem, actinomorphic; spathella clavate, uo to 2.5 cm long; tepals 7, triangular, one on either side of a stamen; stamens 7, 3-5 mm long, anthers 2-2.5 mm long; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, 3-4 x 1-1.5 mm, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, 1.5 mm long, fused basally, papillate. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 non-suture, ribs not raised, expanding apically, lighter than the surface of the capsule, suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

M. Sperling, 6132, NY, 2282956, (NY02282956), Pará
K.I. Goebel, s.n., K, (K000584956), K, (K000543164), Pará, **Typus**

REFERENCE

Philbrick, C.T.; Philbrick, P.K.B. & Bove, C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). *Novon 25*: 51–56. doi: 10.3417/2016023
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.

Apinagia longifolia (Tul.) P.Royen

Has as synonym
basionym *Oenone longifolia* Tul.
homotype *Ligea longifolia* (Tul.) Tul.
heterotypic *Apinagia staheliana* (Went) P.Royen
heterotypic *Apinagia surumuensis* (Engl.) P.Royen
heterotypic *Oenone staheliana* Went
heterotypic *Oenone surumuensis* Engl.

DESCRIPTION

Stem: axis main present; **orientation** erect. **Leaf: type** entire/pinnate. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** in cycle complete; **stamen number** 10/30; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 1m high. **Stems** upright, branched or unbranched, elliptical in cross section. **Leaves** distichous, simple to pinnately lobed, or secti; lamina 3-20 x 0.5-5 cm, pinnatinerved, with tufts of multicelular filaments on the abaxial surface; petiolate. **Flowers** many per stem, axillary to leaves, actinomorphic; spathella clavate, up to 2.5 cm longapex rounded; tepals 10-17, triangular, one to several on either side of a stamen; stamens 10-30, 5-7 mm long, in 1 or more whorls, whorls complete; anthers 1-2.5 mm long; ovary 2-carpellate, 2-locular, 2.5-4 x 1.5-2 mm, oval in outline, round to oval in cross section, lines absent, 2 narrow dark suture lines, stigmas 2, fused basally. **Capsule** 2-locular, with two equal persistent valves, each valve with 1central non-suture rib, 2 additional incomplete ribs at the base, ribs not raised, equal width above and below the middle, lighter than the surface of the capsule; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Roraima)

HERBARIUM MATERIAL

C.P. Bove, 1943, R, Roraima
H.R. Schomburgk, 437, P (P00167848), K, (K000584975), K, (K000543163), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Apinagia longifolia* (Tul.) P.Royen

Figure 2: *Apinagia longifolia* (Tul.) P.Royen

Figure 3: *Apinagia longifolia* (Tul.) P.Royen

Figure 4: *Apinagia longifolia* (Tul.) P.Royen

Figure 5: *Apinagia longifolia* (Tul.) P.Royen

Figure 6: *Apinagia longifolia* (Tul.) P.Royen

Figure 7: *Apinagia longifolia* (Tul.) P.Royen

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.
Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutshauser, R.; XI, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.
Tippery, N.P.; Philbrick, C. T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Apinagia richardiana (Wedd.) P.Royen

Has as synonym
basionym *Ligea richardiana* Tul.
basionym *Neolacis richardiana* Tul.
homotype *Ligea richardiana* Tul. var. *richardiana*
homotype *Neolacis richardiana* Tul. var. *richardiana*
homotype *Oenone richardiana* (Tul.) Warm.
heterotypic *Apinagia capillarifolia* Engl.
heterotypic *Apinagia corymbosa* var. *capillarifolia* (Engl.) P.Royen
heterotypic *Apinagia corymbosa* (Tul.) Engl. var. *corymbosa*
heterotypic *Apinagia corymbosa* (Tul.) Engl.
heterotypic *Apinagia exilis* (Tul.) P.Royen
heterotypic *Apinagia microcarpa* (Wedd.) Engl.
heterotypic *Apinagia minor* P.Royen
heterotypic *Apinagia secundiflora* (Wedd.) Pulle
heterotypic *Apinagia uleana* Engl.
heterotypic *Lacis chrysanthemum* Schnizl.
heterotypic *Ligea corymbosa* (Tul.) Benth. & Hook.f. ex B.D.Jacks.
heterotypic *Ligea richardiana* var. *corymbosa* Tul.
heterotypic *Ligea richardiana* var. *exilis* Tul.
heterotypic *Ligea secundiflora* (Wedd.) Tul.
heterotypic *Neolacis corymbosa* (Tul.) Wedd.
heterotypic *Neolacis richardiana* var. *microcarpa* Wedd.
heterotypic *Neolacis secundiflora* Wedd.
heterotypic *Oenone othmeri* Matthiesen
heterotypic *Oenone secundiflora* (Tul.) Engl.

DESCRIPTION

Stem: axis main absent; **orientation** erect. **Leaf: type** entire/pinnate/lobate/pinnatifid. **Flower: spathella indumentum** glabrate; **flower symmetry** zygomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** linear; **stamen disposition** lateral; **stamen number** 2/5; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 20 cm high. **Stems** upright, branched, elliptical in cross section, winged. **Leaves** distichous, up to 5 cm long, simple, pinnately lobed to pinnatisecti; lamina elliptical or asymmetric rectangular to rhombiform, nerved, with tufts of multicelular filaments on the abaxial surface; petiole decurrent. **Flowers** 1 to many per stem, axillary to leaves, zygomorphic; spathella clavate, apex rounded, 0.5-2 cm long; pedicel 2-6 cm long; tepals 3-6, linear, at the base of the ovary, one to several on either side of a stamen; stamens 2-5 to many, 2-7 mm long, whorl incomplete; anthers 1-1.5 mm long; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, 2-3x1-1.5 mm, with 2 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, fused basally. **Capsule** 2-locular, with two equal persistent valves, each valve with 1 non-suture ribs, 2 additional incomplete ribs at the base, ribs not raised, equal width above and below, lighter than the surface of the capsule; suture margins not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Roraima)
Northeast (Alagoas, Ceará, Pernambuco)
Southeast (São Paulo)
South (Paraná)
Possible ocurrences
North (Rondônia)

HERBARIUM MATERIAL

Schomburgk, 434, P (P00167916), **Typus**
Schomburgk, R., 434, K, (K000543469), **Typus**
C.P. Bove, 1971, R, Roraima
Hostmann, 1323, P (P00167906), **Typus**
Rothing, C. Esq., 54, K, (K000584962)
Schomburgk, 434, P (P00167917), **Typus**
Schomburgk, R., 434, K, (K000543468), **Typus**
Schomburgk, R., 436, K, (K000543470), **Typus**
Schomburgk, 436, P (P00167907), **Typus**
Richard, s.n., P (P00167986), **Typus**
R. Spruce, 555, P (P00167918), Pará, **Typus**
R. Spruce, s.n., P (P00167908), Pará

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Apinagia richardiana* (Wedd.) P.Royen

Figure 2: *Apinagia richardiana* (Wedd.) P.Royen

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.
Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutshauser, R.; XI, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.
Tippery, N.P.; Philbrick, C. T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Apinagia riedelii (Bong.) Tul.

Has as synonym
basionym *Lacis riedelii* Bong.
homotype *Neolacis riedelii* (Bong.) Wedd.
heterotypic *Apinagia fluitans* P.Royen
heterotypic *Apinagia fucoides* (Mart. & Zucc.) Tul.
heterotypic *Apinagia gardneriana* Tul.
heterotypic *Apinagia psyllophora* Tul. & Wedd.
heterotypic *Apinagia pygmaea* (Bong.) Tul.
heterotypic *Apinagia rangiferina* P.Royen
heterotypic *Apinagia yguazuensis* Chodat & Vischer
heterotypic *Lacis fucoides* Mart. & Zucc.
heterotypic *Lacis pygmaea* Bong.
heterotypic *Neolacis fucoides* (Mart.) Wedd.
heterotypic *Neolacis gardneriana* (Tul.) Wedd.
heterotypic *Neolacis psyllophora* (Tul. & Wedd.) Wedd.
heterotypic *Neolacis pygmaea* (Bong.) Wedd.

DESCRIPTION

Stem: axis main absent; **orientation** erect. **Leaf: type** entire/pinnate/lobate/pinnatifid. **Flower: spathella indumentum** glabrate; **flower symmetry** zygomorphic; **tepal(s) size** up to half of the ovary; **tepal(s) form** linear; **stamen disposition** lateral; **stamen number** 2/5; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3 - 7; **costa type** branched/of the base to apex.

ADDITIONAL DESCRIPTION

Herbs up to 50 cm high. **Stems** upright. branched, elliptical in cross section. **Leaves** distichous, up to 30 cm long, simple, pinnate to pinnatisect; lamina pinatinerved, with or without tufts of multicelular filaments on the abaxial surface; petiole 30-80x1-2 mm. **Flowers** 1 to many per stem, axillary to leaves, zygomorphic; spathella, 2-15 mm long clavate, apex rounded and papilate; pedicel up tp 3 cm long; tepals 3-6, linear to lanceolate, 0.5-3 mm long, one on either side of a stamen; stamens 2-5, incomplete whorl, 2-7 mm long; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, 2-3x1-2 mm, 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, fused basally, 0.5-1.5 mm long. **Capsule** 2-locular, with two equal persistent valves, each valve with 3-5 non-suture ribs, additional incomplete basal or apical ribs can occur, ramified ribs can occur, ribs raised, equal width above and below the middle, lighter than the surface of the capsule; suture margins thickened and not rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Rondônia, Tocantins)

Northeast (Bahia, Ceará, Paraíba)
Central-west (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)
Possible ocurrences
Northeast (Alagoas, Maranhão, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)

HERBARIUM MATERIAL

C.F.P. Martius, 2056, B (B 10 0249255), P (P00167860), W (W0071395), W, (W18890264794), Bahia, **Typus**
H.A. Weddell, 2368, K, (K000584959), K, (K000584967), P (P00167829), P (P00167830), P (P00167831), **Typus**
C.P. Bove, 2139, R, Tocantins
L. Riedel, 393, S (S-R-7389), B (B 10 0249249), K, (K000584957), P (P00167937), São Paulo, **Typus**
L. Riedel, 392, P (P00167896), B (B 10 0249248), US, (US00365132), São Paulo

FIELD IMAGES / ILLUSTRATIONS

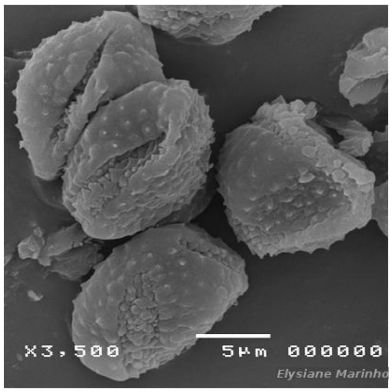

Figure 1: *Apinagia riedelii* (Bong.) Tul.

Figure 2: *Apinagia riedelii* (Bong.) Tul.

Figure 3: *Apinagia riedelii* (Bong.) Tul.

Figure 4: *Apinagia riedelii* (Bong.) Tul.

Figure 5: *Apinagia riedelii* (Bong.) Tul.

Figure 6: *Apinagia riedelii* (Bong.) Tul.

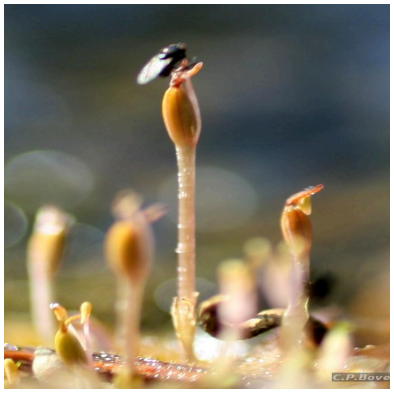

Figure 7: *Apinagia riedelii* (Bong.) Tul.

REFERENCE

Bove, C.P. & Philbrick, C.T. 2016. Proposal to conserve the name *Lacis riedelii* (*Apinagia riedelii*) against (*L. fucoides*) (Podostemaceae). Taxon 65 (6): 1432-1433. DOI: 10.12705/656

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56.

Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutshauser, R.; XI, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.

Tippery, N.P.; Philbrick, C. T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Apinagia tenuifolia P.Royen

Has as synonym
homotype *Oenone uleana* Engl.
heterotypic *Apinagia kochii* (Engl.) Royen
heterotypic *Oenone kochii* Engl.

DESCRIPTION

Stem: axis main present; **orientation** erect. **Leaf: type** entire. **Flower: spathella indumentum** glabrate; **flower symmetry** actinomorphic; **tepal(s) size** up to the base of the ovary; **tepal(s) form** triangular; **stamen disposition** in cycle complete; **stamen number** 15/22; **gynophore** absent. **Fruit: capsule ornamentation** costate; **costa number by valve** 3; **costa type** of the base to apex.

ADDITIONAL DESCRIPTION

Herbs ca. 30 cm high. **Stems** upright, branched, elliptical in cross section. **Leaves** distichous, simple, lanceolate, 20-30x1-1.5 cm; lamina pinnatinerved, with tufts of multicelular filaments on the abaxial surface, sinuate margin, cuneate base; petiole up to 2.5 cm long. **Flowers** many per stem, axillary to leaves, actinomorphic; spathella clavate, apex rounded, up to 15 mm long; tepals 13-15, triangular, 0.5-0.8 mm long, one to several on either side of a stamen; stamens 15-22, up to 8 mm long, in 1 or 2 complete whorls; ovary 2-carpellate, 2-locular, oval in outline, round to oval in cross section, up to 5 mm long, with 6 longitudinal dark lines, 2 narrow dark suture lines, stigmas 2, fused basally. **Capsule** 2-locular, with two equal persistent valves, each valve with 3 large non-suture ribs, raised, equal width above and below the middle, suture margins thickened and rib-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Roraima)

HERBARIUM MATERIAL

E.H.G. Ule, 7588, B, Roraima, **Typus**
E. H. G. Ule, 7588, B (B 10 0249245), Roraima, **Typus**
Edwards, P.J., 2509, K (K000584973), Roraima
Ule, E., 7588, K (K000584974), Roraima, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Castelnavia Tul. & Wedd.

This treatment is composed of the following taxa: *Castelnavia*, *Castelnavia fluitans*, *Castelnavia monandra*, *Castelnavia multipartita*, *Castelnavia noveloi*, *Castelnavia pendulosa*, *Castelnavia princeps*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Castelnavia *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13670.

DESCRIPTION

Herbs aquatic, annual or perennial (?), attached to rocks in river-rapids and waterfalls (occasionally trunks of rheophytic trees/shrubs). Roots/Shoot system prostrate, chlorophyllated, tightly attached to substratum throughout length, cylindrical to flattened, repeatedly dichotomously, subdichotomously or haphazardly branched, with swollen side-branches or lacking, turning white when exposed or upright, cylindrical and not ramified or foliaceous. Leaves distichous, arising from stem margins, monothecous (single sheath) or dithecous (two sheaths); simple, dichotomously divided, variously lobed or pinnate; petiolate or not, petiole rounded, elliptical or flat in cross-section, 1-several veined; rachis distinctly widened and flattened or elliptical to round. Spathella clavate, oriented horizontally, papillate apically, rupturing apically or subapically into numerous linear to triangular segments, lower region remaining covered by stem tissue. Flowers solitary, numerous per stem, imbedded in pockets in main stem or 1-4 per branch and surrounded by fused leaf sheaths, oriented horizontally, hermaphroditic, zygomorphic, short pedicellate, covered by sac-like spathella; pedicel not elongating during anthesis, attached to ovary perpendicular to ovary axis; receptacle asymmetrically expanded on side opposite stamen attachment (asymmetry becoming obscured in fruit as receptacle dries). Tepals 0-3, linear, hair-like to flattened, one on either side of fused stamen filaments, an additional tepal arising between the two filaments in some populations of C. multipartita), apex acute. Stamens 1-2, filament flattened, wider at base than apex, attached to anther in pocket-like area, elongating during anthesis and projecting from ruptured spathella, persisting after anthesis; anthers basifixed, triangular, thecae fused apically, apex blunt, dehiscing introrsely and longitudinally. Pollen in monads, isopolar, oblate spheroidal to prolate spheroidal, tricolpate, planaperturate, spiculate, colpus short or long, colpus membrane with conspicuous spicules. Ovary 2-carpellate, unilocular at maturity, oriented horizontally or nearly so, strongly anisolobous, dorsal (upper) carpel markedly smaller than ventral (lower) carpel, papillate, papillae absent from ventral (larger) carpel; remaining inside spathella during anthesis; suture line between carpels diagonal relative to ovary axis. Ovules numerous, placentation axile, placenta thick. Stigmas 2, free, linear, papillose, offset toward one side of ovary apex, projecting from ruptured spathella at anthesis. Capsules oriented horizontally, partially covered by surrounding stem tissue and persistent spathella, markedly anisolobous; dehiscing by 2 valves, upper (dorsal) valve deciduous, 3-5 ribbed (non-suture), suture margins thickened and rib-like, papillate on upper region or papillae lacking; lower (ventral) valve persistent, cup-like, 3-7 ribbed, suture margins thickened and rib-like, lacking papillae. Seeds orange-brown, obovate.

COMMENTS

Plants of *Castelnavia* grow attached to solid substrates in river-rapids and waterfalls. Rocks (e.g., granites, basalt) are the typical substrate. Two species (*C. monandra*, C. *multipartita*) commonly occur on bark of rheophytic myrtaceous shrubs such as *Psidium* sp. (*Bove & Philbrick 1856* [R]), and *Myrciaria dubia* (Kunth) McVaugh (*Bove & Philbrick 1857* [R]) in the Araguaia and Teles Pires Rivers.
Several species of *Castelnavia* often occur within close proximity (several cm) of each other. For example, *C. fluitans*, *C. monandra* and *C. princeps* occur essentially together in the Araguaia River near São João do Araguaia (Pará). In the Juruena River (Mato Grosso), *C. fluitans*, *C. multipartita* and *C. princeps* occur together. Species of *Castelnavia* also commonly co-occur with other Podostemaceae (e.g., species of *Apinagia*, *Jenmaniella*, *Mourera*, *Tristicha*, *Weddellina*) in the same habitat.
Little is known about reproductive systems of *Castelnavia*. Although bees have been observed collecting pollen from the nectarless flowers of *C. fluitans* and *C. monandra* (Philbrick & Bove, unpublished data), their role in pollination, if any, has not been determined. It is conceivable that dense growth and prolific flower production may make some species important as seasonal pollen sources for floral visitors.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)
Central-west (Goiás, Mato Grosso)
Southeast (Minas Gerais)

IDENTIFICATION KEY

1. Tepals present ……..……..……..…. 2
1'. Tepals absent..... 9
2. Papillae present on upper portion of deciduous (dorsal) capsule valve……..... 3
3. Stem prostrate, attached throughout its length..... *C. multipartita*
3'. Stem pendulous, attached by an expanded holdfast..... *C. pendulosa*
2'. Papillae absent on upper portion of deciduous (dorsal) capsule valve.....…… 4
4. Tepals 3…….....…….....……. 5
4'. Tepals 2. ……..... 6
5. Stem prostrate, attached throughout its length..... *C. multipartita*
5'. Stem pendulous, attached by an expanded holdfast..... *C. pendulosa*
6. Ribs uniformly 3 on each capsule valve ……..... *C. princeps*
6'. Ribs ranging from 3-7 on each capsule valve ……..... 7
7. Stem prostrate, attached throughout its length….....*C. multipartita*
7'. Stem pendulous, attached by an expanded holdfast.....……*C. noveloi*
9. Stamens 1.…….....……..... *C. monandra*
9'. Stamens 2. ……..……..... 10
10. Papillae present on upper portion of deciduous (dorsal) capsule valve, flowers occurring in short, swollen branches..... *C. fluitans*
10'. Papillae absent on upper region of deciduous (dorsal) capsule valve, flowers occurring in prostrate, dichotomously-subdichotomously
divided stems. ……..……*C. princeps*

REFERENCE

Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalvez-Eesteves, V. 2012. Pollen morphology of the aquatic Brazilian endemic genus *Castelnavia* Tul. & Wedd. (Podostemaceae). Pl. Syst. Evol. 298 (8): 1455-1461.
Jäger-Zürn, I.; Philbrick, C.T.; Bove, C.P. 2016. The architecture of *Castelnavia noveloi* (Podostemaceae) – a re-investigation. Brittonia 66 (2): 202-211.
Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Castelnavia fluitans Tul. & Wedd.

Has as synonym
heterotypic *Castelnavia pusillima* Tul. & Wedd.
heterotypic *Castelnavia serpens* Tul. & Wedd.

DESCRIPTION

Root: root absent. **Stem: habit** prostrate/branched. **Flower: tepal(s)** absent; **stamen** 2. **Fruit: surface** papillate/ribbed.

ADDITIONAL DESCRIPTION

Herbs, often dense, moss-like growth habit. *Stems* prostrate, tightly attached to substratum throughout their length, slightly rounded to flattened, (0.3) 1.6 (5) mm wide, irregularly branched; swollen branches arising laterally at irregular intervals or clustered. *Leaves* (3) 6 (15) per branch, arising from margins of lateral branches, simple (most common) or once divided, linear, (0.7) 4.1 (27.5) X (0.1) 0.3 (0.8) mm at midpoint, 1-veined or vein lacking, apex acute or obtuse. *Spathellas* (1.3) 1.7 (2.5) X (0.5) 0.6 (0.9) mm, rupturing apically into (3) 7 (11) linear to triangular segments. *Flowers* (1) 1 (4) per branch, surrounded by fused leaf sheaths (branch thus appearing swollen), pedicel (0.1) 0.2 (1.0) mm long prior to anthesis. *Tepals* absent. *Stamens* 2, filaments prior to anthesis (0.5) 0.6 (1.0) X (0.1) 0.1 (0.2) mm, elongating to (1.0) 1.9 (3.6) mm and projecting from the ruptured spathella during anthesiss; anthers (0.5) 0.7 (4) X (0.3) 0.3 (5.5) mm. *Pollen* polar diameter (12.5) 17.2 (17.5) µm, equatorial diameter (12.5) 18.3 (17.5) µm, colpus long, (10) 10.7 (11) X (1) 1.3 (2) µm, sexine 0.5 µm, nexine 0.5 µm. *Ovary*, apical region of dorsal (upper) carpel papillate; in preanthesis flowers (0.6) 0.7 (1) X (0.4) 0.5 (0.6) mm; in post anthesis flowers (0.6) 0.8 (1.1) X (0.4) 0.5 (0.7) mm. *Ovules* (8) 15 (27) per ovary. *Stigmas* (0.3) 0.4 (0.8) mm prior to anthesis, elongating to (0.3) 0.7 (2) mm during anthesis. *Capsules* (0.4) 0.7 (1.5) X (0.4) 0.5 (1.2) mm; upper (dorsal) valve (0.5) 0.6 (0.8) X (0.4) 0.4 (0.6) mm, 3-5 ribbed (non-suture), suture margins appearing thickened and rib-like, papillate in apical region; lower (ventral) valve (0.6) 0.7 (0.9) X (0.4) 0.5 (0.7) mm, (3) 5 (7)-ribbed (non-suture). *Seeds* (0.15) 0.2 (0.3) X (0.1) 0.14 (0.2) mm; (0) 9 (17) per capsule.

COMMENTS

Castelnavia fluitans is morphologically similar to *C. monandra* and can be distinguished based primarily on stamen number per flower; two and one, respectively. Pollen features (polar and equatorial pollen shape; subtriangular and subcircular, oblate-spheroidal and prolate-spheroidal, respectively) also differ. Dried plants often become whitened. Flowering occurs from June-July. Occurs in Araguaia River (Pará – Tocantins boarder) and several rivers in Mato Grosso. Extremely abundant, often forming dense carpet-like growth on rocks outcrops. Although not yet documented, it is likely that this species can also grow on bark of rheophytic shrubs (e.g., Myrtaceae), as has been documented for *C. monandra* and *C. multipartita*. *Castelnavia fluitans* often occurs with *C. monandra* and *C. princeps* in the Araguaia River, and *C. multipartita* in several rivers in Mato Grosso.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)

Central-west (Mato Grosso)

HERBARIUM MATERIAL

C.P. Bove, 1498, R, Pará
Weddell H.A., s.n., P (P00167702), Tocantins, **Typus**
Weddell H.A., s.n., P (P00167689), Tocantins, **Typus**
Weddell H.A., s.n., P (P00167701), Tocantins, **Typus**
Weddell H.A., s.n., P (P00167690), Tocantins, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia fluitans* Tul. & Wedd.

Figure 2: *Castelnavia fluitans* Tul. & Wedd.

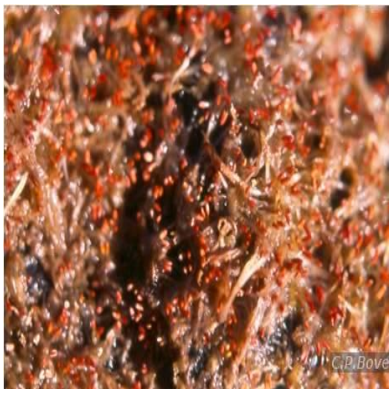

Figure 3: *Castelnavia fluitans* Tul. & Wedd.

Figure 4: *Castelnavia fluitans* Tul. & Wedd.

REFERENCE

Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalvez-Eesteves, V. 2012. Pollen morphology of the aquatic Brazilian endemic genus *Castelnavia* Tul. & Wedd. (Podostemaceae). Pl. Syst. Evol. 298 (8): 1455-1461.
Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Castelnavia monandra Tul. & Wedd.

Has as synonym
heterotypic *Oserya flabellifera* Tul. & Wedd.

DESCRIPTION

Root: root absent. **Stem: habit** prostrate/branched. **Flower: tepal(s)** absent; **stamen** 1. **Fruit: surface** papillate/ribbed.

ADDITIONAL DESCRIPTION

Herbs, often dense, moss-like growth habit. *Stems* prostrate, tightly attached to substratum throughout their length, slightly rounded to flattened, (0.3) 0.9 (4) mm wide, repeatedly irregularly divided, swollen branches arising laterally at irregular intervals or clustered. *Leaves* (3) 7 (14) per branch, arising from margins of lateral branches, simple (most common) or once divided, linear, (1.1) 10 (21.5) X (0.1) 0.35 (1.1) mm at midpoint, 1-veined or vein lacking, apex acute or obtuse. *Spathella* (0.8) 1.6 (2.3) X (0.5) 0.7 (1.1) mm, rupturing apically into (5) 7 (12) linear to triangular segments. *Flowers* numerous, (1) 1 (3) per branch, surrounded by fused leaf sheaths (branch thus appearing swollen), pedicel (0.1) 0.2 (0.6) mm long prior to anthesis. *Tepals* absent. *Stamen* 1, filaments (0.6) 0.8 (1.6) X (0.1) 0.2 (0.3) mm prior to anthesis, elongating to (2.1) 5 (8.2) mm and projecting from ruptured spathella during anthesis; anthers (0.5) 0.8 (1.2) X (0.3) 0.5 (0.5) mm. *Pollen* polar diameter (18.75) 20.2 (22.5) µm, equatorial diameter (15) 15.3 (16.25) µm, colpus long, (15) 16.3 (17) X (1) 2.3 (4) µm, sexine 0.5 µm, nexine 0.6 µm. *Ovary* apical region of dorsal (upper) carpel papillate; in preanthesis flowers (0.6) 0.8 (0.8) X (0.3) 0.5 (1.6) mm; in post anthesis flowers (0.6) 0.8 (1.2) X (0.4) 0.5 (0.8) mm. *Ovules* (12) 21 (33) per ovary. Stigmas (0.4) 0.6 (1.1) mm prior to anthesis, elongating to (0.4) 1.25 (5.2) mm during anthesis. Capsules (0.5) 0.7 (1) X (0.3) 0.5 (0.6) mm; upper (dorsal) valve (0.4) 0.6 (0.8) mm, (0.2) 0.5 (0.7) mm, 3 ribbed (non-suture), papillate in apical region; lower (ventral) valve (0.4) 0.7 (0.9) mm, (0.3) 0.6 (0.8) mm, (3) 5 (7)-ribbed (non-suture). Seeds (0.13) 0.19 (0.26) X (0.1) 0.12 (0.18) mm; (0) 13 (32) per capsule.

COMMENTS

Castelnavia monandra are morphologically similar to *C. fluitans* and can be distinguished based primarily on stamen number per flower; one and two, respectively. Pollen features (polar and equatorial pollen shape; subcircular and subtriangular, prolate-spheroidal and oblate-spheroidal, respectively) also differ. Dried plants often become whitened. Flowering occurs from June-July. Known only from the Araguaia River (Pará – Tocantins boarder). Extremely abundant, often forming dense carpet-like growth on rock outcrops and sometimes stems of rheophytic shrubs (e.g., Myrtaceae). *Castelnavia monandra*, *C. fluitans* and *C. princeps* occur in the same region of the Araguaia River.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)

HERBARIUM MATERIAL

C.P. Bove, 1503, R, Pará, **Typus**
C.T. Philbrick, 5849, NY, (NY01163485), Pará, **Typus**
Weddell, s.n., K, (K000584969), Tocantins, **Typus**
Weddell, s.n., P (P00723698)

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia monandra* Tul. & Wedd.

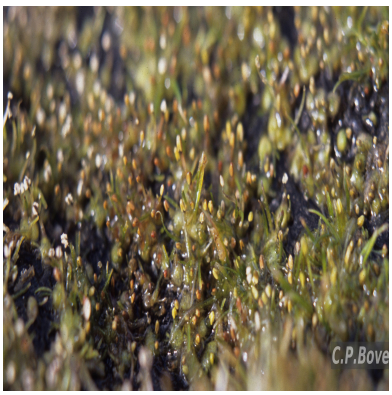

Figure 2: *Castelnavia monandra* Tul. & Wedd.

Figure 3: *Castelnavia monandra* Tul. & Wedd.

REFERENCE

Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalvez-Eesteves, V. 2012. Pollen morphology of the aquatic Brazilian endemic genus *Castelnavia* Tul. & Wedd. (Podostemaceae). Pl. Syst. Evol. 298 (8): 1455-1461.
Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.
Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson M.H.G.; Philbrick, C.T.; Rutishauser, R.; Xi, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.

Castelnavia multipartita Tul. & Wedd.

This treatment is composed of the following taxa: *Castelnavia multipartita*, .

Has as synonym
homotype *Castelnavia multipartita* Tul. & Wedd. f. *multipartita*
heterotypic *Castelnavia fimbriata* Tul. & Wedd.

DESCRIPTION

Root: root absent. **Stem: habit** prostrate/branched. **Flower: tepal(s)** present; **stamen** 2. **Fruit: surface** papillate/ribbed.

ADDITIONAL DESCRIPTION

Herbs, often dense growth habit. *Stems* prostrate, tightly attached to substratum throughout their length, cylindrical to flattened in cross-section, (0.7) 2 (3.5) mm wide, repeatedly dichotomously or subdichotomously branched. *Leaves* simple (uncommon), palmately, pinnately or irregularly lobed, (1.3) 8.6 (20) X (0.6) 1.5 (7) mm at widest, (0) 5 (7) lobed, lobes (0.2) 1.2 (4.4) mm X (0.2) 0.4 (1.2) mm, (0) 5 (7) veined. *Spathella* (2.6) 3 (3.3) X (1.2) 1.4 (1.7) mm, rupturing apically or subapically into (3) 6 (11) linear to triangular segments. *Flowers*, pedicel (0.2) 0.3 (0.4) mm long prior to anthesis. *Tepals* 2 (occasionally 3), hair-like (easily overlooked), one on either side of the fused stamen filaments, (0.3) 0.5 (0.6) m. *Stamen* filaments prior to anthesis (1.2) 1.3 (1.8) X (0.3) 0.4 (0.5) mm prior to anthesis, elongating to (0.9) 2.9 (3.8) mm during anthesis; anthers (0.8) 1 (1.1) X (0.4) 0.5 (0.5) mm. *Pollen* polar diameter (16.25) 17.4 (20) µm, equatorial diameter (17.5). *Ovary* in preanthesis flowers (1.2) 1.3 (1.4) X (0.8) 1 (1.2) mm; in post anthesis flowers (1) 1.5 (1.7) X (0.8) 1.1 (1.3) mm. *Ovules* (63) 93 (124). *Stigmas* (0.5) 0.7 (0.8) mm long prior to anthesis, elongating to (0.5) 1.1 (2) mm long during anthesis. *Capsules* (0.9) 1.2 (2) X (0.6) 0.8 (1.1) mm; upper (dorsal) valve (0.8) 1.1 (1.8) X (0.5) 0.7 (1.1) mm, (3) 5 (7) -ribbed (non-suture), papillate; lower (ventral) valve (0.8) 1.2 (1.8) X (0.2) 0.8 (1) mm, (5) 7 (9) ribbed (non-suture). *Seeds* (0.11) 0.21 (0.35) X (0.07) 0.15 (0.9) mm; (0) 23 (61) per capsule.

COMMENTS

Dried plants on exposed outcrops often become whitened. Royen (1954, Plate 4) shows the leaves of *C. multipartita* as simple. As there are no leaves on the type specimen, i.e., the only specimen of the species listed by him, this interpretation is questionable. Most specimens studied were past flowering. Flowering seems to occur from June-July. Common in northern Mato Grosso and southern Pará, occasional in northern Goiás. Extremely abundant in some rivers in Mato Grosso, often forming dense carpet-like growth on large rock outcrops and sometimes stems of rheophytic shrubs (e.g., Myrtaceae). *Castelnavia multipartita* can occur with *C. fluitans* and *C. princeps.*

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

Central-west (Goiás, Mato Grosso)

HERBARIUM MATERIAL

C.P. Bove, 1861, R, Pará
Weddell H.A., s.n., P (P00167691)
Weddell H.A., s.n. (P00167691)
Weddell H.A., s.n., P (P00167692), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia multipartita* Tul. & Wedd.

Figure 2: *Castelnavia multipartita* Tul. & Wedd.

Figure 3: *Castelnavia multipartita* Tul. & Wedd.

Figure 4: *Castelnavia multipartita* Tul. & Wedd.

Figure 5: *Castelnavia multipartita* Tul. & Wedd.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & EDSON, T. C. 2009. Monograph of Castelnavia (Podostemaceae). Syst. Bot. 34(4):715-729.

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Castelnavia noveloi C.T.Philbrick & C.P.Bove

DESCRIPTION

Root: root present/foliaceous. **Stem: habit** prostrate/pendulous/branched. **Flower: tepal(s)** present; **stamen** 2. **Fruit: surface** smooth/ribbed.

ADDITIONAL DESCRIPTION

Herbs, often dense growth. *Roots* prostate or foliate, prostate tightly attached to substratum throughout their length, cylindrical to flattened, (0.9) 2 (3) mm wide, repeatedly dichotomously or subdichotomously branched; foliate roots pinnate (1.7) 13 (22) X (0.4) 1.3 (6) cm; base round to elliptical in cross section, (0.8) 3.2 (8) cm long; rachis distinctly widened and flattened, (1.4) 4.7 (12) mm wide, (2) 5 (12) veined, pinnae (0.2) 1.5 (9) cm long, variously lobed, ultimate lobes (0.2) 2.1 (8) X (0.1) 0.3 (0.8) mm, linear, spatulate or triangular in outline, apex acute or obtuse. Stems attached or unattached to substratum, (2) 4 (6) times dichotomously or subdichotomously branched, unattached stem usually curled, (2.5) 7.5 (20) mm. *Leaves* arising from stem margins, simple, linear to spatulate, (0.3) 1.5 (13) X (0.2) 0.4 (0.8) mm at midpoint, spatulate upper regions (0.2) 0.6 (1.2) mm wide; *Spathella* (1.9) 2.6 (3) X (1) 1.4 (1.7) mm, rupturing apically or subapically into (5) 7 (11) linear to triangular segments. *Flowers* numerous [few post-anthesal flowers observed], lateral on stems or axillary to branches, pedicel (0.4) 0.5 (0.7) mm long. *Tepals* 2, hair-like, linear, (0.1) 0.3 (0.5) mm long, one on either side of the fused stamen filaments, apex acute. *Stamens* 2, filaments prior to anthesis (0.9) 1.4 (1.9) X (0.6) 0.8 (1.2) mm, elongating and projecting from the ruptured spathella during anthesis; anthers (0.6) 0.8 (1) X (0.3) 0.4 (0.6) mm. *Pollen*, polar diameter (16.2) 17.6 (18.8) µm, equatorial diameter (17.5) 19.1 (20), colpus membrane with conspicuous spicules, sexine 0.6 µm, nexine 0.8 µm. *Ovary*, in preanthesis flowers (1.3) 1.8 (2.6) X (0.9) 1.1 (1.6) mm. *Ovules* (93) 132 (147) per ovary. *Stigmas* (0.1) 0.4 (0.6) mm prior to anthesis, elongating to (0.7) 1 (1.6) mm during anthesis. *Capsules* (1.5) 1.8 (1.9) X (0.8) 1.3 (1.6) mm; upper (dorsal) valve (1.1) 1.6 (1.9) X (0.7) 0.9 (1.2) mm, 5-ribbed (non-suture), lacking papillae; lower (ventral) valve (1.3) 1.6 (1.8) X (1) 1.3 (1.6) mm, 7-ribbed (non-suture). *Seeds* (0.17) 0.22 (0.26) X (0.12) 0.15 (0.18) mm; (0) 77 (124) per capsule.

COMMENTS

Castelnavia noveloi is easely distinguishble by its foliate roots (see Jäger-Zürn et al. 2016 for details). Flowering occurs from May-June. It is known only from the Taquarussu River, east of Taquarussu, Tocantins, Brazil. The plant has been collected along approximately 0.5 km of the river and is interpreted as vulnerable (IUCN, 2001). Plants occur on large outcrops across which water flows. *Castelnavia noveloi* occurs with two other species of Podostemaceae: *Monostylis capillacea* Tul. and *Apinagia* sp.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences

North (Tocantins)

HERBARIUM MATERIAL

C.P. Bove, 1484, R, Tocantins, **Typus**
C.T. Philbrick, 5830, MO (MO2246622), Tocantins, **Typus**
C.T. Philbrick, 6000, NY, (NY01182036), Tocantins

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia noveloi* C.T.Philbrick & C.P.Bove

Figure 2: *Castelnavia noveloi* C.T.Philbrick & C.P.Bove

Figure 3: *Castelnavia noveloi* C.T.Philbrick & C.P.Bove

Figure 4: *Castelnavia noveloi* C.T.Philbrick & C.P.Bove

Figure 5: *Castelnavia noveloi* C.T.Philbrick & C.P.Bove

REFERENCE

Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalvez-Eesteves, V. 2012. Pollen morphology of the aquatic Brazilian endemic genus *Castelnavia* Tul. & Wedd. (Podostemaceae). Pl. Syst. Evol. 298 (8): 1455-1461.
Jäger-Zürn, I.; Philbrick, C.T.; Bove, C.P. 2016. The architecture of *Castelnavia noveloi* (Podostemaceae) – a re-investigation. Brittonia 66 (2): 202-211.
Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Castelnavia pendulosa (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Castelnavia multipartita* f. *pendulosa* C.T.Philbrick & C.P.Bove

DESCRIPTION

Root: root absent. **Stem: habit** prostrate/pendulous. **Flower: tepal(s)** present; **stamen** 2. **Fruit: surface** papillate/ribbed.

ADDITIONAL DESCRIPTION

Herbs,often with dense growth. *Stems* repeatedly dichotomously or subdichotomously branched, pendant, attached by expanded (0.2) 0.6 (1.2) cm wide holdfast, central axis (3.6) 17 (41) cm long, (0.3) 1.3 (5) mm wide midway between holdfast and first branch, gradually tapering toward apex, circular to somewhat flattened in cross-section, becoming flattened and twisted upon drying, side branches (0.3) 2 (16) cm long. *Leaves* dichotomously-subdichotomously divided, (1.2) 2.4 (7) cm long, ultimate divisions parallel sided or awl shaped. *Spathella* (1.2) 1.4 (1.6) X (0.6) 0.7 (1.1) mm, rupturing apically or subapically into (3) 5 (9) linear to triangular segments. *Flowers* (2) 7 (44) per side branch. *Tepals* 3, one on either side of the fused stamen filaments, a third between the two stamen filaments. Stamens 2, filaments elongating to (0.8) 2.1 (3.1) mm during anthesis, anthers (0.6) 0.8 (0.9) X (0.3) 0.4 mm. Pollen polar diameter (17.5) 19.0 (20.0) µm, equatorial diameter (15.0) 15.3 (17.5) µm. Ovary papillate in apical region of dorsal carpel (sometimes obscure), 0.5 X (0.4) 0.5 (0.6) mm. Ovules numerous. Capsules (1.7) 1.9 (2.1) X (0.8) 0.9 (2.1) mm; upper (dorsal) valve (1.6) 1.9 (2) X (0.8) 0.9 (1) mm, (3) 5 (7) ribbed (non-suture), papillate or papillae indistinct; lower (ventral) valve (1.6) 1.9 (2) X (0.9) 1 (1.1) mm, (7) 7 (9) ribbed (non-suture). *Seeds* (0.22) 0.28 (0.41) X (0.14) 0.18 (0.23) mm; (0) 29 (73) per capsule.

COMMENTS

Castelnavia pendulosa occurs on vertical or near vertical surfaces of waterfalls or other areas of especially strong current. In the Teles Pires and Aripuanã Rivers (MT) this form occurs in close proximity with *C. multipartita*.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)
Central-west (Mato Grosso)

HERBARIUM MATERIAL

C.P. Bove, 1871, R, Mato Grosso
Rosario, CS, s.n., MBM (MBM405636), MBM (MBM405525), MBM (MBM392323), MBM (MBM392322), Pará

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia pendulosa* (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

Figure 2: *Castelnavia pendulosa* (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

Figure 3: *Castelnavia pendulosa* (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

Figure 4: *Castelnavia pendulosa* (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

Figure 5: *Castelnavia pendulosa* (C.T.Philbrick & C.P.Bove) C.T.Philbrick & C.P.Bove

REFERENCE

Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.

Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Castelnavia princeps Tul. & Wedd.

Has as synonym
heterotypic *Castelnavia cuneifolia* P.Royen

DESCRIPTION

Root: root absent. **Stem: habit** prostrate/branched. **Flower: tepal(s)** present/absent; **stamen** 2. **Fruit: surface** smooth/ribbed.

ADDITIONAL DESCRIPTION

Herbs, often with dense growth. *Stems* prostrate, tightly attached to substratum throughout their length, cylindrical to flattened, (0.7) 2 (45.0) mm wide; repeatedly dichotomously or subdichotomously branched. *Leaves* arising from prostrate stem margins, simple, variously lobed or pinnate; simple leaves linear to spatulate, (0.2) 2.1 (8.5) X (3) 11 (22) mm at midpoint; pinnate leaves (0.9) 2.5 (6) X (3) 6.5 (14) mm; petiolate or petiole lacking, petiole flat in cross section, (0.2) 0.65 (0.8) cm long; rachis distinctly widened and flattened, (0.1) 2.5 (6.0) mm wide, (1) 3 (11) veined (at base), pinnae (2) 7.5 (50) mm long, variously lobed, ultimate divisions (0.4) 1.1 (2.8) X 0.03) 0.05 (0.3) mm, linear, spatulate or triangular in outline, apex acute or obtuse. *Spathella* (2.4) 3.9 (4.8) X (1.2) 1.5 (2.2) mm, rupturing apically or subapically into (7) 11 (14) linear to triangular segments. *Flowers* numerous, lateral on stems, each in cavity in stem, pedicel (0.2) 0.3 (1.4) mm long prior to anthesis. *Tepals* (0) 2 (3), one on either side of the fused stamen filaments, occasionally an additional one between stamen filaments (lacking in some populations), (1.3) 2.5 (3.6) mm long, apex acute. *Stamens* 2, filaments prior to anthesis (0.8) 1.7 (2.1) X (0.3) 0.5 (0.7) mm wide, elongating to (1.8) 3.2 (6.0) and projecting from the ruptured spathella during anthesis, anthers (1.2) 1.4 (1.6) X (0.8) 0.8 (0.8) mm. *Pollen* polar diameter (17.5 µm) 18 (20) µm, equatorial diameter (15) 16.6 (18.75) µm, colpus short, (13) 14.1 (15) X (5) 5.5 (6) µm, sexine 1µm, nexine 0.8 µm. *Ovary*, apical region of dorsal (upper) carpel lacking papillae; in preanthesis flowers (0.9) 1.9 (2.4) X (0.7) 1.3 (2.0) mm; in post anthesis flowers (1.3) 1.9 (2.2) X (0.8) 1.55 (1.9) mm. *Ovules* (46) 77 (261) per ovary. *Stigmas* (0.3) 0.8 (1.6) mm prior to anthesis, elongating to (1) 3.5 (4.0) mm during anthesis. *Capsules* (1.3) 1.9 (2.7) X (1) 1.5 (2) mm; upper (dorsal) valve (1.3) 2.1 (2.7) X (0.8) 1.2 (1.7) mm, 3-ribbed (non-suture), lacking papillae; lower (ventral) valve (1.3) 1.9 (2.7) X (0.9) 1.5 (2) mm, 3-ribbed (non-suture). *Seeds* (0.17) 0.28 (0.5) X (0.1) 0.17 (0.3) mm; (0) 40 (240) per capsule.

COMMENTS

Dried plants often become whitened. The flabelliform growth habit is pronounced when plants are dry. Some populations lack tepals. Circumstantial evidence indicates that *Castelnavia princeps* inhibits the growth of other species of *Castelnavia* growing within several cm (allelopathy). Field observations reveal a zone of inhibition around plants of this species in some populations. Flowering occurs from January through August. *Castelnavia princeps* is the most widespread species in the genus, occurring in Goiás, Mato Grosso, Minas Gerais and Pará. Plants can be extremely abundant, forming dense carpet-like growth. *Castelnavia princeps* has been documented growing in close proximity to other species in the genus (*C. fluitans*, *C. monandra*, *C. multipartita* f. *multipartita*) as well as species in other genera of Podostemaceae (*Monostylis*, *Apinagia*, *Lonchostephus*, *Tristicha*).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)
Central-west (Goiás, Mato Grosso)
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.P. Bove, 725, R, Minas Gerais
Weddell H.A., s.n. (P00167700), Tocantins, **Typus**
Weddell H.A., s.n., P (P00167700), **Typus**
Weddell H.A., s.n. (P00222695), Tocantins, **Typus**
Weddell H.A., s.n., P (P00222695), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Castelnavia princeps* Tul. & Wedd.

Figure 2: *Castelnavia princeps* Tul. & Wedd.

Figure 3: *Castelnavia princeps* Tul. & Wedd.

Figure 4: *Castelnavia princeps* Tul. & Wedd.

Figure 5: *Castelnavia princeps* Tul. & Wedd.

Figure 6: *Castelnavia princeps* Tul. & Wedd.

REFERENCE

Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalvez-Eesteves, V. 2012. Pollen morphology of the aquatic Brazilian endemic genus *Castelnavia* Tul. & Wedd. (Podostemaceae). Pl. Syst. Evol. 298 (8): 1455-1461.
Philbrick, C.T.; Bove, C.P. & Edson, T.C. 2009. Monograph of *Castelnavia* (Podostemaceae). Systematic Botany, 34(4):715-729.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Ceratolacis (Tul.) Wedd.

This treatment is composed of the following taxa: *Ceratolacis*, *Ceratolacis erythrolichen*, *Ceratolacis pedunculatum*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Ceratolacis *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB32388.

Has as synonym
homotype *Dicraea* Tul. & Wedd.

DESCRIPTION

Roots red or green, elongate and cylindrical when young, becoming broad and crust-like, irregular in outline when older, branched, prostrate, flattened to elliptical in cross section, tightly attached to rocks via adhesive hairs, growing intertwined. Stems monomorphic, arising opposite or subopposite along the flanks of roots, obscured by leaf bases, erect, unbranched. Leaves petiolate, distichous, stipulate, double-sheathed, upright, compound, divided, rarely subdichotomous or pinnate, midvein faint or lacking, apices acute or obtuse; petiole long, elliptical in cross section; stipules asymmetric, composed of an extension of the amplexicaul leaf base, larger on leaves subtending flowers, apex entire. Inflorescence with flowers solitary or few. Flowers 2 (1-6) per stem, hermaphroditic, zygomorphic, borne singly in a leaf axil, pedicellate or not; tepals 3, scale-like, linear, acute, two (one on either side) at the base of the stalk from which the stamens arise (andropodium); a third tepal occurring at the apex of the andropodium; stamens 2, deciduous; andropodium present, anthers dehiscing introrsely and longitudinally, inner and outer thecae of equal length; pollen in dyads, tricolpate; ovary with 2 equal carpels, 2-locular, oval in shape, oriented parallel or obliquely on the pedicel, with 6 longitudinal dark lines on the ovary wall; stigmas 2, free, each stigma triangular in outline, widest at base, upright prior to spathella rupture, during anthesis upright or divergent, base of stigmas becoming hardened and persisting in fruit. Fruit a 2-locular capsule, capsule apex emarginate due to persistent stigma bases, with two equal valves, persistent, valves 3-ribbed, suture margins thickened and rib-like; peduncle not distinguishable from pedicel in capsule (due to shedding of spathella and parenchymatous tissues of peduncle and pedicel);

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Caatinga, Central Brazilian Savanna

Vegetation Types
Caatinga (stricto sensu), Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)
Northeast (Pernambuco)
Southeast (Minas Gerais)

IDENTIFICATION KEY

1. Peduncle present, axis of the ovary oblique from that of the pedicel by 30-45^{o}.....*C. erythrolichen*
2, Peduncle absent, axis of the ovary parallel to that of the pedicel .....*C. pedunculatum*

REFERENCE

Philbrick, C.T.; Novelo, A.R. & Irgang, B. 2004. A new species of *Ceratolacis* (Podostemaceae) from Minas Gerais, Brazil. Novon 14(1): 108–113.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Ceratolacis erythrolichen (Tul. & Wedd.) Wedd.

Has as synonym
basionym *Dicraea erythrolichen* Tul. &Wedd.

DESCRIPTION

Root: colour red. **Stem: type** monomorphic. **Leaf: stipule** present. **Inflorescence: peduncle** absent. **Flower: ovary position** straight.

ADDITIONAL DESCRIPTION

Roots fleshy, 5-10 X 1-2 mm. Leaves distichous, 2-3 mm, a few times forked or entire. Flowers solitary or few; pedicel up to 3 mm;
tepals filiform; stamens 2; anther dorsifixed, elliptic, top retuse; ovary fusiform, with 6 prominent ribs. (Description extracted from Tulasne (1852) and Royen (1954), as only the types are known and comprised of only vegetative structures)

COMMENTS

Description extracted from Tulasne (1852) and Royen (1954), as only the types are known and comprised of only vegetative structures.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)

HERBARIUM MATERIAL

Weddell, H.A., s.n., P, K, (K000584942), Tocantins, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Ceratolacis pedunculatum C.T.Philbrick, Novelo & Irgang

DESCRIPTION

Root: colour green. **Stem: type** monomorphic. **Leaf: stipule** present. **Inflorescence: peduncle** present. **Flower: ovary position** oblique.

ADDITIONAL DESCRIPTION

Roots green, elongate and cylindrical when young, becoming broad and crust-like, irregular in outline when older, branched, prostrate, flattened to elliptical in cross section, median = 0.9 (0.3-5.2) mm [N = 50] wide, tightly attached to rocks via adhesive hairs, growing intertwined. Stems monomorphic, arising opposite or subopposite along the flanks of roots, 4.9 (0.9- 12) mm [N = 50] apart, obscured by leaf bases, erect, less than 0.1 mm high, unbranched. Leaves petiolate, distichous, stipulate, double-sheathed, upright, compound, 4 (1-6) [N = 50] times divided, rarely subdichotomous or pinnate, 17 (2.9-35.2) mm [N = 100] long, ultimate leaf segments linear to spatulate, 3.1 (0.2-9.5) mm [N = 100] long x 0.3 (0.1-1) mm [N = 100] wide, midvein faint or lacking, apices acute or obtuse; petiole 3.9 (0.4- 14) mm [N = 100] long, elliptical in cross section; stipules asymmetric, composed of an extension of the amplexicaul leaf base, 0.5 (0.1-5.6) mm [N = 50] long, larger on leaves subtending flowers, apex entire. Inflorescence with flowers pedunculate and solitary. Flowers 2 (1-6) [N = 50] per stem, hermaphroditic, zygomorphic, borne singly in a leaf axil, covered by a spathella, pedicellate; peduncle (below attachment point of spathella) 0.8 (0.1-3.1) mm [N = 100] long prior to spathella rupture, elongating to 2.6 (0.3-8.5) mm [N = 100] long after spathella rupture; spathella clavate, 2.4 (14.5) mm [N = 100] long x 1.1 (0.6-1.7) mm [N = 100] wide, rupturing apically, falling away completely in fruit; pedicels 0.8 (0.1-3.1) mm [N = 100] long prior to spathella rupture, elongating to 5.1 (1.8- 8.5) mm [N = 50] long after spathella rupture; tepals 3, scale-like, linear, acute, two (one on either side) at the base of the stalk from which the stamens arise (andropodium), 0.6 (0.2-1.8) mm [N = 50] long; a third tepal occurring at the apex of the andropodium, andropodial tepal 0.4 (0.3-0.5) mm [N = 50] long; stamens 2, deciduous; andropodium 1 (0.6-2) mm [N = 50] long prior to spathella rupture, during anthesis elongating to 4.3 (2-7) mm [N = 50] long; filaments 0.4 (0.2-1.8) mm [N = 50] long prior to spathella rupture, during anthesis elongating to 0.9 (0.4-1.8) mm [N = 50] long; anthers quadrangular, with parallel sides, 1.1 (0.7- 1.4) mm [N = 50] long, 1 (0.6-1.2) mm [N = 50] wide, dehiscing introrsely and longitudinally, inner and outer thecae of equal length; pollen in dyads, tricolpate, 35 (31 10) µm [N = 100] long, 24 (19- 28) µm [N = 100] wide; ovary with 2 equal carpels, 2-locular, oval in shape, oriented obliquely on the pedicel, 1.5 (0.7-2.6) mm [N = 50] long, 1 (0.6- 1.7) mm [N = 50] wide, with 6 longitudinal dark lines on the ovary wall; ovules 20 (12-32) [N = 25]; stigmas 2, free, each stigma triangular in outline, widest at base, upright prior to spathella rupture, 0.5 (0.3-1) mm [N = 50] long, during anthesis upright or divergent, elongating to 0.9 (0.4-1.1) mm [N = 50] long, base of stigmas becoming hardened and persisting in fruit. Fruit a 2-locular capsule, 1.8 (1.4-2.1) mm [N = 50] long, 1.3 (0.9-1.5) mm [N = 50] wide, capsule apex emarginate due to persistent stigma bases, with two equal valves, persistent, valves 3-ribbed, suture margins thickened and rib-like; peduncle not distinguishable from pedicel in capsule (due to shedding of spathella and parenchymatous tissues of peduncle and pedicel); length of peduncle and pedicel combined 6.8 (1.5-17) mm [N = 100] long. Mature seeds unknown.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Caatinga, Central Brazilian Savanna

Vegetation Types
Caatinga (stricto sensu), Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Northeast (Pernambuco)
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.T. Philbrick, 5679, NY, (NY00803741), MO (MO357077), ICN, (ICN00000554), BHCB, Minas Gerais, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Ceratolacis pedunculatum* C.T.Philbrick, Novelo & Irgang

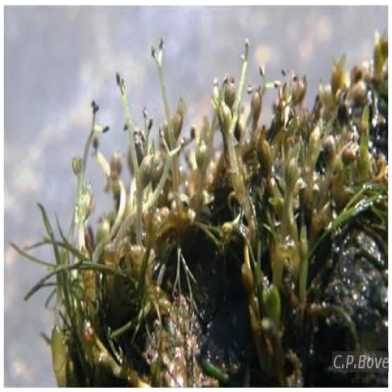

Figure 2: *Ceratolacis pedunculatum* C.T.Philbrick, Novelo & Irgang

Figure 3: *Ceratolacis pedunculatum* C.T.Philbrick, Novelo & Irgang

Figure 4: *Ceratolacis pedunculatum* C.T.Philbrick, Novelo & Irgang

Figure 5: *Ceratolacis pedunculatum* C.T.Philbrick, Novelo & Irgang

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. A new species of Ceratolacis (Podostemaceae) from the state of Minas Gerais, Brazil. Novon 14: 108-113.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Cipoia C.T.Philbrick, Novelo & Irgang

This treatment is composed of the following taxa: *Cipoia*, *Cipoia inserta*, *Cipoia ramosa*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Cipoia *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB102899.

DESCRIPTION

Small aquatic perennial herbs, attached to rocks in river-rapids and waterfalls. Roots prostrate, elongate, dorsiventrally flattened to elliptical in cross-section, sometimes intertwined, green and photosynthetic, branched, with asymmetric root cap, attached to rocks via holdfasts (haptera) and adhesive hairs. Stems arising opposite or subopposite along the flanks of roots, unbranched, erect, elliptical to terete in cross-section at base, monomorphic. Leaves petiolate, distichous, monomorphic, upright, monothecous or dithecous, simple (rare, basal on young stems only) to compound, dichotomously divided, stipulate; ultimate leaf segments linear to spathulate, lacking a vein; petiole elliptical in cross-section; stipule composed of an extension of the amplexicaul, boat-shaped leaf base; apex entire to emarginate, hardened and persistent on older stems. Flowers 1 to several per stem, axillary, achlamydeous, hermaphroditic, zygomorphic, short pedicellate or sessile, covered by a sac-like spathella; spathella clavate, punticulate, rupturing apically into several small and irregularly shaped segments; tepals 2, scale-like, linear, one on either side of the stamen filament, apex acute; stamen 1, deciduous, filaments elongating during anthesis and projecting from the ruptured spathella; anthers basifixed, triangular, tapering outward toward the base; thecae acute, joined at the top, of equal height, dehiscing introrsely and longitudinally; pollen in dyads, tricolpate; ovary 2-carpellate, 2-locular, elliptical, with 6 longitudinal dark lines, remaining inside the spathella during anthesis, borne on a gynophore which elongates during anthesis and usually becomes longer than pedicel; ovules numerous, placentation axile; stigmas 2, free, linear, upright prior to rupture of the spathella, during anthesis elongating, upright or divergent, projecting from the ruptured spathella, longer than ovary; pedicel very short or lacking; fruit a capsule, 2-locular, elliptical, maturing within the ruptured spathella, with two equal valves (isolobous); valves persistent, each 3-ribbed, suture margins appearing thickened and rib-like; seeds flattened, elliptical, ovate or obovate.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)
Southeast (Minas Gerais)

IDENTIFICATION KEY

1. Stems branched, sheathing leaf base with two tooth-like marginal extensions, one on either side of the petiole, at anthesis,ovary longer than stigmas ....*Cipoia ramosa*
2. Stems unbranched, sheathing leaf base entire, boat-shaped, at anthesis ovary shorter than stigmas .....*Cipoia inserta*

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Syst. Bot. 29: 109-117.

Bove, C. P.; Philbrick, C.T. & Novelo, A. 2006 A new species of *Cipoia* (Podostemaceae) from Minas Gerais, Brazil. Syst. Bot. 31: 822-825.

Cipoia inserta C.T.Philbrick, Novelo & Irgang

DESCRIPTION

Stem: shape non branched. **Leaf: stipule shape** entire. **Flower: anther position** parallel side; **pollen-grain size** medium; **ovary size** shorter than stigma.

ADDITIONAL DESCRIPTION

Roots (0.2-) 0.4 (-0.7) mm wide, flattened to elliptical in cross-section. Stems arising (0.7-) 3 (-4.1) mm apart along root, (0.1-) 2 (-3.5) cm high, (0.2-) 0.4 (-0.8) mm wide at base. Leaves compound, (2) 3 times dichotomously divided, (3.8-) 10 (-20.4) mm long; ultimate leaf segments (0.8-) 3.5 (-0.6) mm long, (0.1-) 0.2 (-0.4) mm wide; apex acute or obtuse; petiole (1.4-) 4.1 (-10) mm long; stipules (0.05-) 0.2 (-0.4) mm long. Flowers 1 (3) per stem; spathella (0.9-) 1.7 (-2.7) mm long, (0.5-) 0.6 (-0.8) mm wide; tepals (0.3-) 0.4 (-1) mm long; stamen filament (0.6-) 1.2 (-2) mm long prior to anthesis, elongating to (1-) 2.8 (-5.1) mm during anthesis; anthers (0.6-) 1 (-1.2) mm long, (0.4-) 0.6 (-0.7) mm wide; pollen (28-) 31 (-38) mm long, (16-) 19 (-23) mm wide; ovary (0.5-) 1.2 (-1.7) mm long, (0.4-) 0.6 (-0.9) mm wide; ovules (18) 21 (26); gynophore (0.1-) 0.5 (-0.6) mm long; stigmas prior to spathella rupture (0.4-) 0.7 (-1) mm long, elongating to (1-) 1.7 (-2.3) mm during anthesis; pedicels (0.1-) 0.3 (-0.4) mm long or lacking; capsules (1.1-) 1.3 (-1.5) mm long, (0.5-) 0.6 (-0.8) mm wide.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.T. Philbrick, 5659, ICN, (ICN00000555), MO (MO357076), NY, (NY00803743), Minas Gerais, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Cipoia inserta* C.T.Philbrick, Novelo & Irgang

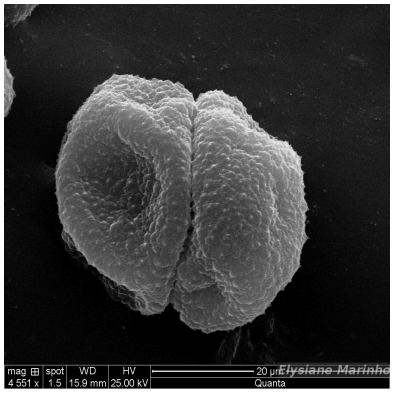

Figure 2: *Cipoia inserta* C.T.Philbrick, Novelo & Irgang

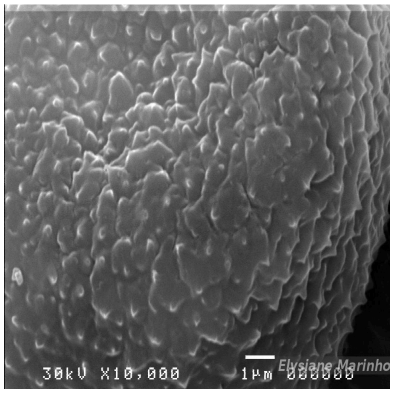

Figure 3: *Cipoia inserta* C.T.Philbrick, Novelo & Irgang

Figure 4: *Cipoia inserta* C.T.Philbrick, Novelo & Irgang

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Syst. Bot. 29: 109-117.

Cipoia ramosa C.P.Bove, C.T.Philbrick & Novelo

DESCRIPTION

Stem: shape branched. **Leaf: stipule shape** dentate. **Flower: anther position** prominent angle; **pollen-grain size** smaller; **ovary size** longer than stigma.

ADDITIONAL DESCRIPTION

Small aquatic herbs, perennial (?), attached to rocks in river-rapids and waterfalls. Roots prostrate, elongate, flattened to cylindrical in crosssection, branched, occasionally arising from the stems, with asymmetric root cap, (0.2-) 0.4 (-0.9) rnm wide. stems erect, arising (1.2-) 3.0 (4.8) mm apart along root, opposite or subopposite (occasionally alternate) along the flanks of roots, (0) 3 (9) times branched, elliptical to terete in cross-section at base, monomorphic, (0.5) 2.0 (-5.5) cm high, (0.5-) 0.9 (-1.3) mm wide at base, internodes (0.1-) 2.3 (-5.3) mm. Leaves petiolate, distichous, monomorphic, upright, monothecous or dithecous, simple or 1-time dichotomously divided (occasionally trichotomously divided), (3.G) 7.2 (-16.0) mm long; ultimate leaf segments linear to spathulate, apex acute or obtuse, faint central vein visible from the base of leaf sheath to the base of petiole 0.10 (-0.12) mm wide; petiole elliptical in cross section, (0.4-) 2.4 (-6.2) mm long, base persistent,hardened and darkened on older stems; leaf base expanded, sheathing (amplexicaul), (0.4) 0.8 (-1.2) mm long; stipules composed of two tooth-like marginal extensions of the sheathing leaf base, symmetrical, one on each side of leaf base, acute, often persisting on older stems, (0.19-) 0.40 (4.70) mm long. Flowers 1-6 per stem (1 per branch), terminal, hermaphroditic, zygomorphic, sessile prior to anthesis, pedicel (0.5-) 0.7 (-1.2) mm long during anthesis, covered by a sac-like spathella; spathella clavate, rupturing apically into several small, irregularly toothed segments, (2.0-) 2.5 (-3.5) mm long, (0.5-) 0.7 (-1.0) mm wide; tepals 2, scale-like, linear, one on either side of the stamen filament, apex acute, 0.24.4 mm long; stamen 1, deciduous, filament flattened, wider at the top than bottom, with a faint central vein, elongating and projecting from the ruptured spathella during anthesis, (0.7-) 1.4 (-1.8) mm long prior to anthesis, elongating to (2.1-) 2.6 (-3.0) mm long during anthesis, 0.1-0.2 mm wide; thick (well developed) anther connective, basifixed, triangular, tapering toward the base; thecae acute, joined at the top, of equal or slightly unequal height, dehiscing introrsely and longitudinally, anther thecae prominently divergent after anthesis, anthers (0.3-) 0.8 (-0.9) mm long, (0.3-) 0.4 (-0.5) mm wide; pollen in dyads, acalymate, each pollen grain small, prolate, tricolpate, longicolpate, granulate, polar axis (20.0-) 21.6 (-22.5) um, equatorial axis (14.0-) 15.0 (-18.0) um; ovary 2-carpellate, 2-locular, elliptical, with 6 longitudinal dark lines, remaining inside the spathella during anthesis, (LO-) 1.4 (-1.9) mm long, (0.5-) 0.6 (4.8) mm wide, borne on a gynophore that elongates, gynophore (0.1-) 0.4 (-0.5) mm long during anthesis, (0.2-) 0.5 (-0.7) mm long in fruit; ovules (lo-) 24 (40), placentation axile, placenta thick, in some places extending to the ovary wall and lacking ovules in that region; stigmas 2, free, linear or spatulate, papillose, upright prior to rupture of the spathella, during anthesis elongating and diverging, shorter than ovary, (0.3-) 0.6 (-0.7) mm long prior to spathella rupture, elongating to (0.7-) 0.8 (-1.2) mm during anthesis; pedicel (0.1-) 0.4 (-0.6) mm long prior to spathella rupture, (0.G) 0.8 (-1.3) mm during anthesis; capsule with two equal valves (isolobous), (1.0-) 1.3 (-1.8) mm long, (0.5-) 0.7 (-0.8) mm wide, valves persistent, each 3-ribbed, suture margins appearing thickened and rib-like, seeds (12-) 25 (-35) per capsule, flattened, elliptical, ovate or obovate, (0.07-) 0.2 (-0.32) mm long, (0.02-) 0.11 (-0.16) mm wide.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.P. Bove, 1575, R, Minas Gerais, **Typus**
Pedradelli, G.; Meyer, S.T. & Santos, J.C., s.n., R, 203668, (R000203668), Minas Gerais, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

Figure 2: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

Figure 3: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

Figure 4: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

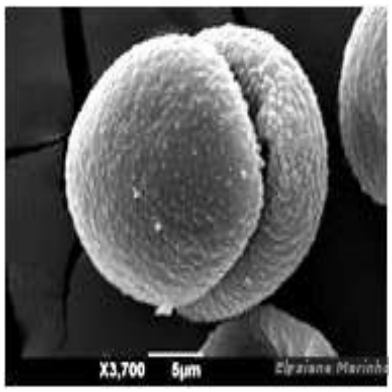

Figure 5: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

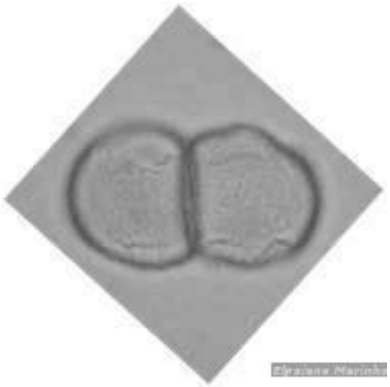

Figure 6: *Cipoia ramosa* C.P.Bove, C.T.Philbrick & Novelo

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Syst. Bot. 29: 109-117.

Bove, C. P.; Philbrick, C.T. & Novelo, A. 2006 A new species of *Cipoia* (Podostemaceae) from Minas Gerais, Brazil. Syst. Bot. 31: 822-825.

Diamantina Novelo, C.T.Philbrick & Irgang

This treatment is composed of the following taxa: *Diamantina*, *Diamantina lombardii*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Diamantina *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB121906.

DESCRIPTION

Small aquatic perennial herbs, attached to rocks in river-rapids and waterfalls. Roots prostrate, elongate, dorsiventrally flattened, sometimes intertwined, green and photosynthetic, branched, with asymmetric root cap, attached to solid substrata via holdfasts (haptera) and adhesive hairs. Stems arising opposite or subopposite along the flanks of roots, at base becoming broadened and disk-like when older, branched, erect, terete in cross-section at base, sometimes with adventitious roots, monomorphic, dark brown or black. Leaves distichous, upright, monothecous, digitate, with 3 to 8 segments and expanded sheathing base, lacking a central vein, estipulate; segments of the leaf variable in size and form; young leaves with a long central segment, linear, flexible, light green, cylindrical and sometimes flattened on top, caducous, the lateral segments 2–3, shorter than the central segment, flexible to hardened, persistent, filiform, light green, apex acute; older leaves with up to 8 segments, more or less the same size or the central one longer, spine-like, hardened and usually persistent on older stems, black, most internodes between the digitate leaves obscure, leading to crowded leaf arrangement, basal internodes longer and with longitudinal furrows. Flowers 1 to several per stem, apical, achlamydeous, hermaphroditic, zygomorphic, pedicellate, covered by a sac-like spathella (sac-like covering over flower); spathella clavate, smooth, apex rounded, rupturing apically into several irregularly shaped segments, without a cap-like apical segment; tepals usually (2) 3 (4), scale-like, linear or incurved, apex blunt, often darkened distally, alternating with the stamens or sometimes arising from the pedicel; stamens (1) 2 (3), free, on one side of pistil, deciduous; filaments short, elongating during anthesis but never reaching the length of the ovary; anthers basifixed, quadrangular; thecae parallel, apices acute, distinct, of equal heights, dehiscing introrsely and longitudinally; pollen in tetrads, tricolpate; ovary 2-carpellate, 2-locular, globose, with 6 longitudinal dark lines, borne on a gynophore that elongates during anthesis; ovules numerous, placentation axile; stigmas usually 2, rarely 3, free, upright prior to rupture of the spathella, conical when young, divergent and elongating during anthesis; pedicel elongating during anthesis; fruit a capsule, 2-locular, spherical to subellipsoid, with two equal valves (isolobous); valves persistent, each 3 to 7-ribbed, suture margins appearing thickened and rib-like; seeds unknown.

COMMENTS

The generic name derives from the city of Diamantina, which is in the region where the species occurs. It is endemic to the state of Minas Gerais.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Minas Gerais)

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Syst. Bot. 29: 109-117.

Diamantina lombardii Novelo, C.T.Philbrick & Irgang

DESCRIPTION

Roots (0.2-) 0.4 (-0.8) mm wide, flattened. Stems arising (1.3-) 2.1 (-2.5) mm apart along root, (3.5-) 19.5 (-40) mm high, (0.6-) 0.8 (-1.3) mm wide, hold-fasts disk-like (1-) 2.3 (-3.6) mm wide. Young leaf upright with central segment several times longer than lateral segments, (0.8-) 1 (-1.3) cm long, (0.1-) 0.2 (-0.3) mm wide, apex acute; lateral segments (0.1-) 0.5 (-0.9) mm long; older leaf upright with central segment equal or slightly longer than lateral ones, (0.5-) 0.8 (-1.5) mm long, apex acute or blunt; lateral segments (0.5-) 0.8 (-1.5) mm long, apex acute. Flowers (1) 3 (7) per stem, apical; spathella (1.5-) 2.2 (-2.9) mm long, (0.8-) 1.1 (-1.5) mm wide; tepals (2) 3 (5), straight or incurved, (0.2-) 0.3 (-0.4) mm long, (0.05-) 0.1 (-0.15) mm wide at base; stamen filaments (0.1-) 0.3 (-4) mm long, red; anthers prior to anthesis (0.2-) 0.3 (-0.4) mm long, (0.2-) 0.3 (-0.4) mm wide, to (1.1-) 1.3 (-1.5) mm long during anthesis, (0.7-) 0.8 (-1) mm wide, red; pollen in tetrads, (26-) 27 (-29) mm in diameter; ovary (0.7-) 1 (-1.1) mm long, (0.8-) 0.9 (-1.2) mm wide, pink; ovules (57) 58 (59); stigmas (0.5-) 0.6 (-0.7) mm long, (0.2-) 0.3 (-0.4) mm wide prior to anthesis, to (0.6-) 0.7 (-1) mm long during anthesis, (0.2-) 0.3 (-0.5) mm wide at the base, red; gynophore (0.2-) 0.3 (-0.4) mm long prior to anthesis, to (0.5-) 1.8 (-2.5) mm long during anthesis; pedicel (1.3-) 2.2 (-3) mm long prior to anthesis, to (2.5-) 4.6 (-7) mm long during anthesis, (0.10-) 0.11 (- 0.15) mm wide; capsules (0.8-) 1.1 (-1.3) mm long, (0.6-) 0.9 (-1.1) mm wide.

COMMENTS

The specific epithet honors Mr. Julio A. Lombardi, Universidade Federal de Minas Gerais, Brazil, who first collected the species

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.P. Bove, 2253, R, Minas Gerais
C.T. Philbrick, 5647, BHCB, 56413, (BHCB000395), MO (MO357078), ICN, (ICN00000556), Minas Gerais, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

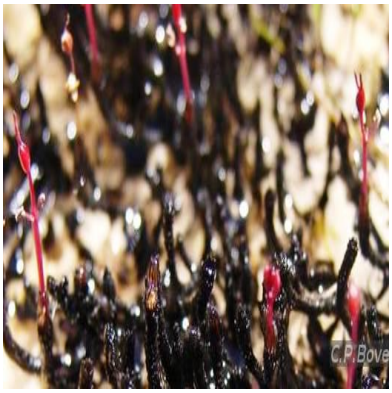

Figure 2: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

Figure 3: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

Figure 4: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

Figure 5: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

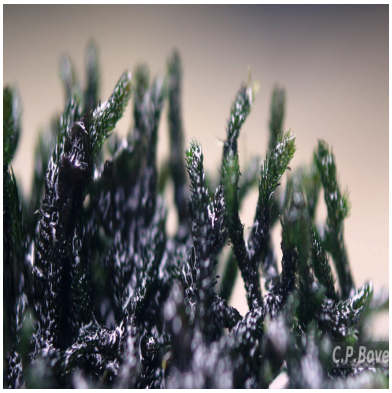

Figure 6: *Diamantina lombardii* Novelo, C.T.Philbrick & Irgang

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Philbrick, C.T.; Novelo, A. & Irgang, B.E. 2004. Two new genera of Podostemaceae from the state of Minas Gerais, Brazil. Syst. Bot. 29: 109-117.

Lophogyne Tul.

This treatment is composed of the following taxa: *Lophogyne*, *Lophogyne aripuanensis*, *Lophogyne ceratophylla*, *Lophogyne fimbriata*, *Lophogyne fimbrifolia*, *Lophogyne goeldiana*, *Lophogyne lacunosa*, *Lophogyne paraensis*, *Lophogyne royenella*, *Lophogyne tridactylitifolia*, *Lophogyne varians*, *Lophogyne wilsonii*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Lophogyne *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13672.

Has as synonym
heterotypic *Jenmaniella* Engl.
heterotypic *Monostylis* Tul.

DESCRIPTION

Annual or perennial herbs, firmly attached to rocks and other solid substrates in seasonally strong currents of rivers and streams. Roots linear, prostrate and flattened, green, branched or not. Stems prostrate, tightly attached to substrate throughout its length or arising along flanks of roots, opposite or sub-opposite, disk-shaped (holdfast-like) or upright. **Leaves** distichous, arising from stem margins, or projecting from an upright or pendulous stem, lacking silica bodies, petiolate or sessile; petioles terete to flattened, sometimes winged; blades variable, lobed, repeatedly pinnately or dichotomously compound; ultimate divisions hair-like or flattened, blunt or acute at apex. **Flowers** bisexual, solitary, pedicelate; zygomorphic; enclosed in sac-like spathella, projecting from the ruptured spathella because of the elongation of the pedicel; tepals 2-7, in incomplete whorl, tepals free, linear,or lanceolate; stamens 1-7, free, confined to one side of flower; anthers basifixed; pollen in monads, dyads or tetrads, tricolpate; ovary 2-carpellate superior, sometimes borne on a short gynophore ovary oriented vertically or obliquely at anthesis; placenta fleshy, axillary; ovules axile, anatropous, bitegmic, tenuinucellate; stigmas 2, free or fused basally, subulate,espathulate or flattened, semicircular in outline with margin irregularly dentate. **Fruits** capsular, 1-locular, 2-valved, septifragal longitudinally, 3, 6-10 non suture ribs per valve, equal or unequal valves, both valves persistent; suture margins thickened or not; seeds ca. 1-2 mm long, numerous, becoming sticky upon wetting, without endosperm; embryo straight.

COMMENTS

Lophogyne s.l. is a strongly molecular supported clade Four morphological characters states define the genus. Although they do not represent synapomorpies, in combination they represent a suite of characters that is unique to the clade in the neotropics. First, the ovary is oriented vertically or obliquely at anthesis. Vertical orientation typifies most neotropical Podostemaceae. Castelnavia, where the ovary is oriented horizontally at anthesis, is the exception. Second, at anthesis the flowers project from the ruptured spathella because of the elongation of the pedicel. This feature is also widespread in neotropical members of the family. The two exceptions are species of Castelnavia and Cipoia. In both these latter genera the ovary is enclosed within the spathella at anthesis; only the stigmas project from it. The placement of stamens and tepals on one-side of the ovary also characterizes all species of Lophogyne s.l.. Stamen and tepal number vary among species, but the absence of a complete whorl around the ovary is distinctive in the neotropics (and also occurs among African genera). As with the others, this feature also occurs in some others genera of neotropical Podostemaceae. For example, all species of Castelnavia, Cipoia, Noveloa and Oserya s.s. possess stamens and tepals that arise on one side of the ovary. Lastly, all species of Lophogyne s.l. lack silica bodies in their leaves. Three neotropical clades lacked these structures. Two of these clades correspond to genera: Rhyncholacis and Castelnavia. The third corresponds to Lophogyne s.l.. The loss of silica bodies represents an apomorphy that occurred in the ancestor to Lophogyne + Autana + Castelnavia + Rhyncholacis. In summary, Lophogyne s.l. is characterized by the co-occurrence of four characters: vertical or oblique orientation of the ovary at anthesis and its projection past the ruptured spathella, stamens and tepals on one side of the ovary, and absence of silica bodies in leaves. No other neotropical taxa have this combination of characters.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Cerrado (lato sensu), Amazonian Savanna, Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Tocantins)
Northeast (Bahia, Piauí)
Central-west (Distrito Federal, Goiás, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro)
Possible ocurrences
Central-west (Mato Grosso)

IDENTIFICATION KEY

1. Flower with dentate stigma ….... *L.lacunosa*
1'. Flower with decurrent stigma …..... 2
2. Flower without gynophore ….... *L.fimbrifolia*
2'. Flower with gynophore …….…… 3
3. Ovary and fruit with 6-10 non-suture ribs per valve 4
3'. Ovary and fruit with 3 non-suture ribs per valve ….....…. 7
4. Erect stem ……..... 5
4'. Prostate stem …..... 6
5. Ovary and fruit with 6 non suture ribs per valve ..... *L. goeldiana*
5'. Ovary and fruit with 8 non suture ribs per valve ..... *L.aripuanensis*
6. Petiolate leaf, flowers with 1 stamen, fruits with 7 non suture ribs per valve ….... *L. royenella*
6'. Leaf without petiole, flower with 2 stamens, fruit with 8-10 non suture ribs per valve …….. *L. paraensis*
7. Root-stem attached to the substratum thoroughly …….....…….…..... 8
7' Apical root and stem unattached from the substratum ……..... *L. wilsonii*
8. Leaf with ultimate division nerved ….....… 9
8'. Leaf with ultimate division nerveless …..... 10
9. Flower with 2 tepals, 1 stamen ……..... *L. ceratophylla*
9'. Flower with 5-6 tepals, 2-4 stamens …..... *L. tridactylitifolia*
10. Petiole terete in cross section ……..... *L.varians*
10'. Petiole rhombiform in cross section …..... *L. fimbriata*

REFERENCE

Bove, C.P, Philbrick, C.T & Costa, W. J. E. M. 2011. Taxonomy, distribution and emended description of the Neotropical genus *Lophogyne* (Podostemaceae). Brittonia 63(1):156-160. DOI10.1007/s12228-010-9143-3.
Bove, C.P.; Philbrick, C.T & Da Costa, F.G.C.M.. 2019. *Corrigendum to*: Nomenclatural changes allow for a broadened circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). Phytotaxa: 420: 89-90.
Bove, C.P, Philbrick, C.T & Lourenço, A.R. 2020. A new species of *Lophogyne s.l.* (Podostemaceae) from the Amazonian savanna of Amapá, Brazil. Phytotaxa 474 (2): 172–178.
Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.

Tavares, A.S., Trevisan, R. & Ferreira, F.A. 2015. Novas espécies de *Monostylis* Tulasne (Podostemaceae) para a região Amazônica. *Biotemas* 28(3): 15-22.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne aripuanensis (A.S.Tav.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Monostylis aripuanensis* A.S.Tav.

DESCRIPTION

Stem: orientation erect. **Leaf: apex** innervious; **venation** absent; **petiole** flattened; **type** petiolate. **Flower: stamen** free; **stamen** 2/3; **stigma** truncate; **gynophore** present; **tepal(s)** linear. **Fruit: costa** 16; **form** flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Mato Grosso)

HERBARIUM MATERIAL

C.C. Berg, P18570, NY, (NY00918678), Mato Grosso, **Typus**
A. S. Tavares, 982, FLOR, Mato Grosso, **Typus**
C.C. Berg, P18570, US, (US00365128), Mato Grosso, **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Tavares, A.S., Trevisan, R. & Ferreira, F.A. 2015. Novas espécies de Monostylis Tulasne (Podostemaceae) para a região Amazônica Biotemas, 28 (3): 15-22.

Lophogyne ceratophylla (Engl.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Jenmaniella ceratophylla* Engl.
homotype *Jenmaniella ceratophylla* Engl. var. *ceratophylla*
heterotypic *Jenmaniella ceratophylla* var. *hexandra* Engl.
heterotypic *Jenmaniella ceratophylla* var. *parva* P.Royen

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** nerved; **venation** present; **petiole** cylindric; **type** petiolate. **Flower: stamen** free; **stamen** 1/2/6; **stigma** subulate; **gynophore** present; **tepal(s)** linear. **Fruit: costa** 6; **form** not flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará)
Northeast (Piauí)

HERBARIUM MATERIAL

C.P. Bove, 1866, R, 213040, Pará
G.S. Jenman, 7496, (K000584976), K, (K000543161), **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne fimbriata (P.Royen) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Jenmaniella fimbriata* P.Royen

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** absent; **petiole** rhombic; **type** petiolate. **Flower: stamen** free; **stamen** 3; **stigma** subulate; **gynophore** present; **tepal(s)** linear/lanceolate. **Fruit: costa** 6; **form** not flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)

HERBARIUM MATERIAL

C.P. Bove, 1489, R, 213.792, Pará
J.E. Huber, s.n., MG (MG001816), Pará, **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne fimbrifolia (P.Royen) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Apinagia fimbrifolia* P.Royen
heterotypic *Apinagia parvifolia* P.Royen

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** united; **stamen** 8 9 10; **stigma** spathulate; **gynophore** absent; **tepal(s)** dentate. **Fruit: costa** 6; **form** not flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)
Northeast (Bahia)
Central-west (Distrito Federal, Goiás)

HERBARIUM MATERIAL

C.P. Bove, 2497, R, 224149, Goiás
A.F.M. Glaziou, 21982, P (P00167864), P (P00167863), P (P00167862), K, (K000883372), Distrito Federal, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Lophogyne fimbrifolia* (P.Royen) C.T.Philbrick & C.P.Bove

Figure 2: *Lophogyne fimbrifolia* (P.Royen) C.T.Philbrick & C.P.Bove

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne goeldiana (A.S.Tav.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Monostylis goeldiana* A.S.Tav.

DESCRIPTION

Stem: orientation erect. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** free; **stamen** 2/3; **stigma** subulate; **gynophore** present; **tepal(s)** linear. **Fruit: costa** 12; **form** flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Mato Grosso)

HERBARIUM MATERIAL

N.A. Rosa e M.R. Santos, 2030, MG, Mato Grosso, **Typus**
N. A. Rosa, 2030, NY, (NY00918677), Mato Grosso, **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Tavares, A.S.;Trevisan, R. & Ferreira, F.A. 2015. Novas espécies de *Monostylis* Tulasne (Podostemaceae) para a região Amazônica. Biotemas 28(3): 16-22.

Lophogyne lacunosa (Gardner) C.P.Bove & C.T.Philbrick

Has as synonym
basionym *Marathrum lacunosum* Gardn.
homotype *Lophogyne helicandra* Tul.
heterotypic *Lophogyne arculifera* Tul. & Wedd.

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** present; **petiole** flattened; **type** petiolate. **Flower: stamen** free; **stamen** 1/2/3/4; **stigma** dentate; **gynophore** present/absent; **tepal(s)** linear. **Fruit: costa** 6; **form** not flattened.

ADDITIONAL DESCRIPTION

The content of this field was omitted due to formatting problems, please consult our page directly (http://floradobrasil.jbrj.gov.br/).

COMMENTS

The content of this field was omitted due to formatting problems, please consult our page directly (http://floradobrasil.jbrj.gov.br/).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Northeast (Bahia)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro)

HERBARIUM MATERIAL

G. Gardner, 5860, P (P00167783), Rio de Janeiro, **Typus**
G. Gardner, 5860, P (P00167782), Rio de Janeiro, **Typus**
G. Gardner, 5860, P (P00167784), Rio de Janeiro, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Lophogyne lacunosa* (Gardner) C.P.Bove & C.T.Philbrick

Figure 2: *Lophogyne lacunosa* (Gardner) C.P.Bove & C.T.Philbrick

Figure 3: *Lophogyne lacunosa* (Gardner) C.P.Bove & C.T.Philbrick

Figure 4: *Lophogyne lacunosa* (Gardner) C.P.Bove & C.T.Philbrick

Figure 5: *Lophogyne lacunosa* (Gardner) C.P.Bove & C.T.Philbrick

REFERENCE

Bove, C. P.; Philbrick, C. T. & Costa, J. E. M. 2011. Taxonomy, distribution and emended description of the Neotropical genus Lophogyne (Podostemaceae). Brittonia 63(1):156-160. DOI10.1007/s12228-010-9143-3.
Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne paraensis (A.S.Tav.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Monostylis paraensis* A.S.Tav.

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** united; **stamen** 2; **stigma** subulate; **gynophore** present; **tepal(s)** linear. **Fruit: costa** 16/18/20; **form** flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)
Possible ocurrences
Central-west (Mato Grosso)

HERBARIUM MATERIAL

N.A. Rosa, 4619, MG, Pará, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Lophogyne paraensis* (A.S.Tav.) C.T.Philbrick & C.P.Bove

Figure 2: *Lophogyne paraensis* (A.S.Tav.) C.T.Philbrick & C.P.Bove

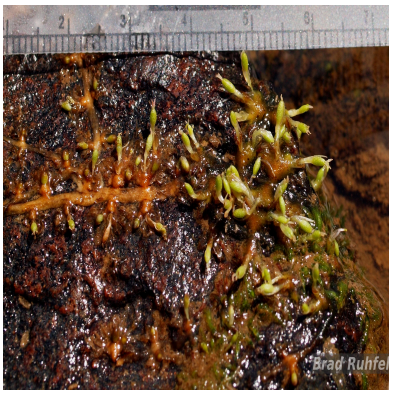

Figure 3: *Lophogyne paraensis* (A.S.Tav.) C.T.Philbrick & C.P.Bove

Figure 4: *Lophogyne paraensis* (A.S.Tav.) C.T.Philbrick & C.P.Bove

Figure 5: *Lophogyne paraensis* (A.S.Tav.) C.T.Philbrick & C.P.Bove

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5

Tavares, A.S.;Trevisan, R. & Ferreira, F.A. 2015. Novas espécies de *Monostylis* Tulasne (Podostemaceae) para a região Amazônica. Biotemas 28(3): 16-22.

Lophogyne royenella C.P.Bove & C.T.Philbrick

Has as synonym
homotype *Apinagia capillacea* (Tul.) Engl.
homotype *Lophogyne capillacea* (Tul.) C.T.Philbrick & C.P.Bove
homotype *Monostylis capillacea* Tul.
homotype *Neolacis capillacea* (Tul.) Wedd.

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** free; **stamen** 1; **stigma** spathulate; **gynophore** present; **tepal(s)** lanceolate. **Fruit: costa** 14; **form** flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Rondônia)
Central-west (Mato Grosso)

HERBARIUM MATERIAL

R. Spruce, 1038, GH, (GH00077305), B (B 10 0249257), K, (K000584950), K, (K000584951), NY, (NY00387817), Pará, **Typus**

REFERENCE

Bove, C.P.; Philbrick, C.T & Da Costa, F.G.C.M.. 2019. *Corrigendum to*: Nomenclatural changes allow for a broadened circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). Phytotaxa: 420: 89-90.
Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne tridactylitifolia (Engl.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Jenmaniella tridactylitifolia* Engl.
heterotypic *Jenmaniella jenmanii* (Engl.) P.Royen
heterotypic *Marathrum jenmanii* Engl.
heterotypic *Marathrum pauciflorum* var. *heterophyllum* P.Royen

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** nerved; **venation** present; **petiole** flattened; **type** petiolate. **Flower: stamen** free; **stamen** 4/5/6/7; **stigma** subulate; **gynophore** present; **tepal(s)** lanceolate. **Fruit: costa** 6; **form** not flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

C.A.C. Ferreira, 2243, INPA, 96484, Pará
G.S. Jenman, 7189, K, (K000584984), (K000543162), (K000584985), **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne varians (Engl.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Jenmaniella varians* Engl.
heterotypic *Jenmaniella guianensis* Engl.

DESCRIPTION

Stem: orientation prostrate. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** free; **stamen** 1/2/3/4/5/6; **stigma** subulate; **gynophore** present; **tepal(s)** lanceolate. **Fruit: costa** 6; **form** not flattened.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

G.T. Prance, 14356, NY, 01922430, Amazonas
Barthlott, W.A., 8249, K, (K000584980), **Typus**
Barthlott, W.A., 8249, K, (K000584979), **Typus**

REFERENCE

Philbrick, C.T. & Bove, C.P. (2019) Nomenclatural changes allow for a broadned circumscription of *Lophogyne* Tul. to reflect a prominent neotropical clade of Podostemaceae (Podostemoideae). *Phytotaxa* 400(2): 81–86. https://doi.org/10.11646/phytotaxa.400.2.5
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T. & Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Lophogyne wilsonii C.P.Bove & C.T.Philbrick

DESCRIPTION

Stem: orientation erect. **Leaf: apex** innervious; **venation** absent; **petiole** cylindric; **type** petiolate. **Flower: stamen** free; **stamen** 2/3/4/5; **stigma** subulate; **gynophore** present; **tepal(s)** linear. **Fruit: costa** 6; **form** flattened.

ADDITIONAL DESCRIPTION

Aquatic herb, perennial (?). *Roots* green, presumed photosynthetic, linear, prostrate and attached to rocks or unattached (pendulous), branched or unbranched, oval to flattened in cross section;
attached roots 0.8–2 mm wide, branched or not; unattached roots appearing stem-like, 0.4–2.2 mm wide; multiple times branched, 2–40 cm long, 1.5–9 cm wide mid-way between branches.
Stems arising laterally from attached or unattached roots, branched or unbranched, distinct or indistinct, often obscured by leaf bases; stems arising from prostrate attached roots 0.5–4 x 0.3–0.6 mm, base often flattened and attached to the substratum via hapteron-like base; stems arising from pendulous root 0.5–5 x 0.3–0.7 mm, hapteron-like base absent. *Leaves* 1-5 per stem; distichous, circinate, petiolate, 3–11 times pinnately divided, mature leaf 1.7–10 cm long; petiole sheathing stem, petiole of mature leaf 2–40 mm long, 0.2–0.7 mm wide at base (above sheathing leaf base), 0.3–0.7 mm wide at midpoint, 0.3–1.6 mm wide at base of first pinna; pinnae linear, 0.4–1.2 mm wide, ultimate division 0.6–23 x 0.05–0.2 mm; flattened to hair-like, blunt or acute. *Flowers* arising individually from between sheathing leaf bases, 1–4 per stem, bisexual, zygomorphic, pedicellate, covered by apically rounded sac-like spathella, spathella rupturing apically into 2–8 irregular tooth-like segments; pedicel elongating at anthesis, projecting from ruptured spathella, 10–20 x 0.1–0.15 mm at midpoint, oval in cross section; tepals 2–5, arising adjacent to or slightly below stamen filaments, in incomplete whorl around ovary, linear, rarely triangular or two-lobed, flattened, acute, tan to white, 0.2–0.6 x 0.05 mm at base, persisting in fruit or not; stamens 2–5; on one side of ovary, at anthesis filaments 1.5–2.2 x 0.05–0.1 mm at midpoint, narrowing apically, dorsifixed, apex becoming darkened, becoming spiral shaped post anthesis or not, persist in fruit or not, not indurate; anther 2 lobed apically, 1–2 x 0.2–0.6 mm; basal lobes divergent; pollen shed as radially symmetrical and isopolar monads, small in size (20–25 x 13.1–17.9 µm), prolate in shape (P/E = 1.41), tricolpate, longicolpate, small polar area (ca. 5 µm), microechinate exine (spinules < 1.0 µm), sexine as thick as nexine (ca. 0.5 µm); ovary 2 carpellate, somewhat flattened perpendicular to the suture margins, oriented vertically on pedicel or at angle, isolobous, 1.5–2.2 x 0.5–0.9 mm (suture side), 0.5–0.7 mm wide (non-suture side); with 3 prominent longitudinal non-suture lines per valve, suture lines also prominent; gynophore 0.3–0.9 mm long; ovules numerous, placentation axile, placenta thick; stigmas 2, apical, free, linear, 1–2.2 x 0.01 mm, papillose. *Capsules* pedicellate, pedicel 10–22.0 x 0.1–0.15 mm at midpoint, oriented vertically on pedicel or at an angle; oval in cross section, somewhat flattened, 1.8–2.6 x 0.9–1.3 mm (suture side), 0.8–1.1 mm wide (non-suture side), dehiscing by two-valves, each valve with 3 longitudinal non-suture ribs, suture margins also raised and rib-like, valves persisting; seeds orange-brown, obovate, 0.23–0.3 x 0.15–0.2 mm; outer integument expanding and becoming mucilaginous and sticky when wetted, 25–123 per capsule.

COMMENTS

Lophogyne wilsonii is known from three localities in the eastern region of Amapá, Brazil (Guiana Shield). The species occurs in medium to small rivers with slow current in full sunlight at 20-27m elevation; inside a narrow strip of Cerrado in the Amazon region. Where it occurs it is abundant. According the IUCN Criteria (IUCN 2019) the extent of occurrence (EOO) is 165.963 Km² and the area of occupancy (AOO) is 12.000 Km². Based on AOO, *Lophogyne wilsonii* is classified as Endangered (EN). The human induced negative impacts in the region, however, are predicted to have a negative impact on AOO. Consequently, the species is designated as Critically Endangered (CR B2abiii, IUCN 2019).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Amazonian Savanna

Geographic Distribution
Confirmed ocurrences
North (Amapá)

HERBARIUM MATERIAL

C.P. Bove, 2472, R, **Typus**
C.P. Bove, 2467, R, Amapá, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

Figure 2: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

Figure 3: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

Figure 4: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

Figure 5: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

Figure 6: *Lophogyne wilsonii* C.P.Bove & C.T.Philbrick

REFERENCE

Bove, C.P, Philbrick, C.T & Lourenço, A.R. 2020. A new species of *Lophogyne s.l.* (Podostemaceae) from the Amazonian savanna of Amapá, Brazil. Phytotaxa 474 (2): 172–178.

Marathrum Humb. & Bonpl.

This treatment is composed of the following taxa: *Marathrum*, *Marathrum azarensis*, *Marathrum capillaceum*, *Marathrum foeniculaceum*.

HOW TO CITE

Bove, C.P., Pellegrini, M.O.O., Philbrick, C.T. 2020. Marathrum *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13675.

Has as synonym
heterotypic *Vanroyenella* Novelo & C.T.Philbrick

DESCRIPTION

Annuals or perennials. Roots elongate, occasionally branched, prostrate, flattened or fan-shaped, strongly attached to the substratum throughout, green. Stems arising endogenously along the flanks of the root, opposite or subopposite, thalloid and holdfast-like to elongate, prostrate, strongly attached to the substratum. Leaves distichous, arising from the flanks of a thalloid stem, often rosette-like in appearance, petiolate; petiole bases expanded, with 1 or 2 sheaths; blades flat, repeatedly pinnate with hair-like or flattened ultimate divisions; stipules (apical extensions of the leaf sheath) present, hood- or tooth-like. Flowers arising singularly or in fascicles from between leaf bases, actino or zygomorphic, covered by a sac-like spathella, pedicellate. Spathella clavate. Pedicels with or without an expanded cup-like process around the capsule base. Tepals 3-8, dentate, linear, lanceolate or spathulate, alternating with the stamens, restricted to one side (incomplete whorl) or not (complete whorl); stamens 2-8, narrowly linear-triangular, the thecae fused apically, restricted to one side or not, deciduous or persisting, not indurate, the filaments often pink, free or fused at the base, often spreading at anthesis or appressed to the pistil (including stigmas); pollen in monads; ovary 2-locular, the carpels equal or subequal, ellipsoidal; styles 2. Capsules 2-locular, ellipsoidal, with 2 equal or subequal valves, persistent, each 3-ribbed (non-suture ribs), ribs with or without wings, suture margins thickened and rib-like; seeds numerous.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia)
Northeast (Bahia, Pernambuco)
Central-west (Goiás)
South (Santa Catarina)

IDENTIFICATION KEY

1. Flower zigomorphic; linear, lanceolate or spathulate tepals..... 2
1' Flower actinomorphic; dentate tepals ..... *M. foeniculaceum*
2 Flowers fasciculate, fruit with winged ribs ..... *M. capillaceum*
2' Flowers solitary, fruit without winged ribs ..... *M. azarensis*

REFERENCE

Mello, A.S., Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. *Rodrigésia 62*(4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). *Novon* 25: 51-56.
Royen, P. van. 1951. The Podostemaceae of the world. Part I. *Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107*: 1-151.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). *Syst. Bot. 36*(1): 105-118.
Tulasne, L.R. 1863. Podostemaceae. *In*: Martius, C.F.P. von; Eichler, A.W. & Urban, I. (eds.*) Flora brasiliensis…,München, Wien, Leipzig, v.4* part 1, p.231-276, pls. 73-76.

Marathrum azarensis Tur

DESCRIPTION

Flower: grouping isolated; **stamen** 2; **pedicel** non cupuliform; **symmetry** zygomorphic; **tepal(s)** linear lanceolate spathulate.
Fruit: costa not winged.

ADDITIONAL DESCRIPTION

Prostate stem. Distinction between stems and leaves sometimes unclear. Leaves along the margin of the stems, conspicuously nerved, cuneate, ca. 2 cm long, laciniae, last leaf divisions lasciniate, 1–2 mm long. Flowers solitary,axillary; 3 tepals, free, c. 1.5 mm long, spatulate apex ; 2 stamens, anthers c.0.7 mm long, base emarginate, filaments 1.5–2 mm long. Ovary ellipsoid, c. 2 mm long, styli 2, c. 0.5 mm long. Capsule 2 mm long, 2 equal valves, persistent, 3 non-suture ribs per valve, 2 ribs like sutures margin, pedicels 4 mm long.

COMMENTS

According Melo *et al.* (2011) the new occurence of this species to the state of Paraná, as well as to Brazil, mentioned by Bove (2010), was made based on the material referred by Fontana (2007), collected in the Paraná River (Paraguay), far from the border with Brazil. So the correct new ocurrence of *M. azarensis* to Brazil is the collection A.S. Mello & A. Nuernberg 584 (FLOR) in the municipality of Abelardo Luz, Santa Catarina,up to now the only record of the species in Brazil. Due to the impossibility to see this exsiccatae in FLOR, the measures in the species description were taken from Melo *et al.* (2011).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
South (Santa Catarina)

HERBARIUM MATERIAL

Melo, A.S. & Nuernberg, A., 584, FLOR, Santa Catarina

REFERENCE

Mello, A.S., Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. *Rodrigésia 62*(4): 867-885.

Marathrum capillaceum (Pulle) P.Royen

Has as synonym
basionym *Lophogyne capillacea* Pulle
heterotypic *Marathrum nervosum* Engl.

DESCRIPTION

Flower: grouping fasciculate; **stamen** 3 4; **pedicel** cupuliform; **symmetry** zygomorphic; **tepal(s)** linear lanceolate spathulate.
Fruit: costa winged.

ADDITIONAL DESCRIPTION

Prostate stem, branched, ca. 3.5 cm diam and up to 1.5 cm thick, upright stem distichous, terete, 1—1.5 cm long. Leaves along the margin of the prostate stems or in the upright stems, 3—15 cm long. Leaves repeatedly pinnate, petiolate, petiole compressed,1.5—2.5 cm long, 3—8 mm diam, primary pinnae slightly winged, ultimate divisions triangular to lanceolate, acute, 0.5—1 mm long. Flowers fascicled, pedicel 3—5 cm long, narrowly winged; tepals 3—5, free or united at the base with the filaments, lanceolate, acute, 0.5—1.5 mm long; stamens 3 or 4, in a incomplete whorl, 3—5 mm long, anthers 1—1.5 mm long, obtuse; ovary 4—5 x 1—2 mm, obtuse, slightly compressed, with 3 winged non-suture ribs; styles spathulate, 1—2 mm long, slightly compressed, sometimes with 2 or 3 short dents at the top, free. Fruit with 3 prominent winged non-suture ribs per valve, 2 indistinct marginal ribs; pedicel cupuliform, 2.5—5 cm long.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia)
Northeast (Bahia, Pernambuco)
Central-west (Goiás)

HERBARIUM MATERIAL

C.P. Bove, 2075, R, Goiás
W.A. Egler, 47725, NY, (NY02282945), K (K000807463), IAN (IAN108952), Amapá

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Marathrum capillaceum* (Pulle) P.Royen

Figure 2: *Marathrum capillaceum* (Pulle) P.Royen

Figure 3: *Marathrum capillaceum* (Pulle) P.Royen

Figure 4: *Marathrum capillaceum* (Pulle) P.Royen

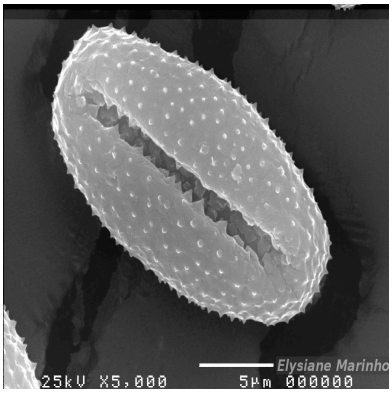

Figure 5: *Marathrum capillaceum* (Pulle) P.Royen

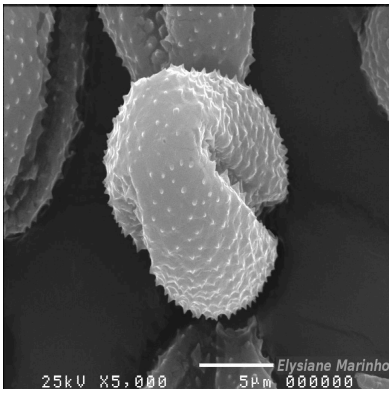

Figure 6: *Marathrum capillaceum* (Pulle) P.Royen

REFERENCE

Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. Annals of the Missouri Botanical Garden, 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.
Ruhfel, B.R.; Bittrick, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutishauser, R.; Xi, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Marathrum foeniculaceum Bonpl.

Has as synonym
heterotypic *Marathrum allenii* Woodson
heterotypic *Marathrum indifferens* P.Royen
heterotypic *Marathrum leptophyllum* P.Royen
heterotypic *Marathrum minuti* f. *orum* (P.Royen) P.Royen
heterotypic *Marathrum minuti* f. *orum* (Woodson) P.Royen
heterotypic *Marathrum minuti* Engl. f. *orum*
heterotypic *Marathrum minuti* f. *orum* P.Royen
heterotypic *Marathrum minuti* f. *orum* P.Royen
heterotypic *Marathrum minutiflorum* Engl.
heterotypic *Marathrum modestum* (Wedd.) Nash
heterotypic *Marathrum oxycarium* Tul.
heterotypic *Marathrum oxycarpum* Tul.
heterotypic *Marathrum pusillum* P.Royen
heterotypic *Marathrum schiedeanum* var. *modestum* Wedd.
heterotypic *Marathrum schiedeanum* (Cham.) Tul. var. *schiedeanum*
heterotypic *Marathrum schiedeanum* var. *stenocarpum* Wedd.
heterotypic *Marathrum schiedeanum* (Cham.) Tul.
heterotypic *Marathrum stenocarpum* (Wedd.) P.Royen

DESCRIPTION

Flower: grouping isolated/fasciculate; **stamen** 5 to 11; **pedicel** non cupuliform; **symmetry** actinomorphic; **tepal(s)** triangular.
Fruit: costa not winged.

ADDITIONAL DESCRIPTION

Roots 0.2-1 mm wide. Prostate stems. Leaves up to 80 cm, petiolate, repeatedly pinnately divided, the primary pinnae alternate along an expanded central rachis, central rachis straight to distinctly angled, repeatedly divided; ultimate divisions 0.6-4.5 × 0.02-1 mm, hair-like to flattened, the apex acute to blunt; petioles circular to flattened in cross section, lacking a wing. Pedicels in fruit 4-10 cm, the apex below the capsule cup-like or a cupule not formed. Flowers zigo or actinomorphic; tepals pink, 6-11, in a complete or incomplete whorl around the ovary, alternating with stamens; stamens 5-11, in a complete whorl around the ovary, filaments 3.8-6.5 mm, anthers 1.4-2.8 mm; stigmas 0.6-1.5 mm. Capsules 4-6 × 1.7-2.5 mm, 3 non-suture ribs per valve.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

Schultes, R., 9231, IAN, Amazonas
F. W. H. A. von Humboldt, s.n., B (B -W 07144 -01 0), **Typus**
Hinton, G.B., 11624, K (K000974817)
Hinton, G.B., 11624, K (K000974817), **Typus**
Husnot, s.n., P (P00167819), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Marathrum foeniculaceum* Bonpl.

Figure 3: *Marathrum foeniculaceum* Bonpl.

Figure 4: *Marathrum foeniculaceum* Bonpl.

Figure 5: *Marathrum foeniculaceum* Bonpl.

Figure 6: *Marathrum foeniculaceum* Bonpl.

Figure 7: *Marathrum foeniculaceum* Bonpl.

REFERENCE

Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. Annals of the Missouri Botanical Garden, 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.
Ruhfel, B.R.; Bittrick, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutishauser, R.; Xi, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Mourera Aubl.

This treatment is composed of the following taxa: *Mourera*, *Mourera alcicornis*, *Mourera aspera*, *Mourera elegans*, *Mourera fluviatilis*, *Mourera glazioviana*, *Mourera monadelpha*, *Mourera schwackeana*, *Mourera weddelliana*.

HOW TO CITE

Pellegrini, M.O.O., Bove, C.P., Philbrick, C.T. 2020. Mourera *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13677.

Has as synonym
homotype *Lacis* Schreb.
homotype *Murera* J.St.-Hil.
heterotypic *Lacis* Lindl.
heterotypic *Lonchostephus* Tul.
heterotypic *Stengelia* Neck.
heterotypic *Tulasneantha* P.Royen

DESCRIPTION

Herbs annual or perennial, firmly attached to rocks and other solid substrates in seasonally strong currents of rivers and streams. **Roots** short, thread-like, attached to the solid substrate via adhesive hairs. **Stems** short or inconspicuous, conical or bifacial, prostrate or erect, unbranched, opposite or subopposite, attached to the solid substrate via holdfasts (i.e., haptera). **Leaves** distichously-alternate, basal, arising from stem margins, free, adaxially papillate, papillae sparsely to densely distributed across the leaves, wart-shaped, abaxially epapillate, sometimes adaxially spinescent, spines distributed across the blades and along the veins, branched or not, papillate; sheaths dithecous, partially fused to the stem and following leaf-sheaths; petiole indistinct or short or long, terete or laterally-flattened, sometimes winged; blades free or attached to solid substrates via adhesive hairs, subentire or pinnatifid or palmate or finely-pinnate, flabellate or ovate or elliptic or obovate in outline, membranous or crass or subcoriaceous, margin repeatedly bifurcated, becoming finely-dissected, terminal divisions filiform; nervation pinnate, conspicuous or not. **Monochasium** axillary, pedunculate, spike-like, rarely leaf-like, papillate, papillae sparsely to densely distributed across the inflorescence, (1–)4–many-flowered, flowers distichously-alternate; basal bract distinct to the leaves in appearance and smaller in size (i.e., bracteose) or similar to leaves in appearance and ca. the same size (i.e., leaf-like), triangular to elliptic or flabellate; peduncle short to long, straight or curved, terete or laterally-flattened, sometimes winged, wings 2–4, ebracteate, branched or not, crass or fibrous, smooth or striate, papillate or with small spines; main axis straight or curved, sometimes twisted, terete to slightly laterally-flattened or strongly laterally-flattened, crass or fibrous, smooth or striate, papillate or with small spines; bracteoles bracteose, rarely leaf-like, persistent or not, chartaceous, rarely membranous, flat or cucullate, papillate, apex entire or bifurcated, rarely finely-dissected. **Flowers** bisexual, actinomorphic or zygomorphic, pedicellate, buds enclosed in sac-like spathella; pedicel straight to slightly curved at base, light green or white or pink or lilac, smooth or longitudinally striate, short to very long, elongating in fruit; spathella clavate when immature, tubular or infundibuliform when mature, hyaline, apex obtuse or acute or acuminate, sometimes bearing small spines at apex, sometimes papillate at apex, subtended by the bracteole, spathella shorter than or ca. the same length as or much longer than the subtending bracteole; tepals 5–30, free or basally to completely connate, linear or lanceolate or triangular, apex obtuse or acute to acuminate or dentate, arranged in 1 whorl, whorls, complete or incomplete; stamens (4–)5–40, white or pink or lilac, free or basally to partially to entirely connate, remaining connate when in fruit or not, arranged in 1–2 complete whorls, filaments terete to linear-conical or winged, when winged filaments reticulate or not, unbranched or forked, membranous or paleaceous, elongating during anthesis, persistent in fruit, anthers sagittate to hastate, basifixed, caducous, introrsely rimose; pollen grains released in monads, small- or medium-sized, prolate, tricolpate; ovary 2-carpellate, sessile or borne on an inconspicuous or a short gynophore, oblongoid to ellipsoid or ovoid or obovoid or subglobose to globose, rarely slightly laterally flattened, white or pink or reddish-pink to vinaceous, base acute or obtuse to round, apex acute or obtuse to round, ribbed, ribs conspicuous or not, stigmas 2, filiform or clavate or narrowly-triangular or obtriangular to obtrapezoid, free or basally connate, rarely connate up to middle, parallel or apex curved inwards and connivent or divergent and curved outwards, base or whole stigma persistent in fruit. **Capsules** septifragal, 1-locular, 2-valved, ribbed, valves equal, both valves persistent, suture margins thickened or not. **Seeds** numerous, becoming sticky when wet; endosperm absent; embryo straight.

COMMENTS

Mourera Aubl. was the first genus of Podostemaceae to be described, based on *M. fluviatilis* Aublet (1775). Schreber (1789) described Lacis Schreb. as a replacement name for *Mourera*, and transferred all recognized species. This taxonomic concept was accepted by several taxonomists (e.g., Martius & Zuccarini 1824; Chamisso 1833). Bongard (1835) described the new species *Lacis monadelpha* Bong., which was later transferred by Royen (1953) to the new genus *Tulasneantha*, based on its filaments connate during synthesis.
The genus *Lonchostephus* Tul. was described as monospecific (Tulasne 1852) based on *L. elegans* Tul., and due to its winged filaments. Baillon (1888) transferred *L. elegans* Tul. to *Mourera*, as *M. elegans* (Tul.) Baillon. Later, *Lonchostephus* was reestablished by Engler (1930) and Royen (1953), who considered the shape of the filament to be of generic relevance. Nonetheless, a recent phylogenetic study (Tippery et al. 2011) recovered *Lonchostephus* and *Tulasneantha* nested within *Mourera*. Thus, the genus currently includes the monospecific *Lonchostephus* and *Tulasneantha*, with *T. monadelpha* (Bong.) P.Royen recognized as *M. monadelpha* (Bong.) C.T.Philbrick & C.P.Bove (Tippery et al. 2011).
Mourera is currently represented by eight species, distributed across the rivers of South America, but having Brazil (i.e., Northern, Northeastern, Central-Western, and Southeastern regions) as its diversity center. All recognized species are recorded for Brazil, with five out of eight being endemic to the country. The genus is uniquely circumscribed by its leaves and inflorescences covered by epidermal emergences (which give these organs a rough touch), erect two-sided monochasial inflorescences, and each flower individually subtended by a dithecous bract.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)
Central-west (Distrito Federal, Goiás, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná)

IDENTIFICATION KEY

1. Stems bifacial, prostrate, attached to the solid substrate throughout; leaves densely papillate, blades subentire or pinnatifid… 2
1’. Stems conical, erect, attached to the solid substrate only at base; leaves sparsely papillate, blades palmate or finely-pinnate… 4
2. Inflorescences strongly laterally-flattened, leaf-like, peduncle short and indistinct from the main axis, 4–8-flowered; filaments 2(–3)-branched, ovary ca. as wide as long, stigmas filiform, curved divergent and outwards… ***Mourera alcicornis*** **(Tul.) P.Royen**
2’. Inflorescences not or slightly laterally-flattened, spike-like, peduncle long and clearly distinct from the main axis, many-flowered; filaments unbranched, ovary longer than wide, stigmas narrowly-triangular, curved inward and connivent at apex… 3
3. Leaves with blades subentire; inflorescences generally branched, peduncle smooth, peduncle and main axis fibrous; tepals with apex obtuse, ovary ellipsoid… ***Mourera aspera*** **(Bong.) Tul.**
3’. Leaves with blades pinnatifid; inflorescences unbranched, peduncle striate, peduncle and main axis crass; tepals with apex acute to acuminate, ovary ovoid… ***Mourera fluviatilis*** **Aubl.**
4. Inflorescences strongly laterally-flattened, leaf-like, peduncle indistinct from the main axis, bracteoles leaf-like; spathellas shorter than the bracteoles, ovary borne on a short gynophore, stigmas obtriangular to obtrapezoid… ***Mourera elegans*** **(Tul.) Baillon**
4’. Inflorescences not or slightly laterally-flattened, spike-like, peduncle clearly distinct from the main axis, bracteoles bracteose; spathellas ca. the same length as or longer than the bracteoles, ovary sessile, stigmas filiform or clavate… 5

5. Leaves crass, distinctly petiolate, blades palmate, flabellate in outline; spathellas much longer than the bracteoles, infundibuliform, stamens arranged in 1 whorl, filaments winged… 6
5'. Leaves membranous, petioles not clearly distinct from the blade, blades finely-pinnate, ovate to obovate in outline; spathellas much longer than the bracteoles, tubular, stamens arranged in 1–2 whorls, filaments terete to linear-conical… 7
6. Plants small; petioles short; inflorescences generally branched; filaments free during anthesis and fruit, ovary ellipsoid, stigmas parallel… ***Mourera glazioviana*** **Warm.**
6'. Plants robust; petioles long; inflorescences unbranched; filaments connate during anthesis, becoming free in fruit, ovary obovoid, stigmas divergent and curved outwards… ***Mourera monadelpha*** **(Bong.) C.T.Philbrick & C.P.Bove**
7. Inflorescences much shorter than the leaves, 5–10-flowered; stamens 20–30, filaments 2(–3)-branched, stigma clavate, divergent and curved outwards… ***Mourera schwackeana*** **Warm.**
7'. Inflorescences ca. the same length as the leaves, 15–30-flowered; stamens 8–15, filaments unbranched, stigma filiform, parallel… ***Mourera weddelliana*** **Tul.**

REFERENCE

Marinho E.B., Bove C.P., Mendonça C.B.F. & Gonçalves-Esteves V. 2018. Pollen morphology of *Mourera* (Podostemaceae). *Palinology* 42:1-7.
PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
RIAL, A. & BOVE, C.P. 2007. *Mourera alcicornis* (Tul.) P. Royen. Nuevo registro de la familia Podostemaceae en Venezuela. Acta Bot. Venez., 30(1): 249-252.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Mourera alcicornis (Tul.) P.Royen

Has as synonym
basionym *Ligea alcicornis* Tul.
homotype *Oenone alcicornis* (Tul.) Wedd.

DESCRIPTION

Stem: form and stance bifacial and prostrate totally adnate to the substrate. **Leaf: development of the petiole** inconspicuous/ long; **division of the blade** subentire; **consistency of the blade** subcoriaceous; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** foliaceous; **peduncle** indistinct of the main axis; **development of the peduncle** short; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** longer than the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** 2 - 3 branched; **shape of the filament** terete to narrowly conical; **development of the gynophore** absent; **shape of the ovary** subglobose to globose; **shape of the stigma** filiform.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará)

HERBARIUM MATERIAL

R. Spruce, 555, P (P00167992), P (P00167991), NY, (NY00387807), K, (K000642013), K, (K000642012), B (B 10 0249231), GH, (GH00042411), Pará, **Typus**
C. Farney, 1975, INPA, Pará

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II.. Acta Bot. Neerl. 2(1):1-20.

Mourera aspera (Bong.) Tul.

This treatment is composed of the following taxa: *Mourera aspera*, .

Has as synonym
basionym *Lacis aspera* Bong.
homotype *Mourera aspera* (Bong.) Tul. f. *rm. aspera*
heterotypic *Lacis aspera* Raeusch.
heterotypic *Mourera aspera* f. *minor* Warm.
heterotypic *Mourera penicillata* Hicken
heterotypic *Mourera pennicillata* Hicken

DESCRIPTION

Stem: form and stance bifacial and prostrate totally adnate to the substrate. **Leaf: development of the petiole** inconspicuous; **division of the blade** subentire; **consistency of the blade** subcoriaceous; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** short; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** the same length as the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** not branched; **shape of the filament** terete to narrowly conical; **development of the gynophore** absent; **shape of the ovary** ovoid; **shape of the stigma** narrowly triangular.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Caatinga, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)
Northeast (Bahia)
Central-west (Distrito Federal, Goiás, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná)

HERBARIUM MATERIAL

L. Riedel, 413 (P00167998), São Paulo, **Typus**
A.F.M. Glaziou, 21983, P (P00168121), Goiás

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera aspera* (Bong.) Tul.

Figure 2: *Mourera aspera* (Bong.) Tul.

Figure 3: *Mourera aspera* (Bong.) Tul.

Figure 4: *Mourera aspera* (Bong.) Tul.

Figure 5: *Mourera aspera* (Bong.) Tul.

Figure 6: *Mourera aspera* (Bong.) Tul.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.

Mourera elegans (Tul.) Baillon

Has as synonym
basionym *Lonchostephus elegans* Tul.

DESCRIPTION

Stem: form and stance conical and only with the adnate to the substrate. **Leaf: development of the petiole** short; **division of the blade** narrowly pinnate; **consistency of the blade** membranous; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** foliaceous; **peduncle** indistinct of the main axis; **development of the peduncle** short; **development of the bracteole(s)** foliaceous. **Flower: size of the spathella** shorter than the bracteole(s); **shape of the spathe** infundibular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** not branched; **shape of the filament** winged; **development of the gynophore** inconspicuous to short; **shape of the ovary** obovoid; **shape of the stigma** obtriangular to obtrapezoid.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)
Central-west (Mato Grosso)

HERBARIUM MATERIAL

R. Spruce, 1036, B (B 10 0249238), K, (K000642015), K (K000807461), P (P00167766), P (P00167767), P (P00167768), P (P00167769), W, (W18890264789), W, (W18890264804), NY, (NY00387808), S (S08-5583), S (S-R-7387), Pará,
Typus
C.P. Bove, 1899, R, (R010069509), Mato Grosso

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera elegans* (Tul.) Baillon

Figure 2: *Mourera elegans* (Tul.) Baillon

Figure 3: *Mourera elegans* (Tul.) Baillon

Figure 4: *Mourera elegans* (Tul.) Baillon

Figure 5: *Mourera elegans* (Tul.) Baillon

Figure 6: *Mourera elegans* (Tul.) Baillon

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Mourera fluviatilis Aubl.

Has as synonym
homotype *Lacis fluviatilis* (Aubl.) J.F.Gmel.

DESCRIPTION

Stem: form and stance bifacial and prostrate totally adnate to the substrate. **Leaf: development of the petiole** inconspicuous; **division of the blade** pinnatifid; **consistency of the blade** membranous; **spine presence in the blade** absent. **Inflorescence: branching** not branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** long; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** the same length as the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** not branched; **shape of the filament** terete to narrowly conical; **development of the gynophore** absent; **shape of the ovary** oblongoid to ellipsoid; **shape of the stigma** narrowly triangular.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Roraima)
Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe)

HERBARIUM MATERIAL

W. Milliken, 550, K (K000807456), NY, (NY00777811), Roraima
J.M. Pires, 3440, IAN (IAN063883), Bahia
C.P. Bove, 1944, R, (R010061758), Roraima

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera fluviatilis* Aubl.

Figure 2: *Mourera fluviatilis* Aubl.

Figure 3: *Mourera fluviatilis* Aubl.

Figure 4: *Mourera fluviatilis* Aubl.

Figure 5: *Mourera fluviatilis* Aubl.

Figure 6: *Mourera fluviatilis* Aubl.

Figure 7: *Mourera fluviatilis* Aubl.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Mourera glazioviana Warm.

DESCRIPTION

Stem: form and stance bifacial and prostrate totally adnate to the substrate. **Leaf: development of the petiole** long; **division of the blade** palmate; **consistency of the blade** crassus; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** long; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** longer than the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** not branched; **shape of the filament** winged; **development of the gynophore** absent; **shape of the ovary** oblongoid to ellipsoid; **shape of the stigma** filiform.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Northeast (Bahia)
Southeast (Minas Gerais)

HERBARIUM MATERIAL

C.P. Bove, 2270, R, R 211275, Bahia
A.F.M. Glaziou, 21984-a, U, 0007753, (NL-U0007753), P (P00167989), Minas Gerais, **Typus**

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.

Mourera monadelpha (Bong.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Lacis monadelpha* Bong.
homotype *Tulasneantha monadelpha* (Bong.) P.Royen
heterotypic *Lacis bongardii* Tul.

DESCRIPTION

Stem: form and stance conical and only with the adnate to the substrate. **Leaf: development of the petiole** long; **division of the blade** palmate; **consistency of the blade** crassus; **spine presence in the blade** absent. **Inflorescence: branching** not branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** long; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** longer than the bracteole(s); **shape of the spathe** infundibular; **connation of the tepal(s)** free; **connation of the filament** connate on the anthesis free in fruit; **branching of the filament** not branched; **shape of the filament** winged; **development of the gynophore** absent; **shape of the ovary** obovoid; **shape of the stigma** filiform.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará, Rondônia)

HERBARIUM MATERIAL

C.P. Bove, 1713, INPA, Pará
A. Riedel, 1248, P (P00167762), K, (K000642016), Rondônia, **Typus**
A. Saint-Hilaire, s.n., P (P00167763)

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

Figure 2: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

Figure 3: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

Figure 4: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

Figure 5: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

Figure 6: *Mourera monadelpha* (Bong.) C.T.Philbrick & C.P.Bove

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Mourera schwackeana Warm.

DESCRIPTION

Stem: form and stance conical and only with the adnate to the substrate. **Leaf: development of the petiole** long; **division of the blade** narrowly pinnate; **consistency of the blade** membranous; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** short; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** the same length as the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** 2 - 3 branched; **shape of the filament** terete to narrowly conical; **development of the gynophore** absent; **shape of the ovary** oblongoid to ellipsoid; **shape of the stigma** clavate.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Caatinga

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)
Northeast (Ceará, Maranhão, Piauí)

HERBARIUM MATERIAL

C.A.W. Schwacke, 4986, RB, (RB00916622), P, Piauí, **Typus**
A.F.M. Glaziou, 1544, P (P00167990), Ceará, **Typus**
C.P. Bove, 1738, R, R 211223, Tocantins
C.P. Bove, 1870, R, Pará

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera schwackeana* Warm.

Figure 2: *Mourera schwackeana* Warm.

Figure 3: *Mourera schwackeana* Warm.

Figure 4: *Mourera schwackeana* Warm.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.

Mourera weddelliana Tul.

DESCRIPTION

Stem: form and stance conical and only with the adnate to the substrate. **Leaf: development of the petiole** short; **division of the blade** narrowly pinnate; **consistency of the blade** membranous; **spine presence in the blade** absent. **Inflorescence: branching** not branched/branched; **aspect** spiciform; **peduncle** distinct of the main axis; **development of the peduncle** short; **development of the bracteole(s)** bracteose. **Flower: size of the spathella** the same length as the bracteole(s); **shape of the spathe** tubular; **connation of the tepal(s)** free; **connation of the filament** free; **branching of the filament** not branched; **shape of the filament** terete to narrowly conical; **development of the gynophore** absent; **shape of the ovary** oblongoid to ellipsoid; **shape of the stigma** filiform.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará, Tocantins)
Northeast (Maranhão)
Central-west (Mato Grosso)

HERBARIUM MATERIAL

H.A. Weddell, 2320, NY, (NY00387818), K, (K000807460), NY, (NY00387819), NY, (NY00387820), P (P00168115), P (P00168116), P (P00168117), Tocantins, **Typus**
C.P. Bove, 1873, R, Mato Grosso

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Mourera weddelliana* Tul.

Figure 2: *Mourera weddelliana* Tul.

Figure 3: *Mourera weddelliana* Tul.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the world. Part II. Acta Bot. Neerl. 2(1):1-20.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Oserya Tul. & Wedd.

This treatment is composed of the following taxa: *Oserya*, *Oserya biceps*, *Oserya perpusilla*, *Oserya pilgeri*, *Oserya sphaerocarpa*.

HOW TO CITE

Bove, C.P., Pellegrini, M.O.O., Philbrick, C.T. 2020. Oserya *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB32395.

DESCRIPTION

Smal to very small herbs; roots thread-like attached to the substratum, branched; stems short, developing at almost regular intervals along sides of root, opposite or subopposite pairs. Leaf distichous, circinate, petiolate, petiole sheathing stem; blades simple or repeatedly forked with filamentous ultimate segments, the forking extending over the whole leaf or confined to the top, nerved or not. Flowers solitary, terminating the stem or in leaf axils; tepals 2 or 3, on each side of the stamen and the third on back of the fork of filaments or rarely absent; stamens 1-2, when stamens 2, then usually united below into short andropodium; anthers basifixed, extrorse; pollen in monads; stigmas very short. Capsules with valves unequal with oblique and acentric suture, the larger one persistent (both persistent in O. biceps), 6-7 non-suture ribs per valve.

COMMENTS

Genera with a new circunscription based on morphological and molecular data since 2011. See Tippery et al. (2011) for more details.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Roraima, Tocantins)
Central-west (Goiás, Mato Grosso do Sul, Mato Grosso)

IDENTIFICATION KEY

1- Linear entire leaves, both fruit valves persistent ..…… *O. biceps*
1'- Leaves few times forked, one fruit valve persistent ……..... 2
2- Nerved leaves …… *O. perpusilla*
2'- Neverless leaves ……..... 3
3- Two stamens .....……...…… *O. pilgeri*
3'- One stamen .....……. *O. sphaerocarpa*

REFERENCE

Philbrick, C.T.; Philbrick, P.K.B. & Bove, C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56. DOI: 10.3417/2016023
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Oserya biceps Tul. & Wedd.

DESCRIPTION

Leaf: form divided dichotomous; **venation** innervious. **Flower: stamen** 1. **Fruit: costa** 10; **valve** 2 valve persistent.

ADDITIONAL DESCRIPTION

Leaves 2-3 mm, linear, flabellate, sheathed at the base. Flowers solitary; pedicel 3-5 mm; mature spathella tubuliform; tepals 2, c. 0.3 mm, one at either side of the stamen, linear; anther c. 1 mm, obtuse; ovary ovoid-ellipsoid,1.5 X 1 mm, obtuse, rounded at the base, styles unknown. Fruit with two persisting valves, 5 non suture ribs per valve.

COMMENTS

Holotype not found at P. Isotypes unknown. Description based on Tulasne (1852) and Royen (1954). Currently, no other specimen was recognized as this species. The type locality mentioned in the protologous is Tocantins river; taking into account that the other collections of Weddell it was probably in Pará state, not Goiás, as stated by Royen (1954) .

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

Weddell, H.A., s.n., P, Pará, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world. Part II.. Acta Bot. Neerl. 3(2): 215-263.

Oserya perpusilla (Went) P.Royen

Has as synonym
basionym *Apinagia perpusilla* Went

DESCRIPTION

Leaf: form divided dichotomous; **venation** nerved. **Flower: stamen** 1. **Fruit: costa** 10; **valve** 1 valve persistent.

ADDITIONAL DESCRIPTION

Leaves cuneate, few times forked at the top, 1-2 cm long, indistinctly nerved, petiole 5-10 mm wide. Flowers with pedicel 4-14 mm long; tepals
2 or 3, subulate, 0.5 mm long or less, one at either side of the filament and one at the back of the latter (sometimes absent); stamens 1-2 mm, anther cordate, up to 1 mm, obtuse or emarginate, ovary with two unequal carpels, sutures excentric; styles up to 0.5 mm,
free, strongly papillate. Fruit with 2 unequal valves, each valve with 5 non-suture ribs, the suture ribs sometimes very indistinct or absent,
one valve caducous.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Roraima)

HERBARIUM MATERIAL

C.P. Bove, 1946, R, Roraima
Versteeg, 810, P (P00167901), **Typus**
B. Maguire, 24919, RB, (RB00317529)

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Oserya perpusilla* (Went) P.Royen

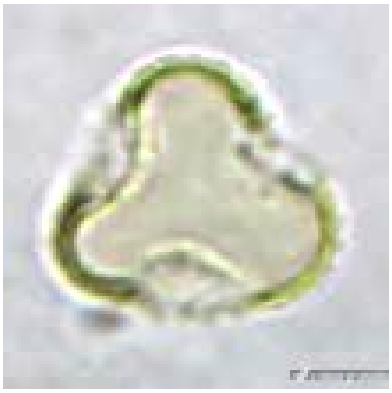

Figure 2: *Oserya perpusilla* (Went) P.Royen

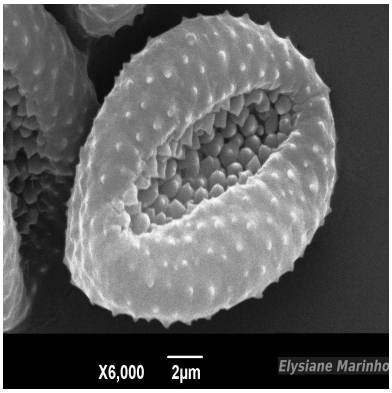

Figure 3: *Oserya perpusilla* (Went) P.Royen

Figure 4: *Oserya perpusilla* (Went) P.Royen

Figure 5: *Oserya perpusilla* (Went) P.Royen

Figure 6: *Oserya perpusilla* (Went) P.Royen

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world. Part II.. Acta Bot. Neerl. 3(2): 215-263.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & LeS, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Oserya pilgeri (Mildbr.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Apinagia pilgeri* Mildbr.
heterotypic *Apinagia nana* Went

DESCRIPTION

Leaf: form divided dichotomous; **venation** innervious. **Flower: stamen** 1/2. **Fruit: costa** 14/12; **valve** 1 valve persistent.

ADDITIONAL DESCRIPTION

Very small herb. Prostate stem, 2—8 mm wide. Leaves ovoid, up to 2.5 mm long and up to 2 mm wide, at the top strongly dissected, with forked segments, nerveless. Flowers borne by an up to 2 mm long pedicel; tepals 3, filiform, confined to one side, obtuse, up to 1 mm long: stamens 2-3, from 0.5 —1.5 mm long, anthers up to 0.5 mm long, obtuse, base of the thecae obtuse, thecae sometimes unequal;ovary ellipsoidal, about 1 mm high and about 0.5 mm diam, acute,styles filiform, slightly cohering at the base, strongly papillate, up to 0.5 mm long. Fruit similar to the ovary, 6-7 non suture ribs per valve.

COMMENTS

The type (Pilger 834 - B) is comprised of fragments of prostrate stems, leaf fragments, and numerous dehisced capsules. Leaf description of othr structures based on Royen (1951) under the synonym *Apinagia pilgeri.*

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)
Central-west (Goiás, Mato Grosso do Sul, Mato Grosso)

HERBARIUM MATERIAL

R.K.Pilger, 834, B, Mato Grosso, **Typus**
E. C. de Oliveira Filho, s.n., NY, (NY00918682), Mato Grosso do Sul

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Oserya pilgeri* (Mildbr.) C.T.Philbrick & C.P.Bove

Figure 2: *Oserya pilgeri* (Mildbr.) C.T.Philbrick & C.P.Bove

Figure 3: *Oserya pilgeri* (Mildbr.) C.T.Philbrick & C.P.Bove

Figure 4: *Oserya pilgeri* (Mildbr.) C.T.Philbrick & C.P.Bove

Figure 5: *Oserya pilgeri* (Mildbr.) C.T.Philbrick & C.P.Bove

REFERENCE

Philbrick, C.T.; Philbrick, P.K.B. & Bove, C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). *Novon 25*: 51-56. DOI: 10.3417/2016023
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Oserya sphaerocarpa Tul.

DESCRIPTION

Leaf: form divided dichotomous; **venation** innervious. **Flower: stamen** 1. **Fruit: costa** 10; **valve** 1 valve persistent.

ADDITIONAL DESCRIPTION

Prostate stem. Leaves a few times forked, widened at the base and provided with two wings. Flowers solitary; pedicel 6-8 mm; tepals 3, very short, filiform, acute, less than 0.5 mm long; stamen 1.5 mm long, anther cordate; ovary ellipsoid, 1 mm high, obtuse, rounded at the base, with two unequal carpels, sutures excentric, oblique. Fruit with one caducous valve, both valves with 5 non-suture ribs.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Roraima)

HERBARIUM MATERIAL

Buck, W.R., 1880, INPA, Roraima
Schomburgk, 431, K, (K000584971), **Typus**

REFERENCE

Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Royen, P. van. 1954. The Podostemaceae of the world III. *Acta Bot. Neerl. 3*(2): 215-263.

Podostemum Michx.

This treatment is composed of the following taxa: *Podostemum*, *Podostemum comatum*, *Podostemum distichum*, *Podostemum flagelliforme*, *Podostemum irgangii*, *Podostemum muelleri*, *Podostemum ovatum*, *Podostemum rutifolium*, *Podostemum saldanhanum*, *Podostemum scaturiginum*, *Podostemum weddellianum*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Podostemum *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13679.

Has as synonym
homotype *Mniopsis* Mart.
homotype *Podostemon* Tul.
heterotypic *Crenias* Spreng.
heterotypic *Devillea* Tul. & Wedd.

DESCRIPTION

Aquatic perennial herbs, attached to rocks in river-rapids and waterfalls. Roots prostrate, elongate, flattened to elliptical in cross-section, green and photosynthetic, branched, with an asymmetric root cap and attached to solid substrata via holdfasts (haptera) and adhesive hairs. Stems arising opposite or subopposite along the flanks of roots, branched or unbranched, erect, elliptical to terete in cross-section at base; monomorphic (vegetative and floral stems of equal length) or dimorphic (flowers restricted to short stems; P. comatum). Leaves distichous, upright or reflexed, arising in ca. 130° or 180° distichous arrangement, simple, lobed, to repeatedly dichotomously to subdichotomously divided, or with a central axis from which arise leaflets in a verticillate manner; leaf divisions arising in a two-dimensional or three-dimensional manner; with a single basal sheath (monothecous) or with two sheaths (dithecous); sessile or petiolate, petioles elliptical to flattened in cross-section; leaf base amplexicaul, boat-shaped (symmetrical) and attaching perpendicular to axis of stem or asymmetrical and attaching obliquely to stem, gradually tapering toward base or markedly wider than petiole, flexible or rigid; stipulate; stipules variable, composed of an extension of the boat-shaped leaf base that sheaths the stem, symmetrical (equal on both sides of leaf base) or asymmetrical (a single stipule on one side of leaf base), flexible, persistent or caducous; symetrical stipules entire or apically divided into 2-11 teeth; teeth triangular, ear-shaped or finger-shaped, flattened or rounded; asymmetric stipules single, laterally placed, triangular to rounded in outline, flexible or rigid, persistent on older stems, apex acute to blunt; simple leaves entire or lobed, with a central vein or lacking; divisions of compound leaves arranged in a 2- or 3-dimensional manner, ultimate leaf divisions awl-shaped, linear or spatulate in outline, flattened to v-shaped in cross-section, with a central vein or lacking, oriented in the same plane as previous division or perpendicular; apices rounded, blunt, acute or apiculate. Flowers 1 to several per stem, apical or axillary, achlamydeous, hermaphroditic, zygomorphic, pedicelate, covered by a sac-like spathella; spathella clavate, smooth to papillate, apex rounded or with a nipple, rupturing apically into several irregularly shaped segments, with or without a cap-like apical segment; tepals usually 3, scale-like, linear, awl-shaped or spatulate, apex acute or blunt, one on either side of the andropodium (lateral tepals), shorter than the ovary, the third (andropodial tepal) arising from the fork between the two stamen filaments or slightly below the fork on the abaxial side of the andropodium, shorter or longer than the lateral tepals (sometimes absent in *P. muelleri)*, 1 tepal arising from the back (dorsal side) of the single stamen filament in *P. flagelliforme*; stamens usually 2 (1 in *P. flagelliforme*), deciduous, borne on a common stalk called an andropodium (or singly in *P. flagelliforme*); andropodium and stamen filaments elongating during anthesis, andropodium longer than ovary; anthers basifixed, quadrangular; thecae parallel sided or projecting outward toward the base, apices of thecae rounded, distinct; thecae at equal heights or inner theca offset (higher) from the outer; dehiscing introsely and longitudinally; pollen in dyads (or monads in *P. flagelliforme*), tricolpate; ovary 2-carpellate**,** 2-locular, oval shaped, oriented obliquely on the pedicel, with 6 longitudinal dark lines or lines lacking, 2 narrow black lines traverse longitudinally from between the stigmas to the base, ovules numerous, placentation axile; stigmas 2, free, entire or with the margins lobed, upright or bent toward the anthers prior to rupture of the spathella, conical when young, divergent and elongating during anthesis; pedicel elongating during anthesis, slightly expanded at the apex; fruit a capsule, 2-locular, with two unequal valves (anisolobous), smaller valve caducous, persistent valve oriented obliquely on the pedicel; each valve 3-ribbed or ribs lacking (smooth), suture margins thickened and rib-like or not thickened; seeds numerous, ovoid, outer integument becoming expanded and sticky when wetted.

COMMENTS

The content of this field was omitted due to formatting problems, please consult our page directly (http://floradobrasil.jbrj.gov.br/).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Caatinga, Central Brazilian Savanna, Atlantic Rainforest, Pampa

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)
Northeast (Bahia)
Central-west (Goiás)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

IDENTIFICATION KEY

1. Stipule visible from only one side of the stem, composed of one asymmetrically placed lobe on leaf base..... 2
2. Mature capsules ribbed……..……..... *P. muelleri*
2'. Mature capsules ribless (smooth)..... 3
3. Stigmas simple; leaves with an expanded ovate base that abruptly narrows at the intersection with the petiole..... *P. ovatum*
3'. Stigmas lobed; leaves lacking an ovate base that abruptly narrows at the intersection with the petiole (a petiole may be lacking or gradually intergrade with the leaf base).
4. Apical leaves dichotomously or subdichotomously divided, with a distinct petiole that gradually tapers to a slightly expanded leaf base ……..…….. P. saldanhanum
4'. Apical leaves 2-lobed, pinnately or dichotomously divided, petioles short or absent..... 5
5. Stem distinct, apical leaves sessile, typically uniformly 2-lobed…….....……..... P. scaturiginum
5'. Stem usually obscured by sheathing leaf bases, apical leaves pinnately to dichotomously lobed or divided with a narrowed petiole……..…….. P. saldanhanum
1. Stipule visible from both dorsal and ventral sides of stem, symmetrical, comprised of a boat-shaped extension of leaf base or two ear-shaped lobes (one on each side of the leaf base, in addition to 3-9 finger-like lobes projecting from the upper region of the petiole base adjacent to the stem)..... 6
6. Andropodium absent (stamen 1); mature capsules ribless (smooth). ……....…….....
……. *P. flagelliforme*
6'. Andropodium present (stamens 2); mature capsules with distinct longitudinal ribs.....7
7. Stipule composed of two ear-shaped lobes, one on each side of the leaf base, in addition to 3-9 finger-like lobes projecting from the upper region of the petiole base adjacent to the stem ……..... *P. irgangii*
7'. Stipules composed of a single symmetrical extension of the sheathing leaf base (entire or divided apically into 2-6 segments).....8
8. Stipules entire .....……. *P. comatum*
8'. Stipules divided into 2-6 triangular teeth 9

9. Stems dimorphic, vegetative stems 5-60 cm long; floral stems 0.2 – 2 cm long (note: floral stems can arise directly from the root or as short branches on otherwise vegetative stems)..... ……..... *P. comatum*
9'. Stems monomorphic, floral stems equal in length to vegetative stems..... 10
10. Plane of the leaf divisions more or less perpendicular to the divisions above and below it (i.e., arising in 3-dimensions), stipular segments 2-7, ultimate leaf divisions v- or u-shaped in cross-section…….....…. *P. distichum*
10'. Plane of the leaf divisions parallel to those above and below it (i.e., arising in 2-dimensions), stipular segments 2, ultimate leaf divisions flat in cross-section..... *P. rutifolium*

REFERENCE

Bove, C.P. & Philbrick, C.T. 2014. Rediscovery of a neotropical rheophyte (Podostemaceae) after 160 years: impacts on conservation unit boundaries (Tocantins, Brazil). Checklist 10 (5): 1170-1173.
Costa, F.G.C.M. Klein, D. E.; Philbrick, C.T.; Bove, C.P. 2018. Silica bodies in leaves of neotropical Podostemaceae: taxonomic and phylogenetic perspectives. Annals of Botany 122:1187 - 1201.
Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Philbrick, C.T. & Novelo, A. 2004. Monograph of *Podostemum* (Podostemaceae). Systematic Botany Monograph, 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.
Sá-Haiad, B.; Torres, C.A.; Righetti, V.H.A.; Gonçalves, M.R.; Mendonça, C.B.F.; Santiago-Fernandes, L.D.R.; Bove, C.P. & Gonçalves-Esteves, V. 2010. Floral structure and palynology of *Podostemum weddellianum* (Podostemaceae, Malpighiales). Pl. Syst. Evol. 290: 141-149.

Podostemum comatum Hicken

DESCRIPTION

Stem: form dimorphic/distinct. **Leaf: stipule** symmetric; **petiole** distinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.8--2.6 (1.7) mm wide. Stems dimorphic, arising 1.1--17 (5.9) mm apart along root; vegetative stems 0.2--720 (12) mm long, larger vegetative stems often twisted; floriferous stems arising from root or as branches on vegetative stems, 0.5--11.5 (1.8) mm long. Leaves petiolate, upright or trailing, arising in a ca. 180° distichous manner, simple (basal leaves only) to 2--11 (5) times dichotomously or subdichotomously divided, 1.8--140 (44) mm long; leaf divisions arising in a 2-dimensional manner; ultimate leaf divisions awl-shaped or linear in outline, flattened in cross-section, apices acute, blunt or rounded, with a faint central vein or vein lacking, 0.2--16.1 (4.4) mm long, 0.05--2 (0.4) mm wide; petioles round, elliptical or flattened in cross-section, 0.7--74 (9) mm long; leaf bases symmetrical, attached perpendicular to stem; stipules composed of an extension of the boat-like sheathing leaf base, on young (short) stems typically caducous, on older (long) stems persistent or absent, when persistent hardened and darkened, 0.1--2.6 (0.6) mm long, entire or with 2--3 (2) straight or curved, flattened triangular teeth, teeth 0.05--1.7 (0.2) mm long. Flowers 1--4 (1) per stem, spathella smooth to minutely papillate, 2.4--3.6 (3) mm long, 1.1--1.9 (1.5) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.5--2.1 (1.5) mm long; andropodial tepal 0.4--1.9 (1.9) mm long; andropodium 0.4--1 (0.7) mm long prior to anthesis, during anthesis to 1.3--3.4 (2.5) mm; stamens 2; filaments 0.4--0.8 (0.6) mm long prior to anthesis, during anthesis to 0.3--2.3 (1) mm; anthers 0.9--1.5 (1.3) mm long, 0.6--0.8 (0.8) mm wide; pollen dyads 27--35 (30) mm long, 17--25 (20) mm wide; ovary 1--2.7 (1.6) mm long, 0.7--1.5 (1.1) mm wide; stigmas entire, 0.4--1 (0.6) mm long prior to anthesis, during anthesis to 0.5--1.6 (1.2) mm; pedicels 0.4--1.1 (0.7) mm long prior to anthesis, during anthesis to 1.5--5.5 (4) mm; capsules 1.5--2.6 (2) mm long, 1--2.4 (1.2) mm wide; 6 ribbed (3 per valve), suture margins also rib-like; pedicels in fruit 1.2--5.7 (4) mm long; seeds 0--68 (36) per capsule, 0.2--0.4 (0.3) mm long, 0.1--0.3 (0.2) mm wide.

COMMENTS

Podostemum comatum is locally abundant where it occurs. Plants grow on vertical to near vertical surfaces of waterfalls, or on near horizontal surfaces of rocks in the deepest and swiftest moving currents. This species can occur alone or with *Podostemum distichum*, *P. rutifolium*, *P. muelleri and Tristicha trifaria*. The species has been collected at elevations ranging from 20 - 800 m.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest, Pampa

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.T. Philbrick, 5352, ICN, Rio Grande do Sul
E. H. G. Ule, 804, B (B 10 0383449), **Typus**
Ule, 804, P (P00167755), **Typus**
Ule E., 804 (P00167755), Santa Catarina, **Typus**
Dusen, 16540, K, (K000584949)
E. H. Ule, 804, US, (US00145936), Santa Catarina, **Typus**

REFERENCE

Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Philbrick, C.T. & Novelo, A. 2004. Monograph of *Podostemum* (Podostemaceae). Systematic Botany Monograph, 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum distichum (Cham.) Wedd.

Has as synonym
basionym *Lacis disticha* Cham.
homotype *Podostemum chamissone* Tul.
heterotypic *Podostemum glaziovianum* Warm.
heterotypic *Podostemum schenckii* Warm.

DESCRIPTION

Stem: form monomorphic/distinct/indistinct. **Leaf: stipule** symmetric; **petiole** distinct/indistinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.6--2.9 (1.4) mm wide. Stems monomorphic, arising 0.8--11 (5.5) mm apart along root, 0.4 -- 600 (6.7) mm long, larger stems often twisted. Leaves petiolate, perpendicular to the stem axis, reflexed or upright, arising in a ca. 180° distichous manner, highly variable in form, with 1-3 central axises from which segments arise in an irregular or verticillate manner, to 2--8 (5) times dichotomously or subdichotomously divided, or with a combination of dichotomous and trichotomous divisions; 2.2--41 (15.1) mm long; leaf divisions arising in a 3-dimensional manner (more or less perpendicular to the plane of the previous division); ultimate divisions awl-shaped, v-shaped or u-shaped in cross-section, apices acute or rarely apiculate or blunt, with a faint central vein or lacking, 0.05--7 (1.7) mm long, 0.05--0.5 (0.2) mm wide; petioles oval to flattened in cross-section, 0.5--2 (1.1) mm long; leaf bases symmetrical, attached perpendicular to the stem axis; flexible or rigid, often persistent and darkened on older stems; stipules composed of a boat-shaped extension of the sheathing leaf base, persistent, hardened and darkened on older stems, 0.2--1.4 (0.7) mm long, with 2--6 (3) straight or incurved, flattened triangular teeth, teeth 0.05--3 (0.7) mm long, lateral teeth typically longer than medial teeth. Flowers 1--5 (1) per stem; spathella smooth to minutely papillate, 1.5--5.5 (2.9) mm long, 0.9--2.2 (1.2) mm wide, apex rounded or with a nipple, sometimes with a cap-like apical segment that becomes reflexed after spathella rupture; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.5--1.9 (1) mm long; andropodial tepal 0.5--1.8 (0.9) mm long; andropodium 0.3--1.6 (0.8) mm long prior to anthesis, during anthesis to 1.3--5.2 (3) mm; stamens 2; filaments 0.3--1.1 (0.5) mm long prior to anthesis, during anthesis to 0.3--2.6 (1.4) mm; anthers 0.6--1.7 (1.1) mm long, 0.5—0.9 (0.7) mm wide; pollen dyads 27--35 (28) mm long, 15--23 (18) mm wide; ovary 0.7--2.7 (1.5) mm long, 0.4--2.1 (1.2) mm wide; stigmas entire, 0.2--1.5 (0.6) mm long prior to anthesis, during anthesis to 0.4--2 (1.2) mm; pedicels 0.3--2.5 (0.8) mm long prior to anthesis, during anthesis to 1.2--6.1 (3.7) mm; capsules 1.3--2.7 (1.9) mm long, 0.9--1.9 (1.3) mm wide; 6 ribbed (3 each valve), suture margins also rib-like; pedicels in fruit 1.6--7.8 (4.2) mm long; seeds 0--97 (31) per capsule, 0.2--0.4 (0.4) mm long, 0.1--0.3 (0.3) mm wide.

COMMENTS

Podostemum distichum is locally abundant where it occurs, it has been collected at elevations ranging from 60--1200 m. Plants can form dense growth on horizontal and vertical rock surfaces. The species can occur as the only podostemad or with *P. irgangii*, *P. muelleri*, *P. rutifolium*, *Tristicha trifaria* and at least one *Apinagia* species. *Podostemum distichum* is distinguished by two features: stipule divided into 2-6 teeth and leaf divisions arising more or less perpendicular to the plane of the previous division, i.e., in a 3-demensional manner. This latter feature can be subtle, especially when leaves are long and flexible. *Podostemum distichum* is morphologically the most variable species in the genus. The divided leaves can be dichotomous, subdichotomous, irregularly divided, or verticillate. Such variation can be found among leaves on the same plant. Stipular teeth vary in number and form (straight or curved). The apex of the teeth can be acute or blunt. The stipule texture also varies from thin and membranous to thickened and rigid, the latter especially on large plants.
Podostemum distichum can be confused with *P. irgangii* in populations where the former produce semi-verticillate or verticillate leaves. It is notable that none of the numerous isotypes of *P. distichum* have the stipule types found in *P. irgangii*.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Central Brazilian Savanna, Atlantic Rainforest, Pampa

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)
Southeast (Minas Gerais, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.T. Philbrick, 5436, ICN, Rio Grande do Sul
F. Sellow, s.n., P (P00167742), **Typus**

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum flagelliforme (Tul. & Wedd.) C.T.Philbrick & Novelo

Has as synonym
basionym *Devillea flagelliformis* Tul. & Wedd.

DESCRIPTION

Stem: form monomorphic/indistinct. **Leaf: stipule** symmetric; **petiole** distinct. **Flower: androphore** absent; **stamen** 1; **stigma** simple. **Fruit: surface** smooth.

ADDITIONAL DESCRIPTION

Roots 0.1--0.3 (0.2) mm wide. Stems monomorphic, 0.2--2 (1) cm long. Leaves petiolate, upright, arising in a 180° distichous arrangement, simple (occasional at base of stem) or 1--6 (2) times dichotomously divided, 8.5--25 (16.5) mm long; ultimate leaf divisions linear; divisions arising in a 2-dimensional manner, flattened, apices acute, with a faint vein or lacking, 0.5--5.2 (2.2) mm long, 0.1--0.3 (0.1) mm wide; petioles round to elliptical in cross-section, 4.5--12.5 (8) mm long; leaf bases symmetrical, attached perpendicular to stem axis; stipules composed of a symmetrical boat-shaped extension of the leaf base, 1--1.9 (1.1) mm long, entire, caducous, absent from leaves 1-2 nodes back from the apex. Flowers 1-2 (1) per stem; spathella smooth to minutely papillate, 1.6--3.1 (2.5) mm long, 0.7--1.2 (1) mm wide, apex rounded or with a nipple; tepals 3, linear or spatulate, straight, apex blunt or acute; lateral tepals 0.3--0.7 (0.4) mm long; 1 staminal tepal arising from the back (dorsal) side of the stamen filament**,** 0.3--0.5 (0.4) mm long; stamen 1, filaments 0.7--1.1 (0.8) mm long prior to and during anthesis; anthers 0.5--0.8 (0.6) mm long, 0.5--0.8 (0.6) mm wide; pollen monads 20--22.5 (22) mm long, 15--18 (16) mm wide; ovary 0.8--1.2 (0.9) mm long, 0.6--1.1 (0.9) mm wide; stigmas entire, 0.1--0.2 (0.1) mm long prior to anthesis, during anthesis to 0.2 mm; pedicels 0.4--1.6 (0.9) mm long prior to anthesis, during anthesis to 0.7--1 (0.9) mm; capsules 1--1.2 (1.1) mm long, 0.9--1 (0.9) mm wide, smooth (lacking ribs); pedicels in fruit 4--6.2 (5.2) mm long.

COMMENTS

The content of this field was omitted due to formatting problems, please consult our page directly (http:// floradobrasil.jbrj.gov.br/).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Tocantins)

HERBARIUM MATERIAL

Weddell, H.A., 2367, P, Tocantins, **Typus**
Weddell H.A., 2367 (P00167757), Tocantins, **Typus**

Weddell H.A., 2367 (P00167758), Tocantins, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

Figure 2: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

Figure 3: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

Figure 4: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

Figure 5: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

Figure 6: *Podostemum flagelliforme* (Tul. & Wedd.) C.T.Philbrick & Novelo

REFERENCE

Bove, C.P. & Philbrick, C.T. 2014. Rediscovery of a neotropical rheophyte (Podostemaceae) after 160 years: impacts on conservation unit boundaries (Tocantins, Brazil). Checklist 10(5): 1170-1173.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum irgangii C.T.Philbrick & Novelo

DESCRIPTION

Stem: form monomorphic/distinct. **Leaf: stipule** asymmetric/lobate/auriculate; **petiole** indistinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.2--2.1 (0.9) mm wide. Stems monomorphic, arising 0.2--20 (4.3) mm apart along roots, erect, 1--42 (20) mm long. Leaves petiolate, arising perpendicular to the stem axis or reflexed, arising in ca. 180° distichous arrangement, with a central axis from which arise leaflets in a verticillate manner, 3.1--7.2 (5.2) mm long, leaf divisions arising in a 3-dimensional manner; with 5--14 (8) verticils per leaf, 6--11 (9) leaflets per verticil, distance between verticils 0.3--0.6 (1.5) mm; ultimate leaf segments awl shaped, parallel margined or triangular, arising in a 3-dimensional manner, rounded to triangular in cross-section, incurved, apices acute, 0.2--0.9 (0.6) mm long; petioles round to elliptical in cross-section, 0.2--0.4 (0.3) mm long; leaf bases symmetrical, attached perpendicular to stem axis, rigid; stipules of two forms, both types rigid, symmetrical, persisting, becoming hardened and darkened on older portions of the stem: 1) 2 auriculate, lobed or unlobed segments detached from the leaf base, on either side of the petiole base, perpendicular to the stem axis, or at an angle of up to a 45^{o} relative to the stem axis, 0.7--1.1 (1) mm wide, projecting 0.4--0.6 (0.5) mm from stem; 2) 3--9 (4) upright, finger-like structures traversing the adaxial side of the petiole adjacent to the stem, 0.2--0.5 mm (0.4) long, blunt. Flowers 1-7 (1) per stem, spathella smooth to papillate, 2.3--3 (2.4) mm long, 1.1--2.1 (1.5) mm wide, apex rounded or minutely cleft, with an apical ridge, cap-like apical portion becoming reflexed after spathella rupture; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.6--1.9 (1.2) mm long; andropodial tepal 0.4--1.5 (1) mm long; andropodium 0.3--1.7 (1) mm long prior to anthesis, during anthesis to 2.2--4.6 (3.4) mm; stamens 2; filaments 0.3--1.2 (0.5) mm long prior to anthesis, during anthesis to 1.1--1.7 (1.6) mm; anthers 0.8--2.1 (1.3) mm long, 0.7--1.3 (0.8) mm wide; pollen dyads 27--40 (35) mm long, 20--25 (23) mm wide; ovary 0.6--2.1 (1.4) mm long, 0.8--1.6 (1.1) mm wide; stigmas entire, 0.4--1.4 (0.6) mm long prior to anthesis, during anthesis to 0.9--1.6 (1.2) mm; pedicels 0.3--3.1 (1) mm long prior to anthesis, during anthesis to 0.6-- 5 (2.4) mm; capsules 1.2--2.2 (1.6) mm long, 0.9--1.7 (1.2) mm wide; 6 ribbed (3 per valve), suture margins also rib-like; pedicels in fruit 1--6 (2.4) mm long; seeds 2--70 (38) per capsule, 0.2--0.4 (0.3) mm long, 0.1--0.3 (0.2) mm wide.

COMMENTS

The content of this field was omitted due to formatting problems, please consult our page directly (http://floradobrasil.jbrj.gov.br/).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences

South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

L.B. Smith, 13892, R, Santa Catarina
C.T. Philbrick, 5466A, MO (MO176295), Santa Catarina, **Typus**
G. Hatschbach, 19182, US, (US00365334), Paraná, **Typus**
G. Hatschbach, 19182, MBM (MBM006427), Paraná, **Typus**

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum muelleri Warm.

Has as synonym
heterotypic *Podostemum dentatum* P.Royen
heterotypic *Podostemum uruguayense* Warm.

DESCRIPTION

Stem: form monomorphic/distinct/indistinct. **Leaf: stipule** symmetric; **petiole** indistinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.3--8 (1.2) mm wide. Stems monomorphic, arising 1--15.4 (4) mm apart along root, 0.2--70 (4) mm long. Leaves sessile or petiolate, upright, arising in a ca 130° distichous arrangement (making stems appear dorsiventral), simple (usually) to 1-4 times dichotomously divided, 0.1--34 (5.1) mm long, 0.2--1.5 (0.4) mm wide; blade of simple leaves and ultimate division of compound leaves linear to spatulate, leaf divisions arising in a 2-dimensional manner; flattened in cross-section, apices blunt, rounded, acute or apiculate, with a faint central vein or lacking; 0.5--15 (4.1) mm long, 0.2--1.5 (0.4) mm wide; petioles oval to flattened in cross-section, 2.3--21.2 (8.3) mm long; leaf bases asymmetrical, equal in width to the blade to markedly wider, flexible or rigid, obliquely attached to stem; stipules composed of a single, asymmetrically placed marginal or submarginal lobe on one side of leaf base, 0.05-1.6 (0.5) mm long, 0.05--1.4 (0.3) mm wide, entire or slightly emarginate, flattened, flexible or thickened and rigid, persistent and hardened on older portions of stems. Flowers 1-10 (1) per stem; spathella smooth to minutely papillate, 2--5 (3) mm long, 0.8--1.8 (1.3) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.5--1.9 (1.1) mm long; andropodial tepal 0.1--1.3 (0.7) mm long, often lacking; andropodium 0.1--3 (1.2) mm long prior to anthesis, during anthesis to 0.8--3 (2) mm; stamens 2; filaments 0.1--0.8 (0.4) mm long prior to anthesis, during anthesis to 0.4--1.5 (1) mm; anthers 0.3--1.5 (0.9) mm long, 0.3--0.9 (0.6) mm wide; pollen dyads 30--40 (33) mm long, 20--25 (20) mm wide; ovary 0.8--2.3 (1.6) mm long, 0.6--1.8 (1.2) mm wide; stigmas entire, 0.2--0.9 (0.5) mm long prior to anthesis, during anthesis to 0.6--1.2 (0.9) mm; pedicels 0.4--2.5 (0.7) mm long prior to anthesis, during anthesis to 1.6--6.4 (4) mm; capsules 1--2.7 (1.8) mm long, 0.9--1.9 (1.3) mm wide; 6 ribbed (3 per valve), suture margins also rib-like; pedicels in fruit 1.7--7 (3.8) mm long; seeds 0--105 (35) per capsule, 0.2--0.5 (0.4) mm long, 0.1--0.4 (0.3) mm wide.

COMMENTS

Podostemum muelleri can be locally abundant or rare. Plants can form dense growth on horizontal to vertical rock surfaces. The species can occur as the only podostemad or with *P. comatum, P. distichum, P. irgangii, P. rutifolium, Tristicha trifaria* and at least one *Apinagia* species. It is characterized by its dorsiventral stem, asymmetrically placed single stipule, ca. 130° distichous leaf arrangement, oblique leaf attachment to the stem and ribbed capsules. Podostemum muelleri is a variable species morphologically. Much variation is associated with plant size. Plants in some populations are small and possess leaves in which the leaf base is barely wider than the blade. In these populations the leaf base and stipule are thin and fexible, and the stipule lies flat against the leaf base. Other populations, composed of robust plants, possess thickened, rigid leaf bases and stipules. In the latter populations the thickened stipules project from the leaf bases at a marked angle.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest, Pampa

Vegetation Types

Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.T. Philbrick, 5238, ICN, Rio Grande do Sul
Ule E., 1876, P (P00167739), **Typus**
G. Müller, s.n., B (B 10 0249228), **Typus**

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum ovatum C.T.Philbrick & Novelo

Has as synonym
homotype *Crenias glazioviana* (Warm.) C.D.K.Cook & Rutish.
homotype *Mniopsis glazioviana* Warm.

DESCRIPTION

Stem: form monomorphic/indistinct. **Leaf: stipule** asymmetric; **petiole** distinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.2--0.8 (0.5) mm wide. Stems monomorphic, arising 0.6--3.7 (2) mm apart along root, 0.3--17 (5) mm long. Leaves petiolate, upright, arising in a 130° distichous arrangement (making stem appear dorsiventral), simple (occasional at base of young stems) or 1--7 (1) times dichotomously divided, 5.2--12.5 (9.2) mm long; ultimate leaf divisions linear, parallel margined or slightly expanded near apex, divisions arising in a 2-dimensional manner, flattened, apices blunt or rounded, with a faint central vein or lacking, 0.8--7 (2.8) mm long, 0.2--0.3 (0.2) mm wide; petioles flattened to elliptical in cross-section, 2--7 (3.6) mm long; leaf bases abruptly widened, asymmetrical, ovate, obliquely attached to stem; stipules composed of a single, asymmetrically placed submarginal lobe on one side of leaf base, 0.3--1.2 (0.6) mm long, entire, triangular, acute or blunt, persistent and sometimes hardened on old leaf bases. (Only preanthesis flowers available for study). Flowers 1-6 (4) per stem; spathella smooth to minutely papillate, 1.3--2.5 (1.7) mm long, 0.9--1.4 (1) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.6--1.1 (0.9) mm long; andropodial tepal 0.4--1 (0.6) mm long; andropodium 0.3--0.9 (0.6) mm long; stamens 2, filaments 0.3--0.4 (0.3) mm long; anthers 0.3--0.8 (0.6) mm long, 0.3--0.7 (0.5) mm wide; pollen dyads 37--48 (43) mm long, 20--28 (25) mm wide; ovary 0.8--1.4 (1) mm long, 0.7--1.2 (0.9) mm wide; stigmas entire, 0.3--0.8 (0.6) mm long; pedicels 0.3--0.7 (0.5) mm long; capsules 1.6---2.2 (1.9) mm long, 1.5--1.9 (1.7) mm wide, smooth (lacking ribs); pedicels in fruit 1.2--1.6 (1.3) mm long; seeds 120--203 (140) per capsule, 0.27--0.34 (0.3) mm long, 0.15--0.23 (0.2) mm wide.

COMMENTS

Podostemum ovatum is endemic to Espírito Santo, Rio de Janeiro, and São Paulo state and is characterized by an ovate leaf base, smooth (ribless) capsules, two stamens, and entire (unlobed) stigmas. Although *P. flagelliforme*, P. saldanhanum, P. scaturiginum,and *P. weddellianum* also have smooth capsules, three of these (*P. saldanhanum, P. scaturiginum, P. weddellianum*) have lobed stigmas and *P. flagelliforme* has a single stamen.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Espírito Santo, Rio de Janeiro, São Paulo)

HERBARIUM MATERIAL

C.P. Bove, 1075, R, Rio de Janeiro
A.F.M. Glaziou, 12191, K, (K001073346), Rio de Janeiro, **Typus**
A.F.M. Glaziou, 12193, NY, (NY00527539), K, (K000195041), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum ovatum* C.T.Philbrick & Novelo

Figure 2: *Podostemum ovatum* C.T.Philbrick & Novelo

Figure 3: *Podostemum ovatum* C.T.Philbrick & Novelo

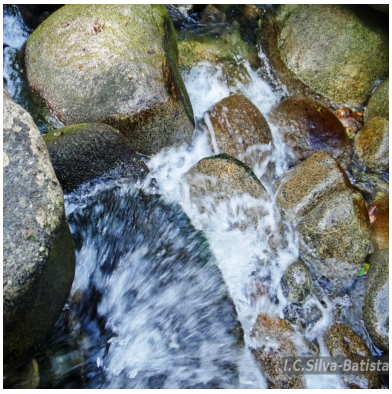

Figure 4: *Podostemum ovatum* C.T.Philbrick & Novelo

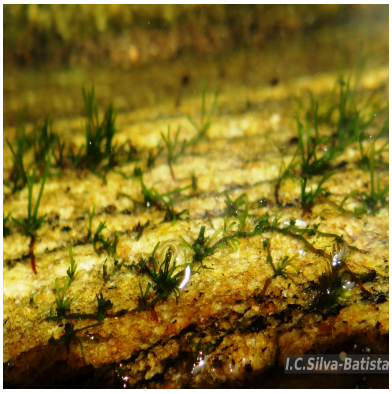

Figure 5: *Podostemum ovatum* C.T.Philbrick & Novelo

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum rutifolium Warm.

This treatment is composed of the following taxa: *Podostemum rutifolium*, *Podostemum rutifolium subsp. rutifolium*.

DESCRIPTION

Stem: form monomorphic/distinct. **Leaf: stipule** symmetric; **petiole** distinct/indistinct. **Flower: androphore** present; **stamen** 2; **stigma** simple. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.2--3.4 mm wide. Stems monomorphic, arising 0.7--11 mm apart along root, 0.1 -- 94 mm long. Leaves sessile or petiolate, upright, arising a ca. 180° distichous arrangement, simple (occasional near stem base) to 1--5 times dichotomously to subdichotomously divided, simple leaves 0.7--9.3 mm long, 0.2--2.7 mm wide, entire, apices rounded, blunt, acute or apiculate; compound leaves divided to the midrib or not, 1.2--21 (5.7) mm long; divisions arising in a 2-dimensional manner; ultimate leaf divisions flattened, apices rounded, blunt, acute or apiculate; compound leaves divided to the midbrid or not, 1.2--21 mm long, 0.2--1.5 mm wide, flattened, apicves rounded, blunt, acute or apiculate, with or without a fair central vein; petioles elliptical, rounded or flattened in cross-section, 0.1--5.3 mm long; leaf bases symmetrical, attached perpendicular to stem axis; stipules composed of an extension of the boat-shaped leaf base; persistent or caducous, often hardened and darkened on older stems, 0.01--0.6 mm long, with 2 flattened triangular teeth, teeth 0.05--0.4 mm long. Flowers 1--5 per stem; spathella smooth to minutely papillate, 1.3--4.5 mm long, 0.7--2.1 mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute or blunt; lateral tepals 0.6--1.7 mm long; andropodial tepal 1-2, 0.2--1.2 mm long; andropodium 0.3--1.4 mm mm long prior to anthesis, during anthesis to 0.6--4.2 mm; stamens 2; filaments 0.2--1 mm long prior to anthesis, during anthesis to 0.2--2 mm; anthers 0.2--1.7 mm long, 0.4--1 mm wide; pollen dyads 22--35 mm long, 12--23 mm wide; ovary 0.4--2.1 mm long, 0.4--1.5 mm wide; stigmas entire, 0.2--1.1 mm long prior to anthesis, during anthesis to 0.3--2.8 mm; pedicels 0.2--2.3 mm long prior to anthesis, during anthesis to 1.1--6.6 mm. Capsules 1.2--2.3 mm long, 0.8--1.6 mm wide; 6 ribbed (3 per valve), suture margins also rib-like; pedicel in fruit 1.2--7.8 mm long; seeds 0--85 per capsule, 0.2--0.6 mm long, 0.1--0.4 mm wide.

COMMENTS

The content of this field was omitted due to formatting problems, please consult our page directly (http://floradobrasil.jbrj.gov.br/).

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest, Pampa

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

G. Hatschbach, 15868, MBM, Paraná

Nuernberg, A., 1406, FLOR (FLOR0052476), Santa Catarina
Nuernberg, A., 1325, FLOR (FLOR0052485), Santa Catarina

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum rutifolium* Warm.

Figure 2: *Podostemum rutifolium* Warm.

Figure 3: *Podostemum rutifolium* Warm.

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum rutifolium Warm. subsp. *rutifolium*

Has as synonym
heterotypic *Podostemum ostenianum* Warm.

DESCRIPTION

Roots 0.2--3.4 (1) mm wide. Stems monomorphic, arising 1.1--11 (4.4) mm apart along root, 0.1 -- 94 (6) mm long. Leaves sessile or petiolate, upright, arising a ca. 180° distichous arrangement, simple (occasional near stem base) to 1--5 (2) times dichotomously to subdichotomously divided, 0.9--6.1 (2.8) mm long, 0.2--1.5 (0.7) mm wide, entire, apices rounded, blunt, acute or apiculate; compound leaves divided to the midrib or not, 1.2--21 (5.7) mm long; divisions arising in a 2-dimensional manner; ultimate leaf divisions flattened, apices rounded, blunt, acute or apiculate, with or without a faint central vein, 0.3--9 (1.8) mm long, 0.2--1.5 (0.5) mm wide; petioles elliptical or flattened in cross-section, 0.1--5.3 (1.1) mm long; leaf bases symmetrical, attached perpendicular to stem axis; stipules composed of an extension of the boat-shaped leaf base; persistent or caducous, often hardened and darkened on older stems, 0.01--0.4 (0.3) mm long, with 2 flattened triangular teeth, teeth 0.05--0.4 (0.1) mm long. Flowers 1--5 (1) per stem; spathella smooth to minutely papillate, 1.3--4.5 (2.6) mm long, 0.8--2.1 (1.2) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.6--1.7 (1) mm long; andropodial tepal 0.2--1.2 (0.8) mm long; andropodium 0.3--1.4 mm (0.7) mm long prior to anthesis, during anthesis to 0.6--4.2 (2.4) mm; stamens 2; filaments 0.2--1 (0.5) mm long prior to anthesis, during anthesis to 2 (0.9) mm; anthers 0.2--1.7 (1.1) mm long, 0.4--1 (0.8) mm wide; pollen dyads 27--35 (30) mm long, 17--23 (20) mm wide; ovary 0.4--2.1 (1.5) mm long, 0.4--1.5 (1.1) mm wide; stigmas entire, 0.2--0.9 (0.5) mm long prior to anthesis, during anthesis to 0.3--2.8 (1) mm; pedicels 0.2--2.3 (0.6) mm long prior to anthesis, during anthesis to 1.1--6.6 (4.1) mm; capsules 1.2--2.3 (1.8) mm long, 0.8--1.6 (1.4) mm wide; 6 ribbed (3 per valve), suture margins also rib-like; pedicel in fruit 2--7.8 (4.3) mm long; seeds 0--85 (5) per capsule, 0.2--0.6 (0.3) mm long, 0.1--0.4 (0.2) mm wide.

COMMENTS

Podostemum rutifolium subsp. *rutifolium* is readily distinguished from all other species (except subsp. *ricciiform)* when ample material is available. The leaf divisions of *P. rutifolium* subsp. *rutifolium* arise in the same plane as those of the next successive division (2-dimensional) and the ultimate leaf divisions are flat in cross-section. Stipules are divided into two apical teeth and capsules have prominent ribs. When material is limited, *P. rutifolium* subsp. *rutifolium* and *P. comatum* can be difficult to distinguish. When flowering material is available the species are distinguished by the monomorphic (*P. rutifolium*) versus dimorphic (*P. comatum*) stems. However, when only small vegetative plants are available it is difficult to distinguish the taxa as both have similar leaves and stipules when young. It can be distinguished from the subsp. ricciiforme by the form of the lateral tepals: acute and not darkened in the typical form and blunt and darkened in ricciiform.
Podostemum rutifolium subsp. *rutifolium* is typically locally abundant where it occurs. Plants can form dense growth on horizontal to vertical rock surfaces. The species can occur alone or with *P. distichum*, P. irgangii, P. muelleri, Tristicha trifaria and at least one *Apinagia* species. The species has been collected at elevations ranging from sea-level to 900 m.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest, Pampa

Vegetation Types

Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.T. Philbrick, 5013, ICN, Rio Grande do Sul
L.B. Smith, 9619, US, (US00365339), Santa Catarina
L.B. Smith, 9619, NY, (NY00686588), Santa Catarina

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum rutifolium subsp. rutifolium* Warm.

Figure 2: *Podostemum rutifolium subsp. rutifolium* Warm.

Figure 3: *Podostemum rutifolium subsp. rutifolium* Warm.

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum saldanhanum (Warm.) C.T.Philbrick & Novelo

Has as synonym
homotype *Crenias saldanhana* (Warm.) C.D.K.Cook & Rutish.

DESCRIPTION

Stem: form monomorphic/indistinct. **Leaf: stipule** asymmetric; **petiole** distinct. **Flower: androphore** present; **stamen** 2; **stigma** lobate. **Fruit: surface** smooth.

ADDITIONAL DESCRIPTION

Roots 0.2--1 (0.6) mm wide. Stems monomorphic, arising 0.4-11 (5) mm apart along root, 0.5--13 (3.1) mm long**.** Leaves petiolate, upright, arising in a 180° distichous arrangement, simple (occasional at base of stem) or 1--5 (2) times dichotomously divided, 3--35 (20) mm long; ultimate leaf divisions linear, parallel margined or slightly expanded near apex, divisions arising in a 2-dimensional manner, flattened, apices rounded, blunt, or acute, with a faint central vein or lacking, 1.7--16.5 (8) mm long, 0.2--0.8 (0.4) mm wide; petioles flattened to elliptical in cross-section, 2--17 (11) mm long, gradually widened to the amplexicaul leaf base; leaf bases symmetrical, attached perpendicular to stem axis; stipules composed of a single, asymmetrically placed, marginal lobe on one side of leaf base, 0.1--2.3 (1.3) mm long, entire, acute, caducous. Flowers 1-13 (2) per stem; spathella smooth to minutely papillate, 2.8--3.6 (3.1) mm long, 1.2--1.4 (1.3) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.9--1.7 (1.2) mm long; andropodial tepal 0.4--1.2 (0.7) mm long; andropodium 1.1--1.4 (1.2) mm long prior to anthesis, during anthesis to 1.2--3.8 (2.3) mm; stamens 2, filaments 0.3 [N=1] mm long prior to anthesis, during anthesis to 0.2--1.1 (0.5) mm; anthers 0.6--0.7 (0.65) mm long, 0.4--0.7 (0.5) mm wide; pollen dyads 42--53 (48) mm long, 20--35 (28) mm wide; ovary 1.3--1.8 (1.6) mm long, 0.8-1.5 (1.2) mm wide; stigmas with 2--5 (4) lobes, 0.3--0.6 (0.5) mm long prior to anthesis, during anthesis to 0.6--0.9 (0.8) mm, lobes 0.1--0.8 (0.3) mm long; pedicels 0.2--1.2 (1.1) mm long prior to anthesis, during anthesis to 0.4--3 (1.3) mm; capsules 1.3--1.9 (1.7) mm long, 1-1.6 (1.3) mm wide, smooth (lacking ribs); pedicels in fruit 0.9--2 (1.2) mm long; seeds 0--124 (106) per capsule, 0.18--0.28 (0.23) mm long, 0.11--0.2 (0.14) mm wide.

COMMENTS

Podostemum saldanhanum is endemic from Rio de Janeiro State and characterized by dichotomously divided leaves, a gradual integration between the narrow leaf petiole and the expanded leaf base, stipules that are usually linear, ribless (smooth) capsules, and lobed stigmas.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (Rio de Janeiro)

HERBARIUM MATERIAL

C.P. Bove, 1042, R, Rio de Janeiro
A.F.M. Glaziou, 13146, P (P00167651), Rio de Janeiro, **Typus**
A.F.M. Glaziou, 13146, K, (K001073349), Rio de Janeiro, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum saldanhanum* (Warm.) C.T.Philbrick & Novelo

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Podostemum scaturiginum (Mart.) C.T.Philbrick & Novelo

Has as synonym
homotype *Crenias scaturiginum* (Mart.) C.D.K.Cook & Rutish.
homotype *Crenias scopulorum* Spreng.
homotype *Mniopsis scaturiginum* Mart.

DESCRIPTION

Stem: form monomorphic/distinct/indistinct. **Leaf: stipule** asymmetric; **petiole** distinct/indistinct. **Flower: androphore** present; **stamen** 2; **stigma** lobate. **Fruit: surface** ribbed.

ADDITIONAL DESCRIPTION

Roots 0.5--1.8 (0.7) mm wide. Stems monomorphic, arising 1.1--4 (2.5, N=8) mm apart along root, 0.5--3 (1.7) cm long. Leaves sessile, upright, arising in a 130° distichous arrangement (making stem appear dorsiventral), entire (occasionally near stem apex) or 2--3 (2) lobed, 1.6--6.5 (2.6) mm long; lobes spatulate or parallel margined, often reflexed, flattened, apices rounded, blunt, or acute, with a faint central vein or lacking, 0.3--3.6 (1.5) mm long, 0.2--1.6 (0.7) mm wide; leaf bases asymmetrical, obliquely attached to stem; stipules composed of a single, asymmetrically placed marginal or submarginal lobe on one side of the leaf base, 0.5--1.3 (0.7) mm long, often leaf-like, blunt to rounded, entire, persistent, becoming hardened on older stems. Flowers 1-16 (4) per stem; spathella smooth to minutely papillate, 1.7--3.2 (2.4) mm long, 1.2--1.7 (1.4) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.8--1.6 (1.2) mm long; andropodial tepal 0.4--1 (0.7) mm long; andropodium 0.6--1.2 (0.9) mm long prior to anthesis, during anthesis to 0.8--2 (1.3) mm; stamens 2, filaments 0.2--0.9 (0.5) mm long prior to anthesis, during anthesis to 0.3--1 (0.7) mm; anthers 0.7--1.2 (0.8) mm long, 0.3--1.2 (0.7) mm wide; pollen dyads 40--48 (45) mm long, 25--30 (28) mm wide; ovary 1--1.7 (1.3) mm long, 0.8--1.5 (1.1) mm wide; stigmas entire (rare) or with 2--7 (3) lobes, 0.5--0.8 (0.6) mm long prior to anthesis, during anthesis to 0.4--1 (0.7) mm, lobes 0.1--0.7 (0.3) mm long; pedicels 0.3--1 (0.4) mm long prior to anthesis, during anthesis to 0.6--2.6 (1.8) mm; capsules 1.1--3 (1.3) mm long, 0.8--1.4 (1.1) mm wide, smooth (lacking ribs); pedicels in fruit 0.6--5.5 (2.3) mm long; seeds 0--172 (80) per capsule, 0.17--0.25 (0.21) mm long, 0.12--0.18 (0.16) mm wide.

COMMENTS

Leaves of *P. scaturiginum* are entire or two lobed. The lobes can be obscured when the leaves are clustered near the apex. Leaves several nodes back from the stem apex lose their lobes and can thus appear entire. Similar to *P. saldanhanum* and *P. weddellianum*, the stigmas of *P. scaturiginum* are lobed.

The stipules of P. scaturiginum can be large (relative to the other species) and leaf-like. Van Royen (1954, p. 225) interpreted the large stipules as smaller leaves rather than stipules: "Leaves in 4 orthostichies, the largest leaves in the outer orthostichies, and two other orthostichies with smaller leaves." Stipule form varies. The outline of the stipule can be entire or with an irregular margin (Fig. 28d-k). The apex can be rounded (often asymmetrically so) to blunt or rarely acute.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Central-west (Goiás)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro)

HERBARIUM MATERIAL

C.P. Bove, 2135, R, Minas Gerais
A.F.M. Glaziou, 22012, K, (K001073343), K, (K001073342), IAN (IAN094369)
A.F.M. Glaziou, 22013, K, (K001073340), K, (K001073341), Goiás

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

PHILBRICK, C.T. & NOVELO, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.

Podostemum weddellianum (Tul.) C.T.Philbrick & Novelo

Has as synonym
homotype *Crenias weddelliana* (Tul.) C.D.K.Cook & Rutish.
homotype *Mniopsis weddelliana* Tul.
heterotypic *Castelnavia fruticulosa* Tul.& Wedd.

DESCRIPTION

Stem: form monomorphic/indistinct. **Leaf: stipule** asymmetric; **petiole** distinct. **Flower: androphore** present; **stamen** 2; **stigma** lobate. **Fruit: surface** smooth.

ADDITIONAL DESCRIPTION

Roots 0.2-- 1.8 (0.7) mm wide. Stems monomorphic, arising 0.6--5 (3) mm apart along root, 0.2--19 (3) mm long. Leaves sessile or petiolate, upright, arising in a 130° distichous arrangement (making stem appear dorsiventral), entire (occasional at base of stem) or pinnately or palmately lobed, 1-24 (5.4) mm long; apices of entire leaves rounded, blunt, acute or apiculate, 1.5--10.2 (2.6) mm long, 0.2--1.6 (0.7) mm wide; lobed leaves with 2-14 (3) lobes, lobes flattened, apices rounded, blunt, acute or apiculate, with a faint central vein or lacking, 0.2--6.2 (1.9) mm long, 0.1--2 (0.6) mm wide; petioles flattened in cross-section, 0.4--9.6 (3) mm long; leaf bases asymmetrical, obliquely attached to stem; stipules composed of a single, asymmetrically placed, marginal or submarginal lobe on one side of the leaf base, 0.1--2 (0.9) mm long, persistent or caducous, often hardened and darkened on older stems. Flowers 1--24 (2) per stem; spathella smooth to minutely papillate, 1.8--4 (3.1) mm long, 0.9--2 (1.6) mm wide, apex rounded or with a nipple; tepals 3, linear or awl-shaped, straight or curved, apex acute; lateral tepals 0.5--2.1 (0.6) mm long; andropodial tepal 0.2--2.1 (1.2) mm long; andropodium 0.6--2.2 (1.2) mm long prior to anthesis, during anthesis to 1.2--2.5 (1.9) mm long; stamens 2, filaments 0.1--0.6 (0.3) mm long prior to anthesis, during anthesis to 0.2--0.9 (0.4) mm; anthers 0.3--0.7 (0.5) mm long, 0.2--0.7 (0.5) mm wide; pollen dyads 32--48 (43) mm long, 20--28 (25) mm wide; ovary 0.5--2.1 (1.3) mm long, 0.6--1.8 (1.3) mm wide; stigmas entire (rare) or with 1--5 (3) lobes, 0.2--1.3 (0.8) mm long prior to anthesis, during anthesis to 0.7--2.2 (1) mm, lobes 0.1--1.2 (0.5) mm long; pedicels 0.2--1.9 (0.7) mm long prior to anthesis, during anthesis to 0.4--3 (1.1) mm; capsules 0.9--1.9 (1.6) mm long, 0.7--1.8 (1.3) mm wide, smooth (lacking ribs); pedicel in fruit 0.7--4.6 (1.7) mm long; seeds 2--200 (123) per capsule, 0.2--0.3 (0.23) mm long, 0.1--0.2 (0.16) mm wide.

COMMENTS

Podostemum weddellianum can be distingueshed from the other *Podostemum* species by the pinnately or palmately lobed leaves, lobed stigmas and the capsules ribless (smooth). A narrowed leaf base may be present or absent.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Caatinga, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences

Northeast (Bahia)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.P. Bove, 1093, R, Rio de Janeiro
A.F.M. Glaziou, 17777, K, (K000195040), Rio de Janeiro

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

Figure 2: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

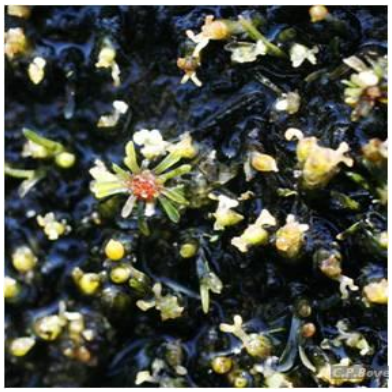

Figure 3: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

Figure 4: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

Figure 5: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

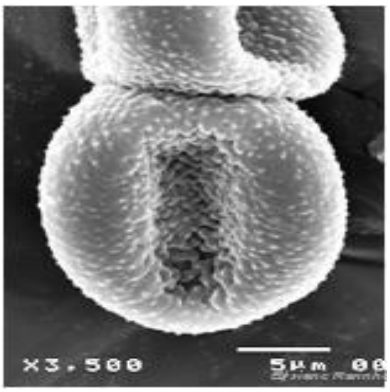

Figure 6: *Podostemum weddellianum* (Tul.) C.T.Philbrick & Novelo

REFERENCE

Marinho, E.B.; Abreu, V.H.R.; Bove, C.P.; Philbrick, C.T.; Mendonça, C.B.F. & Gonçalves-Esteves, V. V. 2014. Pollen morphology of *Podostemum*: the type genus of Podostemaceae. Palynology 38(1):162-170.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T. & Novelo, A. 2004. Monograph of Podostemum (Podostemaceae). Syst. Bot. Monograph 70: 1-103.
Royen, P. van. 1954. The Podostemaceae of the world III. Acta Bot. Neerl., 3(2): 215-263.

Sá-Haiad, B.; Torres, C.A.; Righetti, V.H.A.; Gonçalves, M.R.; Mendonça, C.B.F.; Santiago-Fernandes, L.D.R.; Bove, C.P. & Gonçalves-Esteves, V. 2010. Floral structure and palynology of *Podostemum weddellianum* (Podostemaceae, Malpighiales). *Pl. Syst. Evol. 290*: 141-149.

Rhyncholacis Tul.

This treatment is composed of the following taxa: *Rhyncholacis*, *Rhyncholacis applanata*, *Rhyncholacis carinata*, *Rhyncholacis crassipes*, *Rhyncholacis flagellifolia*, *Rhyncholacis hydrocichorium*, *Rhyncholacis linearis*, *Rhyncholacis minima*, *Rhyncholacis minor*, *Rhyncholacis nitelloides*, *Rhyncholacis oligandra*, *Rhyncholacis paulana*, *Rhyncholacis squamosa*, *Rhyncholacis unguifera*, *Rhyncholacis varians*.

HOW TO CITE

Pellegrini, M.O.O., Bove, C.P., Philbrick, C.T. 2020. Rhyncholacis *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB87129.

Has as synonym
heterotypic *Macarenia* P.Royen

DESCRIPTION

Herbs facultative annual or perennial, firmly attached to rocks and other solid substrates in seasonally strong currents of rivers and streams. **Roots** short, thread-like, attached to solid substrates via adhesive hairs. **Stems** inconspicuous to short or elongate, prostrate, branched or not, obscured by the leaf bases, attached to solid substrate via holdfasts (i.e., haptera). **Leaves** distichous, basal, epapillate, dithecous; petiole short to long, terete or laterally-flattened, sometimes winged, rarely D-shaped in cross-section; blades free from the solid substrate, pinnate, rarely entire, ovate to elliptic to obovate in outline, base symmetric or asymmetric, membranous or chartaceous or crass, lobes repeatedly bifurcate or pinnate, becoming finely-dissected, rarely lacking terminal divisions, terminal divisions filiform to subfiliform or linear or claw-like or lanceolate to triangular or oblong to spathulate; nervation pinnate, midvein conspicuous or not, secondary veins conspicuous or not. **Fascicle** axillary, sessile, (1–)10–35–many-flowered; basal bract distinct to the leaves in appearance and smaller in size (i.e., bracteose) or similar to leaves in appearance and ca. the same size (i.e., leaf-like), ovate to elliptic to obovate; peduncle inconspicuous; main axis inconspicuous; bracteoles absent. **Flowers** bisexual, actinomorphic or zygomorphic, pedicellate, 1(–10–40) flowers, each enclosed in a sac-like spathella; pedicels free or partially connate, straight, sometimes with a cup-like apex, smooth or longitudinally striate or longitudinally winged, long to very long, cylindric or elliptic in cross-section, elongating in fruit, becoming hollow in fruit or not; spathella clavate when immature, tubular or infundibuliform when mature, hyaline; tepals 3–20, free, equal or unequal, linear or lanceolate or triangular, apex obtuse or acute to acuminate or dentate, arranged in 1 whorl, whorl complete or incomplete; stamens 2–9, persistent in fruit or not, free, arranged in 1 whorl, whorl complete or incomplete, filaments terete, unbranched, elongating during anthesis, anthers narrowly sagittate, basifixed, caducous, introrsely rimose, apex 2–3 dentate, sometimes edentate; pollen grains released in monads, tricolpate; staminodes rarely present, arranged in 1 whorl, whorl complete, medially inflated, apex petaloid; ovary 2-carpellate, carpels equal, sessile or borne on an inconspicuous or a short gynophore, ellipsoid or ovoid, laterally compressed, winged, base acute or obtuse to round, midrib of each carpel developed in a wing, non-suture ribs 2, conspicuous or not, sometimes absent, grooved inside, prominent outside, stigmas 2, subulate or clavate, 3-sided to terete at the base, with one of the edges passing into the midrib of the carpel, free or basally connate or connate up to middle, parallel or curved inwards, base or whole stigma hardened, persistent in fruit, apex membranous, caducous in fruit. **Capsules** septifragal, 1-locular, 2-valved, ribbed, valves equal, both valves persistent, suture margins thickened, flattened. **Seeds** numerous, becoming sticky when wet; endosperm absent; embryo straight.

COMMENTS

Rhyncholacis was proposed based on the description of *R. hydrocichorium* Tul. and *R. macrocarpa* Tul. (Tulasne 1849), who improved the initial descriptions and included illustrations three years later (Tulasne 1852). Additional species have been described by Tulasne (1863), Weddell (1873), Goebel (1893), Matthiesen (1908), Engler (1927), and Royen (1951). Most species in the genus (i.e., 13) were described by Royen (1951) in his monograph of the Neotropical Podostemaceae. Royen (1951) also described three varieties, two forms, and proposed one new combination.
Rhyncholacis is morphologically similar to *Marathrum* and some species of *Apinagia* due to their fasciculate inflorescences. However, it can be easily recognized by its 2-winged capsules. Each wing is comprised of the flattened lateral extension of the medial rib on each capsule valve. As there are two capsule valves, there are two wings. Each wing is continuous with the flattened, usually persistent, and hardened stigma base. Wings are most prominent on mature capsules, although the degree to which the wings develop varies among species. Furthermore, other characters restricted to *Rhyncholacis* but not observed in all its

species are the pedicels with an obconic expansion and the connectives with apical teeth. The number of teeth in the connectives can range from 1–3, depending on the species.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Bahia)
Possible ocurrences
North (Pará, Roraima)

IDENTIFICATION KEY

1. Leaves entire to pinnate, terminal divisions absent; pedicels laterally flattened, flowers bisexual or pistillate, staminodes with petaloid apex present in pistillate flowers.. ***Rhyncholacis paulana*** **C.T.Philbrick & C.P.Bove**
1’. Leaves repeatedly pinnate or bifurcated, terminal divisions present; pedicels not laterally flattened, flower always bisexual, staminodes absent.. 2
2. Petioles distinctly carinate.. ***Rhyncholacis carinata*** **P.Royen**
2’. Petioles not carinate.. 3
3. Leaves fused at base; inflorescences produced inside the fused leaf bases.. 4
3’. Leaves free from each other; inflorescences axillary.. 8
4. Leaves repeatedly pinnate; pedicels longitudinally striate, ovary and capsules inconspicuously winged.. ***Rhyncholacis oligandra*** **Wedd.**
4’. Leaves repeatedly bifurcate; pedicels longitudinally 2–4-winged, ovary and capsules distinctly winged.. 5
5. Stems elongate; petioles terete.. 6
5’. Stems short to inconspicuous; petioles laterally-flattened or winged.. 7
6. Leaves with terminal divisions claw-like; stigmas clavate, divergent.. ***Rhyncholacis unguifera*** **P.Royen**
6’. Leaves with terminal divisions filiform to subfiliform; stigmas subulate, convergent.. ***Rhyncholacis varians*** **Spruce ex Wedd.**
7. Leaves with terminal divisions lanceolate to triangular; anthers with connective apically 1–2-dentate.. ***Rhyncholacis linearis*** **Tul.**
7’. Leaves with terminal divisions filiform to subfiliform or oblong to spathulate; anthers with connective apically edentate.. ***Rhyncholacis crassipes*** **Spruce ex Wedd.**
8. Pedicels longitudinally striate, obconic at apex; stigmas connate at least ½ their length.. 9
8’. Pedicels terete or winged, not obconic at apex; stigmas free or slightly connate at base.. 10
9. Petioles terete; mature spathellas tubular; ovary and capsules distinctly winged, stigmas completely hardened.. ***Rhyncholacis flagellifolia*** **P.Royen**
9’. Petioles laterally flattened; mature spathellas infundibuliform; ovary and capsules inconspicuously winged, stigmas hardened only at base, apex membranous and deciduous.. ***Rhyncholacis squamosa*** **(Wedd.) C.T.Philbrick & C.P.Bove**
10. Leaves repeatedly pinnate, petioles terete; mature spathellas tubular, anther apically mucronate (but the connective edentate), ovary and capsules laterally subcompressed, stigmas winged at base, apex spathulate.. ***Rhyncholacis nitelloides*** **(Wedd.) P.Royen**
10’. Leaves repeatedly bifurcate, petioles laterally-flattened or winged; mature spathellas infundibuliform, anthers with connective apically 1–2-dentate (if edentate, anthers not mucronate), ovary and capsules laterally compressed, stigmas not-winged at base, filiform.. 11

11. Pedicels 2–4-winged, stigmas convergent, ovary and capsules distinctly winged.. ***Rhyncholacis hydrocichorium* Tul.**
11'. Pedicels terete, stigmas parallel or divergent, ovary and capsules inconspicuously winged.. 12
12. Leaves with terminal divisions oblong to spathulate; fascicles 1-flowered, ovary and capsules with 6 non-suture ribs.. ***Rhyncholacis minima* P.Royen**
12'. Leaves with terminal divisions filiform to subfiliform or lanceolate to triangular; fascicles many-flowered, ovary and capsules with inconspicuous non-suture ribs.. 13
13. Anthers with connective apically 1–2-dentate, stigmas divergent.. ***Rhyncholacis applanata* Goebel**
13'. Anthers with connective edentate, stigmas parallel.. ***Rhyncholacis minor* P.Royen**

REFERENCE

Engler, H.G.A. (1927) Podostemonaceae americanae novae. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie. Leipzig 61 (138): 1–9, t. 8.
Goebel, K.I.E. (1893) Pflanzenbiologische Schilderungen 2: 331–354, 374–380, t. 26–30.
Matthiesen, F. (1908) Beiträge zur Kenntnis der Podostemaceen. Bibliotheca Botanica 15 (68): 3–9: 48, t. 1, 5–6, f. 81–90C.
Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). *Novon* 25: 51-56.
Philbrick, C.T, Ruhfel, B. & Bove, C. P. (2018) Contributions to the taxonomy of Rhyncholacis (Podostemaceae): Evidence of monophyly, description of a new species, and transfer of the monotypic Macarenia. Phytotaxa 357: 107-116.
Royen, P. van (1951) The Podostemaceae of the New World. Part I. Mededeelingen van het Botanisch Museum en Herbarium van de RijksU niversiteit te Utrecht 107: 1–150. Plates 1–16.
Tulasne, L.R. (1849) Podostemacearum sinopsis monographica. Annales des sciences naturelles, Botanique 11: 87–114. Tulasne, L.R. (1852) Monographia Podostemacearum. Archives du museum d'histoire naturelle 6: 1–208. https://doi.org/10.5962/bhl.title.50495
Tulasne, L.R. (1863) Podostemaceae. In: Martius, C.F.P. von, Eichler, A.W. & Urban, I. (Eds.) Flora brasiliensis, München, Wien, Leipzig,v.4 part 1, pp. 231–276, pls. 73–76.
Tippery, N.P., Philbrick, C.T., Bove, C.P. & Les, D.H. (2011) Systematics and phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Systematic Botany 36: 105–118. https://doi.org/10.1600/036364411X553180
Weddell, H.A. (1873) Podostemaceae. In: de Candolle, A. (Ed.) Prodomus systematis naturalis regni Vegetabilis. Vol. 17. G. Masson, Paris, pp. 39–89.

Rhyncholacis applanata Goebel

This treatment is composed of the following taxa: *Rhyncholacis applanata*, *Rhyncholacis applanata var. applanata*, *Rhyncholacis applanata var. laxipinnata*.

DESCRIPTION

Stem: form conical or cuneiform; **development** inconspicuous to short; **branching** non branched/branched. **Leaf: petiole base** cuneate/expanded; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** filiform to sub filiform/linear/lanceolate to triangular. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** terete; **pedicel apex obconic** absent; **stamen disposition** cycle complete; **anther apex form** connective 1 dentate/connective 2 dentate; **ovary form** ovoid/ellipsoid/obovoid; **stigma form** subulate/clavate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** inconspicuous.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

IDENTIFICATION KEY

1. Petioles expanded at base, ultimate divisions linear to lanceolate; pedicels 4–8 cm long, anthers 3.5–5 mm long, ovary obovoid, stigmas subulate.. ***Rhyncholacis applanata* Goebel var. *applanata***
1'. Petioles cuneate at base, ultimate divisions subfiliform to lanceolate; pedicels 6–20 cm long, anthers 2–3 mm long, ovary ovoid to ellipsoid, stigmas clavate.. Rhyncholacis applanata var. laxipinnata P.Royen

HERBARIUM MATERIAL

Goebel, 54, K (K000642002), **Typus**
C. Davidson, 10091, NY, (NY02282929), RB, 240781, (RB00317555), Pará

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.
TIPPERY, N.P.; PHILBRICK, C.T.; BOVE, C.P. & LES, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Rhyncholacis applanata Goebel var. *applanata*

DESCRIPTION

Petioles expanded at base, ultimate divisions linear to lanceolate; pedicels 4–8 cm long, anthers 3.5–5 mm long, ovary obovoid, stigmas subulate.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

Goebel, 54, K (K000642002), **Typus**

Rhyncholacis applanata var. *laxipinnata* P.Royen

DESCRIPTION

Petioles cuneate at base, ultimate divisions subfiliform to lanceolate; pedicels 6–20 cm long, anthers 2–3 mm long, ovary ovoid to ellipsoid, stigmas clavate.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

Jenman, 7612, K, (K000543210), K, (K000543211), **Typus**

Rhyncholacis carinata P.Royen

DESCRIPTION

Stem: form talloid or irregular; **development** lengthened; **branching** non branched/branched. **Leaf: petiole base** expanded; **petiole form in section transverse** keeled; **blade consistency** chartaceous to crassus; **blade division** repeatedly pinnatisect or pinnatisect with pinae furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** tubular; **pedicel form** terete; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ellipsoid; **stigma form** clavate; **stigma stance** convergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** inconspicuous.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Tocantins)

HERBARIUM MATERIAL

C.E. Calderón, 2952, NYBG, 1921539, (NY01921539), Amazonas
E.A. Goeldi, s.n., MG (MG020991), Amapá, **Typus**
G.T. Prance, 14562A, NY, (NY01922428), Amazonas

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis crassipes Spruce ex Wedd.

DESCRIPTION

Stem: form talloid or irregular; **development** lengthened; **branching** non branched. **Leaf: petiole base** 2 leaf with the base expanded and connate; **petiole form in section transverse** terete; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** spathulate to oblong. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** 2 - 4 winged; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ovoid; **stigma form** subulate; **stigma stance** convergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

R. Spruce, 2720, E, (E00326678), K, (K000584986), K, (K000584987), MG (MG019423), NY, (NY00387825), P (P00167706), P (P00167707), Amazonas, **Typus**
Schultes RE; Cabrera Rodriguez I, 2720, U, U.1518013, (NL-U1518013), US, 2171320, (US00365083), US, 2197958, (US00365084)

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis flagellifolia P.Royen

DESCRIPTION

Stem: form talloid or irregular; **development** lengthened; **branching** branched. **Leaf: petiole base** expanded; **petiole form in section transverse** terete; **blade consistency** membranous; **blade division** repeatedly pinnatisect or pinnatisect with pinae furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** uniflorous/multiflorous. **Flower: spathella mature form** tubular; **pedicel form** with furrow longitudinal; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** connective 2 dentate; **ovary form** ovoid/ellipsoid; **stigma form** subulate; **stigma stance** divergent; **stigma consistency** completely hardened. **Fruit: wing development** developed and distinct of the rib; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Roraima)
Possible ocurrences
North (Pará)

HERBARIUM MATERIAL

W.C. Stewart, 170, INPA, 117906, , , , (INPA0117906), NY, (NY02450306), Roraima
F. Puig, 2888, US, 2195082, (US00365116)
E.H.G. Ule, 7965, K, (K000807455), MG (MG013056), US, (US00145925), Roraima, **Typus**

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis hydrocichorium Tul.

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** branched. **Leaf: petiole base** expanded; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** 2 - 4 winged; **pedicel apex obconic** absent; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ellipsoid; **stigma form** subulate; **stigma stance** convergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará)

HERBARIUM MATERIAL

Tavares, A.S., 561, INPA, Amazonas
Schomburgk, 435, P (P00167710), K (K000642006), K (K000642005)

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Rhyncholacis hydrocichorium* Tul.

Figure 2: *Rhyncholacis hydrocichorium* Tul.

Figure 3: *Rhyncholacis hydrocichorium* Tul.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis linearis Tul.

Has as synonym
heterotypic *Rhyncholacis tenuifolia* Spruce ex Wedd.

DESCRIPTION

Stem: form talloid or irregular; **development** lengthened; **branching** non branched. **Leaf: petiole base** 2 leaf with the base expanded and connate; **petiole form in section transverse** terete; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** lanceolate to triangular. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** 2 - 4 winged; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** connective 1 dentate/connective 2 dentate; **ovary form** ellipsoid; **stigma form** subulate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

J.M. Pires, 801, INPA, Amazonas
R. Spruce, 2272, E, (E00326677), Amazonas, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Rhyncholacis linearis* Tul.

Figure 2: *Rhyncholacis linearis* Tul.

Figure 3: *Rhyncholacis linearis* Tul.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis minima P.Royen

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** expanded; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** spathulate to oblong. **Inflorescence: fascicle** uniflorous. **Flower: spathella mature form** tubular; **pedicel form** terete; **pedicel apex obconic** absent; **stamen disposition** cycle complete; **anther apex form** connective 2 dentate; **ovary form** ovoid/ellipsoid; **stigma form** clavate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** 6.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

R.E. Schultes, R. Barker & I. Cabrera, 18554, US, L, Amazonas

Rhyncholacis minor P.Royen

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** expanded; **petiole form in section transverse** laterally flattened to winged; **blade consistency** chartaceous to crassus; **blade division** repeatedly furcate; **blade division terminal form** lanceolate to triangular. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** terete; **pedicel apex obconic** absent; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ovoid/ellipsoid; **stigma form** subulate; **stigma stance** parallel; **stigma consistency** completely hardened. **Fruit: wing development** slightly developed; **rib number** inconspicuous.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Pará)

HERBARIUM MATERIAL

J.E. Huber, s.n., C, Pará, **Typus**
Pires, JM, 4595, IAN (IAN081961), US, (US00365115), Pará

REFERENCE

Royen, P. 1951. The Podostemaceae of the New World. Meded. Bot. Mus. Herb. Rijksuniv. Utrecht No. 107 102 13

Rhyncholacis nitelloides (Wedd.) P.Royen

Has as synonym
basionym *Neolacis nitelloides* Wedd.
homotype *Apinagia nitelloides* (Wedd.) Engl.

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** expanded; **petiole form in section transverse** terete; **blade consistency** membranous; **blade division** repeatedly pinnatisect or pinnatisect with pinae furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** uniflorous/multiflorous. **Flower: spathella mature form** tubular; **pedicel form** terete; **pedicel apex obconic** absent; **stamen disposition** cycle complete/ cycle incomplete or in 1 of the side of the flower; **anther apex form** mucronate; **ovary form** ellipsoid; **stigma form** subulate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Atlantic Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)
Northeast (Bahia)

HERBARIUM MATERIAL

G.T. Prance, 16018, NY, (NY01921537), US, (US00365093), Amazonas
R. Spruce, 2383, B (B 10 0249222), K, (K000584991), K, (K000807485), P (P00167724), P (P00167725), W, (W18890264792), NY, (NY00387821), Amazonas, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Rhyncholacis nitelloides* (Wedd.) P.Royen

Figure 2: *Rhyncholacis nitelloides* (Wedd.) P.Royen

Figure 3: *Rhyncholacis nitelloides* (Wedd.) P.Royen

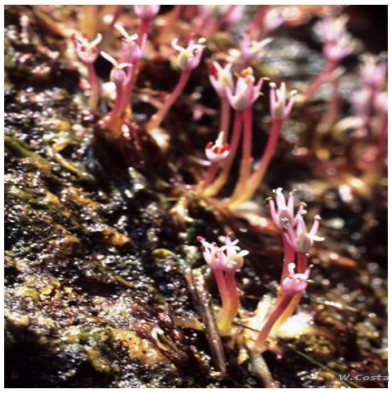

Figure 4: *Rhyncholacis nitelloides* (Wedd.) P.Royen

Figure 5: *Rhyncholacis nitelloides* (Wedd.) P.Royen

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1951. The Podostemaceae of the new world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis oligandra Wedd.

This treatment is composed of the following taxa: *Rhyncholacis oligandra*, *Rhyncholacis oligandra var. oligandra*, *Rhyncholacis oligandra var. tenella*.

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** 2 leaf with the base expanded and connate; **petiole form in section transverse** terete/laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly pinnatisect or pinnatisect with pinae furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** uniflorous/multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** with furrow longitudinal; **pedicel apex obconic** present; **stamen disposition** cycle complete/cycle incomplete or in 1 of the side of the flower; **anther apex form** obtuse to emarginate; **ovary form** ovoid/ellipsoid; **stigma form** subulate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)
Possible ocurrences
North (Roraima)

IDENTIFICATION KEY

1. Petioles laterally-flattened to winged; tepals and stamens in 1 complete whorl, tepals 5–6, stamens 5–6, 2–3 mm long, ovary 2–2.5 × 1 mm, ellipsoid, stigmas 2.5–3 mm long.. ***Rhyncholacis oligandra* Wedd. var. *oligandra***
1'. Petioles terete; tepals and stamens in 1 incomplete whorl or restricted to one side of the flower, tepals 3–5, stamens 2–4, up to 4.5 mm long, ovary 3–4 × 1–1.5 mm, ovoid, stigmas 1 mm long.. *Rhyncholacis oligandra* var. *tenella* P.Royen

HERBARIUM MATERIAL

Walker, I., s.n., INPA, 81767, Amazonas
R. Spruce, 2489, W (W0071413), W, (W18890264808), P (P00167729), P (P00167728), NY, (NY00387827), K, (K000642003), B (B 10 0249221), Amazonas, **Typus**

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

ROYEN, P. van. 1951. The Podostemaceae of the new world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis oligandra var. *tenella* P.Royen

DESCRIPTION

Petioles terete; tepals and stamens in 1 incomplete whorl or restricted to one side of the flower, tepals 3–5, stamens 2–4, up to 4.5 mm long, ovary 3–4 × 1–1.5 mm, ovoid, stigmas 1 mm long.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Possible ocurrences
North (Roraima)

HERBARIUM MATERIAL

N.Y. Sandwith, 1263, K, (K000584998), **Typus**

Rhyncholacis oligandra Wedd. var. *oligandra*

DESCRIPTION

Petioles laterally-flattened to winged; tepals and stamens in 1 complete whorl, tepals 5–6, stamens 5–6, 2–3 mm long, ovary 2–2.5 × 1 mm, ellipsoid, stigmas 2.5–3 mm long.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

I. Walker, s.n., INPA, Amazonas
R. Spruce, 2489, B (B 10 0249221), K, (K000642003), NY, (NY00387827), P (P00167728), P (P00167729), W (W0071413), W, Amazonas, **Typus**

Rhyncholacis paulana C.T.Philbrick & C.P.Bove

DESCRIPTION

Stem: form talloid or irregular; **development** lengthened; **branching** non branched/branched. **Leaf: petiole base** cuneate; **petiole form in section transverse** laterally flattened to winged; **blade consistency** chartaceous to crassus; **blade division** entire to lobate; **blade division terminal form** absent. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** laterally flattened; **pedicel apex obconic** absent; **stamen disposition** cycle complete; **anther apex form** connective 2 dentate; **ovary form** ellipsoid; **stigma form** subulate; **stigma stance** convergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** 6.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amapá)

HERBARIUM MATERIAL

C.P. Bove, 2465, R, 222913, (R000222913), Amapá, **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Rhyncholacis paulana* C.T.Philbrick & C.P.Bove

Figure 2: *Rhyncholacis paulana* C.T.Philbrick & C.P.Bove

Rhyncholacis squamosa (Wedd.) C.T.Philbrick & C.P.Bove

Has as synonym
basionym *Marathrum squamosum* Wedd. var. *squamosum*
basionym *Marathrum squamosum* Wedd.
heterotypic *Marathrum squamosum* var. *phellandrifolium* (Engl.) P.Royen
heterotypic *Marathrum squamosum* var. *spruceanum* Wedd.
heterotypic *Oenone phellandriifolia* Engl.

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short/lengthened; **branching** non branched. **Leaf: petiole base** expanded; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly pinnatisect or pinnatisect with pinae furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** uniflorous/multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** with furrow longitudinal; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** connective 2 dentate; **ovary form** ovoid/ellipsoid; **stigma form** subulate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** slightly developed; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Pará, Rondônia)

HERBARIUM MATERIAL

R. Spruce, 3102, W, (W18890264810), P (P00167818), P (P00167817), P (P00167816), P (P00167727), NY, (NY00387813), K (K000807467), K (K000807466), K, (K000642023), B (B 10 0295012), Amazonas, **Typus**
R. Spruce, 2579, F, V0067355F, (V0067355F), W, 387813, (W18890264809), W, 387813 (W0071403), P, 387813 (P00167814), P, 387813 (P00167813), P, 387813 (P00167812), P, 387813 (P00167811), NY, 387813, (NY00387814), K, 387813 (K000807489), K, 387813, (K000642024), GH, 387813, (GH00077304), Amazonas, **Typus**
T. Koch, 140, B (B 10 0249233), **Typus**

REFERENCE

Philbrick, C.T.; Philbrick, P.K.B. & **Bove, C.P.** Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56. doi: 10.3417/2016023

Rhyncholacis unguifera P.Royen

DESCRIPTION

Stem: form talloid or irregular; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** 2 leaf with the base expanded and connate; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** nail-shaped. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** tubular; **pedicel form** 2 - 4 winged; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ovoid; **stigma form** clavate; **stigma stance** divergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** 8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

Stradelli, 4344, C, P (P00167730), R, 62577, (R000062577), Amazonas, **Typus**
Schultes RE; Cabrera Rodriguez I, s.n., L, L.2107578, (NL-L2107578), L, L.2107587, (NL-L2107587), Amazonas

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

ROYEN, P. van. 1951. The Podostemaceae of the new world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis varians Spruce ex Wedd.

This treatment is composed of the following taxa: *Rhyncholacis varians*, *Rhyncholacis varians var. tricholoba*, *Rhyncholacis varians var. varians*.

DESCRIPTION

Stem: form talloid or irregular/conical or cuneiform; **development** inconspicuous to short; **branching** non branched. **Leaf: petiole base** 2 leaf with the base expanded and connate; **petiole form in section transverse** laterally flattened to winged; **blade consistency** membranous; **blade division** repeatedly furcate; **blade division terminal form** filiform to sub filiform. **Inflorescence: fascicle** multiflorous. **Flower: spathella mature form** infundibular; **pedicel form** 2 - 4 winged; **pedicel apex obconic** present; **stamen disposition** cycle complete; **anther apex form** obtuse to emarginate; **ovary form** ovoid/ellipsoid; **stigma form** subulate; **stigma stance** convergent; **stigma consistency** base hardened apex membranous. **Fruit: wing development** developed and distinct of the rib; **rib number** inconspicuous/8.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

IDENTIFICATION KEY

1. Filaments up to 4.5 mm long; ovary and capsules ellipsoid, with 8 inconspicuous non-suture ribs.. ***Rhyncholacis varians* var. *tricholoba* Wedd.**
1'. Filaments 5.5–6.5 mm long; ovary and capsules ovoid, with 8 non-suture ribs.. *Rhyncholacis varians* Wedd. var. *varians*

HERBARIUM MATERIAL

R. Spruce, 2488, P (P00167732), P (P00167733), P (P00167734), Amazonas, **Typus**

Rhyncholacis var. *ans* Spruce ex Wedd.

DESCRIPTION

Leaves up to 15 cm long; pedicels up to 2.5 cm long, filaments up to 4.5 mm long; ovary and capsules ellipsoid, with inconspicuous non-suture ribs.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

R. Spruce, 2749, MG (MG019421), W, (W18890264715), W (W0071414), GH (GH00107032), S (S12-21824), Amazonas, **Typus**

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

ROYEN, P. van. 1951. The Podostemaceae of the world. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 107: 1-151.

Rhyncholacis Wedd. var. *ans*

DESCRIPTION

Leaves 6–20 cm long; pedicels up to 5 cm long, filaments 5.5–6.5 mm long; ovary and capsules ovoid, with 8 non-suture ribs.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

R. Spruce, 2488, S (S-R-7369), S (S12-21758), NY, (NY00387829), K, (K000642008), BM, GH (GH00107032), Amazonas, **Typus**

Tristicha Thouars

This treatment is composed of the following taxa: *Tristicha*, *Tristicha trifaria*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Tristicha *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13689.

Has as synonym
heterotypic *Dufourea* Bory ex Willd.
heterotypic *Heterotristicha* Tobler
heterotypic *Philocrena* Bong.
heterotypic *Potamobryon* Liebm.
heterotypic *Tristichopsis* A.Chev.

DESCRIPTION

Annuals or perennials. Moss-like herbs, ramified, typically forming dense mats on rocks. Roots elongate, prostrate, endogenous root buds giving rise to stems on the upper surface. Stems terete, arising in clusters, ascending to procumbent [matted]. Leaves scale-like, arranged in ramuli, generally tristichous, sessile, membranous, nerveless or 1-nerved. Flowers solitary, bisexual, enclosed by 2 bracts in bud; pedicellate; tepals 3, persistent, usually united at the base; stamens 1(2), the filaments slender, the anthers basifixed, dehiscing introrsely or latrorsely; pollen in monads; ovary 3-locular; stigmas 3, free, cylindrical; ovules numerous, the placenta axile. Capsules with 3 equal valves, persistent, each valve 3-ribbed, the suture margins not thickened and rib-like; seeds numerous, dust-like.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest, Pampa

Vegetation Types
Caatinga (stricto sensu), Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Mixed Ombrophyllous Forest, Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte)
Central-west (Goiás, Mato Grosso do Sul, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

REFERENCE

Kita, Y. & Kato M. 2004. Phylogenetic relationships between disjunctly occurring groups of *Tristicha trifaria* (Podostemaceae). Journal of Biogeography 31: 1605–1612.
Melo, A.S; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62 (4): 867-885.
Philbrick, C.T.; Bove, C.P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.

Royen, P. van. 1953. The Podostemaceae of the world II. Acta Bot. Neerl., 2(1):1-20.

Tristicha trifaria (Bory ex Willd.) Spreng.

This treatment is composed of the following taxa: *Tristicha trifaria*, .

Has as synonym
basionym *Dufourea trifaria* Bory ex Willd.
homotype *Dufourea boryi* A.Rich.
homotype *Tristicha trifaria* (Bory ex Willd.) Spreng. subsp. *trifaria*
heterotypic *Dufourea alternifolia* Willd.
heterotypic *Dufourea hypnoides* A.St.-Hil.
heterotypic *Dufourea thouarsii* A.Rich.
heterotypic *Heterotristicha schroederi* Tobler
heterotypic *Philocrena pusilla* Bong.
heterotypic *Podostemum dregeanum* C.Presl.
heterotypic *Potamobryon concinnum* Liebm.
heterotypic *Potamobryon laxum* Liebm.
heterotypic *Potamobryon patulum* Liebm.
heterotypic *Tristicha alternifolia* (Willd.) Thouars ex Spreng.
heterotypic *Tristicha bryoides* Gardner
heterotypic *Tristicha concinna* (Liebm.) I.M.Johnst.
heterotypic *Tristicha dregeana* Tul.
heterotypic *Tristicha fontinaloides* Welw. ex Wedd.
heterotypic *Tristicha hypnoides* var. *dregeana* (Tul.) Tul.
heterotypic *Tristicha hypnoides* var. *hilarii* Tul.
heterotypic *Tristicha hypnoides* (A.St.-Hil.) Spreng. var. *hypnoides*
heterotypic *Tristicha hypnoides* var. *major* Tul.
heterotypic *Tristicha hypnoides* var. *microcarpa* Tul.
heterotypic *Tristicha hypnoides* var. *pulchella* Wedd.
heterotypic *Tristicha hypnoides* (A.St.-Hil.) Spreng.
heterotypic *Tristicha philocrena* Steud.
heterotypic *Tristicha tlatlayana* Matuda
heterotypic *Tristicha trifaria* subsp. *pulchella* (Wedd.) C.Cusset & G.Cusset
heterotypic *Tristicha trifaria* subsp. *tlatlayana* (Matuda) C.Cusset & G.Cusset
heterotypic *Tristichopsis riccioides* A.Chev.

DESCRIPTION

Perennials herbs. Roots 0.2-1.3 mm wide, prostrate, linear. Stems 1-8 cm, ascending to procumbent, branched or simple. Leaves 0.5-7 × 0.3-0.7 mm, 3-ranked (tristichous), scale-like, apex acute to rounded. Pedicels 0.15-1.5 cm; lowest floral bract at pedicel base 1.1-2.8 mm, the adjacent upper bract 1-2.6 mm. Tepals 3-lobed, 1.3-2 mm, united at the base; stamens 1(2), the filaments 0.8-1.9 mm, anthers 0.3-0.9 mm; stigmas 0.2-0.7 mm. Capsules 1-2 × 0.7-1.4 mm, 3 non suture ribs per valve; seeds 1-70 per capsule, 0.16-0.25 × 0.1-0.15 mm.

COMMENTS

Tristicha trifaria is the most common member of the family. Its moss-like appearance, however, contributes to it being overlooked. Unlike most of other species in the family, *T. trifaria* can occurs in heavily shaded habitats.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Caatinga, Central Brazilian Savanna, Atlantic Rainforest, Pampa

Vegetation Types
Caatinga (stricto sensu), Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Mixed Ombrophyllous Forest, Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins)
Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte)
Central-west (Goiás, Mato Grosso do Sul, Mato Grosso)
Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo)
South (Paraná, Rio Grande do Sul, Santa Catarina)

HERBARIUM MATERIAL

C.P. Bove, 847, R, Rio de Janeiro
A.F.M. Glaziou, 22001, IAN (IAN093821), IAN (IAN093427), Goiás

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Tristicha trifaria* (Bory ex Willd.) Spreng.

Figure 2: *Tristicha trifaria* (Bory ex Willd.) Spreng.

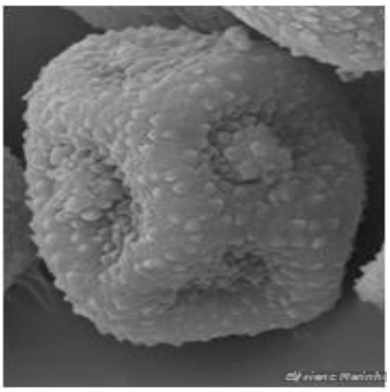

Figure 3: *Tristicha trifaria* (Bory ex Willd.) Spreng.

Figure 4: *Tristicha trifaria* (Bory ex Willd.) Spreng.

Figure 5: *Tristicha trifaria* (Bory ex Willd.) Spreng.

Figure 6: *Tristicha trifaria* (Bory ex Willd.) Spreng.

REFERENCE

Cusset, C. & Cusset, G. 1988. Étude sur les Podostemales 9. Délimitations taxinomiques dans les Tristichaceae. Bull. Mus. Hist. Natl. Nat., Paris, 4e sér., 10, Adansonia 2: 179-218.
Royen, P. van. 1953. The Podostemaceae of the world II. Acta Bot. Neerl., 2(1):1-20.
Ruhfel, B.R.; Bittrich, V.; Bove, C.P.; Gustafsson, M.H.G.; Philbrick, C.T.; Rutishauser, R.; Xi, Z. & Davis, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.
Tippery, N.P.; Philbrick, C.T.; Bove, C.P. & Les, D. 2011. Systematics and Phylogeny of neotropical riverweeds (Podostemaceae: Podostemoideae). Syst. Bot. 36(1): 105-118.

Weddellina Tul.

This treatment is composed of the following taxa: *Weddellina*, *Weddellina squamulosa*.

HOW TO CITE

Bove, C.P., Philbrick, C.T. 2020. Weddellina *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB87142.

DESCRIPTION

Medium to large aquatic **herbs**. **Roots** prostate, elongate, tightly attached to substratum throughout, elliptical to flattened in cross section.**Sterile stems** branched and **fertil**e **stems** unbranched springing from the same slightly flattened and branched root. **Sterile shoots** repeatedly dichotomously, subdichotomously, or irregularly branched, densely covered with 2- to 6-dentate scales and carrying small alternate leaves.**Fertile shoots** small to medium-sized provided with a few squamiform leaves and ending in a single flower. **Flower** when young enveloped by squamiform leaves; scales on the pedicel, tepals 5, white to lilac, distinct, membranaceous, free or slightly united at the base, provided with a single distinct medium nerve; stamens 5—25, in a single complete whorl; anthers dehiscing introrsely; pollen grains ellipsoidal, 3-colporate; ovary 6 non suture ribs, 2-celled, the cells equal; style 1, filiform, discoidally flattened at the top. **Capsules** opening with 2 equal valves; each valve provided with 3 indistinct non suture ribs.

COMMENTS

Weddellina is a monotypic genus easily recognized by the lack of spathella, scales on the pedicel, solitary flower with 5 (free or slightly united at the base) tepals, and colporate pollen.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Tocantins)
Northeast (Bahia)
Central-west (Goiás, Mato Grosso)

REFERENCE

Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. *Ann. Missouri Bot. Gard. 97*: 425-456.
Royen, P. van. 1953. The Podostemaceae of the world II. Acta Bot. Neerl., 2*(*1):1-20.

Weddellina squamulosa Tul.

This treatment is composed of the following taxa: *Weddellina squamulosa*, *Weddellina squamulosa f. squamulosa*, *Weddellina squamulosa f. uaupensis*.

Has as synonym
homotype *Rhyncholacis squamulosa* Tul. ex K.I.Goebel

DESCRIPTION

Roots about 1 mm wide. **Sterile stems** 2.5—80 cm long, terete, slightly compressed at the base. **Fertile stems** 2—12 cm long, indistinctly winged, distinctly winged towards the top, the wings passing into the nerves of the tepals; **leaves** numerous, spirally arranged, squamiform, cordate to obovate, sessile, subamplexicaulous, obtuse to acute, 1—2 x 1 mm. **Flowers** pink to lilac or white; tepals spathulate, entire, obtuse or mucronate, crested at the base, free or shortly united, imbricate, 3—6 mm long; stamens 5—25, 3.5—6.5 mm long; anthers 0.5—1 mm long, obtuse to rather deeply emarginate at the top, base cordate base; lobes obtuse; ovary ellipsoid to subglobose, obtuse, attenuate at the base, 2.5—4 mm x 1.5—2 mm; style 1 mm long, capitate stigma 0.3 mm diam.

COMMENTS

Weddellina squmulosa is easily recognized by the lack of spathella, scales on the pedicel, solitary flower with 5 (free or slightly united at the base) tepals, and colporate pollen.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Cerrado (lato sensu), Ombrophyllous Forest (Tropical Rain Forest), Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Tocantins)
Northeast (Bahia)
Central-west (Goiás, Mato Grosso)

IDENTIFICATION KEY

1. Stamens 5—15.. *Weddellina squamulosa* Tul. f. *squamulosa*
1'. Stamens 20—25.. *Weddellina squamulosa* f. *uaupensis* (Benth. & Hook.) P.Royen

HERBARIUM MATERIAL

C.P. Bove, 1476, R, Tocantins
R. Spruce, 2752, E, (E00326679), **Typus**

FIELD IMAGES / ILLUSTRATIONS

Figure 1: *Weddellina squamulosa* Tul.

Figure 2: *Weddellina squamulosa* Tul.

Figure 3: *Weddellina squamulosa* Tul.

Figure 4: *Weddellina squamulosa* Tul.

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the new world II. Acta Bot. Neerl. 2(1):1-20.
RUFHEL, B.R.; BITTRICH, V.; BOVE, C.P.; GUSTAFSSON, M.H.G.; PHILBRICK, C.T.; RUTISHAUSER, R.; XI, Z. & DAVIS, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.

Weddellina squamulosa f. *uaupensis* (Benth.) P.Royen

Has as synonym
basionym *Weddellina uaupensis* Benth.

DESCRIPTION

Stamens 20–25.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas)

HERBARIUM MATERIAL

R. Spruce, 2752, W, (W18890264737), NY, (NY00387832), MG (MG019420), K, (K000642011), K, (K000642010), GH, (GH00107033), **Typus**

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the new world II. Acta Bot. Neerl. 2(1):1-20.
RUFHEL, B.R.; BITTRICH, V.; BOVE, C.P.; GUSTAFSSON, M.H.G.; PHILBRICK, C.T.; RUTISHAUSER, R.; XI, Z. & DAVIS, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.

Weddellina squamulosa Tul. f. *squamulosa*

Has as synonym
homotype *Rhyncholacis squamulosa* Tul. ex K.I.Goebel

DESCRIPTION

Stamens 5–15

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Amazon Rainforest, Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
North (Amazonas, Amapá, Pará, Rondônia, Tocantins)
Central-west (Goiás, Mato Grosso)

HERBARIUM MATERIAL

Schomburgk, 433, K (K000642026), K (K000642025), **Typus**
P. von Luetzelburg, 20246, W, (W19320005702), NY, (NY02450309)

REFERENCE

PHILBRICK, C. T.; BOVE, C. P. & STEVENS, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
ROYEN, P. van. 1953. The Podostemaceae of the new world II. Acta Bot. Neerl. 2(1):1-20.
RUFHEL, B.R.; BITTRICH, V.; BOVE, C.P.; GUSTAFSSON, M.H.G.; PHILBRICK, C.T.; RUTISHAUSER, R.; XI, Z. & DAVIS, C.C. 2011. Phylogeny of clusoid clade (Malpighiales): Evidence from the plastids and mitochondrial genomes. American Journal of Botany 98: 306-325.

Wettsteiniola Suess.

This treatment is composed of the following taxa: *Wettsteiniola*, *Wettsteiniola accorsii*, *Wettsteiniola pinnata*.

HOW TO CITE

Bove, C.P., Pellegrini, M.O.O., Philbrick, C.T. 2020. Wettsteiniola *in* **Flora do Brasil 2020.** Jardim Botânico do Rio de Janeiro. Available at: http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13691.

DESCRIPTION

Herbs medium sized. **S**tem prostate. **Leaves** repeatedly forked or repeatedly pinnate, last divisions filiform. **Flowers** fasciculated, tepals 3-6 in a incomplete whorl, stamens 1-4 in a incomplete whorl, anthers introrse; ovary 2-carpellate, 2-locular isolobous, ribbed, ovules numerous, placentation axile, stigmas 2, free, conical. **Capsule** 2-locular, with 5 non suture ribs per valve.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Central Brazilian Savanna, Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (São Paulo)
South (Paraná)

IDENTIFICATION KEY

1. Tepals 3—5, half the size of the anthers ..... *W.pinnata*
1'. Tepals 5—6, much longer than the anthers ..... *W.accorsii*

REFERENCE

Philbrick, C.T.; Bove, C.P. & Stevens, H.I. 2010. Endemism in neotropical Podostemaceae. Annals of the Missouri Botanical Garden, 97: 425-456.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.

Wettsteiniola accorsii (Toledo) P.Royen

Has as synonym
basionym *Apinagia accorsii* Toledo

DESCRIPTION

Leaf: compound multipinnate; **type** invaginant. **Flower: stigma** emarginate or obtuse; **filament size** bigger than anther; **tepal(s) number** 5 6.

ADDITIONAL DESCRIPTION

Stem prostate, hepatic-like, up to 10 cm wide, branched, branches of irregular shape about 1 cm wide. **Leaves** along the margin of the base, repeatedly pinnate, up to 30 cm long, petiole up to 8 cm long, terete, widened at the base and provided with 1 or 2 obtuse sheaths, which are up to 7 mm long; primary pinnae up to 10 cm long; ultimate segments in bundles, about 1 mm long; stipels reniform to squamiform, membranaceous, up to 1.5 mm diam. **Flowers** borne by an up to 3.5 cm long pedicel; juvenile spathella nippelshaped, mature one trumpet-shaped, up to 10 mm long; tepals 5—6, linear-lanceolate, acute, 2.5—3.5 mm long; stamens 3 or 4, from 3—6 mm long, filaments sometimes bifurcate, anthers 1.5—2.5 mm long, obtuse, base of the thecae subobtuse; pollen grains ellipsoidal, 3-colpate, 20 x 12 um; ovary ellipsoidal to ovoid, 2.5—3 mm high, 1.5—2 mm diam, obtuse, with 2 subequal or equal carpels: styles up to 2 mm long, shortly cohering at the base, emarginate or obtuse at the top.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Is endemic from Brazil

Phytogeographic Domains
Central Brazilian Savanna

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
Southeast (São Paulo)

HERBARIUM MATERIAL

Accorsi WR, s.n., L, U 0158004, (NL-U0158004), L, U 0158002, (NL-U0158002), L, U 0157750, (NL-U0157750), L, U 0157749, (NL-U0157749), L, U 0157748, (NL-U0157748), L, U 0157747, (NL-U0157747), L, L 0353056, (NL-L0353056), São Paulo, **Typus**
Accorsi, W., s.n., ESA, 1737, São Paulo, **Typus**

REFERENCE

Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.

Wettsteiniola pinnata Suess.

DESCRIPTION

Leaf: compound bipinnate; **type** petiolate. **Flower: stigma** acute; **filament size** half of the size of the anther; **tepal(s) number** 3 4 5.

ADDITIONAL DESCRIPTION

Stem prostate, irregularly peltiform, up to 10 mm in diam. **Leaves** bipinnate, 8 —10 cm long, petiole terete, 4—5 cm long, 3 —5 mm diam; rachis compressed, sometimes flexuose, primary pinnae up to 1.5 cm long, secondary pinnae repeatedly forked, ultimate divisions numerous, filiform, 2—4 mm long; stipels up to 3 mm large. **Flowers** with an up to 2.5 cm long pedicel; spathella unknown; tepals 3—5, up to 0.5 mm long; stamens 1—4, up to 3 mm long, anthers up to 1 mm long; ovary up to 3 x 2 mm diam; styles acute.

Life Form
Herb

Substrate
Aquatic

DISTRIBUTION

Native, Not endemic to Brazil

Phytogeographic Domains
Atlantic Rainforest

Vegetation Types
Aquatic vegetation

Geographic Distribution
Confirmed ocurrences
South (Paraná)

HERBARIUM MATERIAL

G. Hatschbach, 19107, MBM, Paraná
Silva, JM, 6037, MBM (MBM339888), Paraná

REFERENCE

Mello, A. S.; Tavares, A.S. & Trevisan, R. 2011. Podostemaceae in southern Brazil. Rodriguésia 62(4): 867-885.
Philbrick, C. T.; Bove, C. P. & Stevens, H. I. 2010. Endemism in neotropical Podostemaceae. Ann. Missouri Bot. Gard. 97: 425-456.
Philbrick, C.T.; Philbrick, P.K.B. & Bove C.P. 2016. Nomenclatural changes in neotropical riverweeds (Podostemaceae). Novon 25: 51-56.
Royen, P. van. 1951. The Podostemaceae of the New World. Part I. Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht, 107: 1-151.