

FLORA DA RESERVA DUCKE, AMAZONAS, BRASIL: BURMANNIACEAE

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Burmanniaceae Blume, Enum. Pl. Javae 27. 1827. *Nom. cons.*

Maas, P. J. M., H. Maas-van de Kamer, J. van Benthem, H. C. M. Snelders, and T. Rübsamen. 1986. Burmanniaceae. Fl. Neotrop. Monograph 42: 1-189.

Saprophytic, small, **herbs**, mostly rhizomatous. **Leaves** alternate, simple, very small, scale-like. Inflorescence a terminal, 1-many-flowered, bracteate, usually bifurcate cyme. **Flowers** actinomorphic, perianth connate, tepals 6, in 2 whorls, (measurements including ovary). Stamens 3. Style 3-branched at the apex. Ovary inferior, 1-locular with parietal placentation to 3-locular with axile placentation, ovules many. **Fruit** a capsule. Seeds many, very small.

A family represented in the Neotropics by 10 genera and c. 55 species. Occurring throughout the Neotropics. In the Reserva Ducke 5 genera and 8 species are found.

The family can be distinguished from the three other neotropical families of saprophytes (Gentianaceae, Orchidaceae, and Triuridaceae) by a combination of alternate leaves, inferior ovary, and actinomorphic flowers.

Key to the genera of Burmanniaceae of Reserva Ducke

1. Upper part of floral tube caducous, leaving a naked floral tube on top of the capsule.
 2. Flowers white to purple with yellowish throat; outer tepals entire; stamens with a distinct **filament** 6. *Hexapterella*
 2. Flowers whitish, sometimes tinged with purple; outer tepals 3-lobed; stamens sessile.
 3. Capsule erect 5. *Gymnosiphon*
 3. Capsule horizontal 3. *Cymbocarpa*
1. Upper part of floral tube persistent.
 4. Flowers pale purplish blue to white, salverform; outer tepals as long as the inner ones 2. *Campylosiphon*
 4. Flowers whitish or purplish, tubular; outer tepals longer than the inner ones.
 5. Flowers nodding, c. 2 mm long, whitish; inflorescence a 10-20-flowered, bifurcate cyme 4. *Dictyostega*
 5. Flowers erect, 5-20 mm long, purplish; inflorescence a 2-5-flowered cyme or flowers **solitary** 1. *Apteria*

1. *Apteria*

Apteria Nutt., J. Acad. Nat. Sci. Philadelphia 7(1): 64. pl. 9, fig. 2. 1834.

A monotypic genus occurring throughout tropical America.

1.1 *Apteria aphylla* (Nutt.) Barnhart ex Small, Fl. S.E. U.S. ed. 1: 309. 1903; Maas *et al.*, Fl. Neotrop. 42: 133. 1986.

Lobelia aphylla Nutt., Amer. J. Sci. Arts 5: 297. 1822.

Saprophytic **herbs**, 5-30 cm high, stems and leaves purple. **Leaves** 1.5-5 mm long.

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Inflorescence a terminal 2-5-flowered cyme or flowers solitary. **Flowers** erect to nodding, funnelform, purple, 5-20 mm long, pedicellate. Tepals subequal, broadly ovate-triangular, 1.5-5 mm long, margins slightly involute. Stamens 3, filament basally decurrent into a crescent-shaped pouch. **Capsule** nodding, crowned by the persistent perianth, creamy, broadly ellipsoid to globose, 3-5 mm long.

The only species, *Apteria aphylla* is to be expected in the Reserva Ducke.

As indicated in the key it is a saprophytic herb with purplish, erect, more or less funnelform flowers.

2. *Campylosiphon*

Campylosiphon Benth., Hooker's Icon. Pl. 1384. 1882.

Monotypic genus occurring all over tropical South America.

2.1 *Campylosiphon purpurascens* Benth., Hooker's Icon. Pl. 1384. 1882; Maas *et al.*, Fl. Neotrop. 42: 41, f. 11 & 12. 1986.

Saprophytic herbs, 15-25 cm high, stems and leaves white to pale brown. **Leaves** 5-13 mm long. **Inflorescence** a 4-14-flowered bifurcate cyme. **Flowers** erect, white to pale purplish blue, salverform, 23-25 mm long, subsessile, fragrant. Tepals subequal, narrowly elliptic-triangular, 6-7 mm long. Stamens 3, subsessile. **Capsule** erect, crowned by the persistent perianth, white, trigonous, narrowly ellipsoid, 8-14 mm long.

In non-inundated forest, in wet places, on sandy soil.

Flowering and fruiting from July to October.

15.VIII.1995 (fl) Assunção, P. A. C. L. *et al.* 220 (INPA); 22.VIII.1958 (fl) Coêlho, L. 28 (INPA); 29 IX 1977 (fl, fr) Maas *et al.* 3077 (U); 4.IX.1997 (fl) Martins, L. H. P. *et al.* 38 (INPA); 4.VIII.1994 (fl, fr) Ribeiro, J. E. L. S. & Silva, C. F. da 1392 (INPA); 26.VIII.1957 (fl) Rodrigues, W. 554 (INPA); 31.X.1995 (fr) Souza, M. A. D. de & Pereira, E. da C. 137 (U); 23.VII.1994 (fl) Vicentini, A. & Hopkins, M. J. G. 649 (INPA, U).

Campylosiphon purpurascens is a relatively fleshy saprophyte, with rather large, white to bluish flowers with 6 subequal tepals.

3. *Cymbocarpa*

Cymbocarpa Miers, Proc. Linn. Soc. Lond. 1: 61. 1840.

Monotypic genus with two species occurring in Central America, the Greater Antilles, and tropical South America.

Saprophytic herbs. **Inflorescence** a bifurcate cyme, or flowers solitary. **Flowers** white, erect, salverform. Outer tepals 3-lobed. Inner tepals minute, entire. Stamens 3, sessile. Stigma with filiform appendages. **Capsule** horizontal, placed at an angle of 90° with the axis of the infructescence, dehiscence longitudinally by one slit, exposing the seeds in the boat-shaped capsule, crowned by the persistent part of the floral tube (upper part caducous).

Cymbocarpa can be recognized by its capsule placed horizontally, perpendicular to the axis of the infructescence. This in contrast to the capsules of the species belonging to the genus *Gymnosiphon*, which are vertically directed.

Key to the species of *Cymbocarpa* of Reserva Ducke

1. Floral tube with six prominent pouches at its base, just above the capsule 1. *C. saccata*
1. Floral tube without pouches 2. *C. refracta*

3.1 *Cymbocarpa saccata* Sandwith, Bull. Misc. Inform. 1931: 60. 1931; Maas *et al.*, Fl. Neotrop. 42: 91. f. 38. 1986.

Saprophytic **herbs**, to 10 cm high, completely white. **Leaves** 0.5-1.5 mm long. **Inflorescence** 1-3-flowered. Pedicels absent or up to 0.5 mm long. **Flowers** white, c. 6.5 mm long, base of floral tube with six prominent, subglobose pouches to 1 mm in diam. Outer tepals c. 1.5 mm long. **Capsule** ellipsoid to globose, 2-4.5 mm long.

Guyana, Peru, and Amazonian Brazil
In non-inundated forest, on clayey soil.

Flowering and fruiting in April and May.
1.V.1996 (fl, fr) Costa, M. A. S. da & Assunção, P. A. C. L. 505A (INPA, U), floresta de baixo; 19.IV.1996 (fl, fr) Costa M. A. S. *et al.* 494 (INPA U), floresta de plato, solo argiloso.

3.2 *Cymbocarpa refracta* Miers, Proc. Linn. Soc. Lond. 1: 62. 1840; Maas *et al.*, Fl. Neotrop. 42: 90. fig. 37. 1986.

Saprophytic **herb**, to 10 cm tall, completely white. **Leaves** 1-2 mm long. **Inflorescence** a 1-3-flowered cyme. **Flowers** erect, white, salverform, upper part of floral tube caducous. Outer tepals 3-lobed, 2-2.5 mm long. Inner tepals minute. Stamens 3, sessile. Ovary 1-locular, with 3 parietal placentas. **Capsule** ellipsoid, 2.5-4.5 mm long, placed at an angle of 90° with the axis of the infructescence, dehiscence longitudinally by one slit, exposing the seeds in the boat-shaped capsule, crowned by the persistent part of the floral tube. Seeds brown, ellipsoid to ovoid.

Greater Antilles, Costa Rica to N Venezuela, SE Brazil, and Amazonian Brazil.

In non-inundated forest, on clayey soil.
Flowering and fruiting in April.

8.IV.1994 (fl, fr) Vicentini, A. *et al.* 486 (INPA).

4. *Dictyostega*

Dictyostega Miers, Proc. Linn. Soc. Lond. 1: 61. 1840

A genus with 1 species consisting of three subspecies occurring from Mexico in the North to Bolivia and SE Brazil in the South.

4.1 *Dictyostega orobanchoides* (Hook.) Miers subsp. *parviflora* (Benth.) Snelders & Maas, Acta Bot. Neerl. 30: 143. 1981; Maas *et al.*, Fl. Neotrop. 42: 141, fig. 63c, f, g. 1986.

Dictyostega schomburgkii Miers var. *parviflora* Benth., Hooker's J. Bot. Kew Gard. Misc. 7: 13. 1855.

Dictyostega orobanchoides (Hook.) Miers var. *parviflora* (Benth.), Jonker *in* Pulle, Fl. Suriname 1(1): 185. 1938.

Saprophytic **herbs**, 10-30 cm high; stems and leaves whitish. **Leaves** 1-2 mm long. **Inflorescence** a 10-20-flowered bifurcate cyme. **Flowers** nodding, whitish, 1.5-2 mm long. Pedicels 1-3 mm long. Tepals ovate-triangular, inner ones somewhat smaller than the outer ones. Stamens 3, sessile. **Capsule** nodding, broadly ellipsoid to globose, to 2 mm long, crowned by the persistent perianth.

From Colombia, Venezuela, Trinidad, and Surinam in the North to Ecuador, Brazil, and Bolivia in the South.

In non-inundated forest, on sandy soil.

Flowering and fruiting from April to October.

5.VI.1995 (fr) Costa, M. A. S. & Silva, C. F. da 273 (INPA); 18.X.1995 (fl, fr) Costa, M. A. S. & Assunção, P. A. C. L. 397 (INPA); 16.IV.1996 (fl) Costa, M. A. S. & Assunção, P. A. C. L. 490 (INPA U); 1.V.1996 (fl) Costa, M. A. S. & Assunção, P. A. C. L. 504 (INPA U); 21 IX 1974 (fl) Ehrendorfer 74921-2/3b (WU); 8 VII 1989 (fl) Hoogmoed S-41 (U); 29 IX 1977 (fl) Maas *et al.* 3074 (U); 9.VIII.1974 (fl, fr) Nelson, B. W. P21666 (INPA U); 14.IX.1971

(fl, fr) Prance, G. T. et al. 14743 (INPA U); 8.VIII.1973 (fl, fr) Prance, G. T. et al. 18735 (INPA U); no date Pruski 3231 (INPA); 2.VII.1993 (fl) Ribeiro, J. E. L. S. et al. 980 (INPA U); 7.V.1997 (fl) Ribeiro, J. E. L. S. & Silva, C. F. da 1896 (INPA); 25.VII.1957 (fl) Rodrigues, W. 456 (INPA); 9.V.1995 (fl) Sothers, C. A. & Silva, C. F. da 448 (INPA); (fl) no date Souza, M. A. D. de 367A (INPA); 23.VII.1994 (fl) Vicentini, A. & Hopkins, M. J. G. 648 (INPA).

Dicyostega orobanchoides can be recognized by its bifurcate inflorescences of whitish, nodding flowers.

5. *Gymnosiphon*

Gymnosiphon Blume, Enum. Pl. Javae 1: 29. 1827.

Saprophytic herbs. Inflorescence a bifurcate cyme. Flowers white, sometimes tinged with purple, erect, salverform. Outer tepals 3-lobed. Inner tepals minute, entire. Stamens 3, sessile. Stigma with or without filiform appendages. Capsule erect, crowned by the persistent part of the floral tube (upper part caducous).

A genus with 24 species, of which 14 are found throughout the Neotropic, seven in tropical Asia, and three in tropical Africa.

Key to the species of *Gymnosiphon* of Reserva Ducke

1. Floral tube obliquely abscising; stigma with yellow, filiform appendages 1. *G. breviflorus*
1. Floral tube horizontally abscising; stigma unappendaged.
 2. Flowers, in a several-flowered, bifurcate inflorescence; flowers pedicellate.
 3. Internodes of infructescence usually much longer than 3 mm; bracts not overlapping; pedicels 1-2 mm long 3. *G. divaricatus*
 3. Internodes of infructescence very short, 1-3 mm long; bracts slightly overlapping; pedicels 2-4 mm long 2. *G. cymosus*
 2. Flowers solitary, or inflorescence 4-flowered; flowers sessile.
 4. Flowers 5-6 mm long; capsule 3-4 mm long 4. *G. minutus*
 4. Flowers 10-11 mm long; capsule 7-8 mm long 5. *G. tenellus*

5.1 *Gymnosiphon breviflorus* Gleason, Bull. Torrey Bot. Club 56: 22. 1929; Maas et al., Fl. Neotrop. 42: 103. fig. 46. 1986.

Saprophytic herbs, 10-20 cm high, completely whitish. Leaves 1-2 mm long. Inflorescence 7-12-flowered. Pedicels 4-5 mm long. Flowers white, 8-10 mm long. Outer tepals 2-3 mm long. Stigmas provided with yellow, tortuous, filiform appendages c. 2 mm long. Capsule broadly ovoid, 3-4 mm long including obliquely abscised persistent part of floral tube.

From Panama in the North to Amazonian Brazil and Bolivia in the South.

In non-inundated forest, on sandy soil.

Flowering and fruiting in January, April, and October.

28.IV.1995 (fl, fr) Costa, M. A. S. & Assunção, P. A. C. L. 226 (INPA); 5.X.1995 (fl) Costa, M. A. S. & Silva, C. F. da 381 (INPAU); 16.IV.1996 (fl) Costa, M. A. S.

& Assunção, P. A. C. L. 486 (INPA U); 19.I.1996 (fl) Costa, M. A. S. & Silva, C. F. da 723A (INPA); 31.X.1995 (fl) Souza, M. A. D. de & Pereira, E. da C. 138 (INPA U).

Gymnosiphon breviflorus can be recognized by its obliquely abscising floral tube.

5.2 *Gymnosiphon cymosus* (Benth.) Benth. & Hook. f., Gen. Pl. 3(2): 458. 1883; Maas et al., Fl. Neotrop. 42: 99. f. 42. 1986.

Ptychomeria cymosa Benth., Hooker's J. Bot. Kew Gard. Misc. 7: 15. 1855.

Saprophytic herbs, 10-30 cm high, whitish sometimes tinged with purple. Leaves 2-4 mm long. Inflorescence 4-12-flowered, internodes of infructescence 1-3 mm long. Bracts slightly overlapping. Pedicels 2-4 mm long. Flowers white to purplish, 8-10 mm long. Outer tepals 3-4 mm long. Stigmas provided

with yellow, tortuous, filiform appendages to 5 mm long. **Capsule** subglobose, 4-7 mm long including persistent part of floral tube.

Colombia, Venezuela, Surinam, Peru, and Amazonian Brazil.

Campinarana forest, sandy soil.

Fruiting in January.

24.I.1996 (fr) Costa *et al.* 736 (INPA U)

Gymnosiphon cymosus can be recognized by its inflorescence composed of several flowers which are separated by short internodes.

5.3 *Gymnosiphon divaricatus* (Benth.) Benth. & Hook. f., Gen. pl. 3(2): 458. 1883; Maas *et al.*, Fl. Neotrop. 42: 113. fig. 51. 1986.

Ptychomeria divaricata Benth., Hooker's J. Bot. Kew Gard. Misc. 7: 16. 1855.

Saprophytic **herbs**, c. 10 cm high, completely whitish. **Leaves** 1-2 mm long. **Inflorescence** 5-7-flowered. Pedicels 1-2 mm long. **Flowers** white, sometimes tinged with purple, 6-11 mm long. Outer tepals 1-1.5 mm long. Stigmas provided with yellow, tortuous, filiform appendages c. 2.5 mm long. **Capsule** ellipsoid, 5-6 mm long including persistent part of floral tube.

Central and South America.

In non-inundated forest, on sandy to clayey soil.

Flowering and fruiting in January, February, April, May, and October.

Campos, M. T. V. do A. et al. 487 (INPA); 4.V.1995 (fl, fr) *Costa, M. A. S. et al.* 278 (INPA); 4.V.1995 (fl, fr) *Costa, M. A. S. et al.* 279 (INPA); 16.IV.1996 (bd) *Costa, M. A. S. & Assunção, P. A. C. L.* 488 (INPA U); 23.I.1996 (fl) *Costa, M. A. S. et al.* 726 (INPA); 31.X.1995 (fl) *Souza, M. A. D. de & Pereira, E. da C.* 139 (INPA); 26.IV.1994 (fl) *Vicentini, A. et al.* 494 (INPAMG).

Gymnosiphon divaricatus can be recognized by distinctly pedicellate flowers with a horizontally abscised floral tube.

5.4 *Gymnosiphon minutus* Snelders & Maas, Acta Bot. Neerl. 30: 142. 1981; Maas *et al.*, Fl. Neotrop. 42: 109. fig. 49. 1986.

Saprophytic **herbs**, 3-5 cm high, completely white. **Leaves** 1-2 mm long. **Inflorescence** 1(-4)-flowered. **Flowers** white, sessile, 5-6 mm long. Outer tepals c. 2 mm long. Stigma unappendaged. **Capsule** obovoid, 3-4 mm long including persistent part of the floral tube.

Costa Rica, Colombia, Venezuela, Guyana, and Brazil.

In non-inundated forest, on sandy soil.

Flowering and fruiting in January and May. 4.V.1995 (fl, fr) *Costa, M. A. S. et al.* 281 (INPA); 12.I.1996 (fl) *Souza, M. A. D. de & Assunção, P. A. C. L.* 201 (INPA); (fr) *Souza et al.* 356 (U).

G. minutus is a minute saprophyte with a solitary flower of 5-6 mm long.

5.5 *Gymnosiphon tenellus* (Benth.) Urb., Symb. Ant. 3(3): 438. 1903; Maas *et al.*, Fl. Neotrop. 42: 106. fig. 48. 1986.

Ptychomeria tenella Benth., Hooker's J. Bot. Kew Gard. Misc. 7: 17. 1855.

Saprophytic **herbs**, to 10 cm high, completely white. **Leaves** 0.5-3 mm long. **Inflorescence** 1(-4)-flowered. **Flowers** white, sessile, 10-11 mm long. Outer tepals c. 2 mm long. Stigma unappendaged. **Capsule** subglobose, 7-8 mm long including persistent part of the floral tube.

Central America, Jamaica, Amazonian parts of Colombia, Venezuela and Brazil, and in the Brazilian state of Rio de Janeiro.

In non-inundated forest, on sandy soil.

Flowering and fruiting in May.

2.V.1997 (fl) *Brito et al.* 24 (U); 4.V.1995 (fl, fr) *Costa, M. A. S. et al.* 280 (INPA).

G. tenellus is a minute saprophyte with a solitary flower of 10-11 mm long.

6. *Hexapterella*

Hexapterella Urb., Symb. Antill. 3(3): 451. 1903.

Monotypic genus occurring in northern South America and Trinidad.

6.1 *Hexapterella gentianoides* Urb., Symb. antill. 3(3): 451. figs. 33-38. 1903; Maas *et al.*, Fl. Neotrop. 42: 39. fig. 10. 1986.

Saprophytic **herbs**, *c.* 5 cm high; stems and leaves purple. **Leaves** 2-3 mm long. **Inflorescence** a 2-flowered cyme. Pedicels *c.* 2.5 mm long. **Flowers** erect, white to purple

with whitish inner side of tepals and yellowish throat, 8-12 mm long. Outer tepals entire, obovate. Inner tepals narrowly triangular. Stamens 3, with distinct filament. Style and stigmas purple. **Capsule** erect, broadly to transversely obovoid, *c.* 3 mm long, 6-ribbed, crowned by the persistent part of the floral tube (upper part caducous).

In non-inundated forest, on clayey soil.

Very old capsule found in October.

6.X.1995 (fr) Costa, M. A. S. & Maas, H. 417A (INPA).

Hexapterella gentianoides can be recognized by erect, purplish flowers and a 6-ribbed capsule.

