A New Species of *Cipoia* (Podostemaceae) from Minas Gerais, Brazil

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ABSTRACT. A new species of *Cipoia* (Podostemaceae) from the state of Minas Gerais (Brazil) is described and illustrated: *Cipoia ramosa*. It is distinguished from the only other species in the genus, *C. inserta*, by its branched stems, stipules composed of two tooth-shaped appendages adjacent to the leaf base, anther thecae that remain at a prominent angle during and after anthesis, and an ovary that is longer than the stigmas at anthesis.

RESUMO. É descrita e ilustrada uma nova espécie do gênero *Cipoia* (Podostemaceae) para o Estado de Minas Gerais (Brasil): *Cipoia ramosa*. Ela se distingue da outra espécie do gênero, *C. inserta*, por possuir caule ramificado, estípulas compostas por dois apêndices dentados adjacentes à base foliar, tecas que permanecem em ângulo proeminente durante, e depois da antese e ovario maior do que o estigma na antese.

KEYWORDS: aquatic macrophyte, dyad pollen, rheophyte, river rapids

*Cipoia* C.T. Philbrick, Novelo & Irgang is a recently-described genus (Philbrick et al. 2004) that included one species from central and southeastern regions of the state of Minas Gerais, Brazil. It is unique among New World Podostemaceae in possessing dyad pollen and a single stamen per flower, and shares with *Castellania* Tul & Wedd. the unusual feature of the ovary and mature capsule remaining enclosed within the ruptured spathella (Philbrick et al. 2004). Herein, we describe a second species of *Cipoia* that occurs in the same general region as *C. inserta*. In the species description below, variation is expressed as (minimum) median (maximum); N > 25.

TAXONOMIC TREATMENT


*Cipoia ramosa* aliae speciei generis (*C. inserta*) per caulis ramosus, stipulis compositis dente utraque latere vaginae instructis, techis prominentioribus divaricatis postea anthesis et stigmatibus satis minoribus ovarium differt.

Small aquatic herbs, perennial (?), attached to rocks in river-rapids and waterfalls. Roots prostrate, elongate, flattened to cylindrical in cross-section, branched, occasionally arising from the stems, with asymmetric root cap, (0.2–) 0.4 (–0.9) mm 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 ditheceous, simple or 1-time dichotomously divided (occasionally trichotomously divided), (3.6–) 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 between stipules, (0.5–) 3.9 (–11.5) mm long, (0.07–)

**FIG. 1.** *Cipoia ramosa*. Drawings based on the holotype (C. P. Bove, A. Rodarte & J. Rodarte 1575, R). A. General habitat showing one stem four times branched with conspicuous, persistent sheathing leaf bases, and several post-anthesis flowers. B. General habit showing prostrate flattened root with three stems arising from the flanks. One flower occurs at apical region of one stem. C. Root arising from the stem (left), root arising from mid-part of stem (center), root tip with asymmetric root cap (right). D. Apical region of stem showing four simple mature leaves and three dichotomously divided mature leaves. E. Apex of ultimate division of a leaf showing acute tip. F. Two views of sheathing leaf base showing two tooth-like marginal stipules.
G. Apical region of stem showing two trichotomously divided mature leaves, one dichotomously divided mature leaf and one flower bud (enclosed within spathella). H. Post-anthesis flower enclosed within ruptured spathella. I. Two views of flower at anthesis with spathella removed: (left) back (abaxial) view showing single stamen, two tepals arising on either side of filament, ovary with three ribs and gynophore; (right) lateral view showing single stamen, one tepal arising from base of filament, gynophore, ovary with two ribs and suture line and two stigmas. J. Apex of stem with an open capsule, remains of spathella and post-anthesis stamen. K. Detail of dehisced capsule with two persistent valves and post-anthesis stamen.
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 (–0.70) 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, 0.2–0.4 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 introresly 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, acalymmate, each pollen grain small, prolate, tricolpate, longicolpate, granulate, polar axis (20.0–) 21.6 (–22.5) μm, equatorial axis (14.0–) 15.0 (–18.0) μm; ovary 2-carpellate, 2-locular, elliptical, with 6 longitudinal dark lines, remaining inside the spathella during anthesis, (1.0–) 1.4 (–1.9) mm long, (0.5–) 0.6 (–0.8) 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 (10–) 24 (–40), placenta 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, (0.6–) 0.8 (–1.3) mm during anthesis; capsule with two equal valves (isobilobous), (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.

Etymology. From the Latin ramosa. A reference to the ramified stems, that distinguish C. ramosa from the only other species of the genus, Cipoia inserta, which has simple stems.

Geographic Distribution and Ecology. Known only from the type locality, upper rio das Velhas drainage, rio São Francisco basin, southeast Brazil (Fig. 2). *Cipoia ramosa* is a rheophyte that occurs attached to rocks in torrential currents. Plants were collected in close proximity to those of the rheophyte *Utricularia neottioides* A. St.-Hil. & Girard (Lentibulariaceae).


Discussion

Several features distinguish *Cipoia ramosa* from the other species in the genus, *Cipoia inserta*. Most
prominently, C. ramosa possesses branched stems, two tooth-shaped stipules on the margins of the sheathing leaf base, anther thecae that remain at a prominent angle during and after anthesis, and an ovary that is longer than the stigmas at anthesis. In contrast, C. inserta has simple stems, a sheathing leaf base that is entire with a boat-shaped extension, anther thecae that possess parallel sides during and after dehiscence, and an ovary that is shorter than the stigmas at anthesis. Moreover, the pollen of C. ramosa (range: 20.0–22.5 μm, median: 21.6 μm) is significantly smaller than that of C. inserta (range: 28.0–38 μm, median: 31.0 μm).

It was observed that in some flower buds the anthers dehisce before the spathella ruptures. Whether pre-anthesis cleistogamy occurs in the species needs to be confirmed.

The geographic distribution of C. ramosa extends to the west of that of C. inserta. The mountains of the Serra do Cabral and Serra do Espinhaço may provide geographic isolation between these two species.

**Key to Species of Cipoia**

1a. 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

1b. Stems unbranched, sheathing leaf base entire, boat-shaped, at anthesis ovary shorter than stigmas .................. Cipoia inserta

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**Literature Cited**