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Brittonia

ISSN 0007-196X

Volume 64

Number 2

Brittonia (2012) 64:114-118

DOI 10.1007/s12228-011-9213-1



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Paullinia unifoliolata, a remarkable new species of Sapindaceae from the Atlantic Forest of southern Bahia, Brazil

RICARDO DE OLIVEIRA PERDIZ^{1,3}, ANDRÉ M. AMORIM^{1,2,3},
AND MARÍA SILVIA FERRUCCI⁴

¹ Programa de Pós-Graduação em Botânica, Departamento de Ciências Biológicas, Universidade Estadual de Feira de Santana, Av. Transnordestina s.n, 44036-900, Feira de Santana, Bahia, Brazil; e-mail: ricoperdiz@gmail.com

² Departamento de Ciências Biológicas, Universidade Estadual de Santa Cruz, Km 16 rod. Ilhéus-Itabuna, 45600-970, Ilhéus, Bahia, Brazil; e-mail: amorim.uesc@gmail.com

³ Herbário Centro de Pesquisas do Cacau, CEPEC, Rodovia Ilhéus Itabuna, Km 22, 45650-000, Ilhéus, Bahia, Brazil

⁴ Instituto de Botánica del Nordeste (UNNE-CONICET), Sargento Cabral 2131, C.C. 209, 3400, Corrientes, Corrientes, Argentina; e-mail: msferrucci@yahoo.com.ar

Abstract. A new species of *Paullinia* from the Atlantic Forest of southern Bahia, Brazil, is described and illustrated. *Paullinia unifoliolata* belongs to sect. *Pachytoechus* and is distinguished by its unifoliolate leaves. In addition, micromorphological characters of the pollen grains are described, and a comparison with *P. carpopoda*, the most similar species, is provided.

Key Words: Endemism, Paullinieae, pollen morphology, Sapindales.

Resumo. Uma nova espécie de *Paullinia* da Floresta Atlântica do sul da Bahia, Brasil é descrita e ilustrada. *Paullinia unifoliolata* pertence à seção *Pachytoechus* e se distingue por possuir folhas unifolioladas. Como complemento, caracteres micromorfológicos dos grãos de pólen são descritos e uma comparação com *P. carpopoda*, a espécie morfológicamente mais semelhante, é apresentada.

Paullinia L. is the second largest genus in the tribe Paullinieae, with ca. 200 species (Buerki et al., 2009) of wide distribution in the neotropics. It shares the tribe with another six genera, *Cardiospermum* L., *Houssayanthus* Hunz., *Lophostigma* Radlk., *Serjania* Mill., *Thinouia* Triana & Planch., and *Urvillea* Kunth (Radlkofer, 1931–1932; Ferrucci & Acevedo-Rodríguez, 2005). The vast majority of *Paullinia* species occur in humid forests, in contrast to the closely related *Serjania*, which shows a greater diversity in drier vegetation types and disturbed areas (Acevedo-Rodríguez, 1993).

The coastal forests of southern Bahia, Brazil, have yielded many new species since the start of forest inventories in the early 1980s (e.g., Mori et al., 1983; Amorim et al., 2008, 2009). Expeditions to montane forests

in the municipality of Arataca revealed the unusual unifoliolate *Paullinia* species that is described here. After a careful examination of previously deposited material, an additional collection of this same species was found at CEPEC herbarium. This collection (Thomas et al. 11200), gathered at the Una Biological Reserve (REBIO-UNA), was cited as *Paullinia* sp. 1 in Amorim et al. (2008). Because of its unusual appearance, it had previously been misidentified as Euphorbiaceae or Icacinaceae. It is the first *Paullinia* reported that consistently has unifoliolate leaves.

Materials and methods

The description of this species is based on material deposited at CEPEC, CTES, and NY.

Dried flowers and fruits of herbarium specimens were rehydrated before being measured and drawn. Measurements of pistillate flowers were taken from post-anthetic flowers. The terminology used to describe floral symmetry and floral nectaries follows Ronse Decraene et al. (2000) and Solís and Ferrucci (2009).

Pollen grains were obtained from herbarium material (*Amorim et al. 6563*, CEPEC). Samples for light microscopy were acetolyzed according to Erdtman (1966) and mounted in glycerine jelly. These samples were deposited in the pollen collection of the Universidad Nacional del Nordeste (PAL-CTES).

The polar axis and equatorial diameter were measured on 20 grains using a Leica DM LB2 microscope. The terminology used to describe pollen grains follows Punt et al. (2007). Scanning electron micrographs (SEM) were made on acetolyzed pollen grains, and samples were coated with gold/palladium. The equipment used was JEOL 5800 LV operating at 15 KV.

New species

Paullinia unifoliolata Perdiz & Ferrucci, **sp. nov.** Type: Brazil. Bahia: Arataca, Serra do Peito de Moça, trilha de acesso após a casa de Mormaço, 14 Apr 2006 (fr), *A. M. Amorim*, *R. Goldenberg*, *M. Lopes*, *L. C. Gomes* & *S. Sant'Ana 5761* (holotype: CEPEC; isotype: CTES). (Figs. 1, 2)

Species nova *Paullinia carpopoda* Cambess. affinis, sed caule glabro, foliis unifoliolatis, arillo dimidiam tantum seminis partem obtegente differt.

Woody vine to 12 m tall, with milky latex, bearing woody tendrils only on sterile branches. Stems terete, 3–6 mm diam., glabrous, finely striate longitudinally, light brown, with sparse, minute and linear lentils; stem cross section with a single stele and a solid medulla; stipules ovate-triangular, caducous, 0.8–1.5 × 0.8–1 mm, with few sparse trichomes. *Leaves* unifoliolate; petiole subterete, canaliculate adaxially, 1–4.2 cm long, with few sparse trichomes, drying blackish at base and near the articulation; petiolule subterete, bicanaliculate, 3–7 mm long, blackish, glabrous, except for sparse minute, curved glandular trichomes; leaflet

chartaceous, when fresh shiny-green adaxially, lighter greenish and dull abaxially, glabrous, obovate to elliptic, 7.4–21 × 3.5–9 cm, the base acute or obtuse, symmetrical, or less often asymmetrical, the margins entire, sometimes slightly undulate, with a yellowish cartilaginous line, the apex obtuse, shortly acuminate or retuse; venation brochidodromous, primary and secondary veins prominent on both surfaces, secondary veins 7 to 8 pairs, curved; lacking domatia. *Thyrse* axillary, simple, racemiform, erect, with sparse minute appressed trichomes; peduncle subterete, 5–8 mm long; rachis angular, longitudinally striate, 5–11 cm long; bracts ovate-triangular, persistent, 0.5–1 × 0.4–0.8 mm, pubescent, trichomes appressed, the bracteoles similar but smaller; cincinnus 4–10-flowered, the peduncle 2–6 mm long; pedicel 2.5–4 mm long, in fruit 4.5–5 mm long, erect, articulated on the lower 1/4. *Flowers* 3.5–4 mm long; sepals 5, the two anterior ones connate to half of their length, outer sepals concave, ovate to oblong, ca. 0.7 × 0.5 mm, inner sepals obovate, ca. 1.9 × 1.1 mm, abaxially appressed pubescent, adaxially glabrous, the apex obtuse, with ciliate margins; petals obovate to spatulate, clawed, posterior ones symmetrical, 2.9–4 × 0.8 mm, anterior ones asymmetrical, 2.5–4 × 0.7–0.8 mm, minute glandular trichomes in both surfaces, more dense abaxially, the petal appendages with an emarginate or biauriculate crest; nectary lobes 4, ovoid, puberulous, posterior lobes obtuse at apex, anterior lobes smaller than the posterior, acute at apex; androgynophore glabrous; staminate flowers: stamens 1.2–2.5 mm long, the filaments villous; pistillode ca. 0.5 mm long, glabrous; pistillate flowers: ovary puberulous, with simple and glandular trichomes, the style ca. 2 mm long, glabrous, the stigma short, ca. 0.2 mm long. *Capsules* one-seeded, unwinged, globose, stipitate, 1.7–2.5 × 1.2–1.8 cm including stipe, the stipe 1–3 mm long, the base attenuate, the apex apiculate, epicarp glabrous, rugose when dried, 6-ridged, endocarp densely ferruginous-pilose; seeds obovoid-subspherical, 1.2–1.9 × 1–1.6 cm, sparsely covered with minute trichomes, the aril covering basal half of the seed ca. 5.5 mm long, dorsally emarginate, with erose margins; embryo subspheroidal, diagonally superposed, cotyledons thick, starchy.

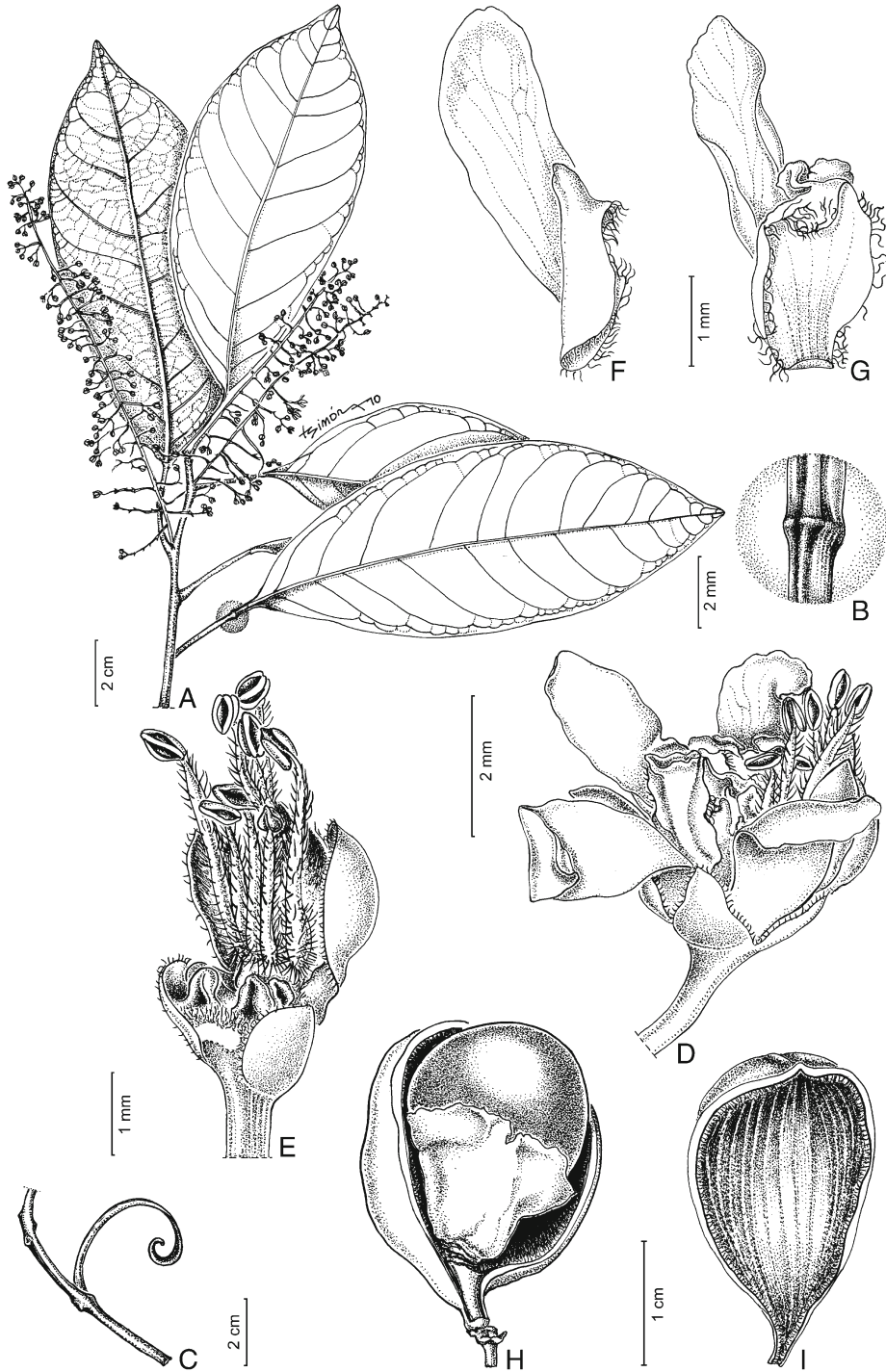


FIG. 1. *Paullinia unifoliolata*. A. Flowering branch. B. Detail of leaflet articulation. C. Tendril. D. Staminate flower. E. Staminate flower, without posterior sepal and petals, showing nectary lobes. F. Anterior petal, adaxial view. G. Posterior petal, adaxial view. H. Capsule, showing a mature seed and its aril. I. Capsule fragment. (A-G from Amorim et al. 6563, CEPEC; H, I from Amorim et al. 5009, CEPEC.)

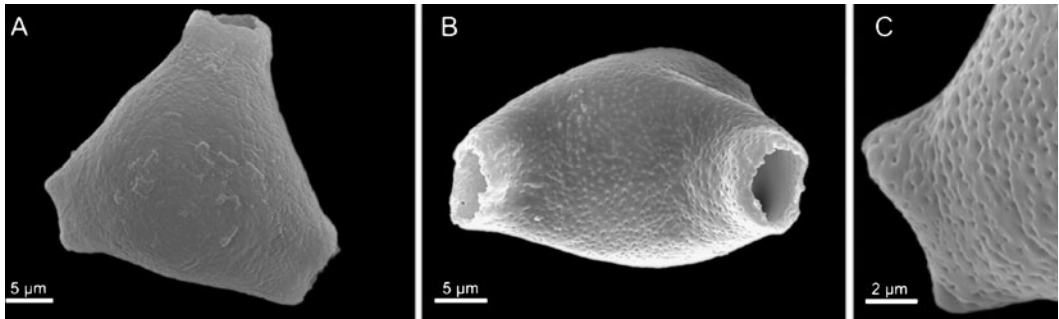


FIG. 2. SEM micrographs of *Paullinia unifoliolata* pollen grains. A. Polar view. B. Equatorial view. C. Detail of pore region. (From Amorim et al. 6563, CEPEC.)

Pollen.—Pollen grains isopolar, oblate, triporate, outline triangular, polar axis (21.7–)26.5 (–32.5) μm , equatorial axis (40.3–)47.3 (–55.8) μm , sexine tectate perforate, psilate toward the central area in polar view.

Distribution, ecology, and phenology.—This species is endemic to the Atlantic Forest of southern Bahia, Brazil, and is known from only a few collections. These collections were made in two areas: the Una Biological Reserve and the Serra das Lontras National Park, both under federal protection (see Amorim et al., 2008, 2009 for details on the areas and their floras). *Paullinia unifoliolata* grows on primary and advanced secondary forest, under the canopy or along the edge. Flowering specimens were collected in November, and fruits from April to June and December.

Etymology.—The specific epithet refers to the unifoliolate leaves of this new species.

Additional specimens examined. BRAZIL. Bahia: Arataca, Serra do Peito de Moça, 15°10'25"S, 39°20'30"W, 14 May 2005 (fr), A. M. Amorim et al. 5009 (CEPEC); Arataca, Serra do Peito de Moça, na trilha para a residência do Sr. Mormaço, 15°10'25"S, 39°20'30"W, 15 Jun 2006 (fr), A. M. Amorim et al. 6093 (CEPEC), 25 Nov 2006 (fl), A. M. Amorim et al. 6563 (CEPEC); Arataca, Serra do Peito de Moça, próximo ao córrego a 2 km da sede, 15°10'27"S, 39°20'22"W, 18 Dec 2005 (fr), J. G. Jardim et al. 4861 (CEPEC); Una, N edge of Una Biological Reserve, ca. 500 mN of Rio Maruim, 15°09'03"S, 39°05'07"W, 11 Nov 1996 (fl), W. W. Thomas et al. 11200 (CEPEC, NY).

Paullinia unifoliolata belongs to section *Pachytoechus* Radlk., which is characterized by anterior sepals that are connate half of their length and unwinged globose capsules with a relatively long stipe and a thick pericarp (Radlkofer, 1931–1932). This new species

can be distinguished from all other species of *Paullinia* by the unifoliolate leaves. In addition, *P. unifoliolata* has glabrous stems and leaves, leaves lacking domatia, cincinni with long peduncles (2–6 mm long), and glabrous one-seeded capsules with an aril covering half the seed length. *Paullinia unifoliolata* is morphologically similar to the sympatric *P. carpopoda* Cambess. *Paullinia unifoliolata* differs from *P. carpopoda* by the glabrous stems and leaflets (vs. stems and leaflets puberulous to tomentose), unifoliolate leaves (vs. leaves decompose, 3–4-jugate), and the aril covering half of the seed length (vs. aril entirely covering the seed). Besides the overall morphological similarity between *Paullinia unifoliolata* and *P. carpopoda*, they also share pollen morphological and morphometric traits, but they differ by the smaller perforations in *P. unifoliolata* (Fig. 2).

This is the first record of unifoliolate leaves in the tribe Paullinieae. *Allophylus*, a genus of the relatively closely related tribe Thouinieae (Acevedo-Rodríguez, 1993, Acevedo-Rodríguez et al., 2011), does have some unifoliolate species (Radlkofer, 1931–1932). With the description of *Paullinia unifoliolata*, the number of species of *Paullinia* in the Atlantic Forest increases to 26 (Somner & Ferrucci, 2009). Of these 26 species, about 65% are endemic to the Atlantic Forest domain, reinforcing once again the uniqueness of this important biodiversity hotspot (Myers et al., 2000; Mittermeier et al., 2005).

Acknowledgments

We thank Jomar G. Jardim for the suggestion of this species as new, and for his helpful comments on an earlier version of this paper;

Márdel Lopes for encouraging the first author to study the Sapindaceae; Laura Simón for the beautiful illustration; Valeria Mambrín for valuable help with the pollen samples; Cristina Salgado for the assistance in SEM service; Walter Medina and Gelina Pieszko for digitizing the images; Pedro Acevedo-Rodríguez and Pedro Fiaschi for the great improvements of language and content on the manuscript; and Patricia Eckel for revising the Latin description. This paper is part of the MSc. thesis of R. O. Perdiz prepared in the “Programa de Pós-Graduação em Botânica” of Universidade Estadual de Feira de Santana (UEFS), Bahia, Brazil. Fieldwork was provided by CNPq (Edital Universal 2009), and FAPESB (Edital Pesquisas 2009). R. O. Perdiz and A. M. Amorim had financial support from CNPq (respectively Mes-trado and Produtividade em Pesquisa grants).

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