



Carajasia (Rubiaceae), a new and endangered genus from Carajás mountain range, Pará, Brazil[#]

ROBERTO M. SALAS^{1*}, PEDRO L. VIANA², ELSA L. CABRAL¹, STEVEN DESSEIN³ & STEVEN JANSSENS³

¹Instituto de Botánica del Nordeste, CONICET. FACENA-UNNE. Sargento Cabral 2131, cc. 209, CP. 3400. Corrientes, Argentina.

²Museu Paraense Emílio Goeldi. Avenida Magalhães Barata, 376, São Braz, Belém - PA, 66040-170, Brazil.

³Botanic Garden Meise, Nieuwelaan 38, BE-1860 Meise, Belgium.

*Author for Correspondence: robertoymanus@gmail.com

[#]In: Delprete, P.G. & Dessein, S. (Editors), Festschrift volume dedicated to Timothy Motley (1966–2013). *Phytotaxa* 206: 1–132. (2015)

Abstract

Carajasia is described as a new genus of Rubiaceae. It is so far known only from the mountain summits of Serra dos Carajás (Pará, Brazil), where it is part of a shrubby vegetation surrounded by tropical rainforest. The new genus belongs to the tribe Spermacoaceae and is positioned within it to the *Spermacoce* clade. *Carajasia* is unique within the clade in having a very particular combination of characters: flowering branches with two axillary flowers per node, homostylous flowers, corollas with a fringe of moniliform hairs, pubescent styles with distinct stigma lobes, bilobed nectariferous discs covered by triangular papillae, pollen with a double reticulum and fruits with a peculiar type of dehiscence. A detailed description of *Carajasia* is presented, including observations of the fruit and pollen, along with distribution maps and images of the plant in its habitat. A dichotomous key to distinguish *Carajasia* from other genera with deeply divided stigmas is provided. A molecular phylogenetic study was carried out using ITS and ETS sequences to determine the phylogenetic position of the new genus within the *Spermacoce* clade. The results of the combined analyses demonstrated that *Carajasia* is sister to *Galianthe* with moderate to high support. Both genera form a weakly supported clade with *Schwendenera*. This clade is sister to the other genera of the *Spermacoce* clade studied in this work. *Galianthe* and *Schwendenera* share with *Carajasia* pollen with a double reticulum, but they are clearly differentiated by suffruticose habit, heterostylous flowers and the pattern of fruit dehiscence. To clarify the phylogenetic position of *Carajasia*, some morphological characters are discussed based on the molecular results: division of the stigma, pollen types and floral syndrome.

Key words: *Galianthe*, *Spermacoce* clade, Spermacoaceae, phylogeny, taxonomy, pollen

Introduction

During the last two decades, the delimitation of the tribe Spermacoaceae has undergone through considerable changes. Currently, three different concepts are recognized. The first coincides with the classical definition (Robbrecht, 1988), including about 20 genera and is still defended by some scientists on the basis of morphological characters (Terrell & Wunderlin 2002). The two other tribal concepts are mainly based on molecular studies. Bremer (1996) proposed the broadest concept of Spermacoaceae, including the former tribes Knoxieae, Triainolepideae, Hedyotideae and Manettieae. Andersson & Rova (1999) redefined and narrowed this concept by recognizing Knoxieae (including Triainolepideae and the ‘*Pentas* group’ of the tribe Hedyotideae) as a separate tribe. The proposal of Andersson & Rova (1999), often referred to as Spermacoaceae *s.l.*, was followed with minor modifications by other Rubiaceae specialists (Dessein 2003; Robbrecht & Manen 2006; Groeninckx *et al.* 2009), and is also accepted in this paper. Robbrecht & Manen (2006) included 33 genera in Spermacoaceae *s.l.*, to which Groeninckx *et al.* (2009) added other taxa; the tribe now comprises 61 genera with an estimated 1235 species. Several new genera were described in Spermacoaceae *s.l.* based on morphological (Terrell 1987; 2001a, b, Terrell & Lewis, 1990, Terrell & Robinson, 2009, Borhidi 2012, Borhidi & Lozada, 2010, 2011) or combined morphological and molecular evidence (Groeninckx *et al.*, 2010a, b, c). Despite the consensus among specialists about Spermacoaceae *s.l.*, morphologically it is difficult to define because no single morphological synapomorphy supports the tribe (Groeninckx *et al.* 2009).