

THE *GUATTERIA* GROUP DISENTANGLED: SINKING *GUATTERIOPSIS*, *GUATTERIELLA*, AND *HETEROPETALUM* INTO *GUATTERIA*

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ABSTRACT

(The *Guatteria* group disentangled: sinking *Guatteriopsis*, *Guatteriella*, and *Heteropetalum* into *Guatteria*) The *Guatteria* group (Annonaceae) consists of four genera: *Guatteria*, *Guatteriopsis*, *Guatteriella*, and *Heteropetalum*. Morphological data have for long suggested a close affinity between these genera. Recent phylogenetic analysis has shown that *Guatteriopsis*, *Guatteriella* as well as *Heteropetalum* are actually nested within *Guatteria*. Here the nomenclatural consequences following from these results are presented. Three new combinations and one new name are introduced for *Guatteriopsis* and one old name is reinstated, one new combination and one new name is proposed for *Guatteriella*, and one old combination is reinstated for *Heteropetalum*. With the transference of the species of these three genera into *Guatteria* the concept of the *Guatteria* group is put out of use.

Key words: synonymy, new combinations, new names, reinstatement of old names.

RESUMO

(O grupo *Guatteria* desvendado: fundindo *Guatteriopsis*, *Guatteriella* e *Heteropetalum* em *Guatteria*) O grupo *Guatteria* (Annonaceae) consiste de quatro gêneros: *Guatteria*, *Guatteriopsis*, *Guatteriella* e *Heteropetalum*. A afinidade entre estes quatro gêneros manteve-se aceita por longo tempo, com base em dados morfológicos. Entretanto, uma recente análise filogenética demonstra que *Guatteriopsis*, *Guatteriella* e *Heteropetalum* encontram-se circunscritos em *Guatteria*. As conseqüências nomenclaturais dos resultados filogenéticos obtidos são apresentadas neste trabalho. São propostas três combinações novas e um nome novo em *Guatteriopsis*, enquanto um nome antigo é restabelecido. Uma nova combinação e um novo nome são propostos em *Guatteriella* e uma combinação antiga é restabelecida em *Heteropetalum*. Com a transferência das espécies destes três gêneros para *Guatteria*, o conceito de grupo *Guatteria* não é mais necessário.

Palavras-chave: sinônimos, novas combinações, novos nomes, reestabelecimento de nomes antigos.

INTRODUCTION

The genus *Guatteria* Ruiz & Pav. contains near to 290 species and is the largest genus within the family of Annonaceae (Erkens 2007). Species of *Guatteria* are frequent constituents of Neotropical (lowland) forests (Morawetz & Waha 1985, Erkens *et al.* 2007) and the genus is widely distributed throughout Mesoamerica, the Caribbean, and tropical South America. Based on morphological characters, *Guatteria* belongs to Fries' *Guatteria* group (1939, 1943, 1959), consisting of four genera: *Guatteria*, *Guatteriopsis* R.E. Fr., *Guatteriella* R.E. Fr., and *Heteropetalum* Benth. (Fig. 1). The close affinity between these genera has been supported by data of many authors after Fries

(e.g. leaf anatomy (van Setten & Koek-Noorman 1986), flower anatomy (van Heusden 1992), fruit and seed morphology (van Setten & Koek-Noorman 1992), unusual chromosome differentiation and cuticular folding patterns (Morawetz & Waha 1985), a distinct pollen type (Walker 1971; Morawetz & Waha 1985), oil composition analysis (Maia *et al.* 2005), and wood anatomy (Erkens *et al.* 2007)). These studies suggested a close affinity of the four genera but did not determine their phylogenetic relationships with respect to each other. In a recent phylogenetic study of the *Guatteria* group (Erkens *et al.* 2007) it was shown that *Guatteriopsis*, *Guatteriella* as well as *Heteropetalum* are all nested within *Guatteria*

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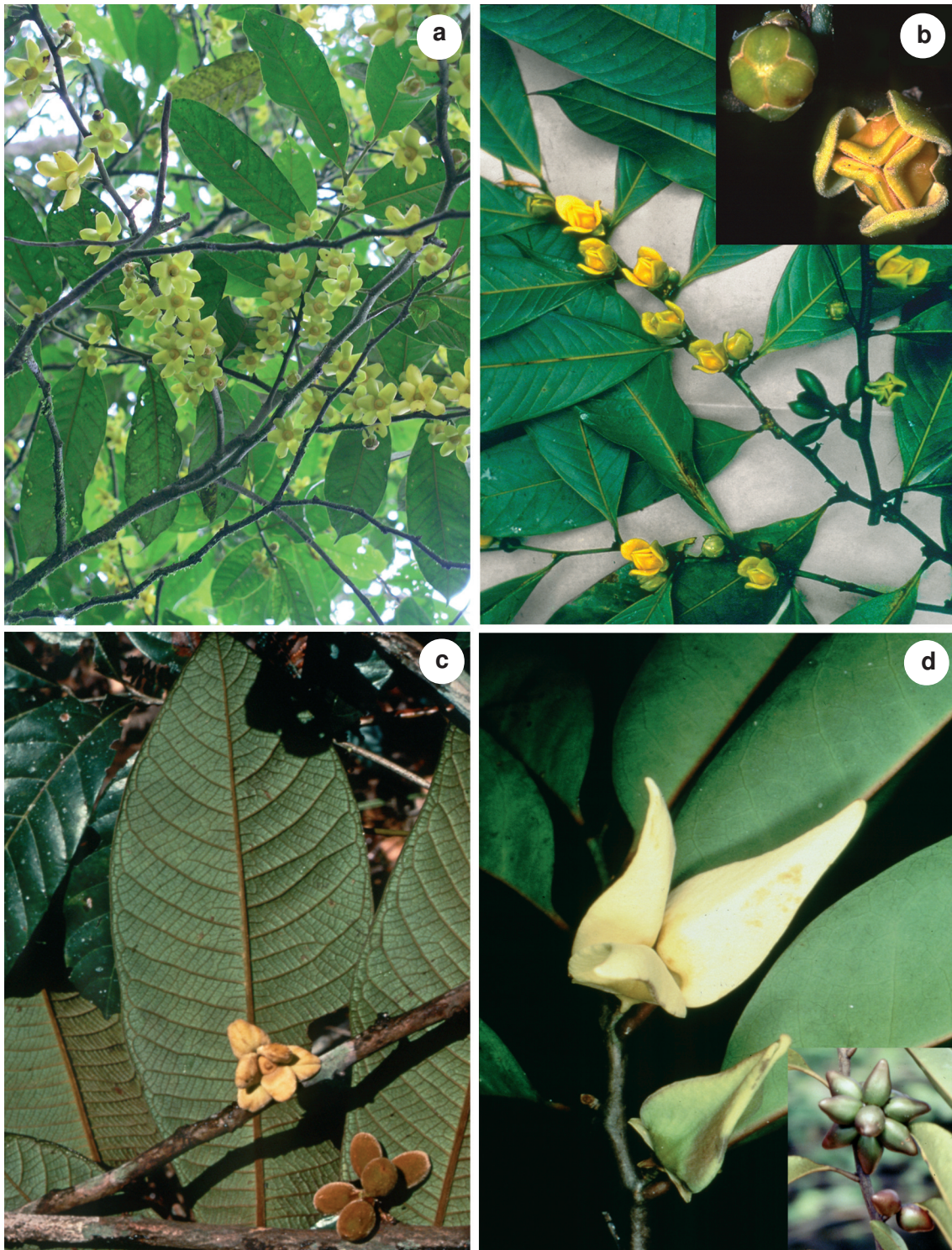


Figure 1 – Representatives of the former *Guatteria* group. a. flowering branch of *Guatteria allenii*. (Maas 9543); b. flowering branch of *Guatteria blepharophylla* (Harley 10962); inset shows close up of flower at anthesis and flower bud (Maas 8365); c. flowering and fruiting branch of *Guatteria campinensis* (Morawetz 31-24883); d. flowering branch of *Guatteria heteropetala* showing flower at anthesis and flower bud; inset shows fruiting branch. Photo credits: a. R.H.J. Erkens; b. P.J.M. Maas; c. W. Morawetz; d. G.A. Romero; inset: P.E. Berry.

(Fig. 2). Therefore, a separate generic status of these three genera is unjustified. All species in these three genera should thus be transferred to *Guatteria*. Here the nomenclatural changes that follow from the aforementioned results are presented.

NEW COMBINATIONS

Guatteria is easily recognised by a combination of an impressed primary vein on the upper side of the leaf, valvate sepals, almost always imbricate petals, numerous carpels (with a single basal ovule), and a pedicel with a distinct suprabasal articulation.

1. *Guatterioipsis* R.E.Fr.

Guatterioipsis ('*Guatteria*-like'; Fries 1934) has been distinguished from *Guatteria* by the fact that both whorls of petals are valvate (non-overlapping) instead of imbricate (overlapping). *Guatterioipsis* was made up of five species: the relatively widespread *G. blepharophylla* (Mart.) R.E. Fr. (Amazonian Brazil, Peru, Ecuador, Venezuela, and Guyana), *G. friesiana* W.A. Rodrigues (Amazonian Brazil and Colombia), *G. hispida* R.E. Fr. (Amazonian Brazil), *G. kuhlmannii* R.E. Fr. (Amazonian Brazil), and *G. ramiflora* D.R. Simpson (Amazonian Peru).

The molecular data presented by Erkens *et al.* (2007) show that *Guatterioipsis* is not a monophyletic clade within *Guatteria*. *Guatterioipsis* consists of three unrelated lineages. The first lineage comprises *Guatterioipsis blepharophylla* and *G. hispida*. These two species were described first (Fries 1934) and possess the synapomorphies that define the genus: flowers on short pedicels, valvate petals and an articulation nearer to the flower when compared to *Guatteria*. It can be seen from Figure 2 that these two species are sister to each other. *Guatterioipsis blepharophylla* was originally described as *Guatteria blepharophylla* and here this name is resurrected, following Johnson & Murray (1995). Additionally, from the four syntypes of this species, namely *von Martius s.n.* (3

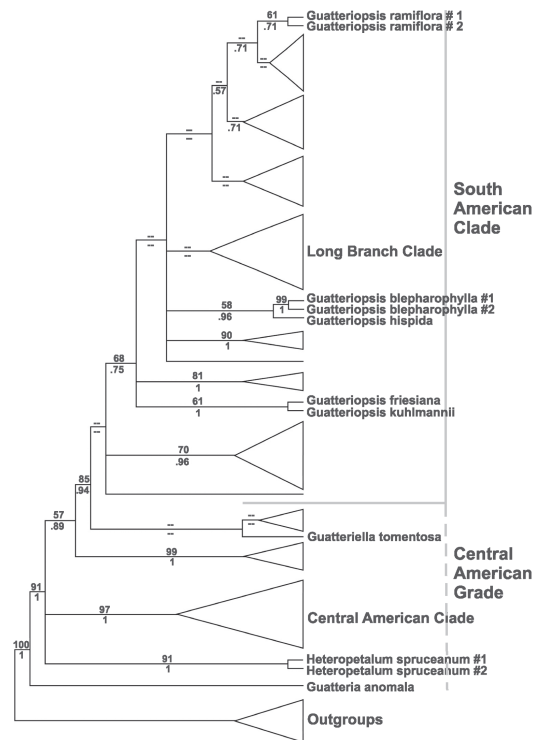


Figure 2 – Schematic representation of relationships between the members of the former *Guatteria* group (Erkens *et al.* 2007; triangles indicate recovered clades). Bootstrap support values are shown above the branches, Bayesian posterior probability values below. Names refer to those used by Erkens *et al.* (2007).

specimens) and *Poeppig 3110*, we have selected a *von Martius* collection as lectotype. *Guatterioipsis hispida* is simply transferred into *Guatteria hispida*.

Originally, there was a sixth species described into *Guatterioipsis* (*G. sessiliflora* (Benth.) R.E. Fr.) but this species has already been synonymized with *Guatterioipsis blepharophylla* (Erkens 2007, p. 264).

The second *Guatterioipsis* lineage (Fig. 2) consists of *Guatterioipsis friesiana* (Rodrigues 1981) and *G. kuhlmannii* (Fries 1937), two species that were described later into the genus. Both species have a rounded to cordate leaf base which separates them from *G. blepharophylla* and *G. hispida*. Furthermore, *G. friesiana* differs from the other species of *Guatterioipsis* in having ovoid

instead of depressed ovoid flower buds. In a phylogenetic context, these species are also sister to each other, as shown in Figure 2. *Guatteriopsis friesiana* is transferred to *Guatteria friesiana*. *Guatteriopsis kuhlmannii* needs a new name in *Guatteria* because the epithet *kuhlmannii* is already occupied in *Guatteria*. The newly chosen epithet *cryandra* ('cold man') is a latinization of 'cool' (the English phonetic form of the German 'kuhl') and 'man' (after the German 'Mann').

Guatteriopsis ramiflora is the most recently described *Guatteriopsis* species (Simpson 1982). However, it is very clear on the basis of morphological characteristics and molecular data that this species has erroneously been described into *Guatteriopsis*: the petals are imbricate, the pedicel is 2.5–4 cm long (in *Guatteriopsis* <1 cm) and the articulation is suprabasal. Therefore, this species should not have been described as *Guatteriopsis* in the first place. As a consequence, the name of this species is here changed to *Guatteria ramiflora*.

Guatteria blepharophylla Mart. in Mart., Fl. bras. 13(1): 38. 1841.

Guatteriopsis blepharophylla (Mart.) R.E. Fr. Acta Horti Berg. 12: 110. t. 6. 1934. BRAZIL. PARÁ: Coari 'In silvis ad Coari, prov. Rio Negro, November 1819', C.F.P. von Martius s.n. (lectotype designated here: M). BRAZIL. PARÁ: Coari ('In silvis ad Coari, provinciae Rio Negro, January 1820'), C.F.P. von Martius s.n. (syntype: M). BRAZIL ('*Guatteria blepharophylla* Mart.'). C.F.P. von Martius s.n. (syntype: M). BRAZIL. AMAZONAS, Tefé ('Ega'), E.F. Poeppig 3110 (syntypes: B, BM, GOET, P, W).

Annona sessiliflora Benth., Hooker's J. Bot. Kew Gard. Misc. 5: 8. 1853. *Guatteria sessiliflora* (Benth.) Saff., Contr. U. S. Natl. Herb. 18: 6. 1914. *Guatteriopsis sessiliflora* (Benth.) R.E. Fr., Acta Horti Berg. 12: 109. 1934. BRAZIL. AMAZONAS: Rio Negro, towards confluence with Rio Solimões, V.1851, R. Spruce 1668 (holotype: K; isotypes: BM, LE, M, NY, W).

Guatteria friesiana (W.A. Rodrigues) Erkens & Maas, *comb. nov.*

Guatteriopsis friesiana W.A. Rodrigues, Acta Amazonica 11: 49. f. 1. 1981. BRAZIL. AMAZONAS: Manaus, Igarapé Passarinho, 14.III.1956, D. Coêlho s.n. (holotype: INPA 3609; isotype: S).

Guatteria hispida (R.E. Fr.) Erkens & Maas, *comb. nov.*

Guatteriopsis hispida R.E. Fr., Acta Horti Berg. 12: 111. t. 7 & 8. 1934. BRAZIL. AMAZONAS: Manaus, Estrada do Aleixo, km 12, 9.XII.1932, A. Ducke s.n. (holotype: S; isotypes: K, RB 23903, US).

Guatteria cryandra Erkens & Maas, *nom. nov.*

Guatteriopsis kuhlmannii R.E. Fr., Acta Horti Berg. 12: 275. t. 8. 1937. BRAZIL. PARÁ: Rio Tucuruí, affluent of Rio Xingu, Victoria, 17.IV.1924, J.G. Kuhlmann s.n. (holotype: S; isotype: RB 24361). Not *Guatteria kuhlmannii* R.E. Fr. (1939).

Guatteria ramiflora (D.R. Simpson) Erkens & Maas, *comb. nov.*

Guatteriopsis ramiflora D.R. Simpson, Phytologia 51: 305. 1982. PERU. San Martín: Prov. Mariscal Caceres, Tocache Nuevo, Quebrada de Ishichimi (Fundo Retiro), 15.IV.1970, J. Schunke V. 3924 (holotype: F; isotypes: COL, F, MO, P, S, U, US).

2. *Guatteriella* R.E. Fr.

Guatteriella ('small *Guatteria*'); Fries 1939) is a rare and little known genus and consists of only two species: *G. campinensis* Morawetz & Maas (Amazonian Brazil; Morawetz & Maas 1984) and *G. tomentosa* R.E. Fr. (Amazonian Brazil and Colombia; Fries 1939). The genus has been characterized by laterally flattened (hairy) monocarps, thick and densely hairy, brownish yellow petals, and a percurrent, straight, tertiary venation. Only one species was used for the phylogenetic analysis of Figure 2. However, because of the synapomorphies that unite these two species it is expected that they are sister species and

both should be placed in *Guatteria*. *Guatteriella campinensis* is renamed to *Guatteria campinensis*. Because the name *Guatteria tomentosa* is already in use, *Guatteriella tomentosa* is renamed *Guatteria trichocarpa*. The latter name is chosen because of the very hairy monocarps of this species.

Guatteria campinensis (Morawetz & Maas) Erkens & Maas, *comb. nov.*

Guatteriella campinensis Morawetz & Maas, Pl. Syst. Evol. 148: 20. f. 12. 1984. BRAZIL. AMAZONAS: km 165 of road from Manaus to Itacoatiara, 24.VIII.1983, W. Morawetz & D. Coêlho 31 24883 (holotype: INPA; isotypes: U, WU).

Guatteria trichocarpa Erkens & Maas, *nom. nov.*

Guatteriella tomentosa R.E. Fr., Acta Horti Berg. 12: 541. f. 39. 1939. BRAZIL. AMAZONAS: Rio Solimões, São Paulo de Olivença, 25.II.1932, A. Ducke s.n. (holotype: S; isotype: RB 23916). Not *Guatteria tomentosa* Rusby (1910).

3. *Heteropetalum* Benth.

The fourth genus in the former *Guatteria* group was *Heteropetalum* ('unequal petals'; Fries 1930) made up of two species (*H. brasiliense* and *H. spruceanum*, both from Amazonian Brazil, southern Venezuela, and southern Colombia). *Heteropetalum* differed from *Guatteria* because its outer petals are greatly reduced in size (becoming almost sepal-like). Fries (1930) split *H. spruceanum* from *H. brasiliense* and split *H. spruceanum* var. *longipetalum* from *H. spruceanum* (in Maguire *et al.* 1957). However, the differences between these taxa are so small and subtle (e.g. smaller versus larger leaves; more versus fewer secondary veins) that it is preferred here to unite them again, as was for instance preliminary done by Steyermark & Berry (1995). Furthermore, the basionym of *H. brasiliense*, which is *Guatteria heteropetala*, is taken up again.

Guatteria heteropetala Benth., London J. Bot. 2: 360. 1843

Heteropetalum brasiliense Benth. J. Proc. Linn. Soc., Bot. 5: 69. 1860. BRAZIL. AMAZONAS: Rio Negro, 1839, R.H. Schomburgk I 950 (holotype K; isotypes BM, F, L, P, U).

Heteropetalum spruceanum R.E. Fr., Acta Horti Berg. 10: 75. t. 3. 1930. VENEZUELA. BOLÍVAR: Río Pasiba ('Vasiva'), affluent of Río Casiquiare, XII.1853, R. Spruce 3184 (holotype: B; isotypes: BM, BP, C, E, K, MG, NY, P).

Heteropetalum spruceanum var. *longipetalum* R.E. Fr., Mem. New York Bot. Gard. 9: 330. 1957. COLOMBIA. Guainia: Río Atabapo, between San Fernando de Atabapo and Cacagual, 18.XI.1953, B. Maguire *et al.* 36261 (holotype: NY; isotype: S).

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