

H. Wiehler & A. Chautems. A reduction of *Lietzia* to *Sinningia*.

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A Reduction of *Lietzia* to *Sinningia*.

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ABSTRACT: An application of the principles of pollination biology among highly evolved plant families and the results of hybridization experiments are the cause for the inclusion of the small genus *Lietzia* within the larger taxon *Sinningia*.

KEY WORDS: Gesneriaceae, *Lietzia*, *Sinningia*, Brazil, pollination biology, bat pollination, hummingbird pollination, euglossine bee pollination, hybridization.

The monotypic genus *Lietzia* was erected by Eduard Regel in 1880 for a species from the State of Espírito Santo, Brazil. This perennial, *Lietzia brasiliensis* Regel & E. Schmidt (Figure 1), has underground tubers ranging from 2-10 cm in diameter. The large, upright and hooded flowers are bell-shaped, with a gaping throat, green, speckled with maroon, excellent examples of the bat-pollination syndrome. Recently, another species with a similar flower was discovered. It will be published at a later time. The range of distribution of these two bat-pollinated species is from southern Bahia to the State of Rio de Janeiro. They flower at the height of summer in Brazil, from November through February. In North America in cultivation, anthesis occurs from July through October.

The senior author had suspected for some years that *Lietzia* represents the bat-pollinated wing of the large genus *Sinningia*, in which red, and purple or white flowers predominate, pollinated by hummingbirds and euglossine bees. The majority of the 60+ species of the tuberous genus *Sinningia* are likewise native to southeastern Brazil. As the green-flowered species of *Lietzia* came into cultivation in North America, a biosystematic study was undertaken to test the affinities of these taxa. Intergeneric hybrids are relatively easily obtained in the neotropical Gesneriaceae, but the resulting offspring is usually sterile, as revealed by the percentage of hybrid pollen stainability (h.p.s.) (WIEHLER, 1983). The results of hybridization between species of *Lietzia* and *Sinningia*, begun in 1987, are shown in Table 1.

The last seven combinations listed in Table 1

were produced with plants brought back by the GRF Expedition to Brazil in October 1991, with the presumed hybrids still in the seedling stage at the time of writing. Judging from the percentages of h.p.s. revealed in the first five combinations shown in Table 1, it seemed no longer surprising that all of the later crosses attempted between *Lietzia* and *Sinningia* produced viable seed.

In the new classification of the neotropical Gesneriaceae (WIEHLER, 1983) are now quite a few genera in which the species have diverse corolla shapes and colors because they employ radically different types of pollinators. Good examples are the genera *Achimenes* Persoon, *Drymonia* Martius, *Gasteranthus* Benth, *Gesneria* Linnaeus, *Gloxinia* L'Heritier, *Nematanthus* Schrader, *Neomortonia* Wiehler, and *Paradrymonia* Hanstein. The present study and others (WIEHLER, 1983) show that the genetic barriers between congeneric species with different modes of pollination may still be quite low. In the crosses listed below, numbers 1, 2, 3, 4, 5, 6, 10, 11, 12, and 14 represent tubular red corollas and pollination by hummingbirds on the *Sinningia* side, bat pollination on the other. In combination numbers 8, 9, and 13, the *Sinningia* parent has a nodding, bell-shaped flower with a purple or white corolla, indicative of euglossine bee pollination. In cross number 7, the long, white, nodding and fragrant flowers of *S. tubiflora* are pollinated by a long-tongued moth.

The h.p.s. shown between *Lietzia* and *Sinningia* compares well with the h.p.s. occurring with crosses within the genus *Sinningia*, where it varies from fully fertile (85-100%), to partially fertile (5-

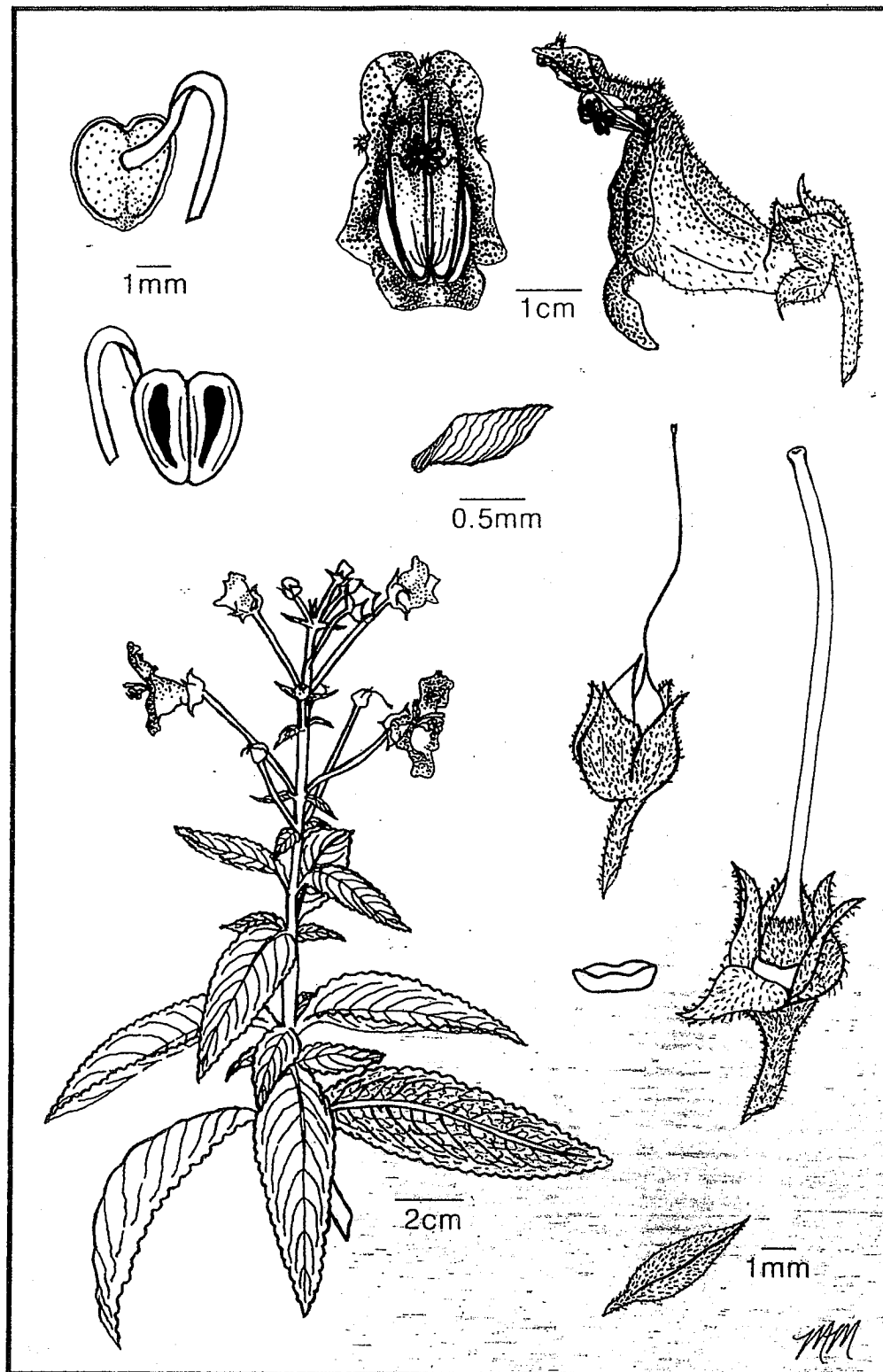


Figure 1: *Sinningia brasiliensis* (Regel & E. Schmidt) Wiehler & Chautems
 Voucher specimen: Wiehler & GRF Expedition 91132; Brazil: Espírito Santo: Ibatiba
 Illustrator: Merrilee Malwitz, 1994
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85%), to sterile (0-2%) (CLAYBERG, 1968:831; WIEHLER & CHAUTEEMS, 1989).

Except for the shape and color of the corolla, and the annular nectary, there are no other important differences between *Lietzia* and *Sinningia*. In contrast to earlier schemes of classification of the neotropical Gesneriaceae, the shape and color of the corolla have lost their decisive value as generic markers (WIEHLER, 1983). A modern understanding of pollination biology shows that such features may be merely an expression of differing pollination strategies of closely related species within a genus. Oddly shaped green flowers and bat pollination fit quite well within the genus *Sinningia* where pollination by hummingbirds predominates. The hybridization experiments between the two taxa substantiate the above theoretical considerations. The genus *Lietzia* thus joins the extensive synonymy of *Sinningia*.

Sinningia Nees, Ann. Sci. Nat. (Paris), ser. 1, 6:296. 1825.

Synonym: *Lietzia* Regel, Gartenflora 29:97. 1880.

Sinningia brasiliensis (Regel & E. Schmidt) Wiehler & Chautems, comb. nov.

Basionym: *Lietzia brasiliensis* Regel & E. Schmidt, Gartenflora 29:97. 1880.

The final disposition of *Sinningia brasiliensis* and a complete sectional treatment of *Sinningia* will be published later (see WIEHLER & CHAUTEEMS, 1989).

LITERATURE CITED

- CLAYBERG, C. D. 1968. Biosystematic studies in *Sinningia* and *Reichsteineria* (Gesneriaceae). Amer. J. Bot. 55(7): 829-833.
- WIEHLER, H. 1983. A synopsis of the neotropical Gesneriaceae. Selbyana 6: 1-219.
- _____ & CHAUTEEMS, A. 1989. GRF Seminar Series: The history and biology of *Sinningia*. Unpublished paper, Gesneriad Research Foundation, Sarasota, Florida.

Table 1. Artificial hybridization between species of *Lietzia* and *Sinningia*.

♀	Parental Species and Origin	♂	H.P.S.
1. <i>L. brasiliensis</i> G-3079 (Esp. Santo)	x	<i>S. incarnata</i> G-3336 (Guyana)	48%
2. <i>S. incarnata</i> G-3336 (Guyana)	x	<i>L. brasiliensis</i> G-3079 (Espirito Santo)	43%
3. <i>S. warmingii</i> G-197 (southern Brazil)	x	<i>L. brasiliensis</i> G-3079 (Espirito Santo)	54%
4. <i>S. incarnata</i> G-2724 (Honduras)	x	<i>L. brasiliensis</i> G-3079 (Espirito Santo)	18%
5. <i>L. brasiliensis</i> G-3340 (Bahia)	x	<i>S. aggregata</i> G-1074 (Santa Catarina)	32%*
6. <i>S. carangolensis</i> AC-1507 (Minas G.)	x	<i>L. brasiliensis</i> AC-1310 (Bahia)	**
7. <i>L. brasiliensis</i> G-3340 (Bahia)	x	<i>S. tubiflora</i> G-192 (Paraguay)	nyf*
8. <i>S. aghensis</i> G-3758 (Espirito Santo)	x	<i>L. brasiliensis</i> G-3678 (Espirito Santo)	nyf***
9. <i>S. speciosa</i> G-3677 (Minas Gerais)	x	<i>L. sp. nov. ****</i> G-3777 (Bahia)	nyf
10. <i>S. magnifica</i> G-3680 (Rio de Janeiro)	x	<i>L. sp. nov. ****</i> G-3777 (Bahia)	nyf
11. <i>S. douglasii</i> G-3672 (Rio de Janeiro)	x	<i>L. sp. nov. ****</i> G-3776 (Bahia)	nyf
12. <i>S. incarnata</i> G-2128 (Mexico)	x	<i>L. sp. nov. ****</i> G-3777 (Bahia)	nyf
13. <i>S. eumorpha</i> G-1041 (Sao Paulo)	x	<i>L. brasiliensis</i> G-3755 (Espirito Santo)	nyf
14. <i>S. glazioviana</i> G-3666 (Sao Paulo)	x	<i>L. brasiliensis</i> G-3755 (Espirito Santo)	nyf

[* Crosses made by John Boggan at Cornell University in 1988. ** Cross made by Mauro Peixoto in Brazil; hybrid has flowered, but H.P.S. unknown. *** nyf = (hybrids have) not yet flowered. **** For the sake of clarity, the new species with the bat-pollination syndrome, is listed here under *Lietzia*.]

Taxonomic Revision of *Sinningia* Nees (Gesneriaceae) III: New Species from Brazil and New Combinations

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ABSTRACT: Following previous accounts on the revision of the genus *Sinningia* (CHAUTEMS, 1990; 1991; 1993), three new species and two new combinations are provided. These results are based on more herbarium and fieldwork in Brazil.

KEY WORDS: Gesneriaceae, *Sinningia*, Brazil.

Sinningia carangolensis Chautems, spec. nov.

Figure 1

A *S. aggregata* (Ker Gawler) Wiehler indumento densiore, inflorescentiis ramosis, pedicellis longioribus, descendentibus recedit.

Terrestrial herb, arising from perennial tuber, with stems erect, 25-40 cm tall and ca. 0.5 cm in diameter, with a dense hair-covering of 0.5-1 mm long trichomes interspersed with shorter glandular hairs (sticky at the touch in vivo); internodes 5-10 cm long; leaves usually ternate, equal to slightly anisophyllous, petioles 0.5-2.5 cm long, light green, with a dense indumentum of trichomes and glandular hairs; blade ovate to elliptic, 5-10 cm long x 3-6 cm wide, apex acute, base obtuse and sometimes slightly asymmetrical, above green, beneath pale green with a whitish hair-covering, margin irregularly crenate with teeth 1-2 mm high x 2-3 mm wide, 7-9 pairs of veins yellowish green. Inflorescences cymes with 1-4 flowers in axillary position on the 3-6 upper nodes, peduncle 1-5 mm; the pedicels 3-6 cm long, the flowers turned into a \pm horizontal position at anthesis; calyx campanulate, lobes subequal, fused at base for ca. 3 mm, lanceolate, acuminate, 7-9 mm long x \pm 3 mm wide, green, margin entire, with a dense hair-covering of erect trichomes; corolla tubular, erect in the calyx, 3-4 cm long, inflated at base in a 5-lobed ring ca. 0.6 cm in diam., then briefly constricted and expanding gradually in a tube ca. 0.6 cm wide, greenish in bud, turning red-orange at anthesis, covered with long, erect trichomes, lobes of the limb subequal, 0.4 x 0.6 cm, tube inside cream-white with red striations; stamens 4, included, filaments 2.8-3.8 cm long, white, glabrous, anthers connivent, pollen white; nectary consisting of 5 glands, the 2 dorsal large and

connate, the 2 lateral and the ventral much smaller (the 2 lateral sometimes fused with the 2 dorsal, forming an incomplete ring); ovary greenish, style and stigma white. Fruit a capsule, ca. 1 cm long x 0.4 cm wide; seeds elliptical, obliquely striate.

TYPE: BRAZIL: MINAS GERAIS: Município Carangola, Pedra do Elefante, 20°47'S 42°02'W, sobre a rocha, 600 m, 13 Jan. 1991, Leoni & Chautems 1394 (HOLOTYPE: GFJP; ISOTYPE: G).

ADDITIONAL MATERIAL EXAMINED: BRAZIL: MINAS GERAIS: Carangola, Pedra do Elefante, 700 m, 13 Dec. 1988, Leoni & Medeiros 586 (GFJP, US); Carangola, Pedra do Amendoeira, Bairro Amendoeira, 500 m, Nov. 1991, Leoni 1700 (G, GFJP); Serra da Araponga, Fazenda Neblina, 20°43'S 42°29'W, 1350 m, 1 Feb. 1992, Leoni 1756 (G, GFJP); Araponga, Fazenda de Gramma, rocky hill to SW, 25 Jan. 1930, Mexia 4226a (photo US).

MATERIAL IN CULTIVATION: Grown in Geneva, at the greenhouse of the Conservatoire Botanique under acc. no. AC-1507, received from Mauro Peixoto - tubers collected in Espera Feliz, Minas Gerais.

DISTRIBUTION: Known only from the SE corner of Minas Gerais, occurring on granitic outcrops, between 500-1400 m. The plants observed in the wild were growing in pockets of organic material and often in association with species of Selaginellaceae, Bromeliaceae and Velloziaceae.

ETYMOLOGY: The name of this species refers to the municipality of Carangola in Minas Gerais where my colleague and friend Lúcio de Souza