A new species of Sinningia (Gesneriaceae) from northeastern Brazil

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Chautems, A. (Conservatoire et Jardin botaniques de la Ville de Genève, C. P. 60, CH-1292 Chambésy, Switzerland), G. S. Baracho & J. A. Siqueira Filho (Herbarium UFP, Depto. de Botânica, CCB, Universidade Federal de Pernambuco, Av. Prof. Moraes Rego s/n, Cidade Universitária, Recife-PE, CEP 50670-901, Brazil). A new species of *Sinningia* (Gesneriaceae) from northeastern Brazil. Brittonia 52: 49–53. 2000.—**Sinningia nordestina** is described and illustrated. Morphological and molecular characters are discussed. It is a new species endemic to northeastern Brazil and is distinguished from other members of the genus by its vestigial tubers, ascending pedicels with pendent flowers, small corollas, and deviating flowering period.

Key words: Gesneriaceae, *Sinningia, Smithiantha,* northeastern Brazil, molecular phylogenetics, hummingbird pollination.

Chautems, A. (Conservatoire et Jardin botaniques de la Ville de Genève, C. P. 60, CH-1292 Chambésy, Switzerland), G. S. Baracho & J. A. Siqueira Filho (Herbarium UFP, Depto. de Botânica, CCB, Universidade Federal de Pernambuco, Av. Prof. Moraes Rego s/n, Cidade Universitária, Recife-PE, CEP 50670-901, Brazil). A new species of *Sinningia* (Gesneriaceae) from northeastern Brazil. Brittonia 52: 49–53. 2000.—**Sinningia nordestina** é descrita e ilustrada. São discutidos caracteres morfológicos e moleculares. É uma espécie nova endêmica do nordeste do Brasil, distinta dos outros membros do gênero pela presença de tubérculos vestigiais, pedicelos ascendentes com flores pendentes, corolas pequenas e pela fenologia diferente.

Sinningia is a genus of neotropical Gesneriaceae with approximately 65 species. The genus is characterized by a mostly rupicolous habit, usually perennial tubers or basal stem portion producing annual flowering shoots, and axillary or terminal inflorescences with usually ornithophilous or melittophilous flowers. A revision of the genus is currently under investigation (Chautems, 1990, 1991, 1995; Chautems & Weber, 1999).

During a visit to the herbarium of the "Empresa pernambucana de pesquisa e agropecuária" (IPA) in 1984, the first author saw some specimens collected by Andrade Lima in Pernambuco and annotated in 1958 by Hoehne as *Naegelia zebrina* (Paxt.) Regel. An illustration of the same species, based on a collection from the state of Paraiba (*Moraes s.n.*) was posthumously published in Hoehne (1970: pl. 185) under the same identification. The correct name for this plant is *Smithiantha zebrina* (Paxt.) Kuntze, as the genus *Naegelia* Regel 1847, non Rabenhorst 1844, must be substituted due to the homonymy (Farr et al., 1979). The genus *Smithiantha* Kuntze includes about five species restricted to southern Mexico and belonging to tribe Gloxinieae (Wiehler, 1983). The presence of scaly rhizomes is the key character for this tribe. The above-mentioned material from Brazil is strikingly reminiscent of the nodding position of the flowers and the red and yellow

corolla of the Mexican genus, but leaf shape and coloration, flower size, and the opposite instead of alternate disposition of the flowers along the inflorescence axis differ from *Smithiantha* (Paxton, 1841; Regel, 1878). In the absence of subterranean organs, it was difficult to assign the Brazilian specimens to genus. In the following years, similar material from several locations in northeastern Brazil was encountered in different herbaria in Brazil, but none bore complete subterranean organs or observations of this important character. All collections, because of their habit and red tubular corolla, pointed to *Sinningia,* a genus well-diversified in southeastern and southern Brazil but of limited distribution in the northeast region. In 1996, the second and third authors located a population in Pernambuco, growing in the municipality of Maraial. Detailed examination of the subterranean organs was done and small tubers were found hidden in the organic litter, among fibrous roots. Another excursion to the same locality was organized in 1998 and we gathered new morphological and ecological observations.

DNA was extracted from dried leaves sent by the second and third authors and included in an ongoing molecular phylogenetic study of the genus *Sinningia* (Perret, Savolainen, Chautems & Spichiger, unpubl. data). In the present work, we have selected a subset of the Perret et al. data set (viz., representing all tribes of the neotropical Gesneriaceae) and analyzed them in order to define the position of this taxon from northeastern Brazil. Based on the cladistic combined analysis of noncoding plastid DNA sequences, i.e., the two intergenes *atp*B-*rbc*B and *trn*L-*trn*F and the *rpl*16 intron, *Sinningia nordestina* emerges clearly nested among other congeneric species and within the tribe *Sinningieae* Fritsch (Fig. 1). Although its relative position among the neighboring species is not yet clearly established, there is enough evidence that this species belongs to genus *Sinningia.* Selected species from all the tribes composing the neotropical Gesneriaceae segregate into clades with high branch-support values (bootstrap with 500 replicates) according to the current classification (Wiehler, 1983). *Smithiantha* appears unambiguously nested in a separate clade including the genera sampled for the tribe *Gloxinieae.*

Sinningia nordestina Chautems, Baracho & Siqueira Filho, sp. nov. (Fig. 2)

TYPE: BRAZIL. Pernambuco: Mun. Maraial, Engenho Curtume, margens do Rio Pirangi, 08°48′S, 35°50′W, 260 m, 5 Sep 1997, *G. S. Baracho & J. A. Siqueira Filho 663/704* (HOLOTYPE: UFP; ISOTYPE: G).

Plantae Brasiliam boreali-orientalem incolentes, habitu gregariae, ab omnibus congeneribus tubero parvo (0.5–1.5 cm diam), pedicellis ascendentibus, floribus cernuis, corollae parvae (2–2.5 cm) cinnabarinae tubo gradatim ampliato ad ventrem flavum rubro maculato, diversae.

Terrestrial herb, arising from fibrous roots and occasionally forming small tubers, 0.5–1.5 cm wide, stem 40–70 cm, cylindric-angular, simple or rarely branched, green to purplish red, glandular-puberulous, glutinous and aromatic, internodes 5–7 cm; leaves decussate, subequal, often bearing shoots in the axils, petioles 3–6 cm, purplish red, pubescent, blades 6–9(–12) × 4–7.5 cm, ovate, cordate at base, acute at apex, margin irregularly toothed, teeth 3–6 × 3–9 mm, abaxial face green, puberulous, adaxial face pale green, glabrescent, 4–7 lateral veins; 1–2 flowers borne in the upper axils and in bracts along an axis 12–25 cm long, pending from ascending pedicels, the pedicels 2–3(–4) cm, glandular-pubescent, calyx subcampanulate, glandular-pubescent, fused for 2 mm, lobes lanceolate, 4 × 2 mm, puberulous, margin entire. Corolla tubular, 2–2.8 cm long, with a 3 mm wide annular swelling at base, abruptly narrowed to 2 mm above, gradually widened to 7–8 mm in throat, slightly grooved laterally toward base, yellow-orange in bud, at maturity scarlet-orange above, yellow with small red dots below, puberulent, throat yellow with dark red dots and glabrous, the lobes erect to slightly spreading, subequal, 5 × 4 mm, the ventral one slightly larger, red outside, yellow with red dots inside; stamens 4, included, filaments white, glabrous, anthers 2 × 1.5 mm, nectary a bilobed dorsal gland, ovary conic, style and stigma slightly exserted. Fruit a capsule, conic, ca. 1 cm, seeds ellipsoid, striate.

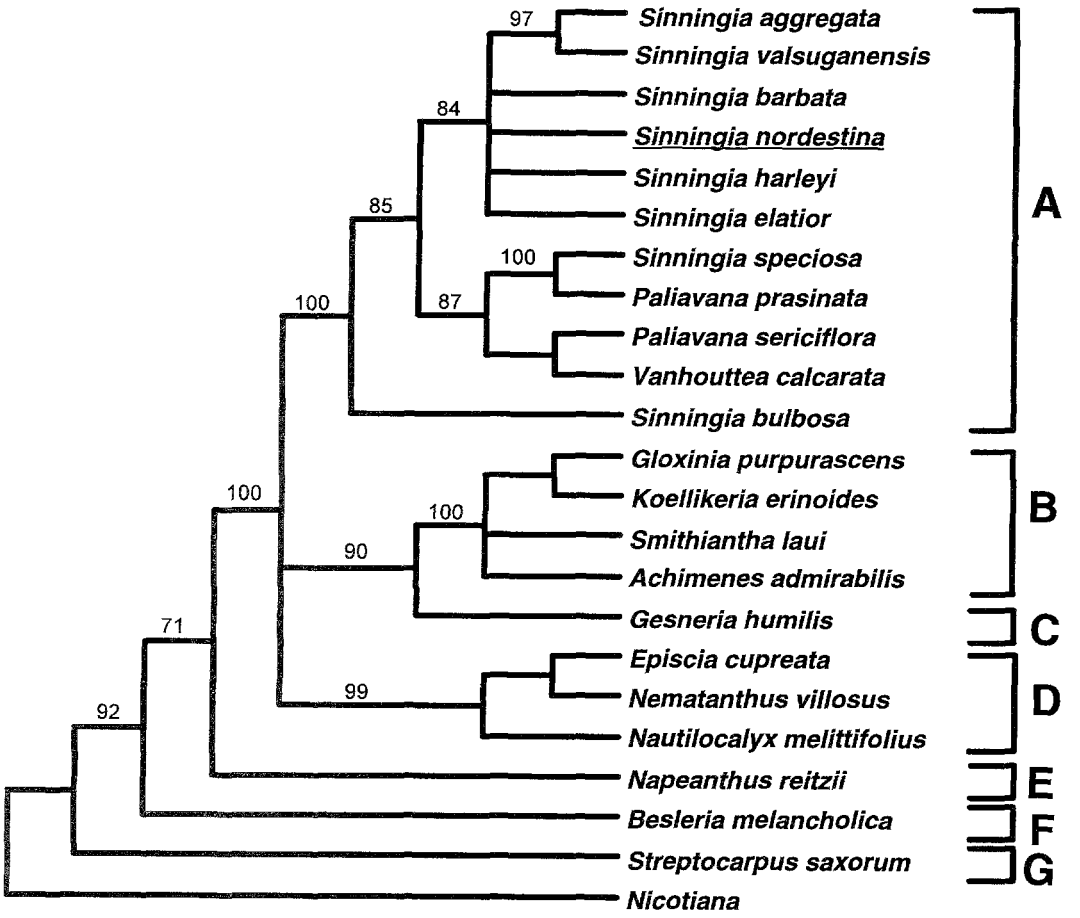

FIG. 1. Strict consensus cladogram based on a phylogenetic analysis of the two intergenes *atp*B-*rbc*L and *trn*L-*trn*F, and the *rpl*-16 intron combined: *Sinningia nordestina* nests among other congeneric species and within tribe Sinningieae. A = *Sinningieae*, B = *Gloxinieae*, C = *Gesnerieae*, D = *Episcieae*, E = *Napeantheae*, F = *Beslerieae*), G = subfam. *Cyrtandroideae* with *Nicotiana* as the outgroup; bootstrap values, based on 500 replicates, are indicated.

Additional specimens examined: BRAZIL. **Alagoas**: Quebrângulo, Reserva Biológica Pedra Talhada, 09°15′62″S, 36°25′48″W, 750 m, Oct 1994, *Cervi et al. 6017* (G). **Bahia**: Praia de Monte Cristo, Bom Jesus dos Passos, terraço de uma falésia de arenito, Jul 1995, *Santos 05* (ALCB). **Ceará**: Unknown locality [label unreadable], Jun 1854, *Fr. Allemão & Cysneiros 911* (R); Serra de Baturité, sítio B. Inácio de Azevedo, 1938–39, *Eugenio 1073* (RB); Viçosa Fragusso, 550 m, 21 Jun 1972, *Sucre & da Silva 9268* (CEPEC, RB). **Paraíba:** Areia, às margens da estrada para Alagoa Grande, 15 Jun 1992, *Agra et al. 1461* (G); Areia, orla da mata, 28 Aug 1956, *Moraes s.n.* (SPSF); Areia, capoeira, 11 Aug 1957, *Moraes s.n.* (SPF). **Pernambuco**: Quipapá, Usina Agua Branca, Faz. Pelada, 12 Jul 1950, *Andrade Lima 50-597a* (IPA); Caruaru, 10 Sep 1971, *Andrade Lima 71-6468* (IPA); Altinho, Fazenda Tabocas, 29 Aug 1980, *Andrade Lima et al. 20* (IPA); Quipapá, Engenho Brejinho, 15 Sep 1972, *Andrade Lima 72-7003* (IPA); Quipapá, Eng. Pelada, 12 Jul 1950, *Leal & Otavio 234* (RB); Ipojuca, Eng. Agua Fria, 25 Jun 1968, *Lira 68-269* (IPA); Maraial, Engenho Curtume, próximo rio Pirangi, 08°48′S, 35°50′W, 260 m, 25 Aug 1996, *Siqueira Filho & Baracho 096* (UFP); Jaqueira, Serra do Espelho, Mata do Jasmim, 26 Aug 1998, *Siqueira Filho 815* (UFP); Maraial, afloramentos rochosos próximos ao rio, 5 Sep 1997, *Wanderley et al. 2248* (SP). **Sergipe**: Frei Paulo, 18 Aug 1981, *Viana 001* (ASE); Nossa Senhora da Glória, 21 Aug 1981, *Viana 016* (ASE); Simão Dias, 3 Sep 1981, *Viana 042* (ASE); Frei Paulo, Faz. Serras Pretas, 11 Aug 1982, *Viana 613* (ASE); Serra de Itabaiana, 4 Oct 1982, *Viana 652* (ASE); Canhoba, Faz. Borda da Mata, 18 Sep 1984, *Viana 1026* (ASE); Nossa Senhora da Glória, Faz. Olhos d'Água, 1 Aug 1986, *Viana*

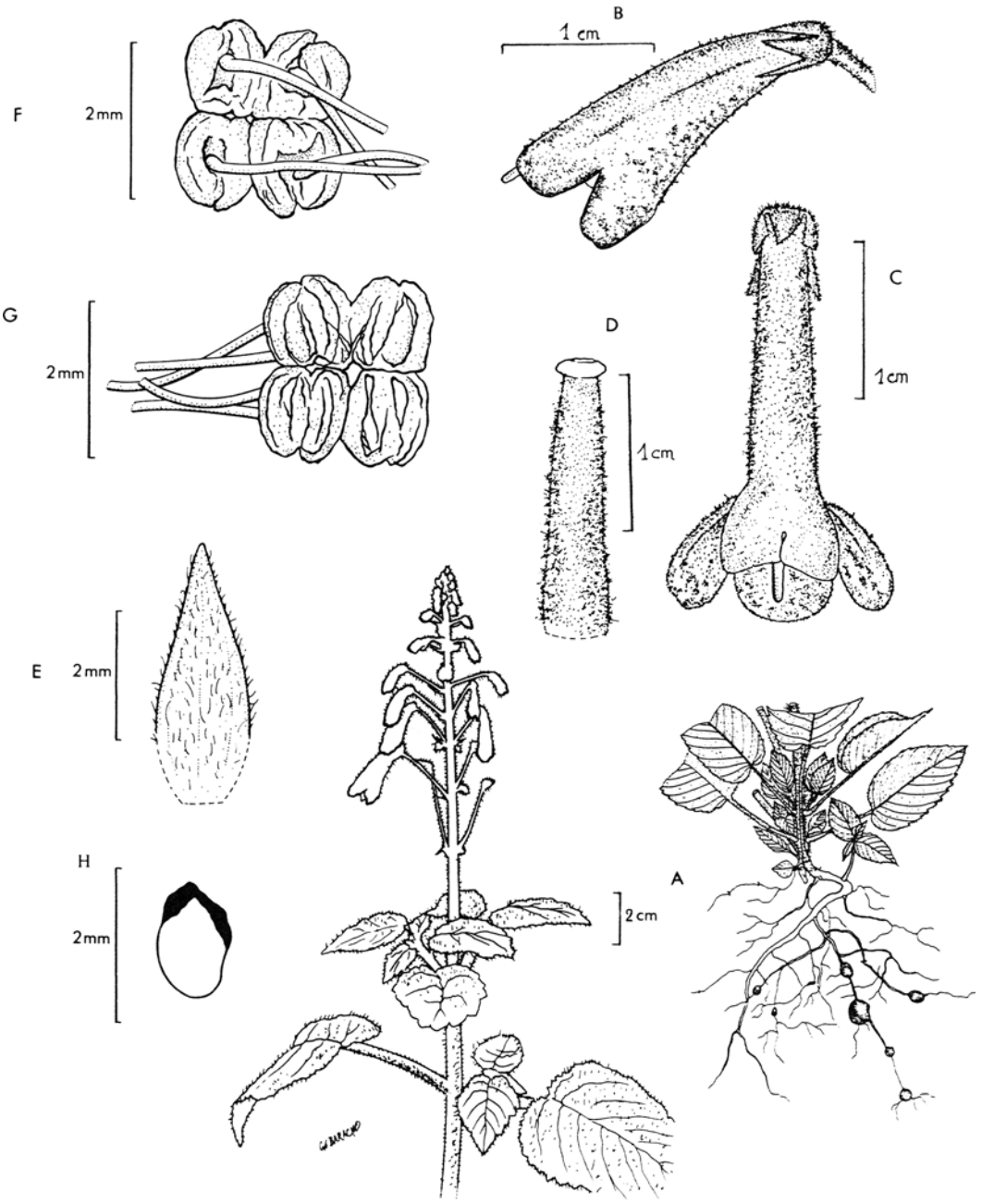

FIG. 2. *Sinningia nordestina*. **A.** Habit: at left is upper portion of the plant, at right is the basal portion of stem with subterranian organs. **B.** Flower, side view. **C.** Flower, front view. **D.** Basal portion of corolla tube. **E.** Detail of calyx lobe. **F.** Anthers, dorsal view. **G.** Anthers, ventral view. **H.** Position of nectary. (A–H, *Baracho & Siqueira Filho 663/704*; details of subterranean organs based on slides taken in 1998 in the type locality).

1549 (ASE); São Miguel do Aleixo, Faz. Tanquinho, 2 Aug 1986, *Viana 1599* (ASE); Nossa Senhora da Glória, Faz. Olhos d'Água, 25 Aug 1987, *Viana 1999* (ASE).

Distribution and ecology.—Sinningia nordestina occurs in northeastern Brazil, between and including the states of Ceará

and Bahia, covering a range of some 1000 km. The species has been found within "caatinga" or "campos rupestre" vegetation type as well as in forested areas, on rocky outcrops or arenitic soil, in semi-shady and humid locations, at elevations between 250 and 1050 m. It is frequently associated with a kind of vegetation known as "brejos de altitude" in northeastern Brazil (Sales et al., 1998).

Etymology.—The specific epithet refers to its peculiar distribution in the northeastern region of Brazil, in contrast to the majority of species of *Sinningia* that occur in the southeastern and southern region of Brazil.

Phenology.—Flowers from June to October. This is again in contrast with most other species of *Sinningia* whose flowering period extends from October to March in southeastern and southern Brazil, relative to the respective rainy seasons.

Sinningia nordestina occurs as a rupicolous herb, growing in thin pockets of organic litter, forming dense populations in patches. Numerous seedlings were observed suggesting that its survival during the dry season essentially relies on heavy seed production. Preliminary experiments on cultivated material revealed that, unlike all the other known *Sinningia* species, the tubers were unable to resprout after a dry period (M. Peixoto, pers. comm.). If this fact is confirmed by further observations, *S. nordestina* would be the first species in the genus completely lacking perennial structure. It would then behave as an annual in response to the northeastern Brazil climate, where the rainy season takes place between May and October, followed by a severe dry period between November and April.

The shining red (almost fluorescent) corollas, the lax inflorescence with obliquely pendent flowers, the production of nectar and the absence of floral odor agree with the syndrome typical for hummingbird pollination (Faegri & Van der Pijl, 1979). During field studies in the Maraial area (Pernambuco), visits of *Phaethornis ruber* were recorded by the third author. Besides *Sinningia nordestina,* few other plants in flower were available for hummingbirds. Therefore, this species of Gesneriaceae may well represent a key resource for the hummingbird community during its flowering period.

Sinningia nordestina differs from all related species by having vestigial tubers, long ascending pedicels combined with pendent flowers and rather short scarlet and yellow corolla. It shares some characters with *S. aggregata* (Ker Gawl.) Wiehler, such as the glutinous and aromatic indument, red and tubular corollas, but the latter differs by having larger tubers (5–10 cm), horizontally held flowers arranged in denser inflorescences (usually 2–10 per axil), longer corollas (2.5–4 cm) and distribution from southeastern Brazil to Paraguay.

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Literature Cited

Chautems, A. 1990. Taxonomic revision of *Sinningia* Nees: nomenclatural changes and new synonymies. Candollea 45: 381–388.

———. 1991. Taxonomic revision of *Sinningia* Nees (Gesneriaceae) II: new species from Brazil. Candollea 46: 411–425.

———. 1995. Taxonomic revision of *Sinningia* Nees (Gesneriaceae) III: new species from Brazil and new combinations. Gesneriana 1: 8–14.

——— **& A. Weber.** 1999. Shoot and inflorescence architecture in the neotropical genus *Sinningia* (Gesneriaceae). Pages 305–322. *In:* M. Kurmann & A. Hemsley, editors. The Evolution of Plant Architecture. Royal Botanic Gardens, Kew.

Faegri, K. & L. Van der Pijl. 1979. The principles of pollination ecology. Ed. 3. Pergamon Press, Oxford.

Farr, E. F., J. A. Leussink & F. Stafleu (eds.). 1979. Index Nominum Genericum (Plantarum). Vol. 2. Bohn, Scheltema & Holkema, Utrecht.

Hoehne, F. C. 1970. Iconografia das Gesneriaceae do Brasil. Instituto de Botânica, São Paulo, Brazil.

Paxton, J. 1841. *Gesnera zebrina.* Paxton's Mag. Bot. 8: 271–272.

Regel, E. 1878. Neue und empfehlenswerthe Zierpflanzen. Gartenflora 27: 278–288.

Sales, M. F., S. J. Mayo & M. J. N. Rodal. 1998. Plantas vasculares das florestas serranas de pernambuco: um check-list da flora ameaçada dos brejos de altitude de Pernambuco—Brasil. Universidade Federal Rural de Pernambuco, Recife.

Wiehler, H. 1983. A synopsis of neotropical Gesneriaceae. Selbyana 6: 1–219.