



A new species of *Nejobertia* Baill. (Bignoniaceae, Bignoniaceae) from Brazil

JAIR EUSTÁQUIO QUINTINO FARIA^{1,3}, MARIA ROSA VARGAS ZANATTA¹, LUZIA FRANCISCA DE SOUZA²
& CAROLYN ELINORE BARNES PROENÇA¹

¹Departamento de Botânica, Herbário, Universidade de Brasília. Caixa Postal 04457, CEP 70904-970. Brasília, Distrito Federal, Brazil.

²Universidade Federal de Goiás, Unidade Jataí, Campus Jatobá, Departamento de Ciências Biológicas, Botânica. BR 364, Km 192, Setor Industrial, Caixa Postal 03, CEP 78500-012, Jataí, Goiás, Brazil.

³Author for correspondence: Jair Eustáquio Q. Faria <jairquintino@yahoo.com.br>

ABSTRACT

A new species of *Nejobertia* is described from Brazil, *Nejobertia alboaurantiaca*. With the inclusion of this new species into the genus, *Nejobertia* includes three species, all of which are endemic to Brazil. *Nejobertia alboaurantiaca* grows predominantly in savannas and occurs in four neighbouring Brazilian states, Maranhão, Piauí, Goiás and Tocantins. In this study, we describe the new species, its habitat, distribution and evaluate its conservation status, as well as present a distribution map, illustrate key features and discuss the morphological features that distinguish it from *Nejobertia mirabilis*. The conservation status of the species has been evaluated as EN (endangered).

Keywords: Cerrado, Brazilian Flora, *Gardnerodoxa*, ornamental plants.

RESUMO

Uma nova espécie de *Nejobertia* é descrita para o Brasil, *Nejobertia alboaurantiaca*. Com a inclusão desta nova espécie no gênero, *Nejobertia* inclui três espécies, todas endêmicas do Brasil. *Nejobertia alboaurantiaca* cresce predominantemente em áreas de savanas e ocorre em quatro estados contíguos do país, Maranhão, Piauí, Goiás e Tocantins. Neste estudo, nós descrevemos a nova espécie, seu hábitat, distribuição e avaliamos seu status de conservação, bem como apresentamos um mapa de distribuição, ilustramos características chave e apresentamos uma discussão sobre os caracteres morfológicos que a distinguem de *Nejobertia mirabilis*. Seu status de conservação foi avaliado como EN (ameaçado).

Palavras-chave: Cerrado, Flora do Brasil, *Gardnerodoxa*, plantas ornamentais.

INTRODUCTION

Bignoniaceae Juss. is a pantropical flowering plant family with 82 genera and approximately 860 species, most of which are Neotropical (Lohmann & Ulloa 2016). The high diversity of pollination syndromes and strategies within the family (Gentry 1974) resulted in the description of many small genera during the 19th to mid 20th century (see Meisner 1840, Bureau & Schuman 1896, Sandwith 1954) giving this family one of the lowest species per genus ratios amongst large flowering plant families (Gentry 1973). Starting in the 1970's with the morphology-based synonymizations proposed by Alwyn Gentry and colleagues (see Gentry 1973, Gentry & Tomb 1979), and culminating with more recent synonymizations based on molecular phylogenetic data (Lohmann 2006), the number of Bignoniaceous genera has fallen significantly (Lohmann & Taylor 2014). However, several small genera are still recognized. For instance, *Nejobertia* Baillon (1888: 35) currently includes only two species, both of which are endemic to Brazil (Lohmann 2015).

Nejobertia was first described by Henri Ernest Baillon with a single species, *N. brasiliensis* Baillon (1888: 35), that was later synonymized to *N. candolleana* (Mart. ex DC.) Bureau & Schumann (1896: 297). More recently, Lohmann & Taylor (2014) synonymized the monotypic genus *Gardnerodoxa* Sandwith (1954: 611) to *Nejobertia*, transferred *G. mirabilis* Sandwith (1954: 611) to *Nejobertia*, and proposed the new combination *N. mirabilis*

(Sandwith) L.G.Lohmann in Lohmann & Taylor (2014: 455). During the study of herbarium material and images, we found an undescribed species of *Neojobertia*. In this study, we describe this new taxon, and discuss its morphology, geographic distribution and conservation status.

MATERIAL AND METHODS

For this study, we consulted seven different herbaria, EAC, HEPH, IBGE, K, MO and UB (acronyms follow Thiers 2015) and the Herbarium of the Universidade Federal de Goiás, Campus Jataí, for which we have used the unregistered acronym HJ. The EAC, K and MO herbaria were consulted online through institutional sites or via Species Link (www.splink.org.br). We found eight specimens of the newly described species distributed among these herbaria. These specimens were used as basis to describe the new taxon. The morphological terminology follows Radford (1974) and Gonçalves & Lorenzi (2007). The distribution map was prepared using QGIS 2.0.1. (Quantum GIS Development Team 2013). Conservation status was determined using the IUCN criteria and GeoCat (2015).

TAXONOMIC TREATMENT

Neojobertia alboaurantiaca Faria & Proença, *sp. nov.* TYPE:—BRAZIL. Tocantins: Palmas, cerrado acompanhando o rio Mutum, 24 May 1994, I.V. Lima & F.P.R. Jesus 374 (holotype UB, isotype HEPH). Figures 1, 2 and 3.

Neojobertia alboaurantiaca is similar to *N. mirabilis* from which it can be distinguished by the acute, cuspidate leaf apices (rounded, obtuse or truncate in *N. mirabilis*), flowers with thin, urceolate, slightly zygomorphic calyces (tubular in *N. mirabilis*), corollas that are orange, yellow or white and infundibuliform (pink and tubular in *N. mirabilis*) and included stamens and style (exserted in *N. mirabilis*).

Subshrub, decumbent shrub or scrambling liana; young branches cylindrical, ca. 7 mm in diameter, glabrous or puberulent, with simple, tector or glandular trichomes, striate, lenticels not seen; prophylls of the axillary buds conical-subulate with inflated base, 2.5–3.5 mm long, puberulent. *Leaves* triternate-pinnate, ca. 11 leaflets, the terminal leaflet trifid or pinna sometimes transformed into a trifid tendril; petiole 4.5–6.6 cm long, glabrescent, with simple, tector or glandular trichomes; primary leaf rachis 3.5–12.2 cm long, pubescent, with simple, tector or glandular trichomes; leaflet petioles 0.3–2.7 cm long, pubescent; leaflets cordiform to elliptic, 3–9.3 × 1.2–7.8 cm, base cordate, asymmetrical, apex acute to cuspidate, margin revolute, frequently serrulate in very young leaflets and sometimes serrate in mature leaves, upper leaf surface glabrous, with sparsely distributed patelliform glands, shiny, lower leaf surface sparsely to densely tomentose, with simple, tector or glandular trichomes along the midvein and secondary veins, with scattered patelliform glands. *Inflorescence* in cymes, axillary or terminal, 28–49.5 cm long, axis with simple, tector or glandular trichomes; bracts and bracteoles linear or deltoid, 2–11 mm long. *Flowers* with calyx greenish white to cream, urceolate and somewhat zygomorphic, 1.9–4 × 1.1–2.1 cm, 5-lobed, sparsely pubescent, with glandular trichomes intercalated with a few tector trichomes, short and subequal lacinia, with two slightly shorter ones and three longer ones, patelliform glands sparsely scattered from the middle to the tip; corolla funnel-shaped, deep orange at anthesis, lemon yellow when fully expanded, cream to white when senescent, 6–8.5 × 1.5–2.5 cm, the outer surface sparsely pubescent with glandular trichomes, the inner surface with glandular trichomes only at the insertion of stamens, lobes sparsely ciliate; stamens included, strongly didynamous, the outer pair 3.6–4 cm long, the inner pair 2.8–3 cm long, inserted c. 1.8 cm from the base of the corolla, anthers divergent, 5–6 mm long, thecae 2–2.8 mm long, staminode diminutive, inserted slightly below the stamens; ovary shortly ovoid, compressed, glabrous, eglandular, 3.5 × 1.1 mm, ovules unisseriate per placenta, style included, 3.8–3.9 cm long, glabrous or puberulent, with simple, tector or glandular trichomes, stigma rhombical; nectariferous disc pulviniform. *Capsule* linear, 22.3–41 × 2.8–3.9 cm, undulate in dry material, apex acute or obtuse, pubescent, with simple, tector or glandular trichomes; valves crustaceous, 1.5–3 mm thick, median line clearly visible, occasionally with two lateral veins running closely parallel on each side of the main vein. *Seeds* transverse-oblong, 2.4–2.8 × 9.4–10.7 cm; seed body transverse-elliptical, pale ochre to cream, rugose; wings ochre close to the embryo and cream for the rest of its length, with the border usually fringed, hilum linear, slightly curved, 1.9–2.3 cm long.

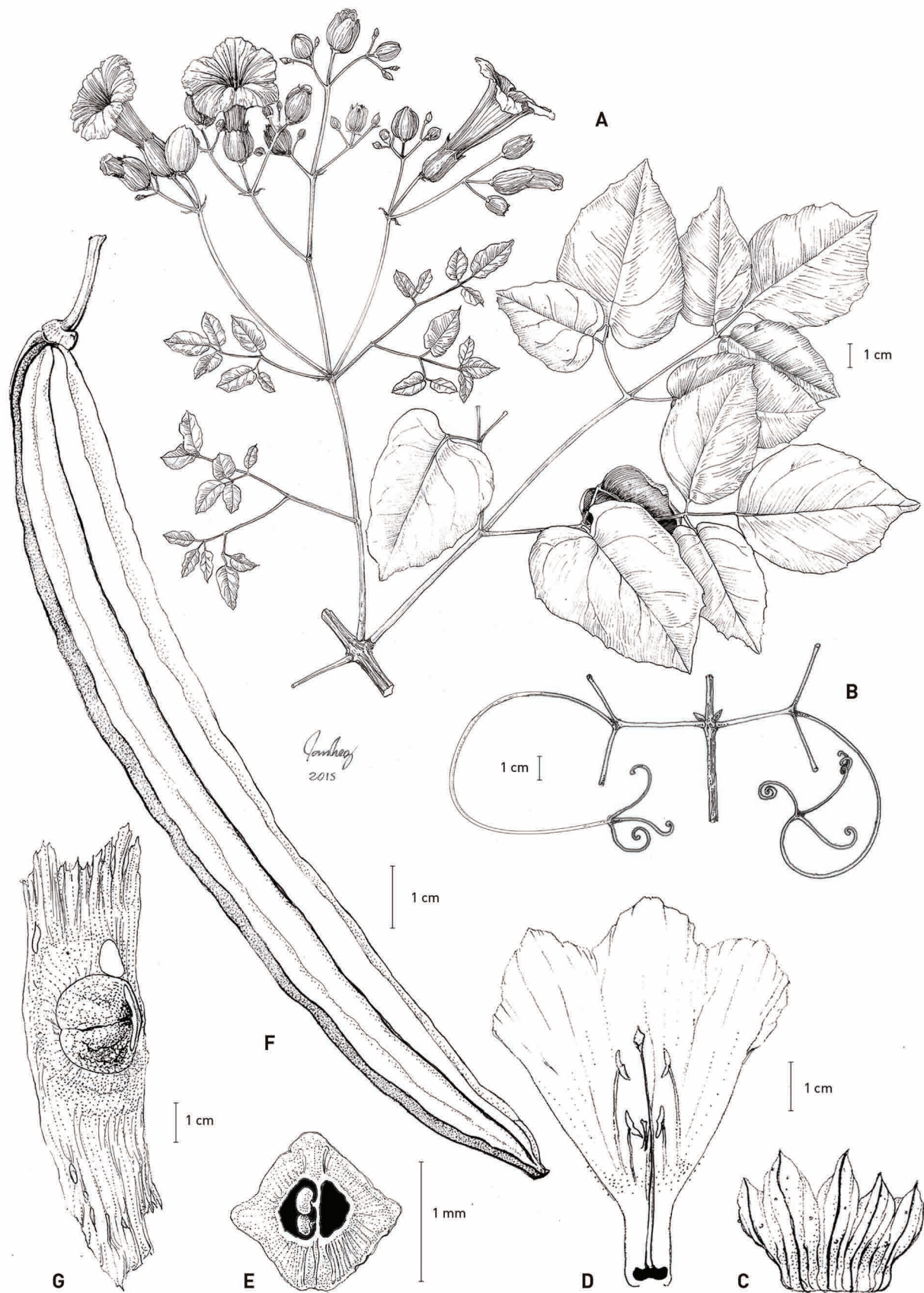


FIGURE 1. *Neojobertia alboaurantiaca* Faria & Proença. A—Flowering branch; B—branch detail with tendril; C—Calyx; D—Flower in longitudinal section showing stamens and pistil; E—Ovary in transversal section showing one locule with ovules and the other locule with ovules removed; F—Fruit; G—Seed. A (isotype HEPH), C, D and E (holotype UB) drawn from *I.V. Lima & F.P.R. Jesus 374*; B, F and G drawn from *L.F. Souza et al. 5749* (paratype UB).

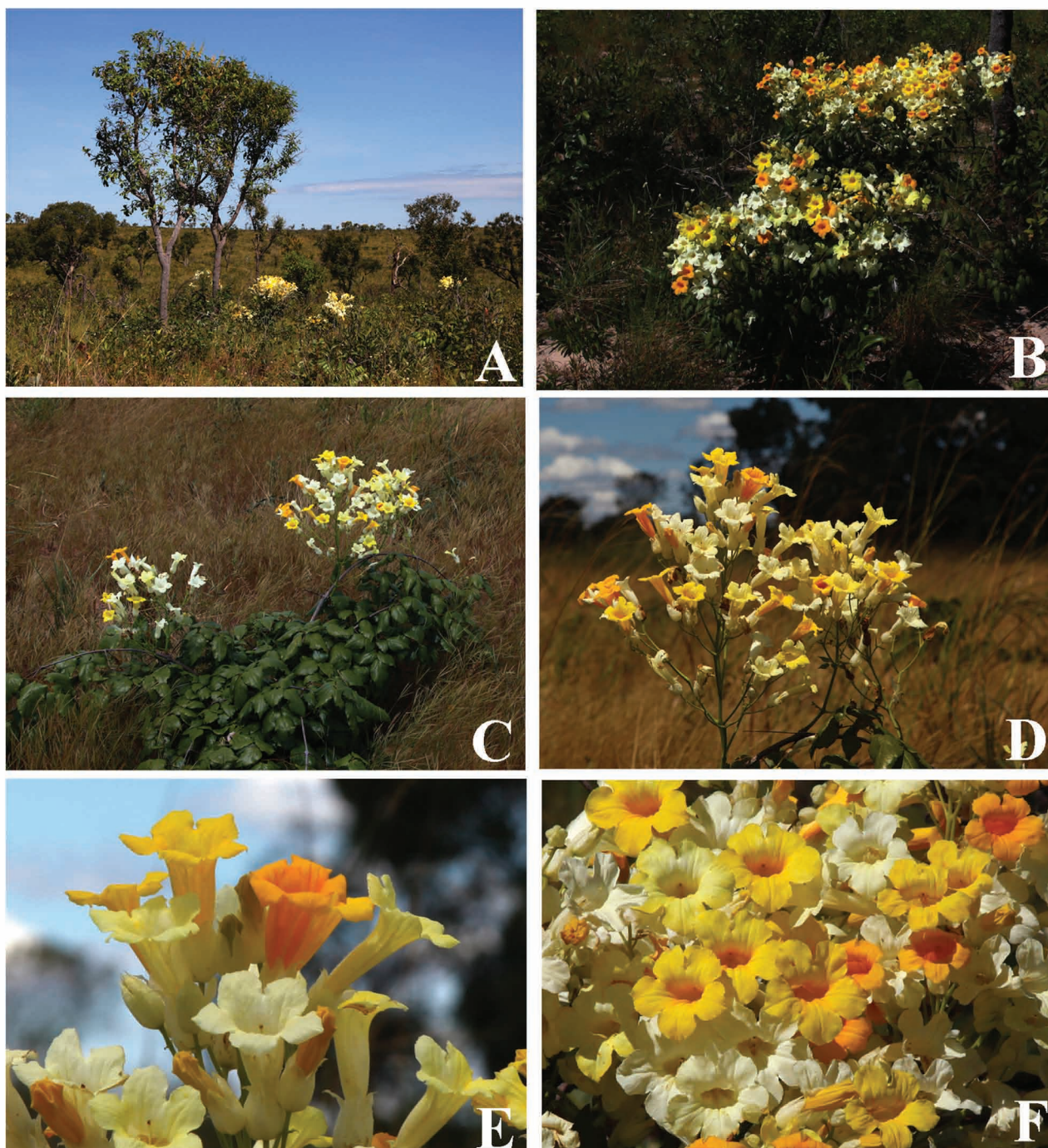


FIGURE 2. *Neojobertia alboaurantiaca* Faria & Proença. A—Habitat; B–C—Flowering plant; D—Inflorescence with open flowers; E–F—Details of the open flowers (Photos by Henrique José Moreira da Costa).

Habitat and distribution:—*Neojobertia alboaurantiaca* Faria & Proença grows predominantly in savannas, more specifically in dry forests, *cerrado*, open *campo sujo*, *carrascos*, and secondary *capoeiras*, mostly on sandy soils (Figure 4). The Maranhão collection and one of the Piauí ones records the habitat as dry forest (*mata seca*).

Phenology:—Flowering specimens were collected in April, June, July, August and November, while fruiting specimens were collected in August and May.

Etymology:—The specific epithet refers to the flower colour that changes from deep orange at anthesis, to lemon yellow when fully expanded, and cream to white when senescent. This is the most distinctive feature of this species.

Conservation status:—*Neojobertia alboaurantiaca* has an extent of occurrence (EOO) of 348,553 km² and an area of occupancy (AOO) of 28 km². The wide range of this species alone suggests that this taxon is not under immediate threat. However, the fact that such a distinctive plant has not yet been described suggests that it is relatively

rare, with low occupancy within its range. The species seems to be a sandy soil edaphic specialist, which is not uncommon within tribe Bignonieae (see Proença *et al.* 2007, Lohmann & Taylor 2014, Lohmann 2015). According to IUCN (2001) “a taxon is endangered when the best available evidence indicates that it meets any of the criteria (A to E), and therefore faces a very high risk of extinction in the wild. *Neojobertia alboaurantiaca* is only known from seven locations (Figure 4), suggesting that it might be endangered. In addition, the severe deforestation of the areas where this species occurs indicates that this species might be under decline. More specifically, the two populations of *N. alboaurantiaca* from the state of Tocantins are located very close to the capital of Palmas, while the six other known populations (i.e., three from Goiás, two from Piauí and one from Maranhão) are surrounded by agricultural areas. Even though the three populations of *N. alboaurantiaca* from the state of Goiás occur near the *Parque Nacional das Emas*, no populations were found within the park limits and the surroundings of the park are highly deforested. This indicates that *N. alboaurantiaca* fulfils conservation criteria B2ab(i,ii,iii) and its conservation status falls within the EN category (endangered).

Paratypes:—BRAZIL. Goiás: Chapadão do Céu, margem da rodovia GO-050, 18°14'34" S, 52°38'04" W, 27 April 2013, *Souza, L.F. et al.* 5581 (HJ!, UB!); Chapadão do Céu, rodovia para Mineiros, 18°15'01" S, 52°01'07" W, 25 May 2013, *Souza, L.F. et al.* 5680 (HJ!, UB!); Chapadão do Céu, GO-050, atrás do Parque Nacional da Emas, 18°14'34" S, 52°38'04" W, 1 July 2013, *Souza, L.F. et al.* 5761 (HJ!, UB!); Chapadão do Céu, GO-050, atrás do Parque Nacional da Emas, 18°14'34" S, 52°38'04" W, 14 August 2013, *Souza, L.F. et al.* 5783 (HJ!, UB!); Mineiros, GO-050, atrás do Parque Nacional da Emas, 17°59'00" S, 52°29'38" W, 1 July 2013, *Souza, L.F. et al.* 5749 (HJ!, UB!). Maranhão: Barra do Corda, BR-226, entre Barra do Corda e Grajaú, 23 April 1979, *Martins, P. & Nunes, E. s.n.* (EAC 5890 image!); Barra do Corda, 31 July 1982, *Fernandes, A. & Matos, A.J.F. s.n.* (EAC 11630 image!, MO 3204497 image!). Piauí: Agricolândia, Tamboril, 23 July 1979, *Chagas e Silva, F.* 42 (IBGE n.v., K image!, MO 2992997, 2926132, 2922301 n.v.); Without municipality, PI-115, entre Campo Maior a Castelo do Piauí, 11 June 1979, *Nunes, E. & Castro, A.J. s.n.* (EAC 6471 image!).

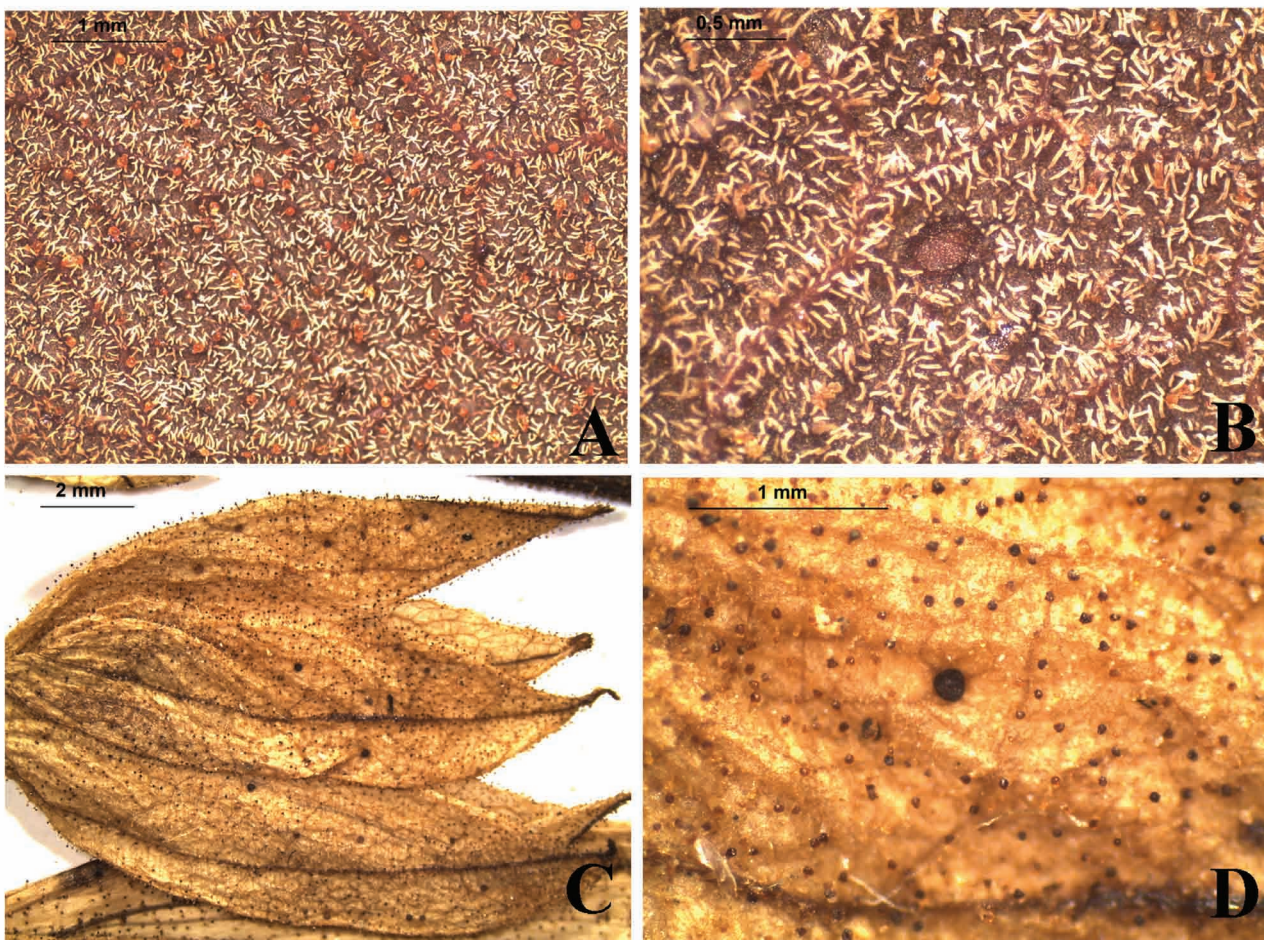


FIGURE 3. *Neojobertia alboaurantiaca* Faria & Proença. A—Detail of the lower leaf surface showing tector and glandular trichomes; B—Detail of lower leaf surface showing patelliform glands; C—Calyx; D—Patelliform glands. A–D drawn from *I.V. Lima & F.P.R. Jesus* 374 (holotype UB).

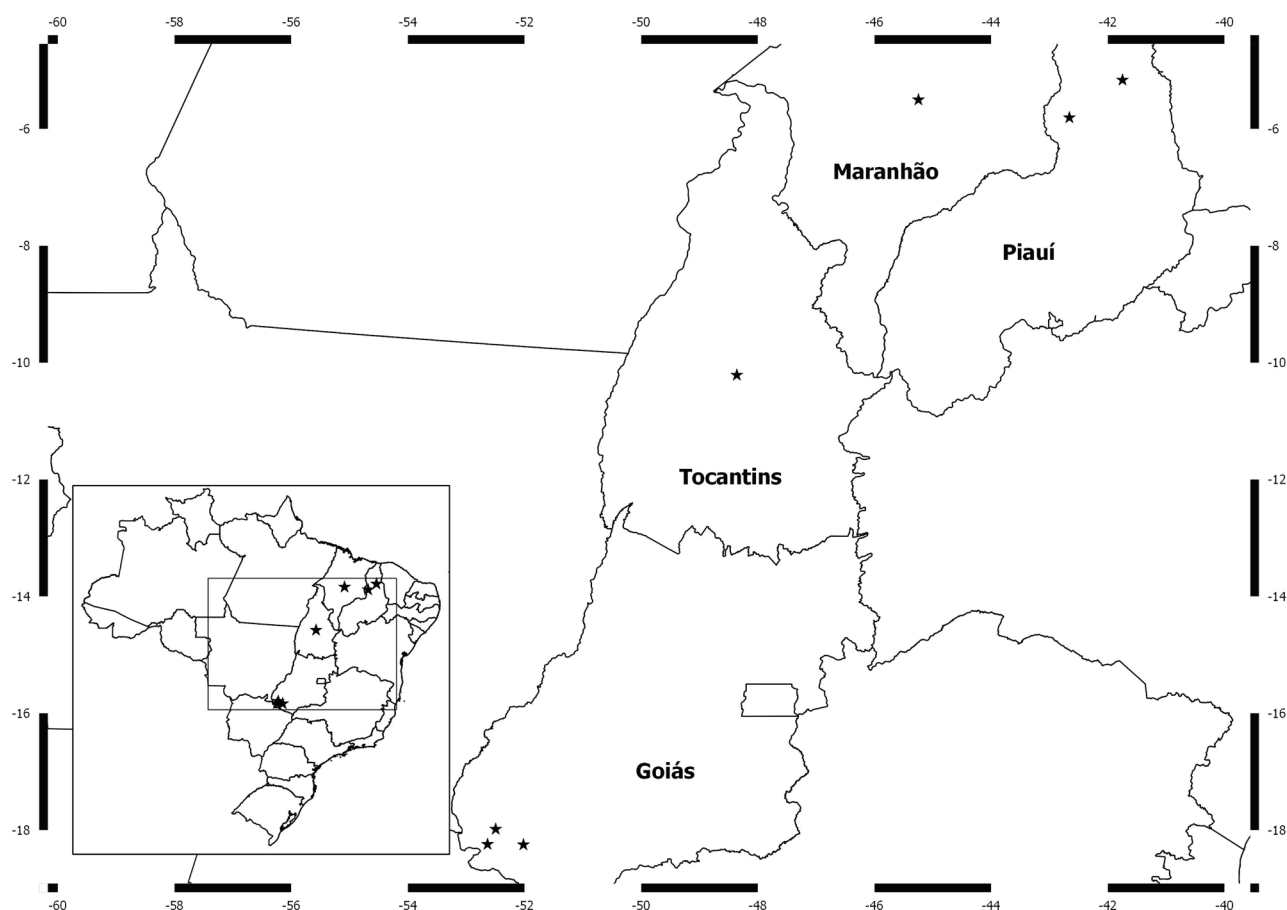


FIGURE 4. Geographic distribution of *Neojobertia alboaurantiaca* Faria & Proença.

DISCUSSION

Neojobertia alboaurantiaca is vegetatively similar to *N. mirabilis* in the following traits: (i) branch shape, (ii) shape of the prophylls of the axillary buds, (iii) leaf division, (iv) leaf shape (except the leaf apices), (v) leaflet indumentum, and (vi) well developed calyx. However, *N. alboaurantiaca* is very different from either of its congeners reproductively, although the inflorescence of *N. alboaurantiaca* is similar to that of *N. candolleana* in branching pattern.

The corolla of *N. alboaurantiaca* is deep orange at anthesis, becoming lemon yellow, and cream to white as the corollas senesce. In addition, the thin, urceolate, pale green to cream-coloured calyx is also lacking in other species of *Neojobertia*. This type of calyx is somewhat uncommon in Bignoniaceae but is known in species of *Cuspidaria* De Candolle (1838: 125), all three species of *Stizophyllum* Miers (1863: 197) and *Dolichandra* Chamisso (1832: 657) emend. L.G. Lohmann in Lohmann & Taylor (2014: 428). In *N. mirabilis* the calyx is narrowly tubular, while in *N. candolleana* the calyx is green and rigidly spathaceous.

The mass flowering strategy (Gentry 1974) of *N. alboaurantiaca*, along with the changing corolla colour as the flower ages makes this a very distinct species (Figure 2). In addition, the young leaves, inflorescences, calyces and corollas are completely covered with sticky-glandular hairs (*L.F. Souza 5581*). Alwyn Gentry (*in sched*) had already noted that this plant might represent a new species and had annotated the collection *Fernandes & Matos s.n.* deposited at EAC and MO as *Gardnerodoxa aurea*, *spec. nov.* However, the genus *Gardnerodoxa* is nested within *Neojobertia* (Lohmann 2006) and *Gardnerodoxa* is no longer recognized (Lohmann & Taylor 2016). In addition, the epithet '*aurea*' is somewhat misleading as it suggests bright yellow flowers, such as those found in *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore (1895: 423).

The inclusion of *N. alboaurantiaca* within *Neojobertia* has confirmed the importance of several characters used to delimit the genus in its most recent circumscription (Lohmann & Taylor 2014): trifid tendrils, ternate or mixed ternate-pinnate leaves, subulate prophylls of the axillary buds, cymose inflorescences, a single series of ovules per placenta, linear and smooth fruits, and rugose seed bodies. However, the newly described taxon has cylindrical branches instead

of hexagonal, pubescent instead of glabrous corollas, and an urceolate calyx. Since this new species has never been included in a phylogenetic study, molecular work is needed in order to confirm its phylogenetic placement and the monophyly of *Neojobertia* under this expanded circumscription.

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