

# New species of *Ipomoea* (Convolvulaceae) from Bahia

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**Summary.** Seven new species of *Ipomoea* are described from Bahia, Brazil: *Ipomoea chapadensis* J. R. I. Wood & L. V. Vasconcel., *I. parvibracteolata* J. R. I. Wood & L. V. Vasconcel., *I. connata* J. R. I. Wood & L. V. Vasconcel., *I. pterocaulis* J. R. I. Wood & L. V. Vasconcel., *I. queirozii* J. R. I. Wood & L. V. Vasconcel., *I. longibracteolata* Sim.-Bianchi. & J. R. I. Wood and *I. magna* Sim.-Bianchi. & J. R. I. Wood. The species are illustrated with line drawings and photographs, their distinguishing characters and relationships are discussed, their distribution is mapped and their conservation status is assessed.

**Key Words.** Brazil, caatinga, cerrado, integrated taxonomy.

## Introduction

Bahia is the largest state in North East Brazil and has a corresponding diversity of habitats. The dry thorny forest known as caatinga occupies a substantial part of the state but there are significant relics of moist Mata Atlântica forest near the coast and areas of cerrado and campo rupestre further inland towards the west as well as smaller areas of other formations. Although botanical exploration of the state began in the 19th century more intensive studies have only taken place during the last fifty years and new species are constantly being discovered.

*Ipomoea* L. is no exception to this pattern. Ongoing studies by one of us (L.V.V.) have identified approximately 46 species of *Ipomoea* growing in the state of Bahia and two new species have been published recently (Vasconcelos *et al.* 2016). It is expected that these studies will eventually result in a full account of the genus in Bahia based on Vasconcelos (2015). The present paper describes an additional seven new species as a result of collaboration between the authors. It should be stressed that we expect additional species to be discovered in the not too distant future. We are aware of individual specimens which cannot be assigned to known species and almost certainly represent new taxa. Amongst these are *W. R. Anderson et al.* 36907 (NY, SP, UB) from Espigão Mestre, c. 10 km N of Rio Roda Velha, which appears to be a species related to *I. marabaensis* D. F. Austin and *Projeto Chapada Diamantina* 2233 (ALCB, HUEFS,

K, SPF), which appears to be related to *I. sericophylla* Meisn. or *I. decipiens* Dammer.

New taxa are being discovered not only as the result of botanical exploration but also as a result of more intensive systematic studies of *Ipomoea*. Monographic work at Oxford University's Department of Plant Sciences enables comparison of material from all over the world so bringing insights to the flora of a state such as Bahia. Thus examination of specimens from Africa combined with molecular studies showed clearly that *I. piurensis* O'Donell, a long recognised species from Bahia (O'Donell 1953: 385), is conspecific with the older African *I. acanthocarpa* (Choisy) Aschers. & Schweinf., although the species is, in fact, of American origin. Molecular studies have also shown that the species described here as *I. pterocaulis* is not *I. jalapa* (L.) Pursh as previously identified in herbaria but a distinct species endemic to north east Brazil.

## Materials and Methods

This paper is based on studies of living plants in the field combined with examination of herbarium material in Brazil and elsewhere by the authors. Herbaria where we have seen material are indicated by their recognised international code after the citation of specimens. We have also been able to sequence *ITS* for at least one specimen for five of the new species described here and this has allowed us to discuss

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phylogenetic relationships with a degree of confidence.

***Ipomoea chapadensis*** J. R. I. Wood & L. V. Vascon., **sp. nov.** Type: Brazil, Bahia, Bonito, estrada Bonito para o assentamento Eugênio Lira, 11°59'54"S 41°04'24"W, 10 Aug. 2014, L. P. de Queiroz, J. R. I. Wood & H. Huaylla 15972 (holotype HUEFS209806; isotype OXF).

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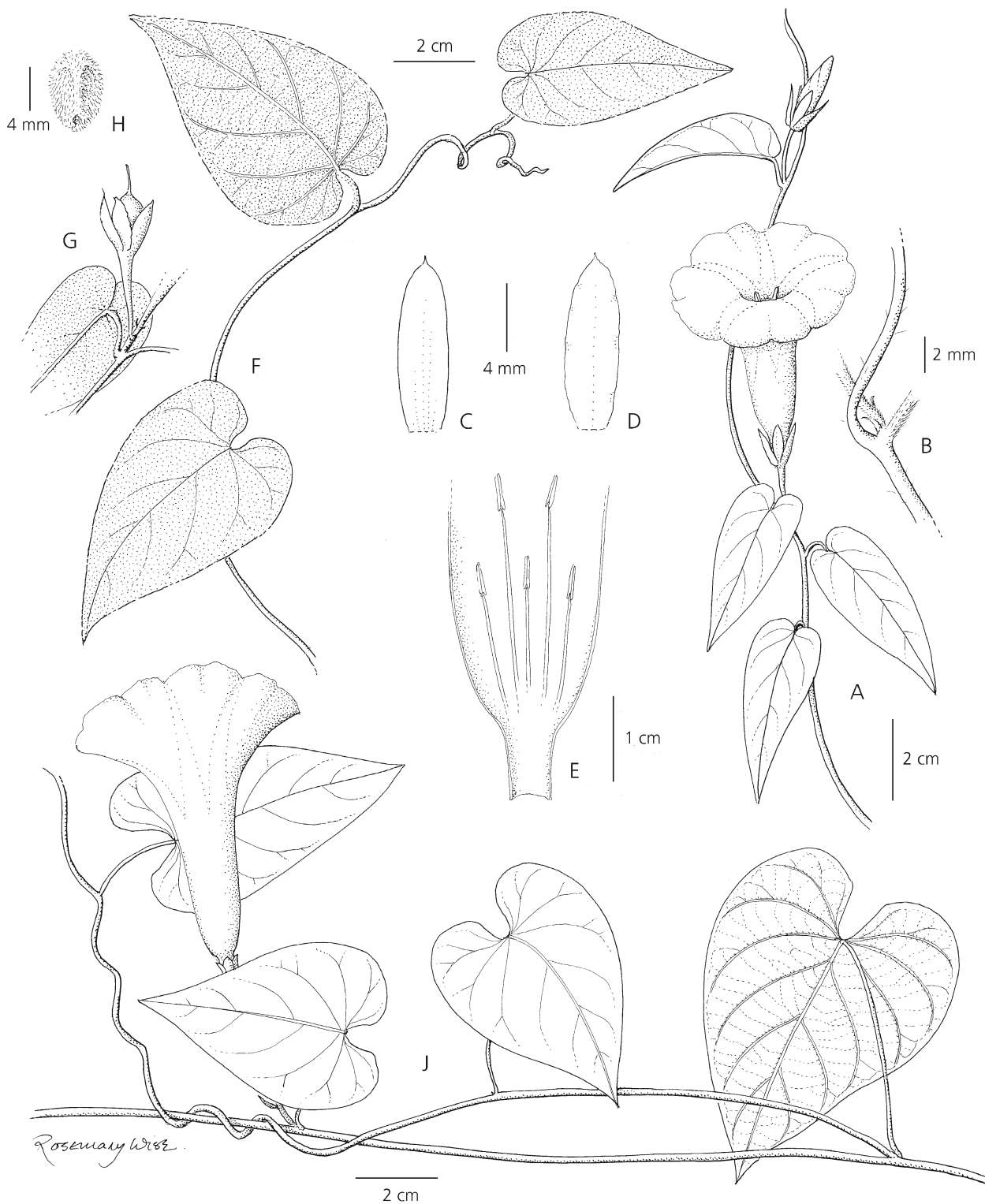
Twining perennial *herb* to 2 m; stems glabrous or thinly hirsute with short spreading hairs, less commonly tomentose. *Leaves* petiolate, 2 – 9 (– 13) × 1 – 4 (– 6) cm, narrowly (or rarely broadly) ovate, acute or acuminate and mucronate, base cordate with a narrow sinus and rounded auricles, both surfaces glabrous or tomentellous on the veins, adaxially with scattered hairs or hair bases only on both surfaces, rarely both surfaces tomentose; petioles 0.5 – 5 cm, the indumentum similar to that of the leaves. *Inflorescence* of solitary (rarely paired) axillary flowers; peduncles 0 – 5 mm often completely suppressed, glabrous to tomentose; bracteoles 2 – 3 × 0.5 mm, lanceolate, acuminate, persistent; pedicels 11 – 30 mm, thickened upwards, glabrous to tomentellous; sepals subequal, narrowly oblong-elliptic, acute and shortly mucronate, densely but very shortly puberulent, the margins slightly scarios, outer 7 – 11 × 3 – 3.5 mm, inner 9 – 13 × 4 mm, obtuse to rounded and mucronate; corolla 4.5 – 5 (– 7) cm, funnel-shaped, pink, puberulent; limb 3.5 (– 5) cm diam., undulate, filaments unequal, two long and three shorter, longer pair c. 25 mm long, shorter c. 15 mm; ovary glabrous; style glabrous; stigma biglobose. *Capsule* 10 – 11 × 7 – 9 mm, ovoid, strongly rostrate, the persistent style base 4 – 5 mm long, glabrous; *seeds* 7 × 4 mm, densely white-tomentose. Figs 1, 3 A – C.

**RECOGNITION.** At first sight this species appears to represent depauperate material of *Ipomoea regnellii* Meisn., both species having puberulent oblong-elliptic sepals and a pubescent corolla. As yet unpublished molecular studies using *ITS* (Williams *et al.* *in prep.*) confirm this relationship and suggest that the two species are distinct. However, the 1 (– 2)-flowered inflorescence with the peduncle almost completely suppressed so the bracteoles appear to be stipules (until they fall) render *I. chapadensis* easy to distinguish from *I. regnellii*. Most specimens have rather distinct narrowly ovate leaves but this is not entirely constant. It is also characteristic of drier forest than *I. regnellii*.

**HABITAT & DISTRIBUTION.** Endemic to the state of Bahia and virtually restricted to the Chapada Diamantina where it is frequent in the transition from caatinga to cerrado vegetation, often being recorded from dis-

turbed bushy habitats, such as roadsides. Most collections were made between 600 and 1100 m. Map 1.

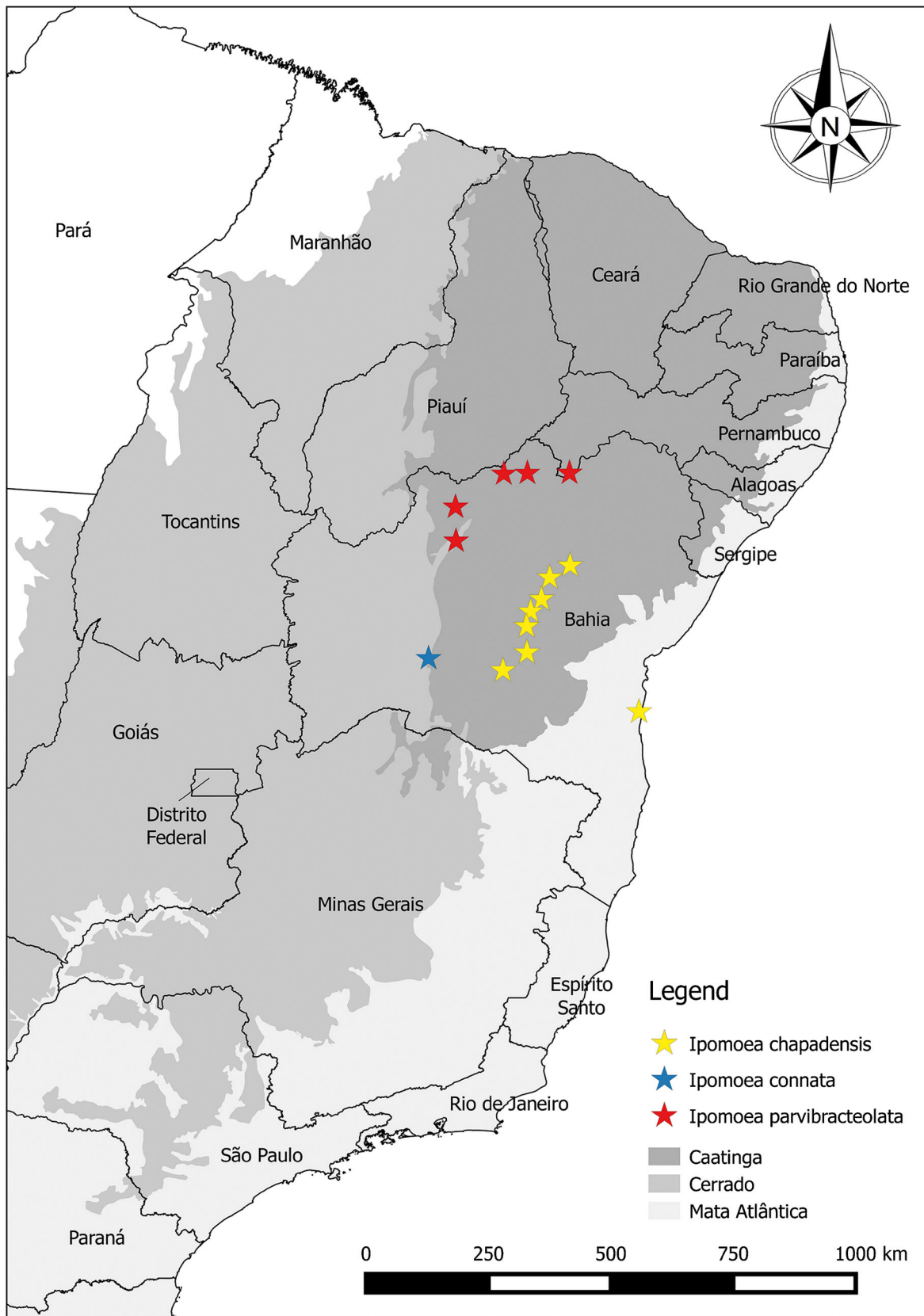
**SPECIMENS EXAMINED.** **BRAZIL.** **Bahia:** Mun. Abaíra, Estrada para Mata do Criminoso, 4 km do entroncamento da estrada principal entre Catolés e Ouro Verde, 23 March 1999, R. M. Harley *et al.* 53644 (HUEFS, RB, UEC). Mun. Andaraí, Estrada entre Andaraí e Mucugê, 12°15'S, 41°18'W, 20 Nov. 1983, L. R. Noblick & A. Pinto 2909 (CEPEC, HUEFS, SP, SPF). Mun. Bom Jesus da Lapa, 10 June 1992, A. M. de Carvalho *et al.* 3956 (CEPEC, NY, SP). Mun. Bonito, estrada Bonito para o assentamento Eugênio Lira, 11°59'54"S, 41°04'24"W, 10 Aug. 2014, L. P. de Queiroz *et al.* 15972 (HUEFS, OXF). Mun. Jacobina, Pinhacó, 11°18'22"S, 40°29'22"W, 625 m, 28 March 1996 *Projeto Chapada Diamantina* 2598 (ALCB, HUEFS, K). Mun. Lençóis, Serras dos Lençóis, 7 km NE da cidade, 12°30'S, 41°22'W, 500 m, 23 May 1980, R. M. Harley *et al.* 22424 (CEPEC, K); Serra do Palmital, 23 km NW de Lençóis, 900 – 1000 m, 16 Feb. 1994, R. M. Harley *et al.* 14124 (K, SPF); *ibid.*, próximo ao Rio São José, 12°33'27"S, 41°22'75"W, 17 Oct. 1997, M. Alves *et al.* 1035 (PEUFR); *ibid.*, Chapada Diamantina, Rio São José, a 2 km de cidade, 12°33'20"S, 40°22'54"W, 20 Oct. 2009, fr., C. T. Lima & S. G. de Lima 291 (HUEFS); Chapada Diamantina, Morro dos Ventos, 12°31'10"S, 41°30'42"W, 950 m, 25 Oct. 2012, G. Almeida-Silva & M. F. M. Barros 294 (HUEFS); Lençóis, Beira do Rio Lençóis, 12°34'S, 41°23'W, 22 Aug. 2002, M. E. R. Junqueira & M. J. G. Andrade 92 (HUEFS); Vale do Rio São José, 3 Aug 1998, R. Funch 146 (HUEFS); Utinga, entrada a c. 9 km NW de Utinga na BA-046 (Utinga-Morro do Chapéu), do lado direito da estrada no sentido Morro do Chapéu, 12°01'S, 41°02'W, 17 Oct. 1994, L. P. Queiroz & N. S. Nascimento 4215 (HUEFS, SP). Mun. Morro do Chapéu. BA 055 indo para Piritiba, c. 2 km do entroncamento para Domingo Lopes, 11°33'28"S 40°54'21"W, 676 m, 8 June 2001, E. Souza *et al.* 121 (HUEFS, SP); Estrada para Bonito, 11°48'31"S, 41°11'21"W, 8 Aug. 2013, E. Melo *et al.* 12115 (HUEFS). Mun. Mucugê, Serra do Gobira, 13°05'44"S, 41°22'41"W, 1242 m, 15 Feb. 2002, R. M. Harley *et al.* 54468 (HUEFS). Mun. Palmeiras, P.N. Itacaré, estrada para Ubaitaba, 14°19'11"S, 39°04'06"W, 139 m, 21 Jan. 2015, E. Melo *et al.* 12022 (HUEFS); Descida do Pai Inácio, 12°27'S, 41° 28'W, 22 Aug. 2002, M. E. R. Junqueira & M. J. G. Andrade 90 (HUEFS, SP); Vale do Capão, Serra do Candombá, 12°37'40"S, 41°30'25"W, 27 July 2012, L. V. Vasconcelos *et al.* 412 (HUEFS, SP); Vale do Capão, Serra do Candombá, 12°36'35"S, 41°30'06"W, 28 July 2012, L. V. Vasconcelos *et al.* 420 (HUEFS, SP); Morro do Pai Inácio, 12°27'26"S, 41°28'01"W, 17 April 2000, M. Gimenes 05 (HUEFS); próximo a pista, 12°27'S, 41°27'W, 3 Oct. 2005, G. Costa *et al.* 54 (HUEFS). Mun. Rio de Contas, Rio Brumado, 13 km da cidade, 13°28'S



**Fig. 1.** *Ipomoea chapadensis*. A habit; B base of peduncle with bracteoles; C outer sepal; D inner sepal; E corolla opened up to show stamens; F habit with more pubescent indumentum; G calyx with fruit; H seed; J habit with broader leaves. A – B from *E. Souza et al.* 121; C – D from *Almeida-Silva & Barros* 294; E, J from *E. Melo* 12022; F from *Projeto Chapada Diamantina* 2598; G from *T. Cavalcanti* 330; H from *Lima & Lima* 291. DRAWN BY ROSEMARY WISE.

41°52'W, 1030 m, 27 Oct. 1988, *R. M. Harley et al.* 25707 (CEPEC, K, SPF); km 15 estrada Rio de

Contas-Brumadinho, 13°31'S 41°58'W, 1150 m, 25 Feb. 1989 (fr.), *T. B. Cavalcanti et al.* 330 (CEN).



**Map 1.** Distribution of *Ipomoea chapadensis*, *I. connata* and *I. parvibracteolata* in NE Brazil.

**CONSERVATION STATUS.** This species is locally common and known from over 20 collections from many different locations. It may be favoured by disturbance and faces no obvious threat. It should, therefore, be classified as Least Concern (LC) within IUCN (2012) guidelines.

**PHENOLOGY.** Although found in flower in most months of the year, flowering takes place principally in the dry July – October period, although, curiously, there are no records from September.

**ETYMOLOGY.** This species is named *chapadensis* after the Chapada Diamantina where it is common and to which it is largely restricted.

**NOTES.** *Ipomoea chapadensis* is very variable in indumentum, some specimens (Harley *et al.* 25707, Cavalcanti *et al.* 330, Junqueira & Andrade 92) being markedly tomentose having a dense texture, whereas others (Souza *et al.* 121, Harley *et al.* 22424) are glabrous or nearly so. Intermediate states are often found. Melo 12022 is somewhat atypical because of its location in the Mata Atlântica (Map 1), larger corolla and broadly ovate leaves; however the very short peduncle and solitary flower suggest it is correctly placed.

***Ipomoea parvibracteolata*** J. R. I. Wood & L. V. Vascon., **sp. nov.** Type: Brazil, Bahia, Casa Nova, estrada para a Fazenda Santarém, 9°24'05"S 41°22'04"W, 468 m, 9 Oct. 2004, L. P. de Queiroz *et al.* 9615 (holotype HUEFS88992, isotype MBM).

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Twining perennial *herb* reaching 3.5 m; stems slightly woody, glabrous. *Leaves* petiolate, 1 – 4 × 1 – 4 cm, ovate to suborbicular, abruptly narrowed to an acute or shortly acuminate apex, base cordate with rounded auricles, margin slightly undulate; abaxially paler; petioles 0.6 – 2 cm. *Inflorescence* of 1 – 3-flowered, axillary cymes; peduncles 2.2 – 8.5 cm, noticeably thicker than the secondary peduncles and pedicels; bracteoles 3 × 0.5 mm, somewhat scarious, caducous; secondary peduncles 0.8 – 2.5 cm; pedicels 1 – 3 cm long; sepals unequal, ovate or ovate elliptic, acute and mucronate, glabrous, outer 15 – 27 × 8 – 11 mm, dark green, prominently 5-ribbed, the ribs sometimes muricate; inner 12 – 18 × 6 – 8 mm, pale green with scarious margins, the longitudinal veins many, the midvein terminating in a fine, fragile mucro; corolla 10 – 10.5 cm long, funnel-shaped, pink, glabrous; limb c. 9 cm diam., entire; filaments unequal, longer pair c. 15 mm long, shorter c. 8 mm. *Capsule* enclosed by the persistent sepals, 13 × 7 mm, narrowly ovoid, mucous, glabrous; *seeds* 7 × 4 mm, blackish, minutely scabridulous. Figs 2, 3D – E.

**RECOGNITION.** Although we have not sequenced this species, its morphology very strongly suggests it is closely related to *Ipomoea setifera* Poir., by which name it has usually been identified. It can be distinguished by its very small leaves (less than 4 × 4 cm, not (4 –) 7 – 14 × 3 – 12 cm), very large corolla 10 – 10.5 cm long (not 5.5 – 8 cm) and the tiny, linear, 3 × 0.5 mm long bracteoles, which contrast strongly with the persistent, ovate to elliptic bracteoles of *I. setifera*, which are 1 – 1.7 × 0.6 – 1.5 cm (Wood *et al.* 2015: 15, O'Donnell 1959: 236). As the bracteoles of *I. setifera* and its only other recognised ally *I. fimbriosepala* Choisy are prominent and persistent, this is of particular significance.

**HABITAT & DISTRIBUTION.** Apparently restricted to the area round Petrolina on the borders of Bahia and Pernambuco States in locations under the influence of the Rio São Francisco. It is reported to grow on sandy soil in areas of quartzite with caatinga vegetation. Few collections record altitude but it appears to grow at around 500 m. Map 1.

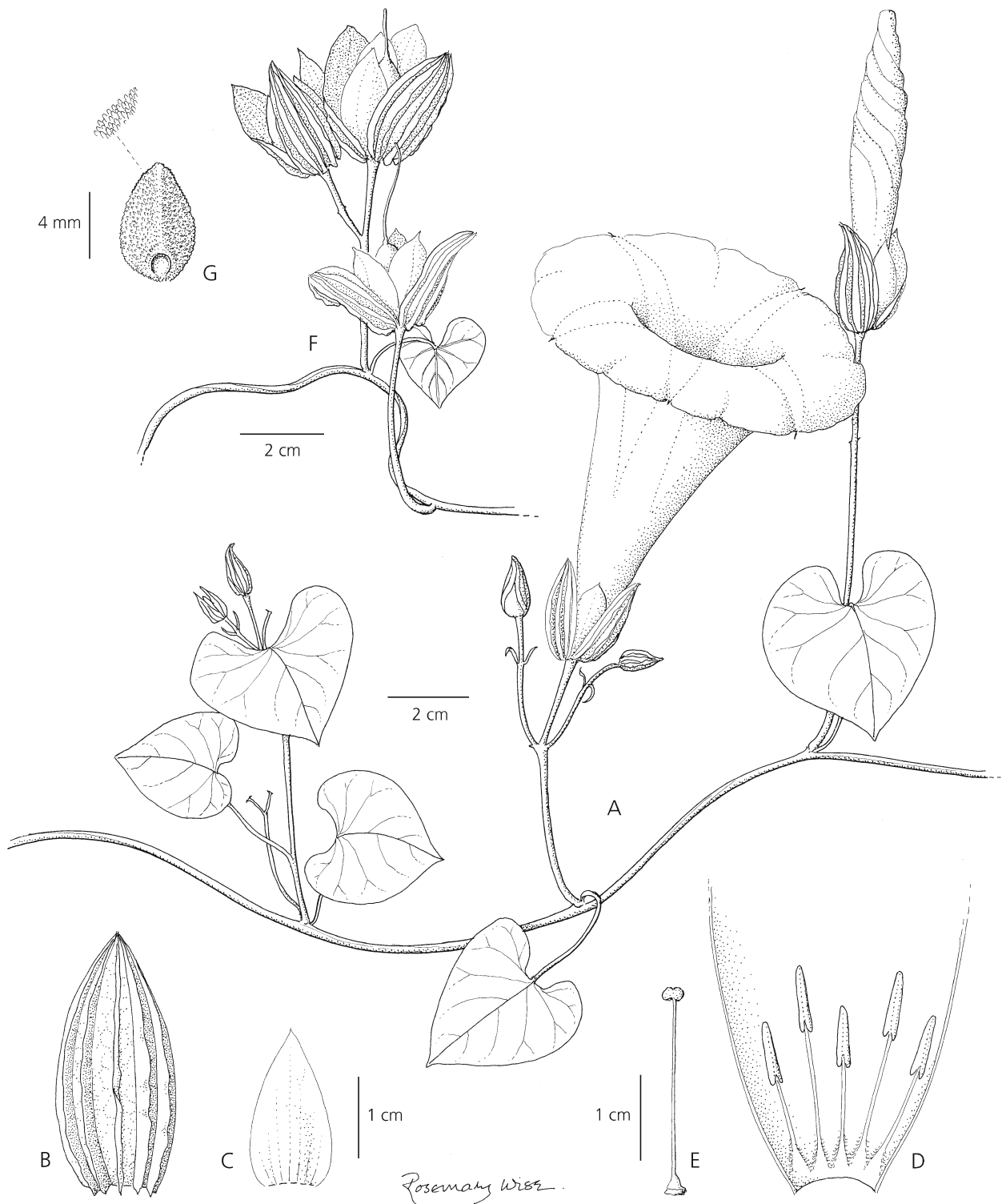
**SPECIMENS EXAMINED. BRAZIL. Bahia:** Barra, Ibiraba, frente de Vila Ibiraba no caminho para os Brejos 10°48'S 42°50'W, 26 Feb. 1997, L. P. de Queiroz 4888 (HUEFS, SP); Casa Nova, estrada para a Fazenda Santarém, 9°24'05S 41°22'04"W, 468 m, 9 Oct. 2004, L. P. de Queiroz, K. R. B. Leite, D. Cardoso, E. R. Souza & S. K. A. Santos 9615 (HUEFS, MBM); 40 km E de Ramanso, estrada Ramanso-Casa Nova, 9°24'56"S 41°51'02"W, 11 Oct. 2004, L. P. de Queiroz *et al.* 9675 (HUEFS); Pilão Arcado, estrada Pilão Arcado para Breco de Zacarias, 10°05'55"S 42°50'38"W, 22 May 2010, L. P. de Queiroz *et al.* 14713 (HUEFS, SP). **Pernambuco:** Arredores de Petrolina, 18 April 1971, E. P. Heringer *et al.* 80 (IPA, OXF, RB, SP, UB); 3 km N de Petrolina, 4 April 1983, Fotius 3393 (HTSA, IPA, SP); Petrolina, 13 June 1995 (fr.), M. M. da Silva *et al.* 18 (HUEFS, K).

**CONSERVATION STATUS.** Although there are collections from several different locations we have no information about the size of these populations or whether they face any threat to their existence. This species must be categorised as Data Deficient (DD) within IUCN guidelines until the populations can be evaluated.

**PHENOLOGY.** Flowering and fruiting from October to June.

**ETYMOLOGY.** The epithet *parvibracteolata* refers to the tiny caducous bracteoles which are one of the most distinctive features of this species and which serve to distinguish it from its apparent close relatives *Ipomoea setifera* and *I. fimbriosepala* Choisy.

**NOTES.** *Ipomoea setifera* and *I. fimbriosepala* comprise a pair of closely related but widely distributed species which have been commonly confused particularly in the Old World. The discovery of a third closely related species, *I. parvibracteolata*, from a very



**Fig. 2.** *Ipomoea parvibracteolata*. A habit; B outer sepal; C inner sepal; D corolla opened up to show stamens; E ovary and style; F fruiting inflorescence with capsule; G seed. A from L. P. de Queiroz 4888; B – E, from L. P. de Queiroz et al. 9675; F – G from M. M. da Silva et al. 18. DRAWN BY ROSEMARY WISE.

restricted area of Brazil poses interesting questions about the geographical origin of this group of species.

***Ipomoea connata* J. R. I. Wood & L. V. Vascon., sp. nov.** Type: Brazil, Bahia, basin of the upper São Francisco R., 4 km N of Bom Jesus da Lapa on main



**Fig. 3.** A *Ipomoea chapadensis* showing solitary flower, suppressed peduncle and calyx; B *I. chapadensis*, corolla limb showing biglobose stigma; C *I. chapadensis*, showing rostrate capsule; D *I. parvibracteolata* showing corolla, sepals and minute bracteoles; E *I. parvibracteolata*, showing habit and small leaves. PHOTOS: A – C LIZIANE VASCONCELOS; D – E ISYS MASCARENHA SOUZA.

road to Ibotirama, 13°13'S 43°24'W, 450 m, 20 April 1980, *R. M. Harley, G. L. Bromley, A. M. de Carvalho, J. L. Hage & H. S. Brito* 21588 (holotype CEPEC; isotypes ARIZ, K, SP).

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Twining perennial *herb* to 2 m, stems reddish-brown, glabrous, slightly angled, weakly winged when young. *Leaves* petiolate, 2.5 – 6 × 1.5 – 4 cm (only seen on inflorescence), ovate-deltoid, shallowly cordate with rounded to subacute auricles, acute or obtuse, margin undulate to sinuate, both surfaces glabrous, abaxially paler; petioles 0.6 – 3 cm, fused with the base of the peduncle for up to 10 mm (Fig. 4B), slender, glabrous. *Inflorescence* of pedunculate axillary cymes, sometimes (?usually) compounded into complex branched axillary inflorescences; peduncles 2.5 – 6.5 cm, glabrous, sometimes extended into a rachis up to 14 cm long; primary bracteoles petiolate, foliose, ovate-deltoid, 5 – 20 × 3 – 11 mm, deciduous and often absent; secondary peduncles 0.7 – 3 cm long; tertiary peduncles 3 – 6 mm; ultimate bracteoles c. 1 – 1.5 mm, ovate, caducous; pedicels 11 – 21 mm; sepals unequal, glabrous, oblong-ovate, outer 6 – 8 × 3 – 4 mm, obtuse, inner 8 – 9 × 5 mm, rounded, scarious except in the central area; corolla 7 – 7.5 cm long, narrowly funnel-shaped, pink, glabrous, limb c. 3.5 cm diam.; filaments unequal, glabrous apart from glandular hairs at base, longer pair c. 13 mm long, shorter c. 8 mm, anthers 6.5 × 1 mm; style 10 mm long, glabrous, stigma biglobose. *Capsule* and *seeds* not seen. Fig. 4.

**RECOGNITION.** At first glance this species appears to be a form of *Ipomoea regnellii* Meisn. because of the shape of the sepals but it is immediately distinguished by its glabrous sepals and corolla. Closer examination reveals a remarkable feature in that the petiole is fused for part of its length with the lower part of the peduncle. This unusual character is known to us only in a few, very different, Mesoamerican species including *I. suffulta* (Kunth) G. Don. and *I. bracteata* Cav. Molecular studies using *ITS* indicate this species is related most closely to *I. pterocaulis* described elsewhere in this paper. The two species have little obviously in common morphologically although they both are distributed in the same region.

**HABITAT & DISTRIBUTION.** Only known from secondary vegetation with caatinga and dry deciduous forest, 450 – 500 m near Bom Jesus da Lapa in western Bahia. Map 1.

**SPECIMENS EXAMINED.** BRAZIL. Bahia: basin of the upper São Francisco R., Faz. Umbuzeiro da Onça, c. 8 km from Bom Jesus da Lapa on by-road to Calderão, 43°22'W 13°09'S, 500 m, 19 April 1980, *R. M. Harley et al.* 21535 (CEPEC, K); 4 km N of Bom Jesus da Lapa on main road to Ibotirama, 43°24'W 13°13'S, 450 m,

20 April 1980, *R. M. Harley et al.* 21588 (holotype CEPEC; isotypes ARIZ, K, SP).

**CONSERVATION STATUS.** This species appears to be a very localised endemic but no information is known of the size of its populations or likely threats to its survival. It is also quite possible that other overlooked populations exist. It should be classified as Data Deficient (DD) within IUCN (2012) guidelines until a proper evaluation can be carried out.

**PHENOLOGY.** Found in flower in April.

**ETYMOLOGY.** The epithet *connata* meaning “joined” refers to the remarkable fusion of the petiole and peduncle for part of their lengths.

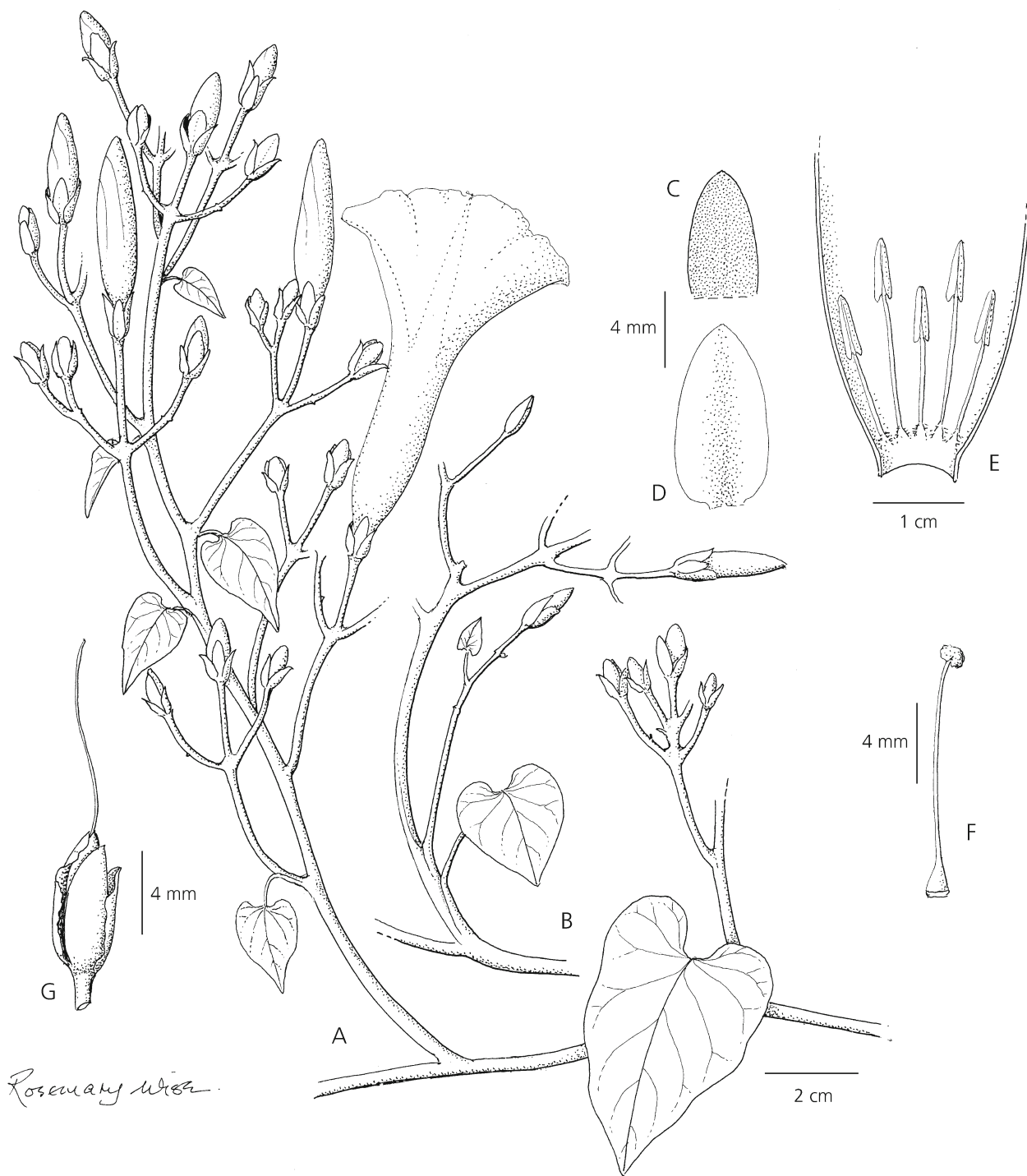
**Ipomoea pterocaulis** *J. R. I. Wood & L. V. Vascon., sp. nov.* Type: Brazil, Bahia, Morro do Chapéu, c. 1 km após Lagoinha na Estrada para Cafarnaum, 11°41'01"S 41°20'11"W, 902 m, *L. P. de Queiroz, J. R. I. Wood & H. Huaylla* 15957 (holotype HUEFS 209791; isotypes K, OXF).

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Vigorous *twining plant* decumbent in open ground or climbing over bushes to several metres, stems stout, prominently winged, glabrous. *Leaves* petiolate, 2.5 – 10 × 2 – 9 cm, ovate-deltoid, acute or obtuse, base shallowly cordate with a broad sinus and rounded to subacute auricles, margin undulate to slightly sinuate, both surfaces glabrous, abaxially paler with prominent veins; petioles 1.3 – 5.5 cm. *Inflorescence* of pedunculate axillary cymes; peduncles 2 – 12 cm; bracteoles 1 – 2 mm, lanceolate, caducous; secondary peduncles 1 – 2 cm; pedicels 3 – 5 mm; sepals subequal, glabrous, 13 – 15 × 7 – 10 mm, elliptic, obtuse rounded; outer often reddish, inner with scarious margins; corolla (6 –) 8 – 9 cm long, glabrous funnel-shaped, tube white; limb 7 – 8 cm diam.; stamens and style held at mouth of corolla; filaments unequal, glabrous except for the hairs at the base, longer pair 8 – 15 mm, shorter filaments 3 – 5 mm; style glabrous, stigma biglobose. *Capsule* 10 × 8 – 9 mm, ellipsoid, glabrous, mucicous; *seeds* 6 × 4 mm, dark brown, glabrous except for long white hairs on angles. Figs 5, 6.

**RECOGNITION.** This is a conspicuous species because of its large corollas and frequent occurrence in open habitats. Particularly distinctive in the field are its winged stems. This might suggest a link with *Ipomoea subalata* Hassl. from Paraguay but the glabrous corolla, leaves and sepals immediately distinguish it. It has been identified in herbaria as *I. jalapa* (L.) Pursh. but can be easily distinguished by its glabrous stem, sepals and corolla. It also differs in its seeds which are glabrous with long white hairs on the angles rather than pilose with hairs of different lengths. It has also been compared with



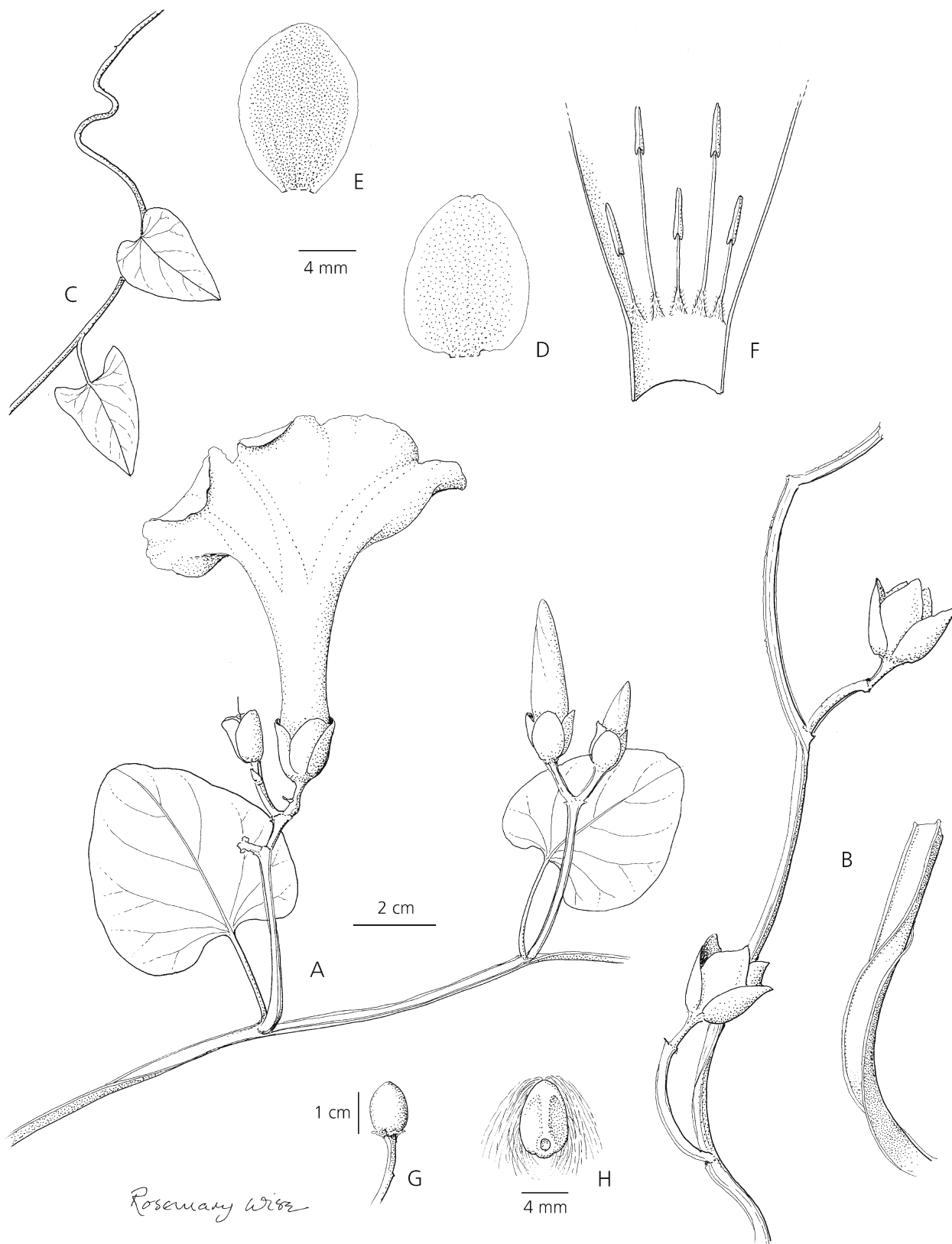


**Fig. 4.** *Ipomoea connata*. A habit; B detail of habit showing partially fused petiole and peduncle; C outer sepal; D inner sepal; E corolla opened out to show stamens; F ovary and style; G calyx after corolla has fallen. From R. M. Harley et al. 21588. DRAWN BY ROSEMARY WISE.

*I. asarifolia* (Desr.) Roem. & Schult. but is easily distinguished by the ovate-deltoid, cordate leaves (not suborbicular to reniform), the subequal (not very unequal) sepals and the seeds pilose on the margins (not minutely and uniformly tomentellous). Unpublished molecular studies place it in a clade with *I. connata* and

slightly more distantly with *Ipomoea rosea* Choisy and *I. graniticola* J. R. I. Wood & Scotland with none of which does it have obvious morphological affinities except for the glabrous leaves, sepals and corolla.

**HABITAT & DISTRIBUTION.** Observations by one of us (JRIW) and notes on herbarium labels suggest this is a



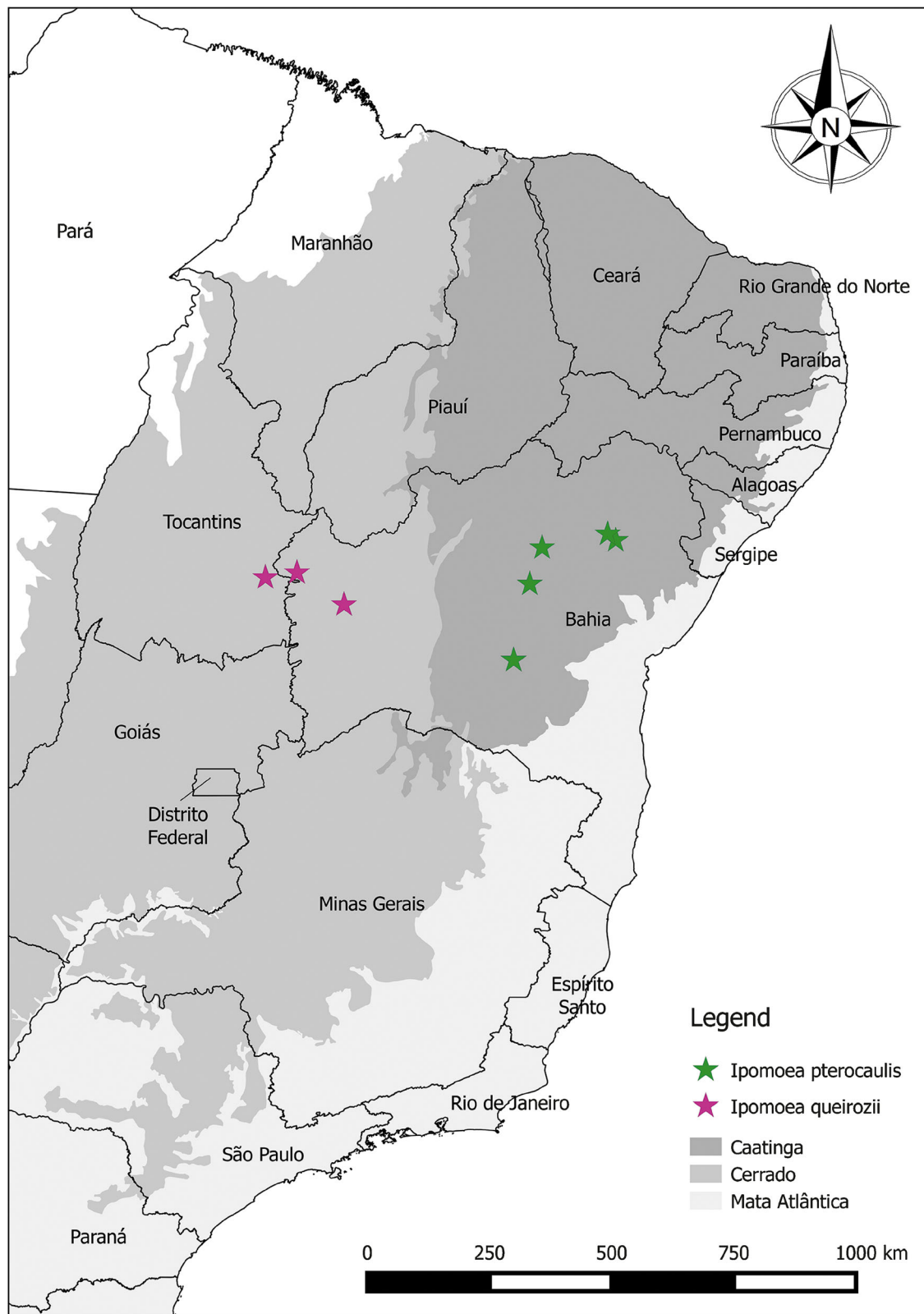
**Fig. 5.** *Ipomoea pterocalis*. A habit; B mature stem; C young stem and leaves; D outer sepal; E inner sepal; F corolla opened up to show stamens; G capsule; H seed. A – E, G – H from L. de Queiroz 15957; F from R. Harley et al. 53599. DRAWN BY ROSEMARY WISE.



**Fig. 6.** *Ipomoea pterocaulis*. A habit; B corolla, calyx and winged stem. PHOTOS: HIBERT HUAYLLA.

plant of sandy soils in open, disturbed caatinga. It is scattered in occurrence and extends from Bahia into

Pernambuco State. The recorded altitudinal range is from about 300 to nearly 1100 m. Map 2.



Map 2. Distribution of *Ipomoea pterocaulis* and *I. queirozii* in NE Brazil.

**SPECIMENS EXAMINED. BRAZIL. Bahia:** 14 km SW of Cansanção on road to Queimadas, 10°47'S 39°34'W, 300 m, 22 Feb. 197?, *R. M. Harley et al.* 16476 (K, MO, P, RB). Mun. Abaira, 1.5 km de cidade, na estrada para Platã, 13°15'22"S 41°40'07"W, 1070 m, 21 March 1999, *R. M. Harley et al.* 53599 (HUEFS, RB). Mun. Bela Vista, Juremal, 10°39'S 39°44'W, 30 March 2004, *M. V. Moraes* 676 (HUEFS). Mun. Ourolândia para Umburanasca, 9 km de Umburanasca, 10°56'S 41°05'W, 599 m, 24 Sept. 2011, *J. G. A. do Nascimento et al.* 620 (HUEFS). Morro do Chapeú, c. 1 km após Lagoinha na Estrada para Cafarnaum, 11°41'01"S 41°20'11"W, 902 m, 10 Aug. 2014, *L. P. de Queiroz, J. R. I. Wood & H. Huaylla* 15957 (holotype HUEFS; isotypes K, OXF). **Pernambuco:** Mun. Afrânio, Serra do Coboclo, 21 April 1971, *E. P. Heringer et al.* 266 (IPA, SPF, UB).

**CONSERVATION STATUS.** This species is known from at least six distinct locations and in the location observed by JRIW was well-established in open disturbed sandy ground including an area of cultivation of *Cajanus cajan* (L.) Huth. It is probably not under threat of any kind but in the absence of any evaluation of the different populations it can only be classified as Data Deficient (DD) within IUCN (2012) guidelines.

**PHENOLOGY.** Flowers and fruits from February to September.

**ETYMOLOGY.** The epithet *pterocaulis*, meaning “winged stem” refers to the distinctive winged stems characteristic of this new species.

**NOTES.** *R. M. Harley et al.* 16476 is slightly different from the other collections in having shorter sepals about 10 mm long and is included with a degree of uncertainty.

***Ipomoea queirozii* J. R. I. Wood & L. V. Vascon., sp. nov.** Type: Brazil, Bahia, Barreiras, c. 20 km W de Barreiras na estrada para Brasília, 12°06'42"S 45°09'47"W, 581 m, 13 April 2005, *L. P. de Queiroz, J. A. Costa, M. N. Stapf & E. B. Souza* 10239 (holotype HUEFS95041; isotype OXF).

<http://www.ipni.org/urn:lsid:ipni.org:names:60473758-2>

Erect *subshrub* to 1 m from a stout taproot at least 15 cm deep and up to 1.5 cm wide, stems slightly woody, pubescent, glabrescent when old. *Leaves* very shortly petiolate, 3 – 18 × 0.3 – 1.4 cm, but becoming clearly bract-like and much smaller (to 3.5 × 0.3 cm) towards the apex, linear to oblong, finely acuminate to a mucronate apex (rarely obtuse and mucronate), base cuneate to attenuate, margins sometimes inrolled, adaxially almost glabrous apart from a few hairs on the midvein, abaxially grey-green, pubescent, somewhat glabrescent; petioles 0 – 8 mm, pubescent. *Inflorescence* terminal, formed of shortly pedunculate 1

– 3-flowered cymes from the upper leaf (bract) axils, the cymes often reduced to single flowers; peduncles 0.4 – 1 cm, pubescent, bracteoles 3 – 11 × 0.5 mm, linear-lanceolate, caducous; pedicels 2 – 12 mm, often very short upwards, pubescent; sepals subequal, outer 6 – 10 × 4 – 8 mm, oblong-elliptic, obtuse to rounded, usually glabrous, margin scarios; inner sepals 1 – 2 mm longer, obovate-elliptic, truncate or retuse; corolla 4 – 7 cm long, pink, glabrous, funnel-shaped, limb 3.5 – 5 cm diam., slightly undulate; ovary glabrous, style glabrous, persistent after corolla has fallen, stigma biglobose. *Capsule* and *seed* not seen. Fig. 7.

**RECOGNITION.** This species is similar to most other erect cerrado species in having shortly petiolate, oblong leaves and a subterminal inflorescence in which the reduced leaves clearly function as bracts. It is most likely to be confused with *Ipomoea paludosa* O'Donnell, *I. campestris* Meisn. or *I. aprica* House but is immediately distinguished from all of these by the glabrous corolla and sepals. The leaf shape and glabrous corolla might suggest a relationship with *I. procumbens* Choisy, but there is no molecular support for this and *I. queirozii* can be readily distinguished by its erect habit, subterminal inflorescence and pubescent sepals. It is, in fact, most similar to the little-known *I. nerifolia* Gardner from which it differs in the shorter oblong-elliptic, glabrous sepals 6 – 8 mm (not oblong, pubescent, 10 – 12 mm) in length and the clearly petiolate lower leaves. Unpublished molecular studies suggest a relationship with *I. pohlilii* Choisy but this has a pubescent corolla and differs additionally in its solitary flowers which are partially concealed by the relatively large bracts.

**ETYMOLOGY.** This species is named for Luciano de Queiroz, who collected the type of this species, many of the cited specimens in this paper, and is one of the pre-eminent contemporary botanists in Brazil.

**HABITAT & DISTRIBUTION.** A cerrado species from the extreme west of Bahia and neighbouring parts of Tocantins State (Map 2). It has been found at altitudes of between 500 and 760 m. The precise habitat is variously described as “cerrado” (*R. M. Harley et al.* 56736), “rocky hillside with cerradão” (*W. R. Anderson et al.* 36478), “cut-over gallery forest and adjacent cerrado” (*H. S. Irwin et al.* 31335) or “dense cerrado” (*L. P. de Queiroz et al.* 10239). Map 2.

**SPECIMENS EXAMINED. BRAZIL. Bahia:** Valley of the Rio das Ondas, c. 10 km W of Barreiras, 500 m, 2 March 1971, *H. S. Irwin et al.* 31335 (FTG); Espigão Mestre, serra, 22 km W of Barreiras, 620 m, 2 March 1972, *W. R. Anderson et al.* 36478 (FTG, NY, SP, UB); Formosa do Rio Preto, 40 km da Faz. Estrondo em direção de Mimosa, 11°27'S 46°08'W, 3 Feb. 2000, *M. L. S. Guedes et al.* 6799 (CEN, HUEFS, K, RB, SPF); Barreiras, c. 20 km W de Barreiras na



**Fig. 7.** *Ipomoea queirozii*. A habit; B abaxial leaf surface; C outer sepal; D inner sepal. From *L. P. de Queiroz* 10239. DRAWN BY ROSEMARY WISE.

estrada para Brasília, 12°06'42"S 45°09'47"W, 581 m, 13 April 2005, *L. P. de Queiroz et al.* 10239 (holotype HUEFS95041, isotype OXF). **Tocantins:** Dianópolis,

distrito de Missões, 2 km de Missões, 11°33'05"S 46°46'58"W, 549 m, 3 Feb. 2012, *R. M. Harley et al.* 56736 (HUEFS).

**CONSERVATION STATUS.** Although there are collections from several different locations we have no information about the size of these populations or whether they face any threat to their existence. This species must be categorised as Data Deficient (DD) within IUCN guidelines (2012) until the populations can be evaluated.

**PHENOLOGY.** Found in flower from February to April.

**NOTES.** As understood here this is a variable species. All cited collections are  $\pm$ hirsute on the stems, abaxial leaf surfaces and on the peduncles. However, *de Queiroz et al.* 10239, *Irwin et al.* 31335 and *Anderson et al.* 36478 are outstanding for their branched terminal inflorescence which appears paniculate, whereas in the other collections the flowers are mostly solitary so the inflorescence appears to be a leafy raceme. *Guedes et al.* 6799 is itself somewhat variable within the same collection, the specimen at CEN having shorter and more obtuse leaves than those at HUEFS and RB.

***Ipomoea longibracteolata* Sim.-Bianch. & J. R. I. Wood, sp. nov.** Type: Brazil, Bahia, Mun. Caetité, Faz. Baixa Grande, 14°04'03"S 42°38'12"W, 820 m, 9 Feb. 1997, *M. L. Guedes, B. Stannard, E. Saar & L. Passos* 5276 (holotype HUEFS28895; isotypes ALCB, CEPEC, HRB, K, SPF).

<http://www.ipni.org/urn:lsid:ipni.org:names:77159997-1>

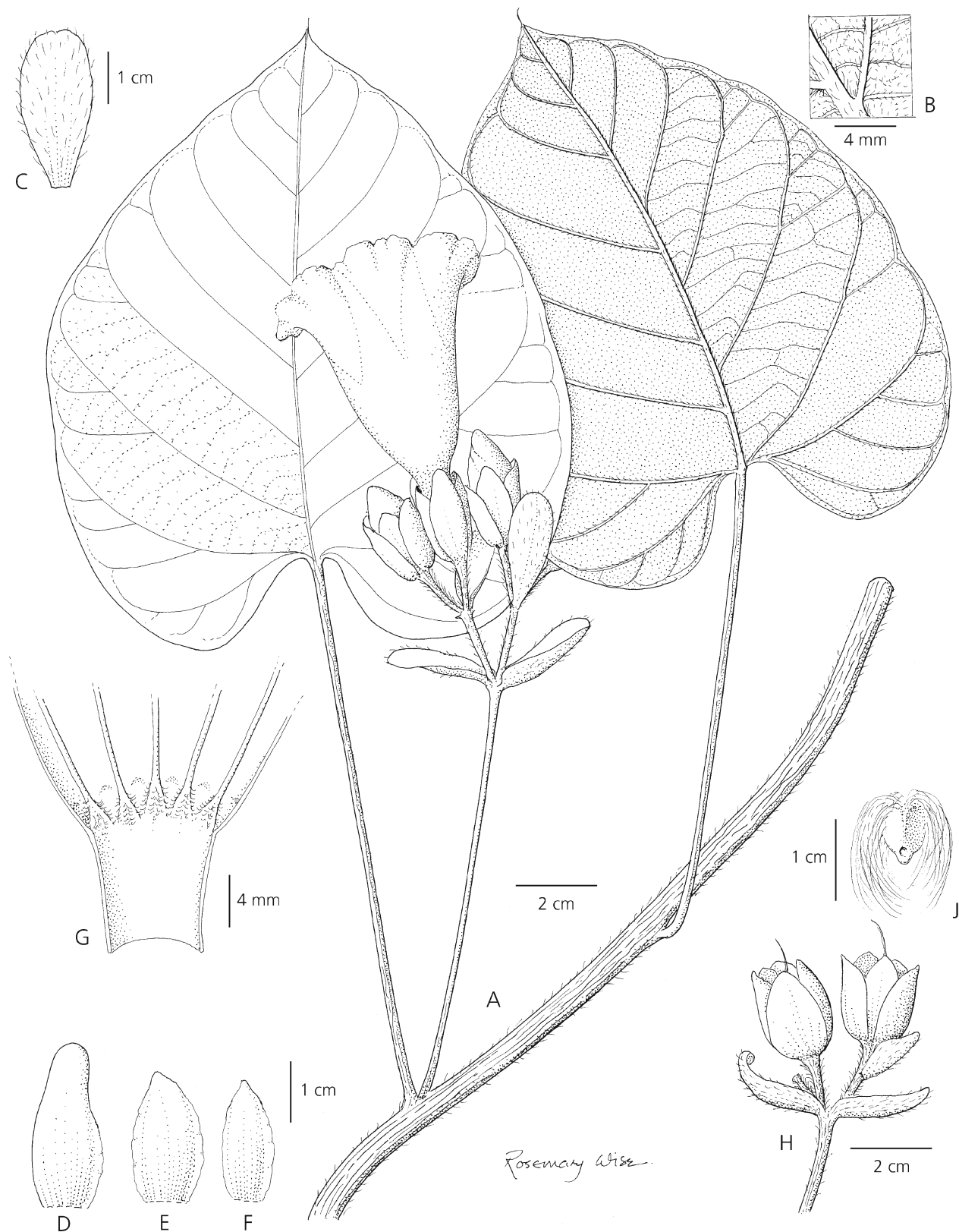
Liana with white latex reaching 10 m; stems woody, asperous-pilose, bark pale grey. *Leaves* petiolate, (7 –) 11 – 20 × (7 –) 14 – 20 cm, ovate, cordate with right-angled sinus and rounded auricles, apex acute, mucronate, sometimes retuse, adaxially thinly pubescent, abaxially paler, densely pubescent, the venation prominent with denser indumentum; petioles (4 –) 12 – 13 cm, pilose. *Inflorescence* of shortly pedunculate, bracteolate, pendulous, axillary cymes; peduncles 1.5 – 8 cm, asperous-pilose; bracteoles 2 – 3 × 0.6 – 1.3 cm, often, boat-shaped, oblong-elliptic or narrowly obovate, base cuneate, apex obtuse, pilose with long white hairs,  $\pm$ persistent; secondary peduncles (if present) 1 – 2 cm; pedicels 0.6 – 1.5 cm, more densely pilose than peduncles; sepals somewhat variable in size, shape and indumentum but generally unequal, outer 18 – 24 × (9 –) 14 – 16 mm, oblong-elliptic, elliptic, obovate, obtuse to rounded, glabrous or with some long white hairs along midrib on the exterior especially near base but glabrous and glandular on the interior, inner 17 – 18 × 7 mm, obovate, obtuse to rounded, glabrous; corolla 5 – 6.5 cm, glabrous, subcampanulate to shortly funnel-shaped, tube strongly inflated 1 – 1.5 cm above cylindrical base, pale pink with a dark wine-red centre and whitish limb; limb c 3.5 cm diam., apparently lobed; stamens included,

unequal, filaments glabrous except for basal glandular hairs, longer c. 2 cm, shorter c. 1.5 cm; anthers c. 5 – 6 × 1 mm; style c. 3 cm long, glabrous, stigma biglobose, included. *Capsule* 2 × 1.5 cm, ellipsoid, glabrous, *seeds* 7 × 5 mm, densely white-pilose on angles with hairs to 15 mm long. Fig. 8.

**RECOGNITION.** Molecular studies using *ITS* suggest a relationship with *Ipomoea burchellii* Meisn. and *I. queirozii* (Williams *et al.* in prep.) and more distantly with *I. brasiliensis* (Mart. ex Choisy) Meisn. but this species is readily distinguished from these and other species by the relatively long, boat-shaped, persistent bracteoles, the distinctive white, asperous pilose indumentum, which is particularly prominent on the inflorescence, and by the characteristically compact inflorescence. The liana habit, subcampanulate corolla and distinct flower colour recall plants placed in the *Arborescens* group but molecular studies do not support its inclusion in this group and the indumentum is very different.

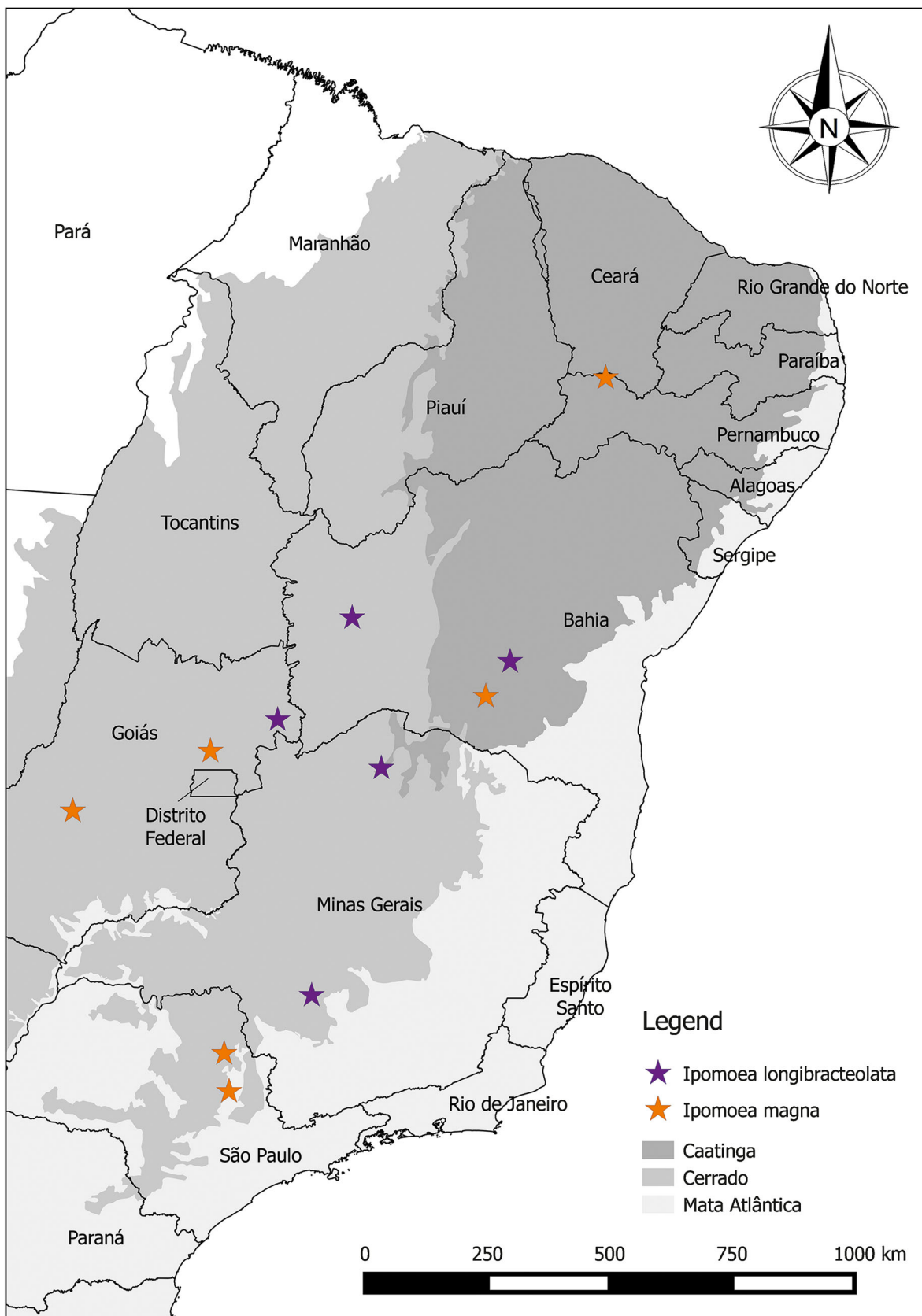
**HABITAT & DISTRIBUTION.** Field data record this species as growing in wooded cerrado or caatinga on sandy or rocky soil. All records are from below 1000 m and mostly from around 500 m altitude. It is endemic to Brazil and has been recorded from Bahia, Minas Gerais and Goiás. Map 3.

**SPECIMENS EXAMINED. BRAZIL. Bahia:** Mun. Abaíra, c. 5 km de Abaíra, ao longo da estrada Piatã-Abaíra, 840 m, 14 Feb. 1992, *L. P. Queiroz et al.* 2607 (HUEFS, SP). Mun. Alvorada, 2 July 1964, *J. M. Pires* 58149 (ARIZ, NY, UB). Mun. Caetité, Faz. Baixa Grande, 14°04'03"S 42°38'12"W, 820 m, 9 Feb. 1997, *M. L. Guedes et al.* 5276 (ALCB, HUEFS, K); Estrada para Brumado, 19 Feb. 1997, *A. M. Carvalho* 3759 (CEPEC, HRB). Mun. Santa Maria da Vitória, 13°27'S, 44°10'16"W, 13 Feb. 2000, *L. P. Queiroz et al.* 5963 (ALCB, CEPEC, HRB, HUEFS, HUESC, OXF, SP). São Desidério, 12°22'44"S 44°5'12"W, 570 m, 6 April 2005, *J. G. de Carvalho-Sobrinho* 471 (HUEFS, OXF, SP). Iuiui, estrada BR030 entre Palmas do Monte Alto e Malhada, 14°17'11"S 43°36'33"W, 470 m, 15 April 2002, *F. França et al.* 3791 (HUEFS, SP). **Goiás:** 15 km N de Alvaorada do Norte, 600 m, 10 March 1979, *G. Hatschbach* 42017 (FTG, MBM). Mun. Nova Roma, 13°41'28"S 46°51'04"W, 410 m, 2 March 2000, *D. Alvarenga et al.* 1303 (IBGE, MO). **Minas Gerais:** Mun. Jaíba, APA Lajedão, 11 March 2008, *I. R. Andrade* 6488 (SP). Mun. Juiz de Fora, 4 June 1877, *A. Glaziou* 8821a (P). Mun. Januária, 1 km E of Rio Pandeiros, near road to Januária, 520 m, 18 April 1973, *W. R. Anderson et al.* 9100 (FTG, NY, UB). Mun. Iguatama, Faz. Faroeste, 9 April 2004, *P. H. A. Melo* 1167 (BHCB, SP). Mun. Itinga, 3 February 1965, *A. P. Duarte* 9043 (HB); Serra do Espinhaço, 5 km NE of Francisco Sá, road to Salinas, 950 m, 13 Feb. 1969, *H. S. Irwin et al.* 23210 (FTG, NY, SP, UB).



**Fig. 8.** *Ipomoea longibracteolata*. A habit; B abaxial leaf surface; C bracteole; D outer sepal; E middle sepal; F inner sepal; G corolla opened up to show stamens; H fruiting inflorescence showing indumentum and persistent bracteoles; J seed. A – B from L. P. de Queiroz et al. 5963, C – G from L. P. de Queiroz et al. 2607, H – J from F. França et al. 59231. DRAWN BY ROSEMARY WISE.





Map 3. Distribution of *Ipomoea longibracteolata* and *I. magna* in NE Brazil.

**PHENOLOGY.** This species has been found in flower in February, March and April, and in fruit in April to July.

**ETYMOLOGY.** The species epithet *longibracteolata* refers to the distinct long bracteoles, which characterise this species.

**CONSERVATION STATUS.** This species is known from 15 collections from three different states in Brazil. Field notes give no indication of its frequency and mention no threats to its populations. It should, therefore be classified as Data Deficient (DD) within IUCN (2012) guidelines although it will need more precise classification after detailed field studies of its populations. Cerrado vegetation, in particular, is under threat in Brazil.

***Ipomoea magna* Sim.-Bianch. & J. R. I. Wood, sp. nov.**  
Type: Brazil, Minas Gerais, 13 km W of Januária on road to Serra das Araras, 575 m, 19 April 1973, W. R. Anderson, P. A. Fryxell, S. R. Hill, R. Reis dos Santos & R. Souza 9184 (holotype UB; isotypes FTG, NY).

<http://www.ipni.org/urn:lsid:ipni.org:names:60473759-2>

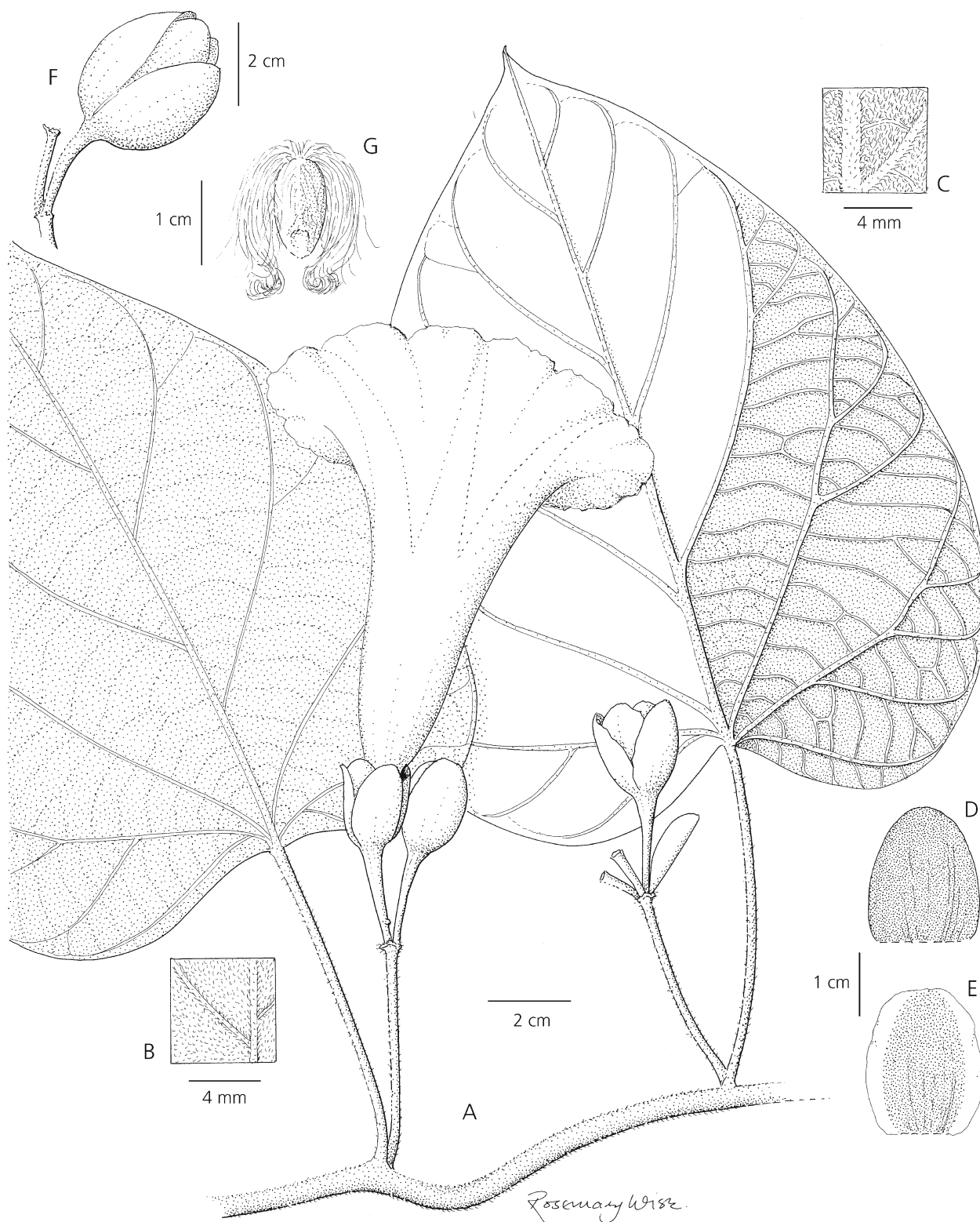
*Liana* reaching at least 10 m, stems twining, woody, tomentose. *Leaves* petiolate, 8 – 28 × 7 – 22 cm, ovate, cordate with rounded auricles, apex acute or obtuse and shortly mucronate, margin slightly undulate, adaxially green, roughly tomentellous, abaxially grey-tomentose; petioles 5 – 11 cm, tomentose. *Inflorescence* of few-flowered axillary cymes; peduncles 2.5 – 10 cm, tomentose; bracteoles 12 – 18 × 4 – 7, oblong or oblong-obovate, obtuse, glabrous, caducous; secondary peduncles 4 – 14 mm, glabrous; pedicels 10 – 30 mm, thickened upwards, glabrous; sepals subequal, 17 – 19 × 11 – 12 mm, accrescent in fruit to 25 × 14 mm, elliptic to obovate, rounded, glabrous on the exterior but scurfy-pubescent on the interior, inner with narrow scarious margins; corolla 10 – 12 cm long, funnel-shaped, pale on exterior and limb, dark pink inside tube, glabrous, limb 6 – 8 cm diam., usually lobed; stamens included, unequal, filaments glabrous except glandular base, longer c. 2.5 cm, shorter c. 1.5 cm, anthers 10 – 12 × 2 mm; style included; stigma not seen. *Capsule* c. 21 × 12 mm, ellipsoid, glabrous; *seeds* 12 × 6 mm, pilose on angles with long white hairs up to 20 mm in length. Fig. 9.

**RECOGNITION.** Resembling a giant form of *Ipomoea brasiliiana* but immediately distinguished by the long hairs on the seeds as well as the larger dimensions of the leaves, sepals and corolla. It appears to be closely related to *I. longibracteolata* but is distinguished by the absence of long white hairs on the inflorescence, the laxer cymes and the larger, different-shaped corolla, which is clearly funnel-shaped, rather than

subcampanulate. It is also close to *I. paradae* J. R. I. Wood & Scotland from Bolivia in its distinctive corolla colouring (Wood *et al.* 2015: 66) but differs in its tomentose (not glabrous) stems, larger, adaxially tomentellous leaves and much longer peduncles. An interesting character is the scurfy pubescent inner (adaxial) surface of the sepals, an unusual character in *Ipomoea* but a feature of most species in the *Arborescens* clade, notably *I. intrapilosa* Rose.

**HABITAT & DISTRIBUTION.** Recorded almost always as growing in caatinga but sometimes in “mata seca” or at the edge of “tropical forest” on sandy soil at altitudes between 500 and 800 m. Its distribution is centred on the State of Bahia and neighbouring parts of Minas Gerais. The recorded populations from Sao Paulo State are somewhat disjunct. Map 3.

**SPECIMENS EXAMINED. BRAZIL. Bahia:** Mun. Caetité, caminho da Faz. Boa Vista para Urânio, 13°59'35"S 42°12'27"W, 560 m, 8 Feb. 1997, E. Saar *et al.* 5254 (ALCB, CEPEC, HRB, HUEFS, K, SP, SPF). Mun. Maracás, 13 – 15 km SW of Maracás on Rodavia BA 026, 26 April 1978, S. A. Mori *et al.* 9985 (CEPEC, RB); Faz de Cova, 18 km de Maracás, 24 Jan. 1963, E. Pereira & G. Pabat 8566 (F, HB); *ibid.*, 24 Jan. 1965, E. Pereira & G. F. J. Pabst 9677 (HB). Mun. Santana, c. 34 km N de Santa Maria da Vitória na estrada para Santana, 14 February 2000, L. P. Queiroz 5982 (HUEFS). Mun. Roda Velha, perto do Rio Corrente, 15 April 1966, H. S. Irwin *et al.* 14895 (ARIZ, NY, SP, UB); Urandi, 15 – 19 km, estrada Urandi – Licínio de Almeida, 14°44'35"S 42°32'32"W, 770 m, 10 April 2002, T. Jost *et al.* 508 (IPA); Espigão Mestre, 9 March 1972, W. R. Anderson 36900 (ARIZ, NY, UB); Espigão Mestre, 14 March 1972, W. R. Anderson 36923 (ARIZ, NY, SP, UB). **Ceará:** Serra de Araripe, Jan. 1839, Gardner 2030 (BM). **Goiás:** Serra Dourada, c. 17 km S of Goiás Velho, 6 km NE of Mossamedes, 700 – 780 m, 12 May 1973, W. R. Anderson 10183 (FTG, NY, UB). **Minas Gerais:** Mun. Januária, 13 km W of Januária on road to Serra das Araras, 575 m, 19 April 1973, W. R. Anderson 9184 (FTG, NY, UB); Fabião, 23 May 1997, J. A. Lombardi & A. Salino 1694 (BHCB); *ibid.*, 15 Feb. 1998, J. A. Lombardi & L. G. Temponi 2131 (BHCB, SP); Cabeceira Grande, UHE Queimado, 16°12'49"S 47°17'28"W, 700 m, 28 March 2002, G. Pereira-Silva *et al.* 6398 (CEN, SP). Mun. Lagoa Santa, 1 March 1996, A. E. Brina & L. V. Costa 32742 (BHCB). Mun. Uberlândia, 28 March 2007, E. K. O. Hattori *et al.* 623 (HUFU, SP). **Pernambuco:** Mun. Salgueiro, Cedro e Jardim, 21 May 1971, E. P. Heringer *et al.* 721 (IPA, SPF). **São Paulo:** Mun. Analândia, 21 March 1995, M. A. Assis 473 (HRCB, SP). Mun. Brotas, Bairro do Patrimônio, 28 Jan. 2007, S. A. Nicolau *et al.* 3206 (SP); *ibid.*, 3 Feb. 2007, S. A. Nicolau *et al.* 3284 (SP). Mun. Carioba, 22 May 1943, M. Kuhlmann 868 (SP); Mun. Limeira, 12 Feb. 1954, W. Hoehne 15256 (SP, SPF); Mun. São Carlos, 5 May 1994, K. D. Barreto *et al.* 2432 (ESA, SP). Mun. São José do Rio Pardo, 25 Feb. 2006, R. Simão-Bianchini 1588 (SP). Mun. Rio Claro, 24 March 2001, R. G. Udulutsch 217 (HRCB).



**Fig. 9.** *Ipomoea magna*. A habit; B adaxial leaf surface; C abaxial leaf surface; D outer sepal; E inner sepal; F calyx in fruit; G seed. A, F – G from *W. R. Anderson et al.* 10183, B – C from *S. A. Mori et al.*, D – E from *T. Jost et al.* 508. DRAWN BY ROSEMARY WISE.

**CONSERVATION STATUS.** This species is known from more than 25 collections from six different states in

Brazil. With one exception (*G. Pereira-Silva et al.* 6398) where it is recorded as locally frequent, field notes give

no indication of its frequency and mention no threats to its populations. It should, therefore, be classified as Data Deficient (DD) within IUCN (2012) guidelines although it will need more precise classification after detailed field studies of its populations. Its wide distribution suggests that it is Least Concern (LC).

**PHENOLOGY.** This species has been found in flower from January to May and in fruit from April to May.

**ETYMOLOGY.** The epithet *magna* meaning “large” refers to the large dimensions of the leaves and corolla of this species.

### Acknowledgements

Rosângela Simão-Bianchini would like to acknowledge the support and assistance of the late Dan Austin over many years and, in particular, his help in originally delimiting *Ipomoea magna* and *I. longibracteolata*. We are grateful to Rosemary Wise for preparing the illustrations that accompany the descriptions, to Isys Mascarenha Souza for the photographs of *I. parvibracteolata*, to Leandro Soares for preparing the map and to Beth Williams for sequencing samples of the species described here. We acknowledge the financial support of the Leverhulme Trust and, also, an NERC IAA award to pay for the illustrations. Liziane Vasconcelos acknowledges the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for funding her Masters degree. John Wood would also like to thank Luciano de Queiroz for his help and hospitality during his visit to Bahia and both him and Hibert Huaylla for a very interesting and productive field trip in August 2014. Finally we would like to thank the curators of various herbaria which have helped our studies, in particular ARIZ, CEN, FTG, HUEFS, K, IPA, MBM, NY, RB and UB.

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