

UNIVERSIDADE FEDERAL DE PERNAMBUCO
PROGRAMA DE PÓS-GRADUAÇÃO EM BIOLOGIA VEGETAL

Sistemática e Filogenia de *Jacquemontia* Choisy
(Convolvulaceae)

Maria Teresa Buril

Recife, 2013

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Sistemática e Filogenia de *Jacquemontia* Choisy (Convolvulaceae)

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Sistemática e Filogenia de *Jacquemontia* Choisy (Convolvulaceae)

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*“There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed Law of gravity, **from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.**”*

Charles Darwin, On the Origin of Species

*Ao herpetólogo e companheiro, Ricardo Rodrigues,
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Resumo

Com cerca de 120 espécies, *Jacquemontia* é um dos maiores gêneros em Convolvulaceae. Cerca de 50% desta diversidade está presente no Brasil. Entretanto, a espécies brasileiras haviam sido tratadas pela última vez na Flora Brasiliensis (1869). Desde então, devido à dificuldade no reconhecimento das espécies pelo expressivo polimorfismo, o gênero tem acumulado uma série de problemas taxonômicos tais quais sinonímias. Este estudo teve como principal objetivo revisar o gênero no Brasil, além de incluir análises palinológicas, moleculares e biogeográficas para buscar responder questões de demilitação infragenérica. Dos 58 nomes reconhecidos na Flora do Brasil (Bianchini & Ferreira 2012), apenas 42 foram considerados aqui. No total, o Brasil apresenta 50 espécies de *Jacquemontia*, atendendo as novas espécies e novos sinônimos aqui indicados. Tanto dados polínicos quanto moleculares demonstraram que as seções estabelecidas para o gênero com base exclusivamente na morfologia das inflorescências, não compõem grupos naturais. Dados de distribuição demonstraram que a maioria das espécies brasileiras apresentam um padrão de distribuição restrito, e que o centro de riqueza de endemismos no Brasil está na Cadeia do Espinhaço. Sugerindo assim, o apoio a políticas conservacionistas na área para a conservação do patrimônio genético de *Jacquemontia*.

Palavras-chave: biogeografia, filogenia, palinologia, semiárido, taxonomia.

Abstract

Jacquemontia is one of the largest genera of Convolvulaceae, comprising around 120 species. Circa of 50% occurs in Brazil. Although, the Brazilian species has been treated only in 1869, on Flora Brasiliensis. Since then, the genus has accumulated many taxonomic problems, due to the polymorphic expression in several species. This study aimed to revise the genus in Brazil, besides includes palynological, molecular and biogeographical studies to understand and answer infrageneric delimitation questions. Comparing with the 58 names listed on Flora do Brasil, 42 are recognized here. Fifty species of Jacquemontia occurs in Brazil, complying with the new species and new synonyms indicated here. Both pollen morphology and molecular data showed that the sections previously established to the genus are not natural groups. Geographical distribution analysis demonstrated that most Brazilian species presents a restrict distribution pattern. Moreover, the endemism richness center is located at the Espinhaço Range. Thus, this study support conservation policies in the area, aiming the conservation of the genetic inheritance of *Jacquemontia*.

Key words: biogeography, phylogeny, palynology, arid regions, taxonomy.

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Capítulo 1: Tratamento Taxonômico

Manuscrito 1

A new species of Jacquemontia (Convolvulaceae) from Northeastern Brazil

Figure 1. *Jacquemontia chrysanthera*. A. Habit. B. Leaf, abaxial surface. C. Leaf, adaxial surface. D. Trichome. E. Sepals, from left to right, the outer ones to inner ones. F. Open flower. G. Stigmatic lobes. H. Ovary and nectary. J. Seed, ventral view at left, dorsal view at right. K. Lateral ridge of seeds, detail. L. Fruit, with open bracts. M. Fruit, with closed bracts. (Drawn from the holotype.)

Figure 2. A–B. *Jacquemontia chrysanthera*. A. Inflorescence. B. Flower detail. (photographed from the holotype.) C–D. *Jacquemontia martii*. C. Inflorescence. D. Flower detail. (photographed from *Buril* 387, UFP.)

Manuscrito 2

Jacquemontia robertsoniana (Convolvulaceae), a new shrub species from Brazil

Table 1. Distinguishing characters of *Jacquemontia robertsoniana* and morphologically related species.

Figure 1. *Jacquemontia robertsoniana*. A habit; B part of adaxial face near midrib, C leaf, abaxial face near midrib; D trichomes; E inflorescence detail; F sepals, from left to right, external to internal; G open flower; H detail of abaxial surface of corolla showing puberulence. (Drawn from the holotype).

Map 1. Distributions of *Jacquemontia robertsoniana* and the related species, *Jacquemontia ochracea*.

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Jacquemontia macrocalyx (Convolvulaceae), a New Species Endemic to Espinhaço Range, Brazil

Table 1. Comparison of characters between *J. macrocalyx* and morphologically related species.

Figure 1. *Jacquemontia macrocalyx* Buril. --A. Fertile habit. --B. Dissection of an open flower. --C. Detail of stamen, showing the pilose filament base. --D. Sepals, from left to right, proceeding from outer to inner positions. --E. Stellate trichomes, 4- or 5-rayed. --F. Capsular fruit, subtended by persistent bracts. --G. Seed. Drawn from the holotype Amorim *et al.* 752, UFP.

Manuscrito 4

A new species of Jacquemontia Choisy (Convolvulaceae) from the Chapada Diamantina, Brazil

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Manuscrito 5

Two new species of *Jacquemontia* Choisy (Convolvulaceae) endemic to Bahia, Brazil

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Figure 2: A – B. *Jacquemontia ciliata*. A. habit; B. sepals, from left to right, outer to inner. C – E. *Jacquemontia corymbulosa*. C. habit; D. sepals, from left to right, outer to inner; E. inflorescence. F – H. *Jacquemontia decipiens*. F. habit; G. trichomes; H. sepals, left outer, right inner. J. *Jacquemontia decumbens*, habit K – M. *Jacquemontia diamantinensis*. K. flower; L. trichomes; M. sepals, from left to right, outer to inner.

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Capítulo 2: Palinologia

Table 1: Vouchers analyzed and morphometric values. PD: polar diameter; ED: equatorial diameter; EDp: equatorial diameter in polar view; DS: density of spines; Sect: sections, AN- Anomalaе, CY- Cymosae, CA- Capitatae, CP- Capituliflorae.

Figure 1: Variation in pollen morphology in *Jacquemontia*. A – B, main apertural patterns. A. pantocolpate, B. tricolpate, C. density of spines, D – E, variation in organization of perforations, D. random, E. in circles forming a bireticulum, F – G. spine ramification, F. bifid, G. multi-branched, H – J. shape of spine, H. base rounded, I. base straight.

Figure 2: Cluster analysis organized by pollen type, and with legends to sections.

Figure 3: Pollen type 1A. A. *J. bracteosa*, B. *J. chrysanthera*, C. *J. diamantinensis*, D. *J. holosericea*, E. *J. martii*, F-G. *J. sphaerocephala*, H-J. *J. spicaeflora*; pollen type 2B. K-L. *J. nodiflora*, M. *J. tomentella*.

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Capítulo 3: Biogeografia

Table 1. Distribution patterns of *Jacquemontia* Brazilian species.

Table 2: Distribution patterns of Brazilian species of *Jacquemontia* and AUC results of geographical modelling distributions.

Figure 1: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and American.

Figure 2: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and South American.

Figure 3: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and South American; *Jacquemontia nodiflora* pattern widely, disjunct, american; *Jacquemontia gracillima* pattern widely, disjunct, Central – South American.

Figure 4: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, disjunct and South American.

Figure 5: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.

Figure 6: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.

Figure 7: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.

Figure 8: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, microendemic.

Figure 9: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, microendemic.

Figure 10: Distribution of *Jacquemontia* endemic species richness in Brazil.

Figure 11: PAE analysis consensus tree.

Capítulo 4: Filogenia

Figure 1: Combined analysis with bootstrap values.

Figure 2: Consensus strict of combined analysis, including groups discussed.

Figure 3: Consensus strict of combined analysis, including Meissner (1869) sections.

Capítulo 5: Contribuições ao conhecimento de Convolvulaceae do Nordeste brasileiro

Manuscrito: Mata Atlântica

Flora da Usina São José, Igarassu, Pernambuco: Convolvulaceae

Figura 1 – a-d. *Bonamia maripoides* (García 1339): a. ramo florífero; b. detalhe da face abaxial da folha; c. detalhe da face adaxial da folha; d. semente, vista frontal. e. *Evolvulus nummularius* (Cavalcanti 25): hábito. f-h. *Ipomoea bahiensis* (<http://www.tropicos.org/Name/8500299>) (García 1159): f. sépala externa; g. sépala interna, vista dorsal; h. sépala interna, vista frontal. i-k. *I. hederifolia* (Melo et al. 141): i. ramo florífero; j. flor, vista lateral; k. fruto com septos persistentes, vista lateral.

Figura 2 – a. *Ipomoea nil* (García 1251): flor, vista lateral. b-d. *I. philomega* (García 1100): b. ramo florífero; c. detalhe da folha; d. flor sem parte da corola. e. *I. quamoclit* (Alves-Araújo 531): ramo florífero. f. *Ipomoea tiliacea* (Nascimento 655): flor, vista lateral.

Figura 3 – *Jacquemontia glaucescens* (García 1104): a. ramo florífero; b. flor, vista frontal. c. inflorescência; d. corte longitudinal da flor; e. detalhe do ovário e a base dos filetes; f. sépalas externas (2) à esquerda, as internas (3) à direita; g. tricomas; h. fruto; i. semente, da esquerda para direita, detalhe dos tricomas na margem, face ventral e vista laterais.

Figura 4 – a-g. *Jacquemontia sphaerostigma* (García 1117): a. ramo florífero; b. inflorescência; c. tricomas, da esquerda para direita, simples, 3-ramificado com 1 braço bem mais longo, 6-ramificado com 1 braço bem mais longo, 3-ramificado com todos os braços iguais, glandular; d. flor; e. androceu e gineceu; f. fruto; g. semente, face dorsal à esquerda, face ventral à direita. h. *Merremia macrocalyx* (Ojima 103): ramo florífero. i-j. *M. umbellata* (Alves-Araújo 665): i. ramo florífero; j. detalhe das anteras e lobos estigmáticos.

Manuscrito: Caatinga

Convolvulaceae da região do Cariri Paraibano, PB, Brasil

Figura 1. Convolvulaceae do Cariri Paraibano. A. *Evolvulus filipes*, inflorescência; B. *Evolvulus frankenioides*, ramo florífero; C. *Evolvulus glomeratus*, ramo florífero; D. *Evolvulus linarioides*, inflorescência; E. *Evolvulus ovatus*, ramo florífero; F. *Ipomoea bahiensis*, cálice; G. *Ipomoea brasiliiana*, cálice; H. *Ipomoea carnea*, cálice; J. *Ipomoea hederifolia*, flor; L. *Ipomoea longerramosa*, ramo florífero; M. *Ipomoea marcellia*, flor; N. *Ipomoea nil*, cálice; O. *Ipomoea*

parasitica, detalhe dos ramos aculeados; P. *Ipomoea rosea*, ramo florífero; Q. *Ipomoea triloba*, inflorescência.

Figura 2. Convolvulaceae do Cariri Paraibano. A – B. *Jacquemontia agrestis*, A. sépalas externas (esquerda) a internas (direita), B. detalhe do indumento dos ramos; C – E. *Jacquemontia corymbulosa*, C. ramo florífero, D. inflorescência, E. sépalas externas (esquerda) a internas (direita); F. *Jacquemontia gracillima*, sépalas externas (esquerda) a internas (direita); G – L. *Jacquemontia nodiflora*, G. ramo florífero, H. detalhe dos tricomas, J. sépalas externas (esquerda) a internas (direita), L. flor; M – N. *Jacquemontia pentanthos*, M. ramo florífero, N. sépalas externas (esquerda) a internas (direita); O. *Merremia cissoides*, inflorescência; P. *Operculina macrocarpa*, flor; Q. *Turbina cordata*, botão floral.

Apresentação

Com cerca de 120 espécies, *Jacquemontia* Choisy é um dos maiores gêneros em Convolvulaceae. No Brasil, eram reconhecidos, antes deste trabalho, cerca de 60 nomes. Mas apesar da grande diversidade reportada para o país, o gênero carecia de tratamentos modernos, tendo sido estudado apenas em 1869 na Flora Brasiliensis.

Sempre foi considerado como de taxonomia difícil. Como vários outros grupos de plantas trepadeiras, são reconhecidos diversos exemplos de polimorfismo, o que dificulta a delimitação específica. Somado ao número reduzido de caracteres diagnósticos, *Jacquemontia* acumulou em seu histórico uma série de problemas nomenclaturais, principalmente as sinonímias.

Com os estudos filogenéticos recentes, incluindo ferramentas moleculares, outras questões surgiram ao redor deste gênero desafiador. Entre elas, estava a dúvida quanto ao seu monofiletismo, além da relação com outros taxa em Convolvulaceae.

Sendo assim, o projeto proposto e desenvolvido, teve como objetivo principal estudar as espécies brasileiras de *Jacquemontia* com diferentes abordagens. Neste trabalho estão incluídos, além do tratamento taxonômico clássico, estudos de palinologia, de filogenia e de biogeografia.

Esta tese é apresentada então na seguinte estrutura de capítulos: 1. Tratamento Taxonômico, que inclui seis manuscritos; 2. Palinologia; 3. Biogeografia; 4. Filogenia. Por fim, ainda são apresentadas em um 5º capítulo, as contribuições ao conhecimento da família Convolvulaceae para a região Nordeste do Brasil.

Fundamentação teórica

Convolvulaceae L. – Histórico taxonômico

Com 56 gêneros e ca. de 1840 espécies, *Convolvulaceae* L. distribui-se amplamente em regiões tropicais e temperadas (Staples & Brummitt 2007). São ervas ou arbustos anuais ou perenes, frequentemente trepadeiras, ocasionalmente árvores, ou ainda holoparasitas (*Cuscuta* L.). As folhas são, na maioria, alternas, simples e as estípulas ausentes, e látex por vezes presente. As flores são gamopétalas, campanuladas ou infundibiliformes, com nervuras mesopétalas proeminentes, estames epipétalos, ovário súpero e fruto geralmente capsular (Austin 2004; Souza e Lorenzi, 2005).

Cronquist (1981) posicionou *Convolvulaceae* na ordem Polemoniales, junto a Polemoniaceae, Cuscutaceae, Duckeodendraceae, Hydrophyllaceae, Lennoaceae, Menyanthaceae, Nolaceae, e Solanaceae. Neste caso, os gêneros *Duckeodendron* (Solanaceae) e *Cuscuta* (*Convolvulaceae*), eram tratados como famílias independentes. Este grupo, apesar de bastante heterogêneo, em geral apresentava folhas alternas, ovário súpero, placentação axial e estames de 5-2. Takhtajan (1997), por outro lado, sugeriu o estabelecimento da ordem Convolvulales, composta unicamente por *Convolvulaceae* e sustentada pela presença de laticíferos, posição do floema, estrutura da semente e morfologia polínica.

No trabalho compilatório mais recente do Angiosperm Phylogenetic group (APG III 2009) foi mostrado, no entanto, que *Convolvulaceae* está mais proximamente relacionada à *Hydroleaceae*, *Montiniaceae*, *Solanaceae* e *Sphenocleaceae*, compondo a ordem Solanales. Apesar de não haverem evidências morfológicas claras para esse agrupamento, são indicadas como sinapomorfias a presença de flavonoides o-methyl, inflorescência terminal, tubo polínico com calosa, cálice persistente e o tipo de desenvolvimento do endosperma.

Tabela 1. Posicionamento sistemático de Convolvulaceae, por diferentes autores.

Autores	Ordem/Clado	Famílias incluídas	Sinapomorfias
Cronquist (1981)	Polemoniales	Polemoniaceae, Cuscutaceae, Duckeodendraceae, Hydrophyllaceae, Lennoaceae, Menyanthaceae, Nolaceae, e Solanaceae.	Folhas alternas, ovário súpero, placentação axial e estames de 5-2
Takhtajan (1997)	Convolvulales	Convolvulaceae	Presença de laticíferos, posição do floema, estrutura da semente e morfologia polínica
APG III (2009)	Solanales	Convolvulaceae, Hydroleaceae, Montiniaceae, Solanaceae e Sphenocleaceae	Flavonoides o-methyl, inflorescência terminal, tubo polínico com calosa, cálice persistente e o tipo de desenvolvimento do endosperma

Convolvulaceae tem sinapomorfias morfológicas claras, sendo o monofiletismo fortemente sustentado por dados moleculares, diagnosticado pela deleção do gene *rpl2*, presente no genoma plastidial das demais angiospermas (Stefanovic *et al.*, 2002). O maior debate está centrado no posicionamento de *Cuscuta*, único com representantes parasitas (Cronquist, 1981). Estudos filogenéticos com dados morfológicos (Austin, 1998a) sugeriram a segregação de *Cuscuta* em uma família à parte, Cuscutaceae, enquanto dados moleculares indicaram sua inclusão em Convolvulaceae (Stefanovic *et al.*, 2003; APG III, 2009), sendo esta a proposta aceita atualmente.

Outras questões taxonômicas importantes em Convolvulaceae giram em torno da circunscrição de tribos e, principalmente, de gêneros (Hallier, 1893; Robertson, 1982). O sistema de classificação tribal em Convolvulaceae foi revolucionado pelo trabalho de Hallier (1893), que considerou vários caracteres. Primeiramente, ele hierarquizou dois grandes grupos com base na morfologia dos grãos de pólen. O grupo Echinoconiae incluía os gêneros com grãos de pólen espinhosos, e Psiloconiae, os gêneros com grãos de pólen psilados (ou de superfície lisa). As tribos foram então delimitadas a partir de caracteres da inflorescência, ovário, estilete e fruto. Peter (1897) corroborou esta proposta e adicionou informações de frutos e estigma à classificação do grupo.

Atualmente, a delimitação aceita dos gêneros está baseada nos seguintes caracteres: hábito, longevidade e grau de suberização dos caules; tipo de tricomas nas estruturas vegetativas; tipo de inflorescência; forma, divisão e cor da corola; forma dos lobos do ovário; número e comprimento dos estiletos; número e forma dos estigmas; número e distribuição das aberturas e ornamentação dos grãos de pólen; deiscência e número de lóculos dos frutos; número, ornamentação e indumento das sementes (Austin, 1973).

Austin (1998a) reconheceu nove tribos na família (Argyreieae, Ipomoeae, Merremieae, Convolvuleae, Erycibae, Hilderbrandtieae, Cresseae, Dichondreae, Poranae); *Cuscuta* foi tratado em uma família monotípica, Cuscutaceae. Stefanovic (2003), agregando as técnicas de filogenia molecular, propôs um novo sistema de tribos para Convolvulaceae, que representaria uma classificação considerada como muito mais natural na evolução do grupo. Neste trabalho, foram sugeridas 12 tribos em Convolvulaceae (Humbertieae, Cuscuteae, Cardiochlamyaeae, Erycibae, Ipomoeae, Merremieae, Aniseieae, Convolvuleae, Jacquemontieae, Cresseae, Dichondreae e Maripeae).

Tabela 2. Tabela comparativa das tribos e gêneros de Convolvulaceae, com base em Austin (1998a) e Stefanovic (2003).

Austin (1998a)		Stefanovic (2003)	
CONVOLVULACEAE		CONVOLVULACEAE	
Argyreieae	Hildebrandtieae	Ipomoeae s.l.	Cresseae s.l.
<i>Argyreia</i>	<i>Hildebrandtia</i>	<i>Argyreia</i> (incluindo	<i>Hildebrandtia</i>
<i>Blinkworthia</i>	<i>Sabaudiella</i>	<i>Rivea</i>)	(incluindo
<i>Rivea</i>	<i>Cladostigma</i>	<i>Astripomoea</i>	<i>Cladostigma e</i>
		<i>Blinkworthia</i>	<i>Sabaudiella</i>)
Ipomoeae	Cresseae		<i>Seddera</i>
<i>Ipomoea</i>	<i>Seddera</i>	<i>Ipomoea</i>	<i>Evolvulus</i>
<i>Astripomoea</i>	<i>Evolvulus</i>	<i>Lepistemon</i>	<i>Cressa</i>
<i>Lepistemon</i>	<i>Cressa</i>	<i>Lepistemonopsis</i>	<i>Bonamia</i>
<i>Lepistemonopsis</i>	<i>Bonamia</i>	<i>Paralepistemon</i>	<i>Stylisma</i>
<i>Paralepistemon</i>	<i>Stylisma</i>	<i>Stictocardia</i>	<i>Wilsonia</i>
<i>Stictocardia</i>	<i>Wilsonia</i>	<i>Turbina</i>	<i>Itzaea</i>
<i>Turbina</i>	<i>Itzaea</i>	“Merremieae”	<i>Neuropeltis</i>
Merremieae	<i>Neuropeltis</i>	<i>Merremia</i>	<i>Neuropletopsis</i>
<i>Merremia</i>	<i>Neuropletopsis</i>	<i>Hewittia</i>	Dichondreae s.l.
<i>Hewittia</i>	Dichondreae	<i>Hyalocystis</i>	<i>Dichondra</i>
<i>Decalobanthus</i>	<i>Dichondra</i>	<i>Decalobanthus</i>	<i>Falkia</i>
<i>Operculina</i>	<i>Falkia</i>	<i>Xenostegia</i>	<i>Nephrophyllum</i>
<i>Xenostegia</i>	<i>Nephrophyllum</i>	<i>Operculina</i>	<i>Petrogenia</i>
<i>Hyalocystis</i>	Poraneae	Convolvuleae	<i>Porana</i> p.p.
<i>Aniseia</i>	<i>Porana</i>	<i>Convolvulus</i> (incluindo	<i>Metaporana</i>
		<i>Calystegia</i>)	

Austin (1998a)		Stefanovic (2003)	
<i>Iseia</i>	<i>Metaporana</i>	<i>Polymeria</i>	<i>Calycobolus</i>
<i>Odonellia</i>	<i>Calycobolus</i>	Aniseieae	<i>Dipteropeltis</i>
<i>Tetralocularia</i>	<i>Dipteropeltis</i>	<i>Aniseia</i> (incluindo	<i>Rapona</i>
Convolvuleae	<i>Rapona</i>	<i>Iseia</i>)	Erycibeae
<i>Calystegia</i>	<i>Cordisepalum</i>	<i>Odonellia</i>	<i>Erycibe</i>
<i>Convolvulus</i>	<i>Poranopsis</i>	<i>Tetralocularia</i>	Cardiochlamyeae
<i>Polymeria</i>	<i>Cardiochlamys</i>	Cuscuteae	<i>Cordiosepalum</i>
<i>Jacquemontia</i>	<i>Tridynamia</i>	<i>Cuscuta</i>	<i>Poranopsis</i>
Erycibeae	<i>Dinetus</i>	Jacquemontieae	<i>Cardiochlamys</i>
<i>Maripa</i>		<i>Jacquemontia</i>	<i>Tridynamia</i>
<i>Dicranostyles</i>	CUSCUTACEAE	Maripeae	<i>Porana</i> p.p.
<i>Lysiostyles</i>	Cuscuteae	<i>Dicranostyles</i>	<i>Dinetus</i>
<i>Erycibe</i>	<i>Cuscuta</i>	<i>Maripa</i>	Humbetieae
<i>Humbertia</i>		<i>Lysiostyles</i>	<i>Humbertia</i>

Potencial econômico de Convolvulaceae

Apesar de pesquisas aplicadas ainda serem incipientes para as espécies de Convolvulaceae, alguns estudos vêm demonstrando o elevado potencial dessas, principalmente na indústria farmacêutica. Propriedades antioxidantes já foram citadas para *Evolvulus* L. (Cervenka *et al.*, 2008) e *Cuscuta* L. (Yen *et al.*, 2008), tradicionalmente utilizados pela medicina natural em países asiáticos. Espécies de *Ipomoea* L. são utilizadas na medicina popular no tratamento de reumatismo, artrite, hipertensão, furúnculos, doenças renais e disenterias. São comprovadas também

cientificamente atividades tais como insulinogênica, hipoglicêmica e anticancerígena, a exemplo da batata-de-purga (*Ipomoea subincana* Meisn.) endêmica do semiárido brasileiro e bastante conhecida entre a população da região (Meira *et al.*, 2008).

Propriedades antiespasmódicas e antiinflamatórias também já foram relatadas para *Ipomoea imperati* (Vahl) Griseb, que ocorre em toda a costa brasileira (Paula *et al.*, 2003), e para *Ipomoea cairica* (L.) Sweet (Austin 2004). *Merremia dissecta* (Jacq.) Hallier, amplamente distribuída nas Américas e cultivada no Velho Mundo, é utilizada por várias culturas como ornamental, medicinal e como condimento, além de registros da utilização das raízes na culinária (Austin, 2007). *Jacquemontia tamnifolia*, amplamente distribuída, é usada popularmente como antídoto para acidentes ofídicos na África (Kokwaro, 2009). E *J. ovalifolia* var. *sandwicens*, endêmica do Havaí, é utilizada no combate à fraqueza de bebês e no tratamento de cortes externos (Kaaiakamanu & Akina 2003)

Entre as Convolvulaceae utilizadas na alimentação, destaca-se a *Ipomoea batatas* (L.) Lam, batata-doce, considerada a segunda raiz comestível mais importante no comércio mundial (FAOSTAT 2006). Outra espécie bastante difundida na cultura asiática é a *Ipomoea aquatica* (espinafre aquático), cujos ramos jovens e folhas são comestíveis (Ochse 1998; Eiche 2008). O emprego de espécies tropicais e subtropicais cultivadas como ornamentais, principalmente dos gêneros *Convolvulus*, *Dichondra*, *Ipomoea* e *Jacquemontia*, é bastante difundido em países europeus e norte-americanos (Souza & Lorenzi, 2005).

Convolvulaceae chama ainda a atenção na área das pesquisas agropecuárias por apresentar várias espécies daninhas e invasoras de plantações, principalmente de *Ipomoea*. Além disso, algumas espécies são fatalmente tóxicas para o gado, como *Ipomoea carnea* Jacq. Esta espécie possui grande importância como planta tóxica na região Nordeste, sobretudo no vale do Rio São Francisco, onde permanece verde por todo o período de estiagem, quando há escassez de pasto para o gado (Antoniasse *et al.*, 2007; Kuva *et al.*, 2007).

Representatividade florística de Convolvulaceae no Brasil

No Brasil, Convolvulaceae tem registros de ocorrência em ambientes amplamente variados, sendo citadas desde a mata atlântica, cerrado, caatinga, até a floresta amazônica. Entretanto, um maior número de espécies é referido para as áreas savanícolas, tais como caatinga e cerrado, e áreas de borda de mata (Souza & Lorenzi, 2005) sendo citada, muitas vezes, entre as famílias mais representativas em número de espécies em listas florísticas principalmente nos ambientes de vegetação aberta, como a caatinga (Barbosa et al., 2007; Vital, 2009).

De acordo com Gentry (1991), 26 famílias de angiospermas incluem 85% de todas as trepadeiras do Novo Mundo, sendo Apocynaceae, Convolvulaceae, Fabaceae, Asteraceae, Bignoniaceae, Malpighiaceae, Sapindaceae, Passifloraceae e Cucurbitaceae as mais ricas em número de espécies, nessa ordem. Levantamentos de trepadeiras em florestas estacionais semidecíduas no sudeste do Brasil trouxeram Convolvulaceae como uma das famílias de destaque com nove e sete espécies nesses trabalhos (Udulutsch *et al.*, 2004; Tibiriçá *et al.*, 2006, Santos et al. 2009). Em um levantamento de lianas em uma área da mata atlântica do Nordeste, foram registradas dez espécies de Convolvulaceae, enquadradas nesta classificação (Araújo & Alves 2010).

O estudo de variação florística e de estrutura populacional de uma comunidade de herbáceas na caatinga realizado por Reis *et al.* (2006), demonstrou que além de estar entre as famílias com maior número de espécies no estrato herbáceo, Convolvulaceae esteve representada nas diferentes estações climáticas analisadas. Podendo assim, segundo os autores, constituir uma importante fonte de recursos durante a estiagem e o período chuvoso. Na caatinga pernambucana Vital *et al.* (2008) citam 12 espécies de Convolvulaceae ocorrentes no Parque Nacional do Vale do Catimbau e Vital (2009) descreve 32 espécies do Município de Mirandiba, estando entre as 5 famílias com maior número de espécies da região.

Joaquim Falcão trabalhou extensivamente com a família e publicou diversas floras locais como a de São Paulo (1971a), Minas Gerais (1973a), Santa Catarina (1976a), Bahia (1977), Pernambuco (1978), Rio de Janeiro (1966, 1979), Goiás (1980), Espírito Santo (1981), Ceará (1984), de Restingas (1976b), do Cerrado (1969),

Amazônia (1968), entre outras. Além de ter monografado alguns gêneros: *Merremia* (1954), *Dichondra* (1974), *Calystegia* (1973b) e *Bonamia* (1985), *Evolvulus* (1971b) e ter sido o responsável pela identificação das coleções brasileiras durante um longo tempo. As espécies brasileiras foram ainda tratadas em outras floras locais com foco na família (O'Donell 1941, 1950, 1952, 1953, 1960a, Austin & Cavalcante, 1982, Bianchini & Pirani 1997, Bianchini 2001, Simão-Bianchini 2009, Vital 2009, Moura 2010).

Outros trabalhos relevantes no conhecimento da família no Brasil são as descrições de novos táxons (O'Donell 1950, 1952, 1960b; Bianchini 1999; Bianchini & Pirani, 2005; Krapovickas 2009; Ferreira & Miotto 2011). Mais recentemente, *Ipomoea* foi tratado para o Sudeste (Simão-Bianchini 1998) e para o Sul do Brasil (Ferreira & Miotto 2009) e *Evolvulus* para a região de Morro do Chapéu, Bahia (Junqueira & Simão-Bianchini 2006) e o estado de São Paulo (Silva 2008).

Algumas espécies brasileiras de Convolvulaceae foram foco de diversos estudos de biologia reprodutiva (Kiill & Ranga 2000a, 2000b, 2003, 2004; Kiill & Simão-Bianchini, 2011; Machado & Sazima, 1987; Pick & Schlindwein, 2011; Silva et al., 2010) e de morfologia polínica (Leite et al. 2006, Machado & Melhem 1987, Vital et al. 2008).

A carência de estudos taxonômicos mais atualizados e com abordagens modernas sobre a família é refletido diretamente na deficiência de informações quanto ao status de conservação dessas espécies. Hoje são consideradas apenas três espécies ameaçadas de extinção e sete espécies com deficiência de dados (MMA, 2008), além de apenas 15 terem sido incluídas na lista de espécies raras do país (Simão-Bianchini & Rosário, 2009).

Jacquemontia Choisy

O gênero *Jacquemontia* foi sugerido em 1834 por Choisy, que o distinguiu de *Ipomoea* e *Convolvulus* a partir da forma dos lobos estigmáticos, globosos no primeiro, filiformes no segundo e oval-planos em *Jacquemontia*. Nesta obra Choisy publicou uma ilustração e indicou que *C. coeruleus* e *C. azureus* (= *J. pentanthos*) pertenciam ao novo

gênero, entretanto nenhuma espécie foi nomenclaturalmente transferida. A transferência e descrição de novas espécies ocorreram em 1837, quando Choisy reconheceu 11 espécies no gênero. Anos mais tarde, no tratamento de Convolvulaceae para o Prodromus de De Candolle, Choisy (1845) adicionou mais sete espécies a *Jacquemontia*. Esses foram os primeiros e únicos tratamentos em escala global desenvolvidos para o gênero, então recém-estabelecido e com 18 espécies reconhecidas.

Em 1869, na Flora Brasiliensis, Meissner além de reconhecer 33 espécies brasileiras, sendo algumas novas, definiu três seções com base primordialmente na estrutura das inflorescências (figura 1). São elas: 1. *J. sect. Cymosae*, que inclui as espécies com inflorescências dicasiais umbeliformes, sendo a seção-tipo do gênero e também a com o maior número de espécies; 2. *J. sect. Capitatae*, constituída de espécies com dicásios capituliformes ou globosas, usualmente com muitas brácteas; e 3. *J. sect. Anomala* (ou *J. sect. Heterogeneae*), que compreende as espécies com cimeiras laxas e paucifloras, assemelhando-se a racemos. Este trabalho é considerado o segundo

maior tratamento taxonômico do gênero, apesar de não terem sido disponibilizadas descrições completas das espécies.

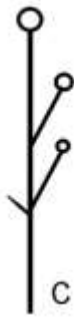


Figura 1: Tipos de inflorescência em *Jacquemontia*. A. Dicásio composto umbeliforme, caracteriza a seção *Cymosae*, *Jacquemontia corymbulosa* Benth.; B. Dicásio composto capituliforme, seção *Capitatae*, *Jacquemontia pentanthos* (Jacq. G. Don.); C. Monocásio, seção *Anomala*, (ou *Heterogeneae*), *Jacquemontia linoides* Meisn.

Alguns anos mais tarde, Hallier (1893), em seu abrangente trabalho sobre Convolvulaceae, propôs diversas novas

combinações em *Jacquemontia*. Além disto, desenvolveu um estudo sistemático detalhado, agregando caracteres morfológicos, anatômicos e palinológicos na classificação do gênero e da família como um todo.

Van Ooststroom (1936) detectou quatro espécies arbustivas de *Jacquemontia*, incorretamente posicionadas entre amostras de *Evolvulus*. Descreveu ainda *J. sect. Capituliflorae*, que compreende as espécies com inflorescências globosas e terminais.

Roberty (1952) segregou *Jacquemontia* em dois gêneros distintos: *Montejacquia* e *Schizojacquemontia*, baseando-se exclusivamente na forma na corola. Além de inexistir uma relação clara entre as seções estabelecidas por Meisner com os novos gêneros propostos por Roberty, seu sistema não foi adotado subsequentemente.

Finalmente, o tratamento mais recente dado ao gênero foi desenvolvido por Robertson (1971), que revisou as espécies da América do Norte, Central e Caribe. Neste trabalho foram estudadas 25 espécies e diversas sinonimizações foram realizadas. Em 1982, Robertson ainda descreveu um novo gênero, *Odonellia*, a partir da exclusão de duas espécies de *Jacquemontia* (*J. hirtiflora* (M. Martens & Galeotti) O'Donell, e *J. eriocephala* (Moric.) Meisn.), usando evidências da morfologia dos tricomas, simples ao invés de estrelados, e dos grãos de pólen hexacolpados, ao invés de 3 ou 15 colpados.

Além destes, outras referências a *Jacquemontia* são restritas a floras locais, podendo ser citados os seguintes relevantes trabalhos: Urban (1902, 1921), Britton and Millspaugh (1920), Hoehne (1922), Britton and Wilson (1925), Standley (1930), van Ooststroom (1932), Verdcourt (1963), van Ooststroom & Hoogland (1953), MacBride (1959), O'Donell (1960 a,b), Leon and Alain (1963), McDonald (1993), Standley & Williams (1970), Shreve and Wiggins (1964), Adams (1972), Powell (1979), e Austin (1982, 1998b). Destes, apenas os trabalhos de Hoehne e O'Donell incluíram espécies brasileiras.

Atualmente são consideradas cerca de 120 espécies em *Jacquemontia* (Staples & Brummitt 2007), sendo este um dos maiores gêneros da família Convolvulaceae. Está bem representado nos Neotrópicos e com apenas algumas espécies ocorrendo nos Paleotrópicos. Bianchini & Ferreira (2012) indicaram 58 nomes para o Brasil, com um maior número de referências para o cerrado (39 nomes), e 38 considerados pelas autoras como endêmicos do país.

Relações genéricas

Ao estabelecer o gênero, Choisy (1834, 1837, 1845) considerou *Jacquemontia* intimamente relacionado a *Ipomoea* e *Convolvulus*, e incluiu esses e outros gêneros na tribo Convolvuleae, que compreendia então as plantas com ovário sincárpico e cápsulas deiscentes. Este arranjo sistemático foi seguido por Meisner (1869), Bentham & Hooker (1876) e Peter (1897). Este último adotou ainda a subtribo Convolvulinae. Alguns autores acreditavam que a relação de *Jacquemontia* e *Convolvulus* era tão próxima, que os consideravam como um único gênero, apesar de não demonstrarem nenhuma justificativa para a fusão (Endlicher 1839, Kuntze 1898).

No sistema de classificação de Hallier (1893), *Jacquemontia* permaneceu inserido na tribo Convolvuleae, junto a *Aniseia*, *Calystegia*, *Convolvulus*, *Hewittia*, *Merremia*, *Operculina* e *Polymeria*. Shinnars (1970) excluiu *Merremia* e *Operculina* de Convolvuleae, e os reposicionou como gêneros próximos a *Ipomoea*, apesar de ambos apresentarem grãos de pólen lisos, ao invés de espinhosos como no último.

Um dos sistemas mais discrepantes ao proposto por Hallier foi o publicado por Roberty (1952, 1964). Baseando-se principalmente na forma da corola ele dividiu a família em diversas tribos, subtribos e gêneros. Entretanto, as hipóteses lançadas sobre as relações entre tribos e gêneros eram tão artificiais que seu sistema não foi empregado pelos estudiosos da família.

Austin, um dos especialistas em Convolvulaceae mais ativos, publicou em 1973 e mais recentemente em 1998a, uma nova proposta de classificação, que no momento melhor refletia uma possível filogenia para a família, dividindo-a em 10 tribos. Neste trabalho, *Jacquemontia* estava incluída em Convolvuleae junto a *Calystegia*, *Convolvulus* e *Polymeria*. Ele reconheceu inicialmente que *Aniseia*, *Iseia*, *Tetralocularia*, *Hewittia*, *Operculina* e *Merremia*, gêneros anteriormente relacionados à *Jacquemontia*, deveriam ser posicionados em um clado informal denominado de “Merremioid”, que teria um ancestral em comum a *Ipomoea*. Entretanto, no trabalho de 1998a, ele reconsiderou o clado Merremioid como próximo à tribo Convolvuleae.

Robertson (1971) acreditava que além de estar relacionado a *Convolvulus*, *Jacquemontia* poderia também estar aliado, ineditamente, a *Evolvulus*. Isso devido a

morfologia polínica e outros caracteres citológicos. Entretanto, nenhuma reclassificação de tribos foi proposta em seu trabalho.

Em contradição a todos os trabalhos anteriores baseados exclusivamente em dados morfológicos, Stefanovic *et al.* (2003) sugeriu que *Jacquemontia* parecia estar evolutivamente mais relacionado ao clado formado por gêneros com estiletes bífidos (como *Evolvulus*), ou clado “Dicranostyloideae”, e propôs ainda uma nova tribo Jacquemontieae, embora a relação tenha apresentado um baixo suporte filogenético. Morfológicamente, a palinologia já mostrava evidências dessa possível relação, tendo em vista que muitas espécies possuem os grãos de pólen policolpados, com os colpos organizados em pentágonos, como encontrados em *Evolvulus*. Todavia, Tellería & Danners (2003) também reportaram a presença de grãos de pólen tricolpados em *Jacquemontia*, assim como os de *Convolvulus*. Desta forma, a estrutura das aberturas apenas sustentava a incógnita da relação de *Jacquemontia* com os outros gêneros da família. Uma das grandes questões é que Stefanovic *et al.* (2003) analisaram apenas cinco das cerca de 120 espécies de *Jacquemontia*, podendo ser considerada uma baixa amostragem em face a variabilidade do grupo. Esta questão foi resolvida no ano seguinte, quando Stefanovic & Olmstead (2004) publicaram uma filogenia que incluía menos espécies, mas com vários marcadores moleculares, e então reforçaram, com maior suporte estatístico, *Jacquemontia* como grupo irmão do clado Dicranostyloideae.

Morfologia

Na revisão das espécies da América do Norte, Central e Caribe, o trabalho mais recente e mais completo a respeito do gênero, Robertson (1971) considerou *Jacquemontia* a partir da associação dos seguintes caracteres: 1. Tricomas estrelados ou derivados dessa condição; 2. Corola glabra; 3. Pólen policolpado; 4. Ovário glabro, 2-locular, 4-ovulado; 5. Estilete único e não ramificado; 6. Lobos estigmáticos elipsoides e achatados dorsi-ventralmente; 7. Cápsula deiscente por 4 (2 – 8) valvas; e sementes glabras, lisa ou com texturas, e geralmente com um anel marginal.

Apesar de *Jacquemontia* ser amplamente conhecido como um gênero de espécies trepadeiras, são reconhecidos muitos representantes arbustivos. Os arbustos

prostrados são relativamente comuns, sendo possível, inclusive, ser observado o enraizamento nos nós, como ocorre em *Jacquemontia ovalifolia* Hallier (Robertson, 1971). No Brasil, espécies arbustivas são bastante frequentes em áreas de campos rupestres (Bianchini & Ferreira 2012).

O tipo de tricoma é tradicionalmente adotado para a distinção genérica em Convolvulaceae (Austin 1998a). *Jacquemontia* geralmente apresenta tricomas estrelados. No entanto, é possível observar grande variação no número e no comprimento das ramificações destes tricomas. São encontrados tricomas com duas até doze ramificações, em forma de T, com todos os ramos iguais ou desiguais, além de tricomas glandulares encontrados em algumas poucas espécies (Robertson 1971). Porém, descrições mais detalhadas dos tipos de tricomas podem ser encontradas apenas no tratamento de Robertson (1971) e nas recentes descrições de novas espécies (Bianchini 1999; Bianchini & Pirani 2005; Krapovickas 2009).

A estrutura das inflorescências foi utilizada como caráter primário na definição das seções em *Jacquemontia* (Meisner 1869; van Ooststroom 1936). As inflorescências em Convolvulaceae são, num geral, cimeiras. Entretanto, apresentam uma variação nas formas que vão desde flores solitárias axilares, até tirsos com florescências parciais umbeliformes, capituliformes, corimbiformes, entre outras (Austin 1973, 1998a). Em *Jacquemontia*, não apenas a forma, mas tanto a posição das inflorescências quanto a morfologia das brácteas, podem auxiliar na identificação das espécies (Meisner 1869).

Caracteres relacionados ao cálice são fundamentais no reconhecimento específico em *Jacquemontia*. Sua importância tem sido destacada desde os primeiros trabalhos de Choisy (1837, 1845) e foi bastante relevante principalmente na chave de identificação disponibilizada na Flora Brasiliensis (Meisner 1869) e no tratamento de Robertson (1971). A forma, base, ápice, indumento e também a relação morfométrica entre as sépalas internas e externas – se diferentes ou iguais em tamanho – são aspectos considerados relevantes para o reconhecimento dos táxons no gênero.

A corola é, na maioria das espécies, infundibuliforme e de coloração azul a branca. Algumas raras exceções entre as espécies do gênero apresentam flores róseas e campanuladas, como *J. tomentella* Hallier f. (Ásia), ou hipocrateriformes e vermelhas, como *J. solanifolia* (L.) Hallier (América Central). São geralmente inteiras ou discretamente lobadas, raramente profundamente lobadas como em um grupo de

espécies da América Central (ex: *J. havanensis* Urb., *J. curtissi* Peter ex Hallier f.). Flores com corola profundamente lobadas são encontradas em um grupo de espécies ocorrente na América Central, como *J. curtisii* Peter ex. Hallier f., *J. havanensis* Urb. e *J. ovalifolia* Hallier f. (Robertson 1971). Apesar de ter sido caracterizada por Robertson (1971) como glabra, a corola em *Jacquemontia* pode ser pubescente na região mesopétala assim como observado em algumas poucas espécies: *J. cephalantha* Hallier f. e *J. sphaerocephala* Meisn. (Meisner 1869; van Ooststroom 1963; O'Donnell 1960b).

Ainda que não tenham sido encontradas evidências de que a forma do estilete e dos lobos estigmáticos, que são tratadas como características mais conservadas e relevantes taxonomicamente para o gênero auxiliem no reconhecimento de espécies, alguma variabilidade é observada. *Jacquemontia nodiflora* (Desr.) G. Don., por exemplo, apresenta lobos estigmáticos cilíndricos, ao invés de ovais-planos que é a forma mais comum no grupo (Robertson 1971, McDonald 1993). Variações na posição dos estiletos na fauce da corola também são relatadas, podendo estes ser insertos ou exsertos em algumas espécies, como em *J. glaucescens* Choisy (Buriel & Alves 2011).

Caracteres que são amplamente utilizados na classificação de Convolvulaceae como um todo, e também importantes na caracterização específica em *Jacquemontia*, estão nos grãos de pólen. Hallier (1893) e Sengupta (1972) estudaram palinologicamente diversas espécies do gênero e os caracterizaram como pantocolpados, com colpos (cerca de 15) organizados em pentágonos. Tellería & Danners (2003) encontraram grãos de pólen tricolpados em *J. blanchetii* Moric. e *J. nodiflora*. Vital et al. (2008) também relataram estes dois tipos polínicos no gênero, e sugeriram que caracteres polínicos eram potencialmente importantes para auxiliar no reconhecimento de grupos de espécies.

Outro exemplo é a morfologia das sementes. Em *Ipomoea*, por exemplo, a ornamentação das sementes é bastante significativa no reconhecimento de espécies (Simão-Bianchini 1998). Em *Jacquemontia*, Robertson (1971) e Elsam (2008) observaram a presença de um anel de tricomas rígidos nas marges de suas sementes. Esse anel é encontrado apenas em *Jacquemontia*, entretanto, não está presente em todas as espécies.

Estudos moleculares

Os trabalhos filogenéticos mais recentes com *Jacquemontia* foram realizados com espécies do Caribe e da América Central. Namoff et al. (2007), ao estudarem a origem e posicionamento filogenético de *J. reclinata* House ex Small, endêmica do Caribe e ameaçada de extinção, com base nos marcadores ITS (nuclear) e *trnH-psbA* (cloroplastidial), disponibilizaram uma árvore filogenética com 15 espécies do gênero. Nesta, foram incluídas principalmente as espécies morfológicamente relacionadas e apenas três com distribuição geográfica mais ampla.

Elsam et al. (2008), também com base nos marcadores com base em ITS (nuclear), *trnH-psbA* (cloroplastidial), e morfologia, propuseram uma filogenia para a tribo Convolvuleae, com o intuito de reavaliar a delimitação genérica. Neste trabalho, eles incluíram cerca de 20 espécies de *Jacquemontia*, contemplando diversos padrões de distribuição, e confirmaram que o gênero não estava, de fato, relacionado à tribo Convolvuleae.

Mais recentemente, em 2010, Namoff et al. estudaram uma espécie bastante controversa, de ocorrência no Caribe, Havaí e África. *Jacquemontia ovalifolia* (Choisy) Hallier f., por vezes foi considerada como três espécies distintas ou como variedades dentro de uma mesma espécie. Os autores comprovaram que se trata realmente de uma única espécie de disjunção atípica e raramente conhecida para outros grupos. Este estudo também levantou diversas hipóteses a respeito da origem e dispersão de *Jacquemontia*. Ao contrário do que era esperado, que as espécies do Caribe seriam mais próximas às espécies da América do Norte, foi demonstrado que elas compartilham um ancestral comum às espécies do Velho Mundo. Foi ainda sugerido que *Jacquemontia* se originou na Ásia e depois ocupou a América através de dispersão, e se diversificou notavelmente no continente.

Objetivo

Diante da complexidade na taxonomia de *Jacquemontia* e na ausência de estudos de revisão das espécies do Brasil, onde o gênero é mais diverso, o presente trabalho teve como principal objetivo revisá-las, além de contribuir no entendimento das relações infra-genéricas com base em dados de morfologia, palinologia e filogenéticos.

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CAPÍTULO 1

Tratamento taxonômico

A new species of *Jacquemontia* (Convolvulaceae) from Northeastern Brazil

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A new species of *Jacquemontia* (Convolvulaceae) from Northeastern Brazil

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Abstract. *Jacquemontia chrysanthera*, a new species from Northeastern Brazil, is described and illustrated, and its relationships with *Jacquemontia martii* and other species in section *Cymosae* are discussed.

Key words: Caatinga, Convolvulaceae, *Jacquemontia*, semi-arid region, vine.

The genus *Jacquemontia* Choisy is distributed predominantly in the Neotropics and contains about 120 species (Staples & Brummitt, 2007), of which approximately 50 occur in Brazil (Bianchini & Ferreira, 2010). Within the semi-arid region of Brazil, which is composed mainly of savannah, there are approximately 30 species of *Jacquemontia* (Bianchini & Ferreira, 2010). Nearly 50% of these species are endemic, making this region a center of diversity for the genus.

Jacquemontia is one of the largest genera of Convolvulaceae and has always been considered taxonomically complex, with species that are difficult to delineate due to overlapping characters (Robertson, 1971). The genus was established in 1834 by Choisy, who later (1837) described new species in his new genus and placed some species of *Ipomoea* L. and *Convolvulus* L. within this taxon based on stigmatic lobe morphology. In 1971, Robertson produced a taxonomic treatment of the North American, Central American, and Caribbean species, which included 25 taxa, some of them also distributed in South America. In this work he distinguished *Jacquemontia* from other genera in the family by the following characters: (1) Stellate or T-shaped trichomes; (2) Glabrous corolla; (3) 3-aggrecolpate pollen; (4) Glabrous, 2-locular, 4-ovulate ovaries; (5) Single 2-lobed style, with flattened, oval lobes; (6) Capsules, usually with (2)4(8) valves; and (7) Glabrous seeds that are often narrowly winged along the outer margin. The Brazilian species have only been treated in the *Flora Brasiliensis*, where Meissner (1869) included 33 names and also established three sections that are still used and are primarily defined by inflorescence morphology. Since these publications, additional studies about the genus have been restricted to local floras and descriptions of new species (e.g., Austin, 1975, 1982, 1998; O'Donnell 1960a, 1960b; Simão-Bianchini, 1999). Phylogenetic analyses of the Convolvulaceae (Stefanovic et al., 2002, 2003) have confirmed the complexity of the genus, demonstrating that besides the problems of specific delimitation, the phylogenetic relationships of *Jacquemontia* with other taxa in the family remains unclear. When suggesting the new tribe Jacquemontieae, Stefanovic et al. (2003) indicated that stellate trichomes, 8-valvate capsules, and ellipsoid stigmatic lobes are possible synapomorphies of *Jacquemontia*. Based on the circumscription of *Jacquemontia* by Robertson (1971), a new species is described here.

Jacquemontia chrysanthera Buril, **sp. nov.** Type: BRAZIL. Bahia: Mun. Caetité, near Brejinho das Ametistas, caatinga, 14°11'60"S 41°39'36"W, 13 Feb 2009, *M. T. Buril, B. Amorim, A. Benko, G. Cruz, D. Pinangé, J. Gitai, M. I. Martins & K. Veiga* 224 (holotype: UFP; isotypes: NY, SP). (Figs. 1, 2)

Species nova *Jacquemontiae martii* Choisy affinis, sed trichomatibus 5- vel 7-radiatis, inflorescentia numerosiore, plus quam 30-flora, sepalis exterioribus oblongis, ad basim crassioribus et quam sepalis interioribus longioribus, antheris vivide flavis differt.

Perennial vine, climbing, with slender stems, somewhat woody at base, much branched, velutinous; trichomes stipitate-stellate, 5(–7)-rayed, the rays usually equal; latex white. Internodes 5.7–10.3 cm long. Leaf blades 5.7–8.6 × 3.4–6.2 cm, papyraceous, entire to slightly sinuate, ovate, the base subcordate, the apex acuminate to apiculate, velutinous, hoary, yellowish when dried, the trichomes on the abaxial side longer than on the adaxial side, with 9 pairs of secondary veins. Petiole 0.8–2.3 cm long, pubescent. Inflorescences compound dichasial cymes, umbelliform, usually ca. 30-flowered, rarely 7-12-flowered; peduncles 3.5–5.2 cm long, axillary, velutinous; bracts 5–8 × 1 mm, entire, linear, two at the base of each cyme, pilose. Sepals unequal, the 2 outer 1.0–1.1 × 0.4–0.45 cm, chartaceous, thick, entire, oblong, the base truncate, the apex acuminate, velutinous, the 3 inner 0.7–0.8 × 0.3–0.35 cm, entire, ovate, the base rounded, the apices acuminate, puberulent in the middle region, persistent. Corolla ca. 2 cm long, funnelform, without lobes between episepalic nervures, the apex of episepalic nervure ciliate, blue. Stamens heterandrous, the longer 2 ca. 0.7 cm long, the smaller 3, ca. 0.6 cm long; filaments with short unicellular trichomes at the base; anthers elliptic, ca. 2 mm long, the base subcordate, the apex rounded, bright yellow. Style ca. 1 cm long, exceeding the stamens, each stigmatic lobe ca. 1 × 0.6 mm, oval, flattened, white; nectary 5-lobate; ovary ca. 1 mm long, globose, glabrous, 2-locular, with 2 ovules per locule. Fruit a capsule, ca. 5 × 4 mm, globose, opening by 8 valves. Seeds 3–3.2 mm long, the dorsal face rounded, the margins with a thin, striate lateral ridge, ca. 0.2–0.4 mm wide, the surface minutely areolate

Distribution and conservation status.—*Jacquemontia chrysanthera* occurs in the caatinga, a shrubby savanna habitat of the semi-arid region in Northeastern Brazil. This species is known only from Bahia and Pernambuco and should be classified as Vulnerable, according to IUCN Red List criteria, because it occupies an area estimated at less than 2000 km², and although it occurs in the Chapada Diamantina National Park, this is still a not totally protected area.

Phenology.—Individuals were found in flower from February to June.

Etymology.—The epithet refers to the bright yellow-colored anthers, a distinguishing feature because most species of *Jacquemontia* have white or light blue anthers.

Additional specimens examined. BRAZIL. Bahia: Mun. Catolés, road leaving Catolés de Baixo, 29 Nov 1999, *Conceição & Campos 486* (HUEFS, SP); Mun. Oliveira dos Brejinhos, Serra da Água Quente, 16 Apr 1999, *Forzza 1238 et al.* (CEPEC, NY, RB, SPF); Mun. Catetité, BR-030 to Brejinho das Ametistas, 14°8'22''S, 42°27'48''W, 14 Apr 2002, *França et al. 3750* (HUEFS); Mun. Morro do Chapéu, 11°37'9''S, 40°59'28''W, 29 Jan 2003, *França et al. 4047* (HUEFS); Mun. Caetité, Serra Geral de Caetité, 1,5 km of Brejinho das Ametistas, 12°29'S, 49°09'W, 11 Apr 1980, *Harley 21219* (NY); Mun. Caetité, near Brejinho das Ametistas, 12°29'S, 49°09'W, 11 Apr 1980, *Harley 21232* (NY, SP, SPF); Mun. Barra da Estiva, 17 Jun 1988, *Harley et al. 26485* (SP, SPF); Mun. Rio de Contas, Road to Jussaipe, 13°37'18''S, 41°45'50''W, 8 Mar 2004, *Harley et al. 55064* (HUEFS); Mun. Lençóis, Road to Mucugê, 12°27'S, 41°26'W, 22 Oct 2000, *Lemos 87 et al.* (HUEFS); Mun. Morro do Chapéu, near waterfall of Ferro Doido, 11°37'31''S, 40°59'38''W, 20 Apr 2001, *Melo et al. 3358* (HUEFS); Mun. Jeremoabo, Baixa dos Quelés, 9°58'59''S, 38°26'24''W, 17 Oct 2009, *Melo et al. 6696* (HUEFS); Mun. Licínio de Almeida, after Riacho Fundo, 12°34'17''S, 42°31'27''W, 11 Dec 2009, *Melo et al. 7489* (HUEFS); Mun. Lençóis, near Tanquinho, 16 May 2001, *de Melo 152* (HUEFS, SP); Lençóis, BR-242, 4 Nov 2001, *L. Miranda 14* (HUEFS); Mun. Caetité, on direction to Mamiaçu, 13°53'10''S, 42°27'15''W, 12 Apr 2005, *Miranda et al. 781* (HUEFS); Mun. Bela Vista, road Delfino to Santo Sé, 10°39'S, 39°44'W, 25 March 2004, *Moraes 661* (HUEFS); Mun. Maracás, Rod. BA 026, 6 km to Maracás, 26 Apr 1978, *Mori et al.*

9928 (CEPEC, NY); Mun. Morro do Chapéu, near the river Ferro Doido, 9 Mar 2003, *de Queiroz 7703 et al.* (HUEFS); Mun. Bom Jesus da Lapa, 12 Jan 2008, *Rapini et al. 1484* (HUEFS); Brejinho das Ametistas, 14°16'0''S, 42°31'34''W, 10 Jan 2006, *Santos 598* (HUEFS). **Pernambuco:** Mun. Exu, 4 Jun 1986, *Lima 443* (IPA, SPF).

The three sections of *Jacquemontia* established by Meissner (1869) appear to form artificial groups; however, according to his definitions of these sections, *J. chrysanthera* should be placed in sect. *Cymosae* because it has umbelliform cymes. *Jacquemontia* sect. *Cymosae* has the largest number of species, which Meissner divided into two major groups, one with sepals having rounded apices, and the other with sepals having acute apices.

Morphologically, *Jacquemontia chrysanthera* and *J. martii* Choisy have a similar habit, leaf form, inflorescence structure, and corolla. However, these species differ by the type and distribution of trichomes; the number of flowers per inflorescence; the shape, consistency, and size of the inner and outer sepals; and anther color. *Jacquemontia martii* has 6-rayed trichomes and usually has up to nine flowers per inflorescence, whereas *J. chrysanthera* has trichomes that are 5- or 7-rayed and an inflorescence usually with more than 30 flowers. The outer sepals of *J. martii* are ovate-lanceolate, slightly smaller than the inner sepals, and reflexed at the apex, while the outer sepals of *J. chrysanthera* are oblong, thicker at the base, and longer than the inner sepals. In addition, based on field observations, the anthers of *J. martii* are white and those of *J. chrysanthera* are bright yellow.

Some of the specimens analyzed were identified as *J. guyanensis* (Aubl.) Meisn. (Brazilian Amazon, French Guiana, Guyana, and Venezuela). However, *J. guyanensis* can be distinguished of *J. chrysanthera* by its usually broadly elliptic, rarely ovate, leaves with the base rounded to truncate, its capituliform cymes, elliptic bracts, and membranaceous sepals with evident venation.

Although Meissner placed *Jacquemontia martii* within the group of *Jacquemontia* sect. *Cymosae* that have sepals with acute apices, this species shares more characters with the group of species that have sepals with rounded apices. Therefore, an

artificial key based on morphological characters is presented here, which includes Brazilian species of *Jacquemontia* that have umbelliform cymes.

Key to Brazilian species of *Jacquemontia* with umbelliform cymes

1. Subshrubs; leaves obovate or elliptic, rounded or obtuse at the base.
 2. Inflorescences sessile; sepals oblong, coriaceous, glabrous.
..... *J. spicaeflora* (Brazil)
 2. Inflorescences pedunculate; sepals ovate, membranaceous, pubescent.
..... *J. selloi* (Argentina, Bolivia, Brazil, Paraguay)
1. Vines; leaves ovate, rounded to cordate at the base.
 3. Sepals with acute apices.
 4. Glandular trichomes present, especially on young stems.
..... *J. sphaerostigma* (Mexico to Panama; West Indies; Argentina, Bolivia, Brazil, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela)
 4. Glandular trichomes lacking.
 5. Sepals membranaceous, with evident venation.
 6. Bracts falcate or lanceolate, sometimes reddish, pubescent.
..... *J. pentantha* (Americas)
 6. Bracts lacking or filiform, greenish, glabrescent.
 7. External sepals rhombic or cordate; pedicels approximately equal..... *J. velloziana* (Brazil)
 7. External sepals lanceolate; pedicels unequal.
..... *J. mucronifera* (Brazil)
 5. Sepals chartaceous, without evident venation.

8. Sepals ciliate; corolla ≥ 4 cm long. *J. ciliata*
(Costa Rica and Panama; Brazil, Colombia, Ecuador, French Guiana,
Guyana, Peru, Suriname, Venezuela)
8. Sepals pubescent; corolla < 4 cm long.
9. Inflorescences until 9-flowered; outer sepals a little shorter than
inner ones, the apex recurved; anthers
white..... *J. martii* (Brazil)
9. Inflorescences usually more than 20-flowered, rare 7-12-flowered;
outer sepals longer than inner ones, the apex straight; anthers bright
yellow..... *J. chrysanthera* (Brazil)
3. Sepals rounded or obcordate apices.
10. Inflorescences sessile or with a peduncle ≤ 2 cm long.
11. Sepals with a rostrum, glabrous..... *J. subsessilis*
(Brazil)
11. Sepals without a rostrum, pubescent or glabrescent.
..... *J. nodiflora* (Mexico to Panama; West
Indies; Brazil, Colombia, Ecuador, Guayana, Peru, Venezuela)
10. Inflorescences with peduncle > 2 cm long.
12. Outer and inner sepals of the same length, velutinous.
..... *J. velutina* (Brazil)
12. Outer sepals shorter than inner ones, pubescent or glabrous.
13. Plant glabrescent, outer sepals a little shorter than the inner ones,
sepals with the base or the apex sometimes puberulent or the margins
ciliate..... *J. blanchetii* (Argentina, Bolivia,
Brazil, Peru)
13. Plant puberulent, outer sepals around half the size of the inner ones,
sepals glabrous.

14. Leaves discolorous, the abaxial surface grayish.
 *J. glaucescens* (Brazil)
14. Leaves not discolorous, the abaxial and adaxial surfaces fulvo-
 tomentose. *J. holosericea*
 (Argentina, Brazil, Colombia, Paraguay, Venezuela)

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We would like to thank FACEPE for providing a Ph.D. scholarship to the first author; the curators of the herbaria where collections were analyzed; Regina Carvalho for the drawn illustrations; reviewers of the manuscript for their comments; and Dr. George Staples, Dr. Daniel Austin, and Dr. Rosângela Simão-Bianchini for their help and valuable suggestions.

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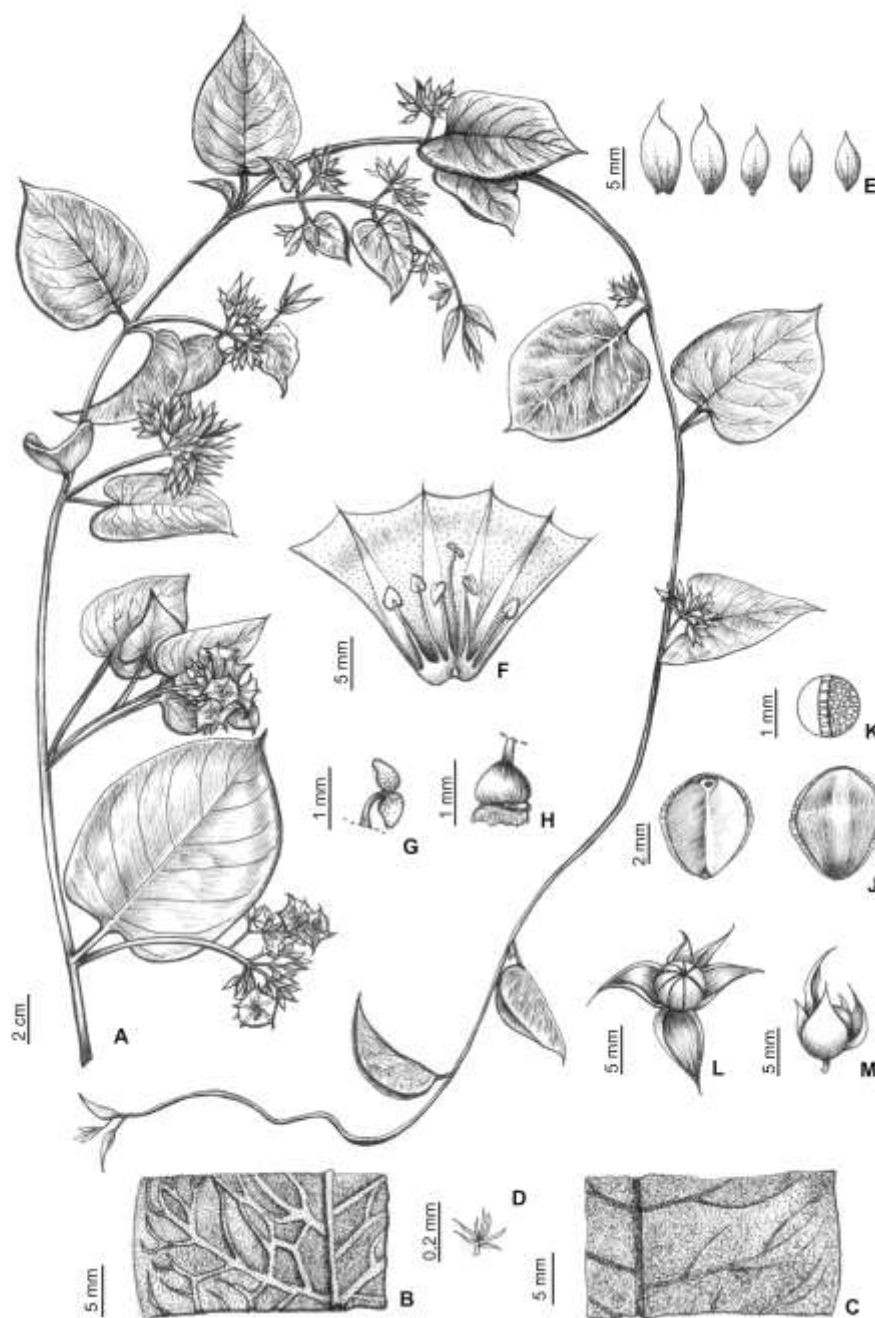


FIG. 1. *Jacquemontia chrysanthera*. **A.** Habit. **B.** Leaf, abaxial surface. **C.** Leaf, adaxial surface. **D.** Trichome. **E.** Sepals, from left to right, the outer ones to inner ones. **F.** Open flower. **G.** Stigmatic lobes. **H.** Ovary and nectary. **J.** Seed, ventral view at left, dorsal view at right. **K.** Lateral ridge of seeds, detail. **L.** Fruit, with open bracts. **M.** Fruit, with closed bracts. (Drawn from the holotype.)

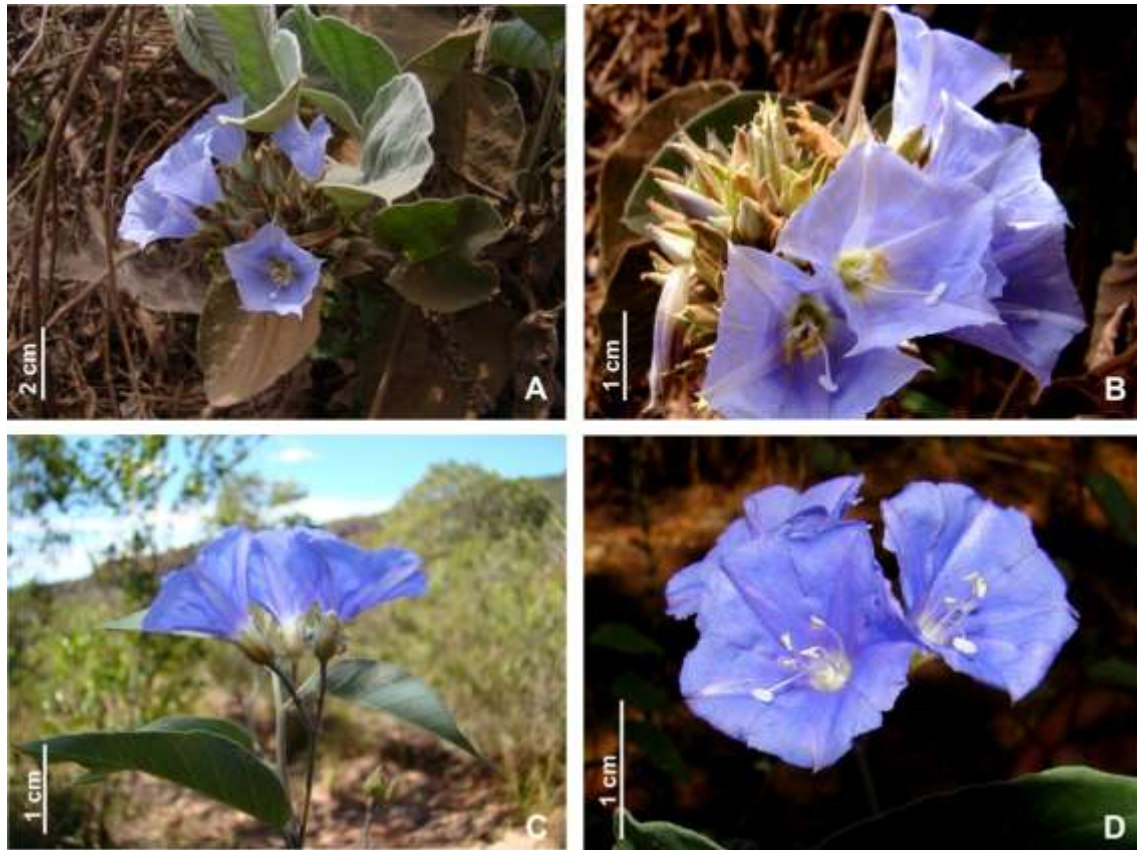


FIG. 2. A–B. *Jacquemontia chrysanthera*. A. Inflorescence. B. Flower detail. (photographed from the holotype.) C–D. *Jacquemontia martii*. C. Inflorescence. D. Flower detail. (photographed from *Buril 387*, UFP.)

***Jacquemontia robertsoniana* (Convolvulaceae), a new shrub species from Brazil**

MARIA TERESA BURIL, R. SIMÃO-BIANCHINI AND M. ALVES

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Jacquemontia robertsoniana (Convolvulaceae), a new shrub species from Brazil

Maria Teresa Buril^{1,3}, R. Simão-Bianchini² & M. Alves¹

Summary- *Jacquemontia robertsoniana*, a new shrub species from Brazil, is described. The relationship of *J. robertsoniana* with other shrub species of this genus is discussed, illustrations, a distribution map, and an identification key are provided. The conservation status is assessed according to IUCN criteria.

Key words: Cerrado, Convolvulaceae, *Jacquemontia*, new species, taxonomy

Introduction

The family Convolvulaceae is cosmopolitan, with its diversity mostly concentrated in the tropics, comprising approximately 1800 species. *Jacquemontia* Choisy is one of the largest genera in this family. It includes around 120 species that are mainly neotropical, with a few species occurring in Africa, Tropical Asia and Oceania (Staples & Brummitt 2007). The most recent taxonomic treatment of the genus (Robertson 1971) included 25 species from the Caribbean and North and Central America and only a few of them are widely distributed. Additional relevant treatments to South American species are local floras as Flora of Peru (O'Donnell 1960) and Flora of Ecuador (Austin 1982).

South America, especially Brazil, is an important center of diversity for the genus, and new species from this region are still being discovered (Simão-Bianchini 1999, Simão-Bianchini & Pirani 2005). The Brazilian species of *Jacquemontia* were treated by Meissner (1869) in Flora Brasiliensis, which referred to 33 names. Bianchini & Ferreira (2010) cited 54 species for Brazil.

The Brazilian semi-arid region, which has caatinga, cerrado and campos rupestres (all savannah vegetation), supports nearly 30% of the species of *Jacquemontia*. Several of them are endemic.

Overall, species of *Jacquemontia* are usually vines with stellate trichomes, a glabrous ovary with 2 locules and 4 ovules, 1 unbranched style, bilobed stigmas (the lobes oval-flat), and 8-valved capsules (Robertson 1971). Within the genus, shrub species are less common, and in Brazil these taxa (such as *J. ochracea* Sim.-Bianch. & Pirani and related species) are more diverse in areas of cerrado and campos rupestres in the Cadeia do Espinhaço (Simão-Bianchini & Pirani 2005).

***Jacquemontia robertsoniana* Buril & Sim.-Bianch. sp. nov.** Species nova
Jacquemontiae ochracea Sim.-Bianch. & Pirani affinis, sed foliis brevioris, apice foliorum terminalibus caudato vel. obtuso cum acumine, trichomatibus 3-radiatis, inflorescentia terminalibus, sepalis interioribus lanceolatis, differt. Typus: Brazil, Bahia,

Mucugê, Serra do Esbarrancado, 17 Apr 2005, 12°43'S 43°30'W, A.A. *Conceição* & D. *Cardoso* 1293 (holotypus HUEFS!). Fig. 1.

Shrub, erect, few branched, stems tomentose, grayish to ochraceous; tomentum formed by stellate trichomes, 3-rayed, the rays usually equal, ca. 0,1 mm, pedunculate. Internodes 0,2 – 0,6 cm long, sometimes shorter. *Leaf blade* 1 – 1,6 x 0,9 – 1,3 cm, papery, entire, oval to orbicular or rarely elliptic, oblong, ovate or obovate, base rounded, apex apiculate to acuminate and on the leaves of the terminal branches becoming longer, caudate to obtuse with an acumen, tomentose, grayish; veins not evident. *Petiole* 0,05 – 0,1 cm long. *Inflorescence* terminal, compound cymes, capituliform, ca. 6-flowered, sessile, terminal; modified bracteoles lacking. *Sepals* unequal, outer 3 0,7 – 0,75 x 0,2 – 0,25 cm, chartaceous, entire, lanceolate to ovate, base rounded, apex long acuminate, lanulose inner 2 0,55 – 0,6 x 0,1 – 0,15 cm, entire, lanceolate, base rounded, apex acute, puberulent in the central region, with margins membranous. *Corolla* ca. 1,2 cm long, funnelform, weakly lobed between episeptic veins, with sparse trichomes on midpetaline band on abaxial face, blue. *Stamens* heterandrous, longer 2 ca. 0,6 cm long, smaller 3 ca. 0,4 cm long, filament glabrous, anthers elliptic, ca. 1.5 mm long, base subcordate, apex rounded. *Style* ca. 0,5 cm long, stigmatic lobes elliptic, oval-flat; nectary absent; ovary ca. 1 mm long, glabrous, 2-locular, 2 ovules per locule. Fruits not seen.

DISTRIBUTION. Brazil: Bahia, Chapada Diamantina (Municipalities: Abaíra, Mucugê, and Palmeiras). Map 1.

SPECIMENS EXAMINED. BRAZIL. Abaíra, Catolés, 13°19' S 41 °51' W, 01 Jun. 2006, A.A. *Conceição et al.* 617 (HUEFS, SP); Mucugê, Serra do Esbarrancado, Road Nova Andaraí to Mucugê, at 3-4 km from Mucugê, 08 Sept. 1981 A. *Furlan et al.* CFCR 1583 (SP, SPF); Mucugê, Guiné, 25 Mar. 2000, A.A. *Conceição* 823 (SPF); Palmeiras, 26 Jun. 2001, A.A. *Conceição* 942 (SP, SPF); Palmeiras, Cachoeira da Fumaça, 7 Jan. 1997, A.A. *Conceição* 226 (SPF); Palmeiras, Cachoeira da Fumaça 22 Out. 1999, A.A. *Conceição* 614 (SPF); Palmeiras, 28 Mai 2002, A.A. *Conceição* & L.R. *Lima* 1046 (SP, SPF).

HABITAT. *Jacquemontia robertsoniana* occurs in open vegetation and rocky fields, in a semi-arid climate, around 800 m alt.

CONSERVATION STATUS. *Jacquemontia robertsoniana* should be classified as Vulnerable (VU) according to the IUCN red list (2001) B1 criteria, because the estimated extent of occurrence for this species is less than 20.000 km², are restrict to less than 10 locations, and is inferred a continuing decline on number of mature individuals. Although this species occurs in a preserved area (Chapada Diamantina National Park), access is not closely monitored.

ETYMOLOGY. The epithet honors Dr. Kenneth Robertson, who contributed to the taxonomy of *Jacquemontia*.

NOTES. *Jacquemontia* is usually a vine; however, a small group of species is erect, with herbaceous to somewhat woody stems, and, although these species are not taxonomically related, they share many similar characteristics. Among the shrubby species, *J. robertsoniana* could be related to *J. ochracea* Sim.-Bianch. & Pirani because of the branching arrangement, leaf shape and color, indumentum, and inner sepal shape. However, on the terminal branches of *J. robertsoniana*, the leaf apex is caudate, while in *J. ochracea* the apex is always apiculate or retuse with a small arista. These species can also be distinguished by the usually longer (1.7-4.5 cm long) and frequently orbicular leaves of *J. ochracea*, and the axillary or terminal cymes, the presence of linear bracteoles, and by the 8-rayed trichomes in *J. ochracea*. In all samples analyzed from both species, the branching of trichomes proved to be constant. Thus, it can be used to distinguish *J. robertsoniana* from *J. ochracea*; although this character is sometimes quite variable for other species in the genus. So far, both species are reported to occur in the complex of mountains of the Cadeia do Espinhaço, which holds a high number of endemic plants (Rapini *et al.* 2008). While *J. robertsoniana* is restricted to the central part of this range in the state of Bahia, *J. ochracea* is only known from its southern part in the state of Minas Gerais (Simão-Bianchini & Pirani 2005) (Map 1).

Jacquemontia robertsoniana is also morphologically similar to *J. hallieriana* Ooststr. and *J. decipiens* Ooststr. (tab. 1). The first species is distinguished by its ovate to orbicular leaves and apparent veins, sessile and capituliform inflorescences with many flowers, and two falcate bracteoles near each pedicel. *Jacquemontia decipiens* has a lanate, silver indumentum.

Simple trichomes are found along the veins of the petals in *J. robertsoniana*, which is unusual for the genus, where the petal trichomes are usually restricted to the apex of the midpetaline band. Robertson (1982) used the presence of trichomes on the corolla as one character to distinguish *Odonellia* from *Jacquemontia*. However, in addition to the corolla trichomes in *J. robertsoniana*, which are more widely spaced than in *Odonellia*, all other features confirm that this species belongs in *Jacquemontia*.

Table 1. Distinguishing characters of *Jacquemontia robertsoniana* and morphologically related species

		<i>J. robertsoniana</i>	<i>J. ochracea</i>	<i>J. decipiens</i>	<i>J. hallieriana</i>
Indument		Tomentose, grayish to ochraceous	Tomentose, ochraceous	Tomentose, yellowish	Lanate, silverish
Trichomes		3-rayed	8-rayed	Simple or 3-rayed	3-rayed
Leaves	Shape	Oval to orbicular or rarely elliptic, oblong, ovate or obovate	Usually orbicular	Oblong or obovate	Oval to orbicular
	Apex	Apiculate to acuminate, becoming longer on terminal leaves	Apiculate or retuse with a small arista	Apiculate	Apiculate
	Ribs	Not apparent	Apparent	Not apparent	Apparent
Inflorescence		Sessile	Pedunculate	Sessile	Sessile
Bracteoles		Absent	Linear	Falcate	Linear to lanceolate

Key to shrub and erect herbaceous species of *Jacquemontia* from South America

1. Erect herbs, stems slender, not woody at the base, sometimes climbing or decumbent
 2. Leaves linear, flowers blue..... **J. linarioides** Meisn. (Brazil)
 - 2'. Leaves oval, ovate, oblong or lanceolate, flowers white
 3. Leaves lanceolate, reddish when dried, inflorescences 1-2 flowered, outer sepals lanceolate, glabrous to ciliate, flowers white with wine-coloured tube, capsules globose..... **J. gracilis** Choisy (Brazil)
 - 3'. Leaves oval, ovate or oblong, greenish when dried, inflorescences 2-5 flowered, outer sepals reniform, puberulent, flowers totally white, capsules cubic.... **J. gracillima** (Choisy) Hallier (Brazil, Guyana, Panama, Venezuela)
- 1'. Shrubs, stems somewhat woody at the base
 4. Inflorescences sessile or short-pedunculate (≤ 1 cm long)
 5. Leaf margin sinuate, glandular trichomes usually present, inflorescences 2-3 flowered..... **J. fruticulosa** Hallier (Brazilian South, Paraguay)
 - 5'. Leaf margin entire, glandular trichomes absent, inflorescences > 3 flowered
 6. Plants with long internodes (> 2 cm long), leaves not overlapping
 7. Plants glabrescent, inflorescences only terminal, leaves narrowly elliptic to oblanceolate..... **J. rojasiana** O'Donell (Brazil)
 7. Plants densely pubescent, inflorescences axillary and terminal, leaves broadly elliptic to ovate
 8. Inflorescences spiciform, sepals glabrous..... **J. spicaeflora** O'Donell (Brazil)
 - 8'. Inflorescences glomeruliform or capituliform, sepals pubescent

9. Inflorescences glomeruliform, bracteoles present..... **J. sphaerocephala** Meisn.(Brazil)
- 9'. Inflorescences capituliform, bracteoles absent..... **J. fusca** (Meisn.) Hallier f. (Brazil)
- 6'. Plants with short internodes (≤ 2 cm long), leaves overlapping
10. Plants lanate, intensely silverish..... **J. decipiens** Ooststr. (Brazil)
- 10'. Plants tomentose to lanulose, indument grayish or ochraceous, never silverish
11. Inflorescences with filiform bracteoles, sepals membranaceous, ovate, with the apex long-acuminate..... **J. hallieriana** Ooststr. (Brazil)
- 11'. Inflorescences with linear bracteoles, or bracteoles lacking, sepals chartaceous, lanceolate, with the apex acute
12. Leaves with the apex apiculate, becoming caudate to obtuse with an acumen on the leaves at terminal branches
..... **J. robertsoniana** (Brazil)
- 12'. Leaves with the apex apiculate or retuse with an arista, not different on the leaves at terminal branches
J. ochracea Sim.-Bianch. & Pirani (Brazil)
- 4'. Inflorescences pedunculate (>1 cm)
13. Inflorescence an umbelliform cyme, sepals membranaceous, broadly ovate, puberulent..... **J. selloi** Hallier f. (Bolivia, Brazil, Paraguay)
- 13'. Inflorescence a capituliform cyme, sepals chartaceous, lanceolate, velutinous..... **J. lasiocladus** (Choisy) O'Donell (Brazil)

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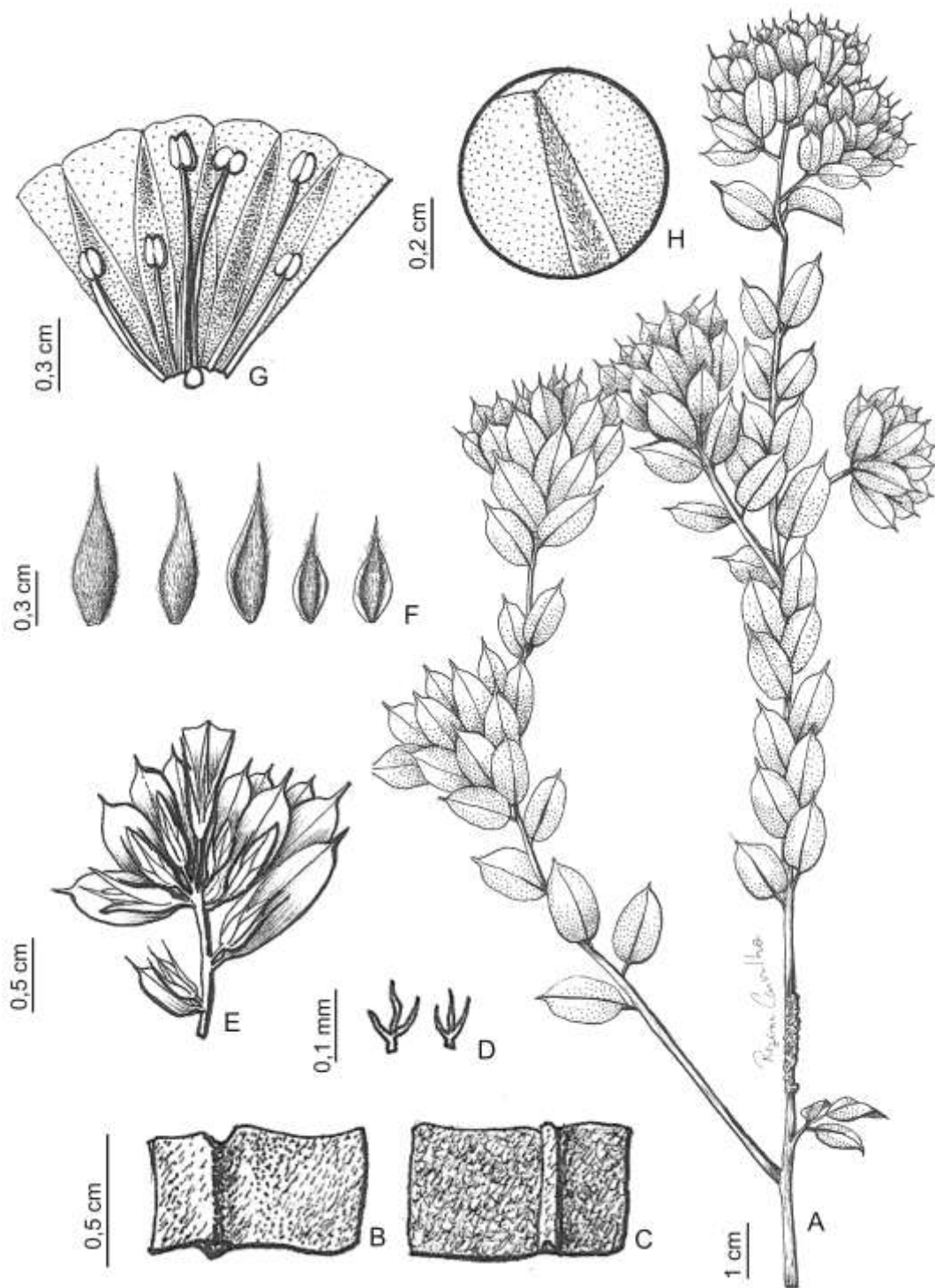
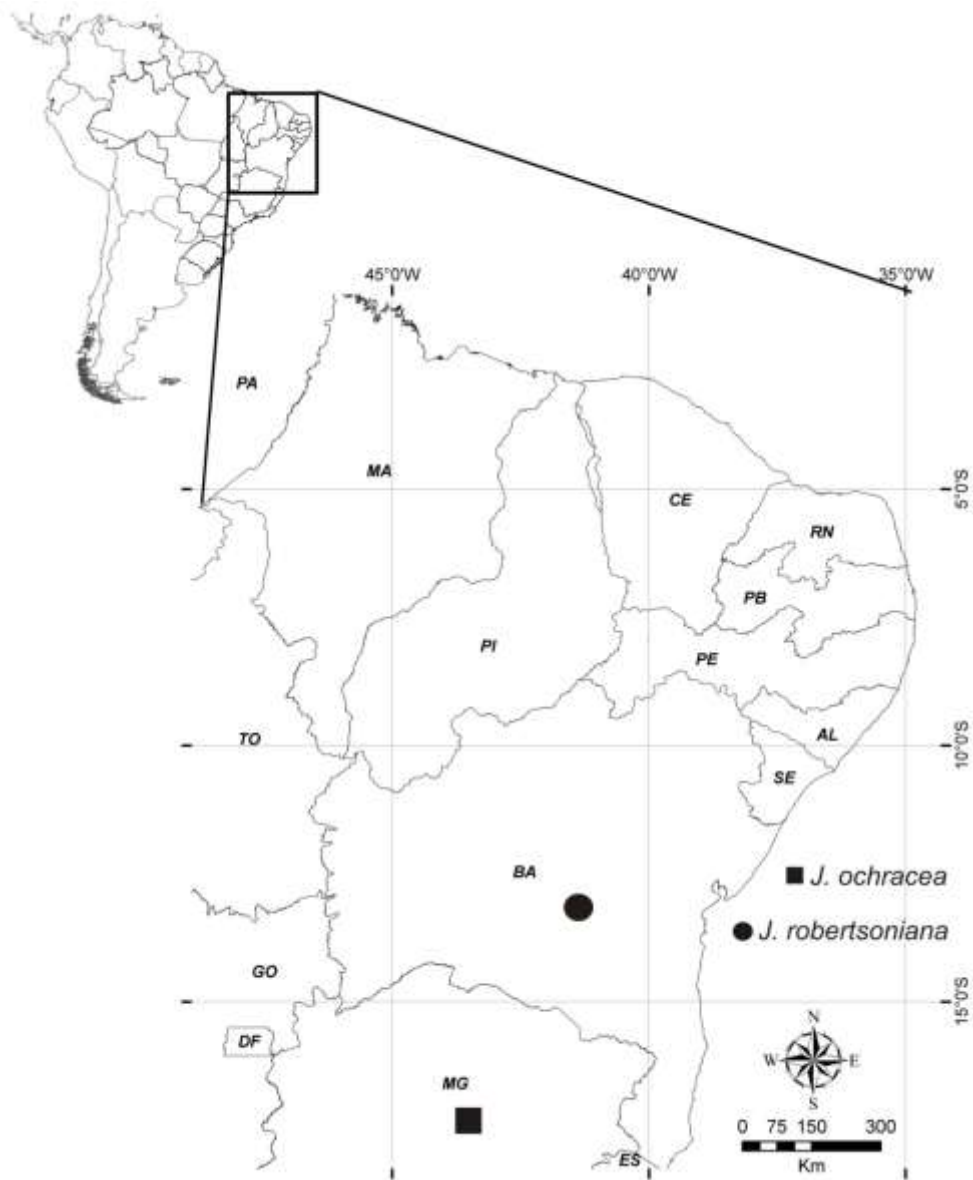


Fig. 1. *Jacquemontia robertsoniana*. A habit; B part of adaxial face near midrib, C leaf, abaxial face near midrib; D trichomes; E inflorescence detail; F sepals, from left to right, external to internal; G open flower; H detail of abaxial surface of corolla showing puberulence. (Drawn from the holotype).



Map 1. Distributions of *Jacquemontia robertsoniana* and the related species, *Jacquemontia ochracea*.

***Jacquemontia macrocalyx* (Convolvulaceae), a New Species Endemic to Espinhaço
Range, Brazil**

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Jacquemontia macrocalyx (Convolvulaceae), a New Species Endemic to Espinhaço
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ABSTRACT. *Jacquemontia macrocalyx* Buril (Convolvulaceae) is described from the Morro do Chapéu, Cadeia do Espinhaço, from the state of Bahia, Brazil. The new species is related to *J. heterantha* (Nees & Mart.) Hallier, but is distinguished by its fruticose habit and the larger sepals. Its conservation status is assessed as EN or Endangered, according to the criteria of IUCN Red List.

RESUMO. *Jacquemontia macrocalyx* Buril (Convolvulaceae) é descrita como endêmica do Parque Estadual de Morro do Chapéu, Cadeia do Espinhaço, Bahia, Brasil. A nova espécie é similar a *J. heterantha* (Nees & Mart.) Hallier, mas se distingue pelo hábito arbustivo e sépalas maiores. O seu status de conservação é considerado como “EN” ou em risco de extinção, de acordo com os critérios da IUCN.

Keywords: *Aniseia*, Brazil, Bahia, Chapada Diamantina, Convolvulaceae, *Jacquemontia*, IUCN Red List.

The Espinhaço Range is the second largest complex of mountains in Brazil, extending from the eastern state of Bahia inland through Minas Gerais, with many stretches above 700 m in altitude (Kamino et al., 2008). This is an area of conjunction among vegetation types of caatinga, cerrado and Mata Atlântica and presents a peculiar flora. Many microendemic species occur along the range and a low similarity in the flora of different areas, sometimes even of adjacent areas, is reported (Rapini et al., 2008). Recently, several new species of Convolvulaceae have been described from the Espinhaço Range (Simão-Bianchini, 1999; Simão-Bianchini & Pirani, 2005; Krapovickas 2009; Buril & Alves 2011), with four of them belonging to *Jacquemontia* Choisy.

Jacquemontia (Convolvulaceae), distributed primarily in the Neotropics, is one of the largest genera of Convolvulaceae with nearly 120 species (Staples & Brummitt, 2007). It occurs mostly in open vegetation types, and the Brazilian semi-arid region can be considered as one of the centers of diversity, with more than 30 species, many of which are endemic (Bianchini & Ferreira, 2012).

Jacquemontia was established by Choisy in 1834 based on species described under *Convolvulus* L. and *Ipomoea* L. He defined the genus, based on the shape of stigmatic lobes, the presence of stellate trichomes (vs. simple ones in all other related genus), and 8-valvate capsules (vs. 4-valvate as often seen in *Convolvulus/Ipomoea*). According to Robertson (1971), the genus can be recognized by: (1) the stellate or T-shaped trichomes; (2) the essentially glabrous corolla to ciliate on the apex of midpetaline line; (3) 3-aggrecolpate pollen; (4) glabrous, 2-locular, 4-ovulate ovaries; (5) single style, with two, flattened, oval lobes; (6) the capsules usually with (2) 4 (8) valves; and (7) glabrous seeds that are often narrowly winged along the outer margin.

Jacquemontia macrocalyx Buril, sp. nov. TYPE: Brazil. Bahia: Parque Est. Morro do Chapéu, Lagedo Bordado, 11°16'20" S, 41°05'05" W, 736m., 6 Feb. 2011, B. S. Amorim, K. Mendes, D. Moura 752 (holotype, UFP; isotypes, SP, MO). Figures 1, 2.

Species nova *Jacquemontiae heteranthae* (Nees. & Mart.) Hallier f. affinis, sed habitu fruticoso, sepalis externis multum latioris et longioris, differt.

Shrub 0.4–1.5 m tall, woody at base, velutinous, stellate trichomes of two sizes, 4–5-rayed, the shorter ca. 0.3 mm more dense, the longer ca. 0.6 mm sparsely distributed; latex absent; stem internodes 1.7–3.2 cm long. Leaf blades $2.5 - 3.6 \times 1.7 - 2.2$ cm, papyraceous, entire, ovate to broadly elliptic, base rounded to subcordate, apex apiculate to acuminate, green to grayish, yellowish when dried, velutinous, corrugated, but apparent only in fresh material; venation camptodromous, with 5 pairs of secondary veins; petiole 4–6 mm. Inflorescences as monochasial or dichasial cymes, 2 or 3-flowered; peduncles 0.5–4.5 cm, axillary, when terminal very short, velutinous; bracts 2, ca. 5 mm, linear, velutinous; sepals membranaceous, entire, unequal, the outer two, $1.2-1.8 \times 0.8-1.5$ cm, ovate to deltoid, rarely lanceolate, base cordate, apex acuminate to acute, pubescent, intermediate one, $1-1.4 \times 0.3-0.4$ cm, asymmetric, inner-2, $0.3-0.5 \times 0.2-0.25$ cm, entire, ovate to lanceolate, base rounded, apex acuminate, pubescent; corolla 1.4–1.5 cm long, funnelform, apex of midpetaline line ciliate, lilac with the tube light pink; stamens ca. 8 mm, filaments pilose on the base, anthers ovoid, white; nectary absent; ovary ca. 0.5 mm, oblong, glabrous, 2-locular, 2 ovules per locule; style 0.5–1 cm, stigmatic lobes ca. 0.5 mm, ovate to flattened, white. Capsule 5 x 4 mm, 8-valvate, oblong, subtended by persistent bracts; seeds 1 or 2, ca. 3–3.5 mm, trigonal, glabrous, with the lateral ridge lacking. Fig. 1

Distribution and habitat. *Jacquemontia macrocalyx* is a shrub from the rocky fields of Bahia, known only from the State Park of Morro do Chapéu, located in the Serra do Espinhaço. It is found among rocks at an average altitude of 700 m. In the field, the leaves are corrugated, a feature which is not distinguishable in dried specimens.

IUCN Red List category. This species is assessed here as Endangered, according to the IUCN (2001) Red List criteria. This is assessed as B1, with an area of occupancy estimated to be less than 5000 km², and the population size is estimated to number fewer than 250 mature individuals, as known to occur in only two locations. The new species is known from only two localities in Bahia, Brazil.

Phenology. Flowers and fruits of *Jacquemontia macrocalyx* were collected in January and February.

Etymology. The Latin epithet *macrocalyx* refers to the size of the outer sepals, which are longer (1.2–1.8 cm) than in other species of *Jacquemontia* which, in general, do not exceed ca. 6 mm.

Taxonomic affinities. Morphologically, the new species described here may be related to a group of species that have been previously placed in the genus *Aniseia* Choisy. Those are *J. gracillima* (Choisy) Hallier f. (basionym: *Aniseia gracillima* Choisy), *J. bifida* (Vell.) Hallier (synonyms: *Aniseia velloziana* Choisy, *Jacquemontia velloziana* (Vell.) O'Donell), and *J. heterantha* (Nees. & Mart.) Hallier f. (synonym: *Aniseia heterantha* Choisy). All of them share the cordate sepals as remarkable characteristic, present in many actual *Aniseia*. However, they have been transferred to *Jacquemontia*, mainly by the presence of stellate trichomes and oval-flattened stigmatic lobes.

Krapovickas (2009) compared *J. estrellensis* with this group of species because of the cordate bracts. Since the sepals are hidden by the bracts, these cordate structures are the ones that stand out on the inflorescence arrangement. Although, the sepals are rounded to truncate, and this is not directly comparable to the cordate ones present in *J. macrocalyx*.

Jacquemontia gracillima is distinguished by the leaves oblong to elliptic, instead of ovate, as is found in *J. macrocalyx*, *J. heterantha* and *J. bifida*. Besides that, the outer sepals are often deltoid, instead of ovate. While the new species and *J. heterantha* present 2–3-flowered inflorescences, *J. bifida* presents umbelliform inflorescences with at least 7 flowers. Finally, in relation to *J. heterantha*, even though the sepals shape and inflorescences are similar, this is clearly distinguished by the habit (vines) and by the smaller sepals (ca. 5 mm long). Table 1.

Paratype. BRAZIL. **Bahia:** Mun. Morro do Chapéu, Lages, on the rd. of Feijão, on the way to Irecê, 11°29'52''S, 41°19'52''W, 30 Jan. 2003 (fl., fr.), *F. França 4103*, *S. Atkins*, *B. M. da Silva* & *M. E. R. Junqueira* (HUEFS).

Table 1. Comparison of characters between *J. macrocalyx* and morphologically related species.

	<i>J. bifida</i>	<i>J. gracillima</i>	<i>J. heterantha</i>	<i>J. macrocalyx</i>
Habit	Vines	Erect to climbing herbs	Vines	Shrub
Leaves blade	Ovate	Oblong to elliptic	Ovate	Ovate to broadly elliptic
Inflorescence	Umbelliform, 7–25-flowered	Monochasial, similar to a racemous, 4–(2-5)-flowered	Monochasial, similar to a racemous, (1)–2(3–4)-flowered	Monochasial or dichasial cymes, 2 or 3-flowered
Outer sepals shape	Ovate to rotund	Deltoid	Ovate to deltoid	Ovate
Outer sepals size	0.45–1.3 x 0.35–0.8 cm	5–6 x 4.4–5.5 mm	5.5–7.5 x 4.5–6.5 mm	1.2–1.8 × 0.8–1.5 cm
Distribution	Brazil (from Ceará to Rio de Janeiro)	Brazil (from Amazonas to Pernambuco), Guyana, Venezuela, Panama	Brazil (from Bahia to Mato Grosso do Sul)	Brazil (Bahia)

Acknowledgments. Thanks are extended to FACEPE for providing a PhD scholarship to the first author; to the curators of the herbaria where collections were analyzed for their availability and help; to Regina Carvalho for the illustrations drawn; to Scott V. Heald for his review of the English in the manuscript; to Bruno Amorim for the collection of the holotype, and to Kalinne Mendes for the pictures; to Dr. Antonio Krapovickas, Dr. Gordon McPherson, Dra. Sara Fuentes and Dra. Victoria Hollowell, for reviewing this paper.

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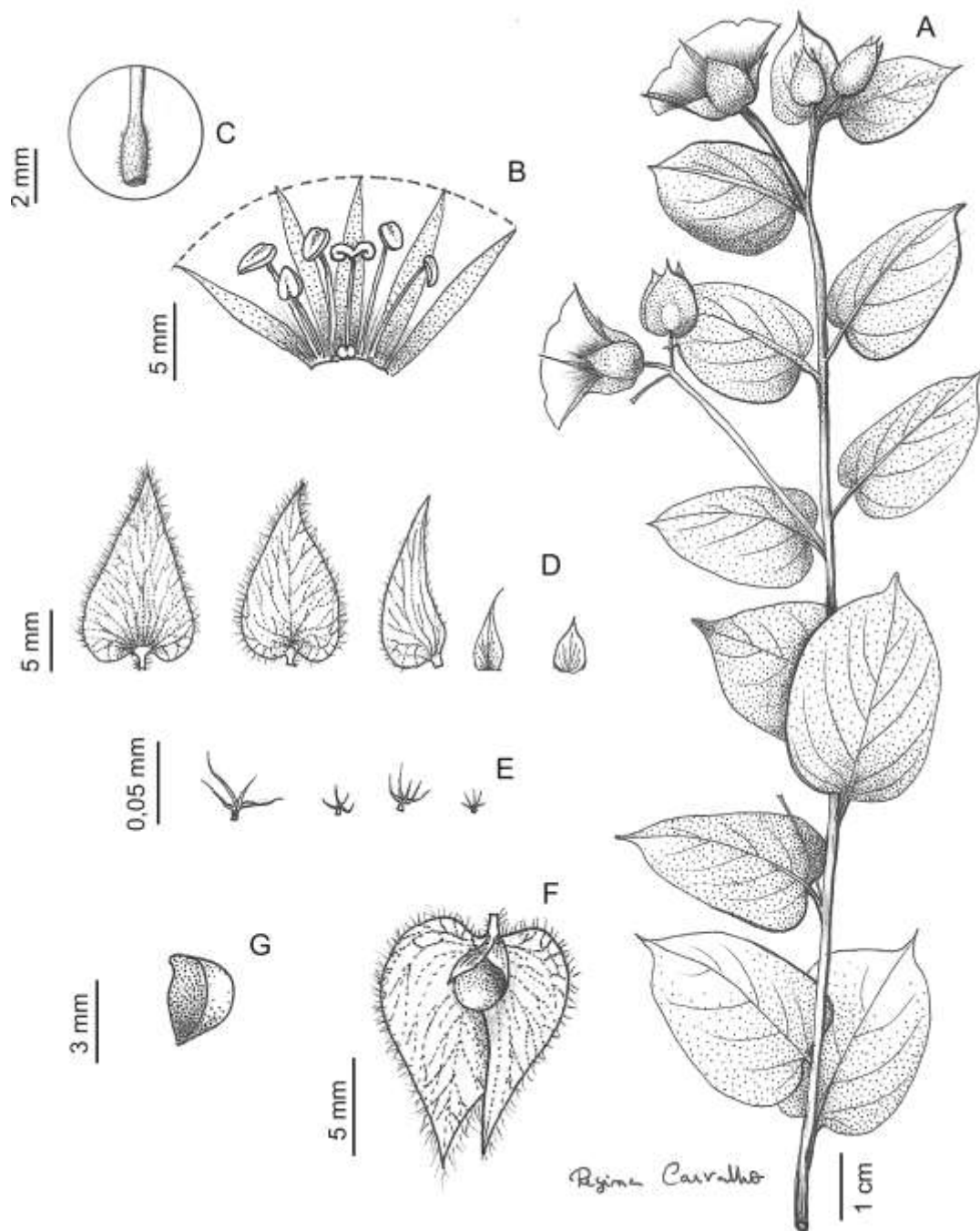


Figure 1. *Jacquemontia macrocalyx* Buril. --A. Fertile habit. --B. Dissection of an open flower. --C. Detail of stamen, showing the pilose filament base. --D. Sepals, from left to right, proceeding from outer to inner positions. --E. Stellate trichomes, 4- or 5-rayed. --F. Capsular fruit, subtended by persistent bracts. --G. Seed. Drawn from the holotype *Amorim et al.* 752, UFP.

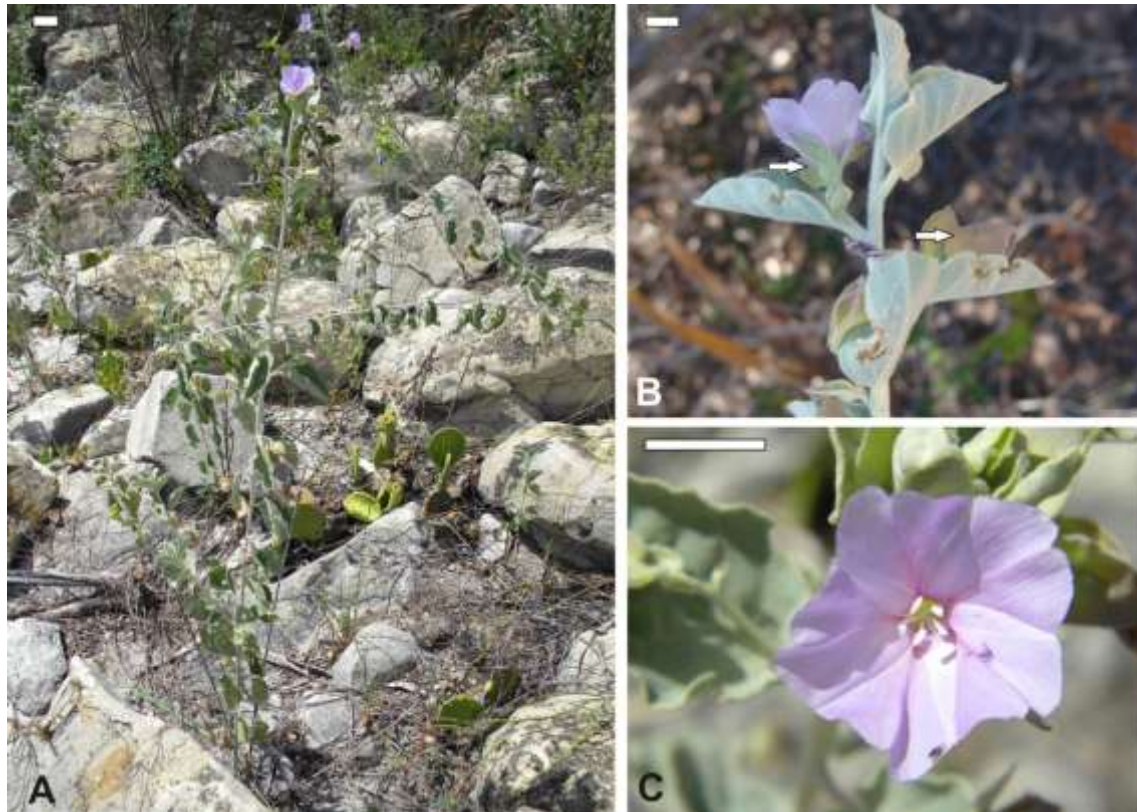


Figure 2. *Jacquemontia macrocalyx*. --A. Plant habit and habitat. --B. Axillary Inflorescences, showing two flowers in lateral view. Arrows indicate the conspicuous calyces. --C. Flower, as seen from above. Photographs of the holotype and type locality (*Amorim et al.* 752, UFP). Scale bars in A--C = 1 cm

**A new species of *Jacquemontia* Choisy (Convolvulaceae) from the Chapada
Diamantina, Brazil**

MARIA TERESA BURIL AND M. ALVES

ACEITO PARA PUBLICAÇÃO NO PERIÓDICO NORDIC JOURNAL OF BOTANY, 2013.

A new species of *Jacquemontia* Choisy (Convolvulaceae) from the Chapada Diamantina, Brazil

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Jacquemontia diamantinensis Buril (Convolvulaceae) is described as a new species, which is endemic to the Chapada Diamantina, in Bahia, Brazil. Illustrations and a table comparing characters with related species are provided.

Jacquemontia (Choisy) is one of the largest genera of Convolvulaceae. It comprises around 120 species (Staples et al. 2012) distributed mainly in tropical America, with a few species occurring in Asia and Africa. The most complete taxonomic treatment was made by Robertson (1971), which included 25 species from North and Central America. Robertson also estimated that there were ca. 50 species native to Brazil. This was a close estimate, as confirmed by Bianchini and Ferreira (2012) who listed 57 species for the country. Morphologically, *Jacquemontia* can usually be recognized by its stellate trichomes, flowers that often have two oval-flat stigmatic lobes, and fruits that are 8-valved capsules.

Because there is no modern taxonomic treatment of *Jacquemontia* for Brazil, many new species are being discovered, especially in poorly collected areas (Simão-Bianchini 1999, Simão-Bianchini and Pirani 2005, Krapovickas 2009, Buril and Alves 2011). All of the recently described species are endemic to the Espinhaço Range or disjunctly distributed in this region and the Chaco.

The Espinhaço Range, which extends from Bahia to Minas Gerais (see map in Kamino et al. 2008), is composed of the confluence of the Caatinga, Cerrado and Atlantic Forest vegetation types. The central and northern regions of the Espinhaço Range, where *Jacquemontia* is very diverse, are composed of savannah, within the Cerrado and Caatinga biomes (Harley 1995).

***Jacquemontia diamantinensis* Buril sp. nov. (Fig. 1-2)**

Type: Brazil. Bahia: Andaraí, road to Igatu, 12°47'S, 41°18'W, 27 Jun 2009, M. T. Buril and R. Rodrigues 391 (holotype: UFP; isotypes: HUEFS, NY)

Perennial vine, climbing, with slender stems, somewhat woody at the base, much branched, pubescent to densely pubescent when young; trichomes 8(–9)-rayed, the rays equal or slightly different in size, appressed; internodes 2.2–8.5 cm long; latex white. *Leaf* blades 2–6.5 × 1.2–4.4 cm, chartaceous, entire, ovate to oval, the base slightly cordate to rounded, the apex acuminate to acute, mucronate, pubescent, with very short stellate hairs 8(–12)-rayed, ca. 0.2 mm, appressed, discolor, the adaxial face darker; 7–8

pairs of secondary veins; petiole 0.4–1.5 cm long, pubescent. *Inflorescences* dichasial cymes, umbelliform, usually ca. 12-flowered; peduncles 2–3.8 cm long, axillary, densely pubescent; bracts lacking or 1 pair on the base of pedicels, ca. 1.5 mm long, linear, glabrescent; pedicels 4–6 mm long. *Sepals* persistent, chartaceous, entire, unequal, the 2 outer 5–6 × 1.8–2.2 mm, oblong, the base rounded to aequilateral, the apex slightly acute, mucronate, densely pubescent, greyish when dried, 1 intermediate, asymmetric, ca. 4.8 × 2 mm, the base rounded, the apex acute, the 2 inner 4 × 1.5–2 mm, entire, lanceolate, the base rounded, the apices acute, with escarious margins, with few cilia on the base; corolla ca. 1.8 cm long, funnelform, slightly lobate, the apex of episeptic nervure ciliate, blue; stamens heterandrous, 3 ca. 1.4 cm long, 2 ca. 0.8 cm long, filaments with short unicellular trichomes at the base, anthers sagittate, 1.5–2 mm long, the apex acute, white; style ca. 1.5 cm long, each stigmatic lobe ca. 0.6 mm long, oval-flattened, white; nectary 5-lobate; ovary ca. 1 mm long, conical, glabrous, 2-locular, ovules-2 per locule. *Capsule* ca. 5 × 6 mm, oval, opening by 8 valves; seeds 2.5–3 mm long, rounded, lateral ridge lacking, smooth surface. Flowering from December to August.

Distribution, ecology and conservation status

Jacquemontia dimantinensis is endemic to the Chapada Diamantina, in Brazil, which belongs to the Espinhaço Range complex. This species occurs in caatinga and rocky fields, and is often found near seasonal streams. According to the IUCN Red List criteria (2001), *J. dimantinensis* should be considered vulnerable because it occupies an area that is less than 2000 km².

Similar species

Jacquemontia diamantinensis belongs to a morphological group of species with umbelliform cymes and chartaceous sepals. Some species in this group that are closely related to *J. diamantinensis* are *J. blanchetii* Moric. and *J. holosericea* (Weinm.) O'Donell, which are more widely distributed, and *J. glaucescens* Choisy and *J. bahiensis* O'Donell, which are endemic to Brazil.

Besides the similar inflorescence structure and sepals, *J. diamantinensis*, *J. glaucescens* and *J. bahiensis* have discolour leaves when they are dry. Although *J. diamantinensis* has trichomes (usually 8-armed and appressed) similar to *J. glaucescens*, the sepals of *J. glaucescens* are almost completely glabrous (or glabrescent) in the middle region. Further, the outer sepals of *J. glaucescens* are rounded and the inner ones are obcordate, while in *J. diamantinensis* they are both acute. In comparison to *J. bahiensis*, even though this species has pubescent sepals, its trichomes are usually (3)–4–5-armed and stipitate, and its sepals are equal and ovate to orbicular. In relation to the differences in sepal size, in *J. glaucescens* the outer sepals are shorter, in *J. diamantinensis* the inner sepals are slightly shorter and in *J. bahiensis* all of the sepals are equal or the outer ones are slightly shorter. Two other characters that distinguish *J. diamantinensis* from *J. glaucescens* and *J. bahiensis* are the shape of its stigmatic lobes, which are oval-flat instead of cylindrical, and its seeds that lack a lateral ridge (Table 1).

Additional specimens examined (paratypes)

Brasil. Bahia: Andaraí, 5 km south of Andaraí, 12°50'S, 41°19'W, 19 Feb 1977, R. Harley et al. 18892 (NY, K); Andaraí, near Rio Piaba, 12°48'S, 41°19'48''W, 16 Feb 2009, M.T. Buril et al. 246 (UFP); Andaraí, Ruínas path, 12°48'S, 41°18'W, 26 Jun 2009, M.T. Buril et al. 387 (UFP); Andaraí, road ca. 2 km to Igatu, 12°54'S, 41°18'W, 20 May 2004, M.T. Costa et al. 765 (HUEFS); Andaraí, 7 Dec 1998, A. Furlan et al. CFCE 460 (HUEFS, SPF); Lençóis, Rio São José, 29 Jul 1998, R. Funch 111 (HUEFS); Lençóis, 4 Jul 1998, P. F. Oliveira and R. C. Araújo 2 (HUEFS); Lençóis, 12°33'52''S, 41°24'6''W, 470 m alt., 4 Aug 2004, R. Funch 1603 et al. (HUEFS); Mucugê, road Andaraí-Mucugê, near to Rio Paraguaçu, 21 Jul 1981, R. Pirani et al. CFCE 1613 (NY, SPF).

Etymology

The epithet is in reference to the Chapada Diamantina, where this species is endemic.

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Simão-Bianchini, R. and Pirani, J.R. 2005. Duas novas espécies de Convolvulaceae de Minas Gerais, Brasil. – *Hoehnea* 32 (2): 295-300.

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(http://cals.arizona.edu/herbarium/sites/cals.arizona.edu/herbarium/files/old_site/assoc/projects/convolv/Convolvulaceae_Pollen_Atlas.htm)

Table 1: Character comparison between *Jacquemontia diamantinensis* and related species.

	<i>J. diamantinensis</i>	<i>J. glaucescens</i>	<i>J. bahiensis</i>
Trichomes	8-9-armed, appressed	(6) –8–(10)-armed, appressed	3-4-(5)-armed, stipitate
Apex of outer sepals	Slightly acute, mucronate	Rounded	Rounded, mucronate
Apex of inner sepals	Acute	Cordate	Rounded, mucronate
Sepal size comparison	Inner ones slightly shorter	Outer ones shorter	Equal or outer ones slightly shorter
Sepal indument	Pubescent	Glabrous to glabrescente in the middle region	Pubescent
Stigmatic lobes	Oval-flattened	Cylindrical	Cylindrical
Lateral ridge of seeds	Absent	Present	Present

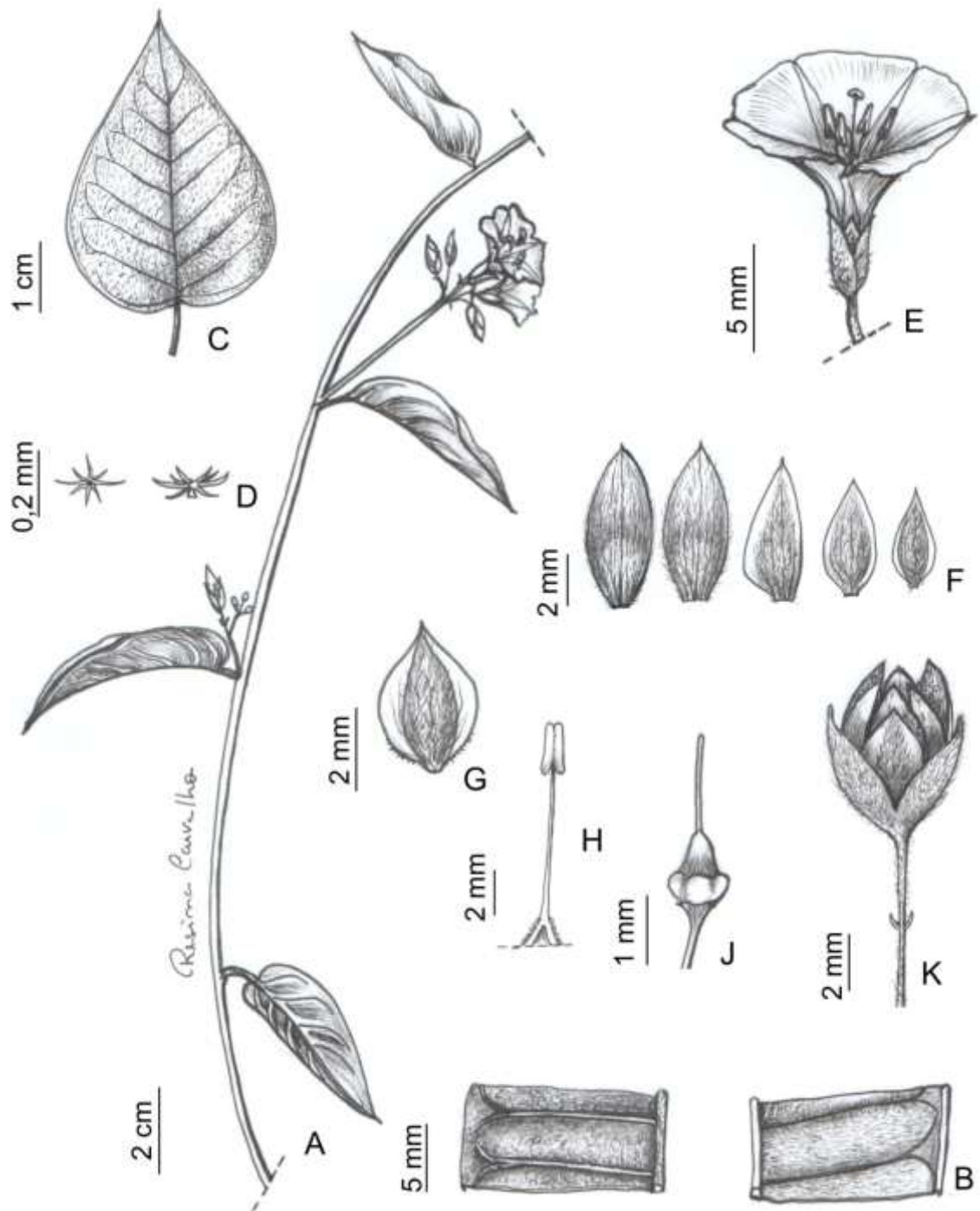


Figure 1: *Jacquemontia diamantinensis*. A. fertile branch; B. abaxial and adaxial view of leaves (from left to right). C. leaf; D. trichomes; E. lateral view of flower; F. sepals (outer to inner, from left to right); G. inner sepal completely extended; H. stamen; J. ovary; K. fruit; Drawing based on the holotype.

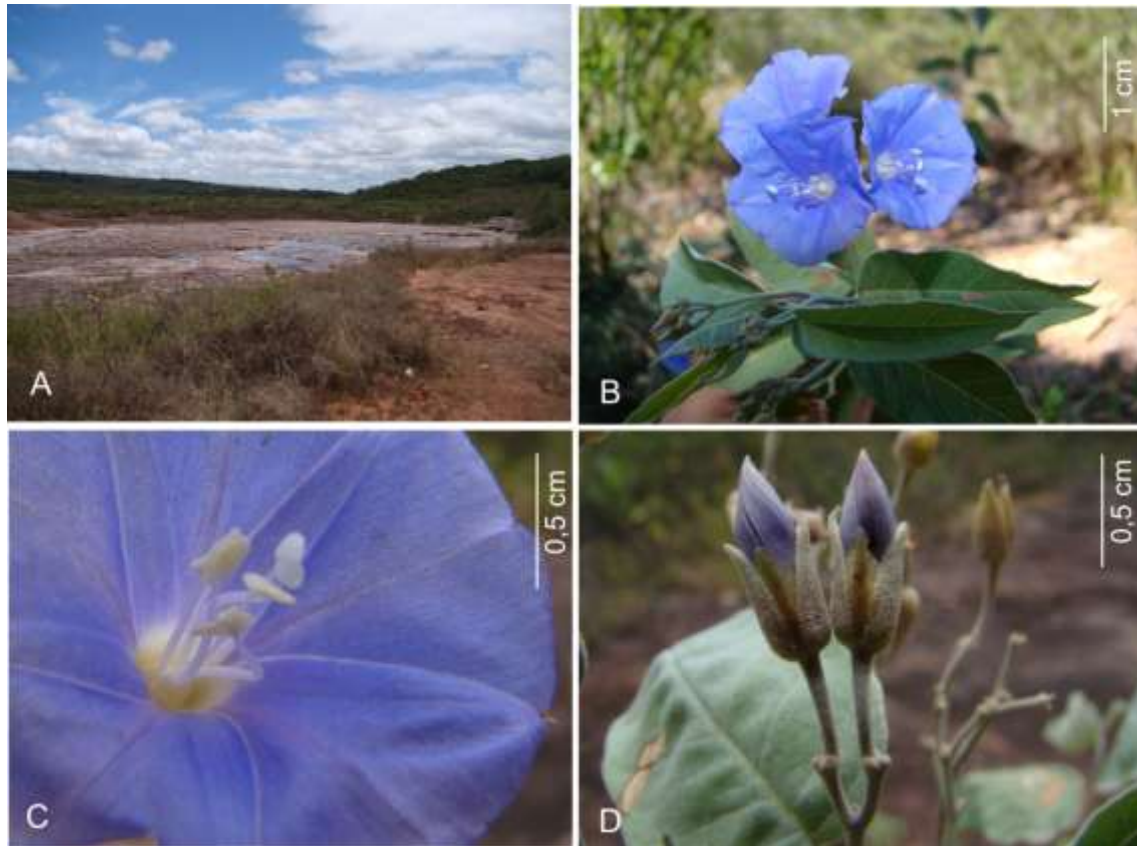


Figure 2: A. Rio Piaba (Andaraí, Bahia), one of the localities where *J. diamantinensis* is found; B. Inflorescence; C. Details of stamen and stigmatic lobes; D. Detail of sepals on floral buds.

Two new species of *Jacquemontia* Choisy (Convolvulaceae) endemic to Bahia, Brazil

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PHYTOTAXA 69: 27-32. 2012.

Two new species of *Jacquemontia* Choisy (Convolvulaceae) endemic to Bahia, Brazil

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Abstract

Two new shrub *Jacquemontia* (*J. staplesii*, *J. grisea*), endemic to Bahia, Brazil, are described. Their morphological affinities are discussed and illustrations are provided.

Key words: taxonomy, species richness, Campos rupestres, Chapada Diamantina, Espinhaço range

Introduction

Jacquemontia Choisy is mostly found in tropical America, with fewer species in tropical Asia, Australia and Africa. The genus is recognized mainly by the following: (1) stellate or T-shaped trichomes; (2) glabrous, 2-locular, 4-ovulate ovaries; (3) a single 2-lobed style, which usually has flattened, oval lobes; and (4) capsules, mostly with 8 valves. This genus comprises around 120 species (Staples & Brummitt 2007, Staples et al. 2008) and 59 names are recognized as occurring in Brazil (Bianchini & Ferreira 2012). The Brazilian species are found in a variety of vegetation types, but the highest richness and endemism occurs in savannah-like vegetation, such as the cerrado, caatinga and chaco.

Jacquemontia was established in 1834 by Choisy who transferred species from *Ipomoea* L. and *Convolvulus* L., due to the distinctive morphology of stigmatic lobes. In 1869 Meissner recognized 33 species on Flora Brasiliensis and also described three sections based on the inflorescence structure. After that, Hallier (1893) on his wide study on the family Convolvulaceae, made several new combinations to *Jacquemontia*.

During the revision of genus *Evolvulus*, Ooststroom (1934) found some specimens that were incorrectly identified under *Evolvulus* and were morphologically similar to species in this genus because they were shrubs with oval, small leaves, and small and blue flowers. However, these specimens clearly belonged to *Jacquemontia*, due to their entire styles, oval stigmatic lobes and stellate trichomes. Based on these findings, Ooststroom described three new species (*J. decipiens*, *J. hallieriana* and *J. villosissima*) in 1936, and delimited the section Capituliflorae.

The most recent taxonomic treatment of the genus was carried on by Robertson (1971), who revised the species from North and Central America. Regarding the Brazilian species, since Flora Brasiliensis, the genus has been treated in new species descriptions (O'Donnell 1950, O'Donnell 1953, Simão-Bianchini 1999, Simão-Bianchini & Pirani 2005, Krapovickas 2009, Buril & Alves 2011a, Buril et al. 2012) and in local floras (Austin and Cavalcante 1982, Simão-Bianchini 1995, 2009, Simão-Bianchini & Pirani 1997, Buril & Alves 2011b).

During an ongoing revision of the Brazilian taxa, two new shrubby species from Bahia were discovered. The specimens were often included among *Evolvulus* sheets in herbaria or misidentified as *Jacquemontia decipiens* or *J. hallieriana*, which belongs to the group of species described by Van Ooststroom (1936).

Taxonomic Treatment

***Jacquemontia grisea* Buril, sp. nov., Fig. 1 A–E**

Type: — BRAZIL. Bahia: Barra da Estiva, Road on direction to Fazenda Brejões, 13°34'41''S 41°23'41''W, 1236 m alt., 3 July 2004, *E. R. de Souza & M.N.S. Stapf 473* (fl.) (holotype HUEFS, isotype SP).

Perennial shrubs, ca. 50 cm height, erect, few branched, vilose, hoary; trichomes T-shaped, one of the arms ca. 3mm long; internodes 1–5 mm long, leaves densely imbricate on the apex of the branches, articulated branches. *Leaf blades* 1–2.4 × 0.5–1 cm, chartaceous, entire, elliptic, ovate or obovate, the base rounded to cuneate, the apex acute to slightly acuminate, densely vilose, silver grayish sometimes tending to bluish, veins obscured by indumentums; sessile. *Inflorescences* capitulliform cymes, up to 5-flowered, sessile, globose, terminal; bracteoles ca. 7 mm long, falcate to linear, densely villose; pedicels ca. 1 mm long. *Sepals* unequal, membranaceous, entire, the 2 outer 7–8 × 2.5–3 mm, oblanceolate, the base cuneate, the apex acuminate, vilose, middle one ca. 7 × 2 mm, asymmetric, the 2 inner ca. 6 × 1.5 mm, lanceolate, the base truncate, the apex acute, pubescent mostly on the middle region; corolla 1.2–1.5 cm long, funnelform, blue, slightly lobate, midpetaline line pubescent; stamens heterandrous, 2 longer ca. 1 cm long, 3 shorter ca. 7 mm long, filaments with short trichomes on the base, anthers elliptic, ca. 1.5 mm long, base subcordate, apex rounded, anthers oblong, ca. 1 mm long, white; nectary present, ovary ca. 1 mm long, oblong, glabrous, 2-locular, 2 ovules per locule, style ca. 1 cm long, stigmatic lobes 0.5 mm long, oval-flat. *Fruits* not seen.

Habitat, Distribution and Conservation: — Endemic to Brazil, this species is known only from the Espinhaço Range, in the state of Bahia (map 1), and occurs in campos rupestres and cerrado vegetation. Due to insufficient data about population size, *J. grisea* should be considered as Data Deficient (DD) according to the IUCN criteria.

Etymology: — The epithet *grisea* (from Latin), refers to the pure greyish (sometimes verging on bluish) colour of its leaves, which is apparent on live plants or dried specimens.

Observations: — *Jacquemontia grisea* is similar to *Jacquemontia decipiens* Ooststr. which is endemic to the southern part of the Espinhaço Range in the state of Minas Gerais. They differs by the presence of T-shaped and very long trichomes (vs. 5-6-armed trichomes in *J. decipiens*) and capitulliform, multi-flowered inflorescences (vs. inflorescences with up to 7 flowers, and sometimes a few axillary flowers, in *J. decipiens*). In addition, bracts occur in *J. grisea* but are absent in *J. decipiens*, and the outer sepals are oblanceolate in *J. grisea* (vs. lanceolate in *J. decipiens*).

Paratypes: — BRAZIL. Bahia: Abaíra, between Serra do Barbado and Serra da Itobira, 13°19'S 41°54'W, 1800 m alt., 20 October 1993, W. Ganev 2522 (fl.) (HUEFS!); Catolés, road Catolés to Boa Vista, 13°19'S 41°50'W, 1200 m alt., 23 July 1992, W. Ganev 710 (fl.) (HUEFS!, NY!); Mucugê, 12°58'S 51°20'W, 1000-1200 m, C.M. Pigozzo 54 (fl.) (HUEFS!).

***Jacquemontia staplesii* Buril, sp. nov., Fig. 1 F–J**

Type: — BRAZIL. Bahia: Lençóis, about 7-10 km, along the main Seabra-Itaberaba road, 41°26'S 12°28'S, 27 May 1980, R. M. Harley 22710 (fl.) (holotype SP!, isotypes SPF!, K!, NY!).

Perennial shrubs, ca. 40 cm high, erect, branched, lanate; trichomes T-shape, and 3–4-armed with the arms equal or unequal; internodes 4–8 mm long, leaves imbricate, densely imbricate on the apex of branches, hiding the inflorescences. *Leaf blades* 1.7–2.4 × 1.2–1.5 cm, chartaceous, entire, margins slightly revolute, ovate to orbicular, the base rounded to slightly cordate, the apex rounded to acute with a mucron, lanate,

discolorous, veins usually apparent on both surfaces; petiole 1–2 mm long.

Inflorescences umbelliform cymes, up to 17-flowered, sessile, usually terminal; bracteoles $0.5\text{--}1.5 \times 0.1\text{--}0.3$ cm, elliptic, margins sinuate, two per pedicel; pedicels ca. 2 mm long. *Sepals* unequal, membranaceous, pubescent, entire, the 2 outer $8\text{--}10 \times 1\text{--}2$ mm, linear to lanceolate, the base truncate to rounded, the apex caudate, slightly sinuate, the 3 inner 6×1.5 mm, lanceolate, the base rounded, the apex acuminate; corolla 1.2–1.5 cm long, funnelform, pale blue, slightly lobate, midpetaline line glabrescent; stamens heterandrous, 2 longer ca. 1 cm long, 3 shorter ca. 7 mm long, anthers sagittate, ca. 1 mm long, oblong, the base cordate; nectary present, ovary ca. 1 mm long, oblong, glabrous, 2-locular, 2 ovules per locule, style ca. 8 mm long, stigmatic lobes 0.5–1 mm long, oval-flat. *Fruits* not seen.

Distribution, Habitat and Conservation: — Endemic to Brazil in the Espinhaço Range, in the Chapada Diamantina, Bahia (map 1). Occurs in caatinga vegetation. Since there are no data on abundance, this species should be considered as data deficient (DD) according to the IUCN criteria.

Etymology: — The epithet honours Dr. George Staples III, specialist in Convolvulaceae, who contributed to the taxonomic revision of Brazilian species of *Jacquemontia*.

Observations: — In Brazilian herbaria, specimens of this species were found misidentified as *J. hallieriana* Ooststr. However, *J. staplesii* and *J. hallieriana* are significantly different based on the closely imbricate leaves that hide the inflorescences at the apices of the branches in *J. staplesii*, versus *J. hallieriana*, which has longer internodes (1.5 cm) that exposes the inflorescences. Moreover, the leaves in *J. hallieriana* are larger (ca. 6×4 cm) and its outer sepals are slightly rhombic. The type of *J. hallieriana* seems to have shorter petioles, with almost sessile leaves.

Paratypes: — BRAZIL. Bahia: Abaíra, Riacho do Piçarrão de Osmar Campos, $13^{\circ}23'S$ $41^{\circ}48'W$, 1000–1300 m alt., 8 May 1994, W. Ganey 3226 (fl.) (HUEFS!, NY!); Abaíra, Catolés, Samambaia, Cabeceira da Samambaia, $13^{\circ}19'S$ $41^{\circ}51'W$, 1 June 2003, A. S. Conceição, M.J.G. Andrade and M. V. Moraes 617 (fl.) (HUEFS!); Lençóis, valley of Mucugezinho river, $12^{\circ}27'48''S$ $41^{\circ}25'6''W$, 486 m alt., 18 September 2002, L.P. de Queiroz 7431 (fl.) (HUEFS!).

Identification key for *Jacquemontia* species with imbricate leaves (internodes <1.5 cm)

1. Plants glabrous..... *J. rojasiana* O'Donell
 - Plants pubescent
2. Leaves with the apex caudate, mainly on the terminal branches
 *J. robertsoniana* Buril
 - Leaves with the apex acute, acuminate, mucronate, rarely rounded, never becoming caudate on leaves on the terminal branches
3. Indument villose, with only trichomes T-shaped on the leaves, hoary, silver sometimes tending to blue or yellow *J. grisea* sp. nov.
 - Indument velutinous or lanate, with T-shape, 3–8-armed trichomes, usually yellowish, sometimes greyish
4. Bracts 0.5–1.5 cm long, elliptic, margins sinuate, trichomes 3–4-armed
 *J. staplesii* sp. nov.
 - Bracts absent, when present linear, reaching 0.5 cm long, trichomes 5–8-armed
5. Secondary and tertiary nerves obscured by pubescence on either leaf surface, 5–6-armed trichomes... *J. decipiens* Ooststr.
 - Secondary and tertiary nerves not obscured by pubescence on abaxial surface, 8-armed trichomes..... *J. ochracea* Sim.-Bianch. & Pirani

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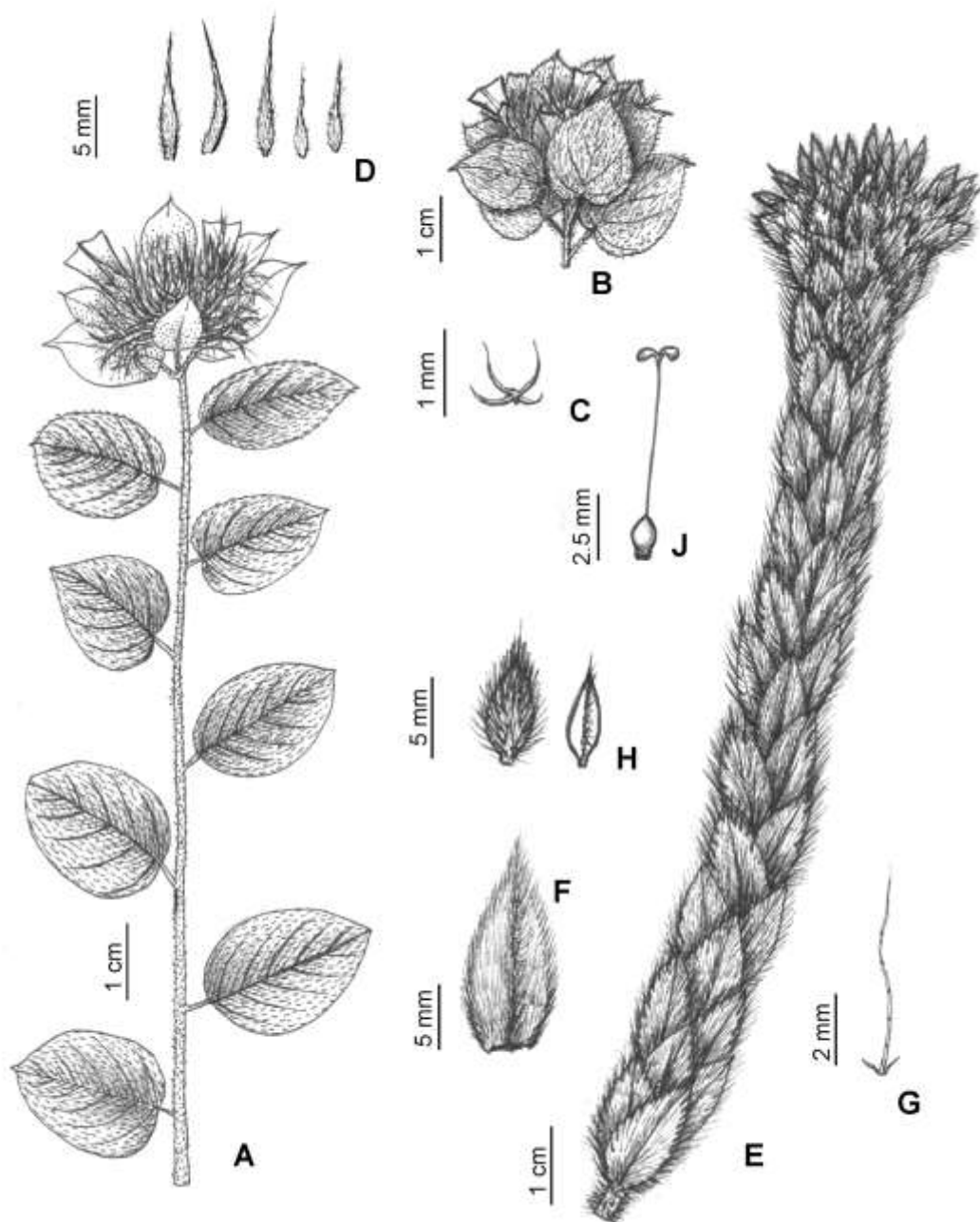
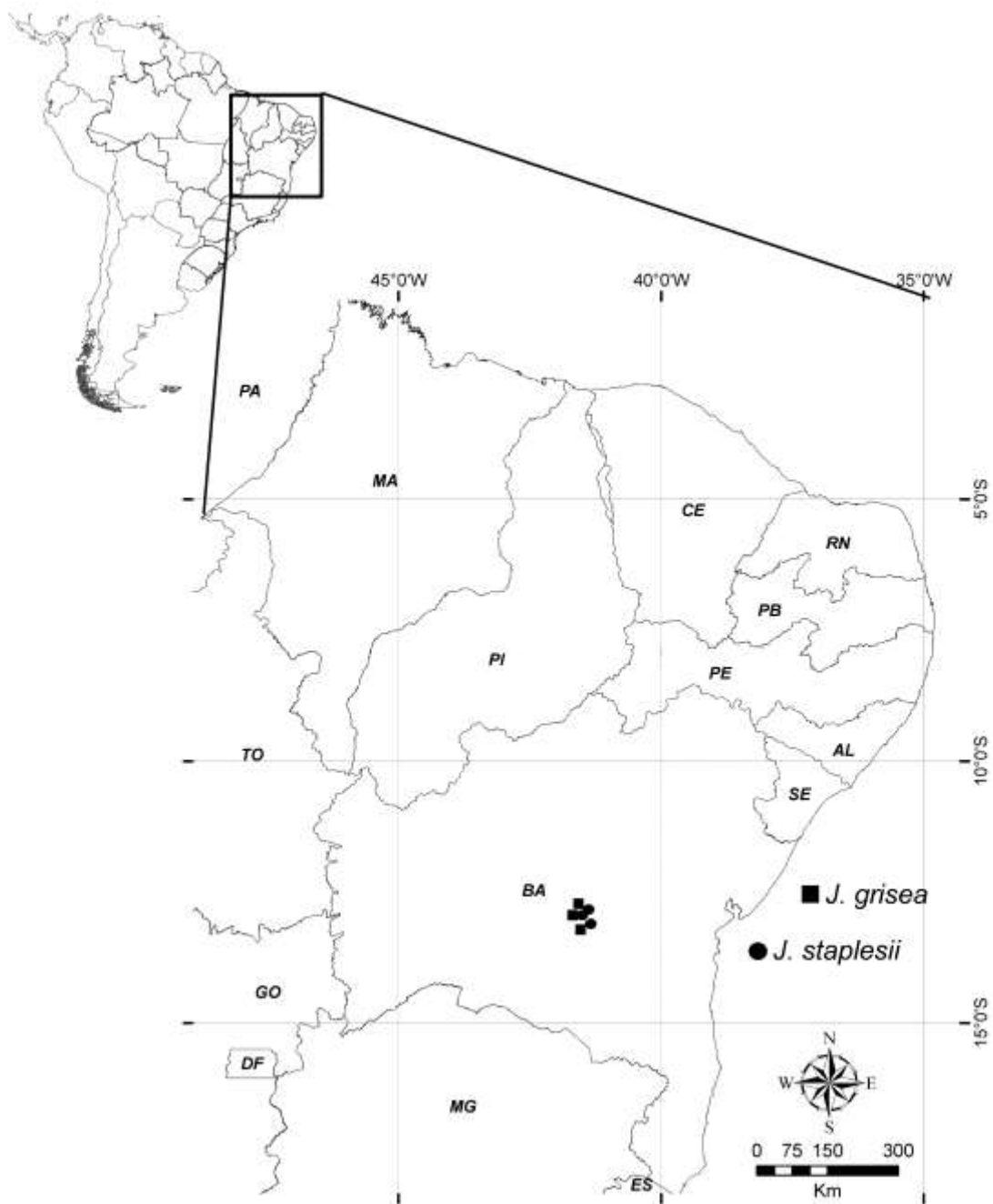


FIGURE 1. A – E. *Jacquemontia grisea*. A. habit; B. leaf; C. trichome; D. sepals, on left the outer one, on right the inner one; E. gynoecium (drawn from the holotype *E. R. de Souza & M.N.S. Stapf* 473); F – J. *Jacquemontia staplesii*. F. habit; G. inflorescence enclosed by leaves; H. trichome; J. sepals, from left to right the outer to the inner (drawn from the holotype *R. M. Harley* 22710).



Map 1. Occurrence area of *Jacquemontia grisea* and *Jacquemontia staplesii*.

Taxonomic revision of *Jaquemontia* (Convolvulaceae) from Brazil

M. T. BURIL AND M. ALVES

A SER SUBMETIDO AO PERIÓDICO PHYTOTAXA

Taxonomic revision of *Jacquemontia* (Convolvulaceae) from Brazil

Maria Teresa Buril & Marccus Alves

Introduction

Jacquemontia Choisy is one of the largest genera in Convolvulaceae, ca. 120 species. And has always being considered as one of the most troublesomes (Robertson, 1982). The distribution of *Jacquemontia* is primarily in the Neotropics, with only a few species occurring in Paleotropics (Staples & Brummitt, 2005). To Brazil, Bianchini & Ferreira (2012) recognized 58 names, of which 38 are endemic. This number also represents ca. of 20% of all family richness identified to Brazil (ca. 290 names).

The genus was established in 1834 by Choisy, who segregate some species from *Ipomoea* L. and *Convolvulus* L., based on oval-flattened stigmatic lobes shape, while globose and filiform in the other, respectively. In the following years (1837, 1845), Choisy transfered and described new species under the genus.

The first extended revisionary study was the Flora Brasiliensis developed by Meissner (1869). He referred to 33 species, and established three sections which are still in use. *Jacquemontia* sect. *Cymosae* includes most of the species and is characterized by umbelliform cymes with 5-more flowers; *J.* sect. *Capitatae* combines plants with capituliform cymes, flowers sessiles or subsessiles, and bracts underlying; and *J.* sect. *Anomala* (= *Heterogeneae*), the species with peduncle axilar with 1–3 flowers similar to racemous. After that, Hallier (1893) gave an important contribution to the genus taxonomy, suggesting several new combinations. On this work he also provided a generic description and adding anatomical and palynological data. Regarding the subgeneric classification, van Ooststroom (1936) described the new section Capituliflorae, including the species with capitulliform and terminal cymes.

In 1952, Roberty, based mostly on corolla shape, divided the genus in two subgenus: *Eujaquemontia*, with entire corollas, and *Schizojaquemontia*, with deeply

lobate corollas. He also segregated some species to compose a new genus *Montejacquia*, proposing the sinonimization of several valid species. His unrealistic taxonomic concept has not been adopted for subsequent works.

The most recent taxonomic treatment was carried out by Robertson (1971) who added in species of Caribbean and North and Central Americas, with only a few species widely distributed included. He considered a narrower concept for *Jacquemontia* delimitation, when compared to previous taxonomists. Because of this, he also suggested that many species should be excluded or placed in different genera. In 1982, based on pollen morphology, and also on the presence of simple trichomes, instead of stellate ones, he described a new genus, *Odonellia*, to set two *Jacquemontia* species.

Since then, the genus has only been treated in several local floras, and the Brazilian species were included in some of them, worth mentioning the following: Hoehne (1922), O'Donnell (1941, 1950a, 1952b, 1953, 1960a), Falcão (1968, 1969), Falcão & Falcão (1977, 1980, 1984) Austin & Cavalcante (1982), Bianchini & Pirani (1997), Austin (1998b), Bianchini (2001), Simão-Bianchini (2009), Vital (2009). Other relevant works to the knowledge of Brazilian diversity of *Jacquemontia* are the descriptions of new taxa.

Taxonomic relationship: from morphology to phylogenetic discussion

Based on syncarpous ovaries and dehiscent capsules, Choisy considered *Jacquemontia* closely related to *Convolvulus* and *Ipomoea*, and delimited the tribe Convolvulae. Many other researchers followed this concept (as Meissner 1869, Bentham & Hooker 1876, Peter 1897). Hallier (1893), proposed a classification for Convolvulaceae, based primarily on pollen morphology, and the delimitation of tribes were founded on characters of the inflorescence, ovary, style, and fruit. He included *Jacquemontia* in tribe Convolvuleae, along with *Convolvulus*, *Calystegia*, *Aniseia*, *Hewittia*, *Polymeria*, *Merremia*, and *Operculina*.

Austin (1973) related *Jacquemontia* to *Calystegia*, *Convolvulus* and *Polymeria*, confirming his hypothesis years later (1998a) on a cladistic study on morphological data base. To Robertson (1971), besides being related to *Convolvulus* could also be compared to *Evolvulus*, because of its pollen apertural pattern (15-colpate, with the

colpi organized in pentagons). Tellería & Danners (2003) found out that both 15-colpate and 3-colpate pollen occurred in *Jacquemontia*. This discovery questioned the classification system adopted.

With the advance of pylogenetic studies in Convolvulaceae, was demonstrated the uncertain placement of *Jacquemontia*. According to Stefanovic et al. (2003), *Jacquemontia* was closely positioned to the clade “Dicranostyloideae” (as *Evolvulus*, *Bonamia* and *Maripa*), or the clade with bifid styles. Even though *Jacquemontia* do not presents this characteristic and this relationship was not strongly supported on this first study, one year later, Stefanovic and Olmstead (2004) improving the analysis with further molecular markers, found an unique and consistent molecular synapomorphie to support the hypothesis that *Jacquemontia* is the sister group of the “bifid style” clade. Even though the generic relationship seems to be more resolved, those studies aroused a series of other evolution issues on *Jacquemontia*, as the interespecif relationship. Recent molecular studies are advancing on these issues (Elsam 2008, Namoff et al. 2007, Namoff et al. 2010).

Material and Methods

This study was carried out through both field trips and herbarium collections analysis. The field trips were directed mostly to areas from Brazilian Semi-arid region, considered as a diversity center of the genus. The vouchers collected were incorporated to the Herbarium UFP with duplicates, always as possible, distributed to HUEFS, BM and NY (acronyms according with Thiers 2009).

Herbaria analysis – The following herbaria collections were analysed: ASE, MAC, UFP, HST, IPA, PEUFR, HVASF, JPB, UFRN, EAC, HURCA, TEPB, HUEFS, CEPEC, ALCB, RB, SP, SPF, SPSF, HRCB, FLOR, BHCB, DIAM, INPA, MG, CEN, UB, P, G, K, FHO, F*, BM, B*, BR, M, NY, US*, MO, SING. The marked ones were consulted by virtual collections. The types specimen seen are marked with an “!” symbol.

Species comments – The geographic distribution and conservation status is based mainly on the herbarium data and on specific literature (Robertson, 1971). Always as possible comments based on field observations were made.

Selected specimen analysed – The specimens selected were based on the geographical distribution. Usually were cited two or three specimens to each vegetation type where they are found (caatinga, cerrado, atlantic forest, amazon or campos). The morphological variation was also considered on the selection. On that species that occurs in only one vegetation type, five specimens were cited. In case of a very restricted distribution (e.g. known only to the same locality), three specimens were cited, when existing. The species with less than three or with no additional specimens cited are those known only by the *typus*, or the specimens cited on the protologue were not found.

TAXONOMIC TREATMENT

Jacquemontia Choisy, Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 6: 476. 1834.

Lectotype species: *Convolvulus pentanthos* Jacqu. = *J. pentanthos* (Jacq.) G. Don; selected by Lindley (1847); also see D'Arcy (1970).

Perennial or annual vines, herbs or shrubs, with climbing, decumbent, prostrate, or erect stems; stems herbaceous or usually woody on the base, rarely rooting at the nodes. Pubescence of 2- to 12-armed stellate, the arms equal or unequal, rarely T-shaped trichomes, uni to multicellular glandular trichomes sometimes also present; density of trichomes varying from glabrous to densely overlapping on stems, leaves, peduncles, pedicels, and sepals. *Leaves* alternate, usually petiolate, rarely congested; margins entire or slightly repand and undulate, flat, rarely revolute; blades variable, linear to elliptic, usually ovate, or subcircular; acuminate to obtuse or obcordate apices; and cuneate, obtuse, truncate, or cordate bases; greenish, sometimes grayish, silver, yellowish or ferruginous when dried. *Synflorescences* polytelic tyrse, rare monotelic,

floescences variously, axillary, rarely terminal cymes, dichasium lax or condensed, monochasium lax, or reduced to a single flower; bracts scale form to large and sepaloïd or foliaceous; peduncles various, to nearly absent and the floescence then sessile, in several species depends on the availability of light on the ambient; pedicels elongate to nearly absent. *Flowers* mostly blue, white, lilac, or rarely pinkish; sepals 5, persistent, equal or unequal, often dimorphic with the 2 outer, middle, and 2 inner sepals having distinct morphologies, from lanceolate to elliptic, ovate, obovate, asymmetric, or orbicular, with obtuse to long acuminate apices and rounded to cordate or cuneate bases; corollas funnellform, campanulate, or rotate, entire, shallowly to deeply 5-lobed, the midpetaline lines prominent, glabrous, ciliate or sparsely pubescent on adaxial face; stamens 5, alternate with the corolla lobes, equal or unequal, usually included but sometimes exserted are found, the bases of the filaments adnate to the corolla tube, flattened, usually pubescent, the anthers introrse; pollen smooth, 3–15-colpate; ovaries 2-locular, each locule with 2 anatropous ovules, the disk small, surrounding the base of the ovary, entire or lobate, sometimes not apparent, the style 1, unbranched, the stigmas 2-lobed, each lobe mostly ellipsoid, flattened. *Capsules* dehiscent by 4 or 8 valves, subtended or enclosed by the persistent and sometimes acrescent sepals. Seeds usually 4, glabrous, usually trigonous in cross section with the outer face rounded and the lateral faces straight, minutely areolate and often verrucate, areolate, ruminate, or striate, the outer 2 margins often with a small wing or crest; embryos longiplicate or lati- longiplicate.

Morphological delimitation – The combination of the following characters can distinguishes *Jacquemontia* from other Convolvulaceae genera: Trichomes stellate or T-shaped (or derived from this condition); Corolla usually glabrous or with midpetaline line ciliate; Ovaries glabrous, 2 locular, 4-ovulate; style single, unbranched; Stigmas bilobed with each lobe dorsiventrally flattened and ellipsoid or cylindrical; Capsules dehiscent by usually 4 valves; and seed glabrous, smooth or textured, the outer margins often with a narrow wing.

Brazilian species – Are presented 50 Brazilian species of *Jacquemontia*. This number is not far from the list published by Bianchini & Ferreira (2012). But, in fact, 42 species

matches with this list, and the other names has been synonymized or excluded and new species or new references to Brazil has been incorporated.

Key for Brazilian species of *Jacquemontia*

1. Glandular trichomes (fig 2 j) present on branches, peduncles, pedicels and sepals
 2. Vines. Inflorescences compound dichasium, loose, 3–15-flowers ***J. sphaerostigma***
 - 2'. Erect, climbing, prostrate or decumbent herbs to shrubs. Florescences monochasium, loose, with 2-4-(6) flowers, rare solitary flowers or simple dichasium 1–3 flowered
 3. Fertile leaves, or bracts, very reduced, ca. 5 mm long, linear to lanceolate, resembling bracts, and the entire branch fertile resembles a panicle..... ***J. racemosa***
 - 3'. Fertile leaves, or bracts, not differentiated, they shaped ovate, obovate, rotund, elliptic to lanceolate
 4. Leaves base cuneate..... ***J. guaranitica***
 - 4'. Leaves base rounded, cordate to truncate
 5. Erect shrubs, often ferrugineous when dried, peduncle 0.3–2.8 cm long, bracteoles elliptic, 2.5–8 x 1.5–2 mm ***J. fruticulosa***
 - 5'. Prostrate or climbing herbs, greenish when dried, peduncle 0.8–12 cm long, bracteoles usually absent, or linear 1–2.5 mm long
 6. Corolla white, ca. 2 cm long, peduncle 0.8–3.8 cm long..... ***J. decumbens***
 - 6'. Corolla blue, 0.7–1.5(1.8) cm, peduncle 1.8 – 12 cm long..... ***J. agrestis***

1'. Glandular trichomes absent

7. Florescences short-pedunculate, peduncle ≤ 1.5 cm long.

8. Florescences with foliaceous outer bracteoles (fig 3 b), hiding the corolla..... ***J. estrellensis***

8'. Florescences with outer bracteoles various shaped, never foliaceous, not hiding the corolla

9. Leaves congested (fig 2 f), internodes shorter than 1.5 cm

10. Plants glabrous..... ***J. rojasiana***

10'. Plants with various types of indument

11. Leaves on the apex of the branches with the apex caudate, mainly on the terminal branches..... ***J. robertsoniana***

11'. Leaves on the apex of the branches with the apex acute, acuminate, mucronate, rare rounded

12. Indument vilose, with T-shape trichomes, hoary, silver sometimes tending to blue or yellow ***J. grisea***

12'. Indument velutinous or lanate, without T-shape trichomes

13. Bracteoles 0.5–1.5 cm long, elliptic, margins sinuate, trichomes 3-armed..... ***J. staplesii***

13'. Bracteoles absent, when present linear, until 0.5 cm long, trichomes 5–8-armed

14. Nervures not apparent on leaves, 5–6-armed trichomes...
..... ***J. decipiens***

14'. Nervures apparent on abaxial face, 8-armed trichomes
..... ***J. ochracea***

9'. Leaves not congested, internodes usually longer than 1.5 cm

15. Florescences terminal
16. Trichomes T-shape, nervures not apparent..... *J. vilosissima*
- 16' Trichomes 3-armed, with the arms equal or subequal, nervures
apparent..... *J. cephalantha*
- 15'. Florescences axillary or very condensed on the terminal branches,
resembling a terminal one (fig 6 e)
17. Vines, leaves with the base usually cordate or rounded
18. Leaves glabrescent, outer sepals oblong, with the apex rounded,
ticker and repand, resembling a rostrum..... *J. subsessilis*
- 18'. Leaves velutinous, rare glabrescent, outer sepals ovate to rotund,
with the apex rounded to acute..... *J. nodiflora*
- 17'. Shrubs, erect stems
19. Sepals glabrous..... *J. spicaeflora*
- 19'. Sepals velutinous to lanate
20. Bracteoles linear to elliptic, 1–1.5 cm long, sepals lanceolate,
membranaceous..... *J. sphaerocephala*
- 20'. Bracteoles linear, ca. 1 mm long, sepals oblong,
chartaceous..... *J. fusca*
- 7' Florescences long-pedunculate, peduncles > 1.5mm long.
21. Leaves membranaceous, glabrescent to pubescent, attenuate, elliptic,
lanceolate, linear, obelliptic, oblongs, obovate, rare ovate
22. Branches hirsute, with T-shape trichomes present
23. Leaves narrowly to broadly ovate, rare elliptic to lanceolate, or rotund,
with the base cordate, rare rounded to subtruncate; florescence
monochasium, loose, similar to a racemous, 2–4(-6)-flowered..... *J.*
agrestis

- 23'. Leaves obovate to elliptic, with the base cuneate; florescence simple
dichasium, 1–3-flowered..... ***J. guaranitica***
- 22'. Branches glabrescent to pubescent, never hirsute, T-shape trichomes
absent
24. Florescences dichasium (fig 2 e)
25. Outer sepals rhombic to oblanceolate, the base truncate.... ***J. linarioides***
- 25'. Outer sepals ovate, the base rounded to slightly cordate..... ***J. selloi***
- 24'. Florescences monochasium, loose (fig 2 j)
26. Sepals equal or subequal
27. Leaves margins revolute..... ***J. revoluta***
- 27'. Leaves margins flat..... ***J. linoides***
- 26'. Sepals unequal, the two outer larger, one middle asymmetric
28. Outer sepals deltoid, the base commonly cordate, rare rounded;
flowers white..... ***J. gracillima***
- 28'. Outer sepals ovate, the base slightly cordate; flowers
blue..... ***J. cuyabana***
- 21'. Leaves chartaceous, with various indument types, usually ovate, rotund, rare
lanceolate or elliptic
29. Florescences with bracteoles foliaceous or various shaped, longer or on the
same size of outer sepals
30. Florescences with foliaceous (similar to the leaves) outer bracteoles
31. Plants densely velutinous, rare pubescent, ferrugineous when
dried, bracteoles velutinous, sepals unequal..... ***J. ferruginea***
- 31'. Plants glabrescent to pubescent, greenish when dried, bracteoles
densely hirsute, sepals equal..... ***J. tamnifolia***

30'. Florescences with outer bracteoles with various shapes, but never foliaceous

32. Bracteoles lanceolate to ovate, with the apex caudate and sinuate margins..... ***J. choisyana***

32'. Bracteoles elliptic, oblanceolate, linear or subcircular, with the apex acute to acuminate

33. Plants usually pubescent, ferrugineous when dried

34. Leaves elliptic, adaxial face usually serous..... ***J. capitellata***

34'. Leaves lanceolate, ovate to rotund, adaxial face usually pubescent

35. Shrubs, erect or decumbent stems, outer sepals lanceolate, the base rounded to aequilateral, the apex acuminate to acute..... ***J. lasiocladus***

35'. Vines, outer sepals rhombic to obovate, the base cuneate, concave, the apex abruptly acuminate..... ***J. ferruginea***
var. ambigua

33'. Plants usually glabrescent to pubescent, greenish when dried

36. Bracteoles broadly ovate to subcircular, the base truncate or cordate..... ***J. pycnocephala***

36'. Bracteoles oblanceolate, rhombic, rare linear..... ***J. pentanthos***

29'. Florescences with bracteoles absent, or present linear to ovate, but shorter than the outer sepals

37. Outer sepals with the base cordate to subcordate

38. Florescence compound dichasium, loose, 3–25-flowered.....
J. bifida

- 38'. Florescence monochasium or simple dichasium, (1)–2(3–4)-flowered
39. Herbs, climbing stems, outer sepals 5.5–7.5 mm long..... *J. heterantha*
- 39'. Shrubs, erect stems, outer sepals 1.2–1.8 cm long..... *J. macrocalyx*
- 37'. Outer sepals with the base rounded, truncate, cuneate or aequilateral
40. Trichomes appressed
41. Outer sepals oblong, the base rounded to aequilateral, the apex slightly acute, mucronate, densely pubescent..... *J. diamantinensis*
- 41'. Outer sepals rotund, the base cuneate to rounded, the apex rounded, glabrous to pubescent on the medium region or concentrated on the base..... *J. glaucescens*
- 40'. Trichomes pedunculate, not appressed
42. Inner sepals with the apex cordate
43. Outer sepals glabrous or with trichomes restrict to the middle region, inner sepals ciliate..... *J. holosericea*
- 43'. Outer sepals pubescent, inner sepals glabrous or with trichomes restrict to the middle region *J. bahiensis*
- 42'. Inner sepals with the apex acute, acuminate or rounded
44. Sepals membranaceous
45. Trichomes 4–7-armed..... *J. unilateralis*
- 45'. Trichomes 3-armed
46. Outer sepals lanceolate to obelliptic, rare ovate; florescence often loose..... *J. corymbulosa*
- 46'. Outer sepals rhombic to obovate ; inflorescence often condensed, sometimes loose

47. Midpetaline line ciliate; outer sepals with apex abruptly acuminate..... ***J. ferruginea***
- 47'. Midpetaline line pubescent; outer sepals with apex acute to acuminate..... ***J. guyanensis***
- 44'. Sepals chartaceous or coriaceous
48. Florescences monochasium 1-3 flora, resembling a racemous, occasionally dichasial, but with no more than 3 flowers; shrubs erect or ascending stems..... ***J. gracilis***
- 48'. Florescences dichasium, umbelliform, frequently with more than 5 flowers; vines
49. Sepals glabrous
50. Outer sepals slightly longer than the inner ones, with the apex acute or acuminate, reflexed..... ***J. martii***
- 50'. Outer sepals shorter than the inner ones, with the apex rounded or acute, straight
51. Leaves densely velutinous..... ***J. uleana***
- 51'. Leaves glabrescente to pubescent..... ***J. blanchetii***
- 49'. Sepals with various types of indument
52. Trichomes 5(–7)-armed; outer sepals velutinous ***J. chrysanthera***
- 52'. Trichomes 3-(4)-armed; outer sepals velutinous, pubescent or ciliate
53. Sepals equal in shape and size, lanceolate to obovate, ciliate..... ***J. ciliata***
- 53'. Sepals equal in size, the outer ones ovate, velutinous to pubescent, the inner ones rotund with

extended escarious margins, the apex rounded with a mucron, ciliate..... *J. velutina*

1. *Jacquemontia agrestis* (Martius ex Choisy) Meisner (1869: 307). fig 1 a – c.

BASIONYM: *Convolvulus agrestis* Choisy (1837 405). TYPE: BRAZIL, Bahia: St. Francisc. prope Joazeiro, *Martius* (holotype M!).

Pro syn. J. agrestia

Jacquemontia erecta Choisy (1845: 396). TYPE: BRAZIL. Campis arenosis ad fluv. S. Francisco pr. Joazeiro, prov. Bahiense, *Martius*: *Hymadryas*. (lectotypus design. here: M!) *syn. nov.*

Jacquemontia evolvuloides var. *longipedunculata* Meisner (1869: 308). TYPE: BRAZIL. Brasiliae, prov. Piauhy et in campi pr. Joazeiro aliisque loci prov. Bahiense. Gardner 2250 (lectotypus design. here P!, K!, M!, SING!) *syn. nov.*

Jacquemontia palmeri S. Watson (1889: 63). TYPE: MEXICO. Sonora: in shade in the mountains about Guaymas, *Palmer* 221 (holotype US; isotypes C, GH, K!, NY!, UC).

Convolvulus secundiflorus Fernald (1897: 90). TYPE: MEXICO. Guerrero: vicinity of Acapulco, *Palmer* 32 (holotype GH; isotype MO!).

Jacquemontia palmeri var. *varians* Brandegees (1903: 170). TYPE: MEXICO. Baja California: W slopes of Cape Region Mountains, anno 1902, *Brandegee s.n.* (holotype UC; isotype US!).

Jacquemontia pauciflora Brandegees (1913: 384). TYPE: MEXICO. Vera Cruz: Baños del Carrizal, *Purpus* 6139 (holotype UC; isotypes F!, GH, MO!, NY!, US).

Jacquemontia diantha Urban (1924: 243). TYPE: CUBA. Oriente: Guantánamo, U. S. Naval Station, near the target practice, *Ekman* 10180 (holotype S; isotypes F!, G!, NY!).

Jacquemontia guatemalensis Standley & Steyermark (1944: 84). TYPE: GUATEMALA. Chiquimula: creeping among grasses on slopes of grassy plains about Chiquimula, alt 400 m, *Steyermark 30066* (F!).

Jacquemontia secundiflora (Fernald) O'Donell, Lilloa (1950b: 467–470. t. 5).

Syn. Nov.

Annual herbs, prostrate or climbing stems, erect when young, somewhat woody at the base, pubescent; trichomes of 3 kinds – glandular with a globose apical gland, rarely absent in adults individuals, peduncles and pedicels, 3-armed with the arms equal or almost equal, and T-shape; most plants with 3 kinds of trichomes, sometimes lacking the glandular ones; internodes 0.8–5.5 cm long. *Leaf blade* 0.8 – 4.5 x 0.6–4.2 cm, membranaceous, entire to sinuate, narrowly to broadly ovate, rare elliptic to lanceolate, or rotund, the base commonly cordate, rare rounded to subtruncate, the apex acute to acuminate or apiculate, glabrescent to pubescent, the base of trichomes usually in depressions of the leaf blade; petiole 0.3–1.5 cm long. *Florescence* monochasium, loose, 2–4(-6)-flowered; peduncles 1.8 – 12 cm long, axillary, pubescent; bracteoles 1–2.5 mm long, linear, one per pedicel, hispid, sometimes absent; pedicels 0.5–3 mm long. *Sepals* equal or subequal, membranaceous, 3–7 x 1–3 mm, ovate to lanceolate, the base rounded, the apex acuminate, pubescent to glabrescent, the inner commonly glabrescent, with all kinds of trichomes; corolla 0.7–1.5(1.8) cm long, subrotate with a very short tube, ca. 3 mm long, to funnelform, slightly lobate to entire, midpetaline line ciliate, blue with the tube vinaceous or sometimes white; anthers elliptic, ca. 1 mm long, white; nectary absent, ovary oblong, stigmatic lobes oval-flat, ca. 0.5 mm long. *Capsules* 8-valvar, subglobose, 4–5 mm diam.; seeds 2–3 mm long, areolate to verrucate.

Distribution, Habitat and conservation: — Widely distributed, occurs from the USA (state of Arizona), through Mexico, Central America, where is less common (Honduras, Nicaragua, Panamá, Cuba) to, until South America (from Venezuela to Argentina). It is usually found in open vegetation areas. In Brazil, common in the Northeast and Central Region, but can also be found in savanna spots in the Amazon and on borders of Atlantic Forest. Globally, *J. agrestis* can be included in the Least Concern category, but there are no data enough to evaluate it in a regional scale.

Comments: — This species has a wide morphological variability, and this resulted in several different taxonomic interpretations. Before Robertson (1971), those plants with glandular and stellate trichomes were identified as *J. secundiflora*, and those with only stellate trichomes under *J. agrestis* or *J. palmeri*. Meissner (1869) used *J. evolvuloides* and its three varieties to express the morphological variation under the name. Although but only two of them are related to *J. agrestis*. *J. evolvuloides* var. *tweddii* was reinstated as *J. heterotricha* by O'Donell (1950b). Austin (1982), suggested *J. agrestis* and *J. evolvuloides* as the same taxon. Thus, here is proposed the new synonym to *J. evolvuloides* var. *longipedunculata* Meisn., the only variety that remained on the taxa. Besides this, is also proposed the synonym to *J. erecta* Choisy, that by the analysis of the typus, is a young specimen already fertile of *J. agrestis*. Finally, the combination *J. secundiflora* (Fernald.) O'Donell is proposed as a new synonym following the synonym suggestion of Robertson (1971) for the basionym *C. secundiflorus* Fernald.

However, the morphological extremes plus their intermediates clearly do not support distinct species.

Selected specimens examined: — BAHIA. Jacobina, Estrada Ourolândia – Jacobina, 16.V.2009, M.T.Buril et al. 358 (UFP, HVASF); Mata de São João, Praia do Forte, 23.XI.2006, A.M.Miranda 5438 (HST); CEARÁ. Aiuaba, 30.V.1996, I.Bezerra-Loiola 183 (EAC); DISTRITO FEDERAL. Barragem do Paranoá, 19.V.1996, E.P.Heringer s.n. (UB, NY); PARAÍBA. São João do Cariri, 25.VI.2011, M.T.Buril et al. 502 (UFP); SERGIPE. Praia de Aruana, 24.VIII.2004, C.Almeida 19 (ASE); MATO GROSSO. Rodovia Transpantaneira, 01.I.1976, Maciel et al. s.n. (INPA); MINAS GERAIS. Jaíba, 19.X.2001, Lombardi et al. 64837 (BHCB); RIO GRANDE DO NORTE. Natal, Parque Estadual das Dunas, 14.X.1980, A.Trindade s.n. (HUFRN); GOIÁS. Alvorada do Norte, 18.V.1984, J.P. de S. Lima s.n. (RB); RONDÔNIA. Porto Velho, 01.01.1995, I.S. Miranda s.n. (INPA, SP); RORAIMA. Normândia, 10.01.1995, I.S. Miranda s.n. (INPA, NY).

2. *Jacquemontia bahiensis* O'Donell (1953: 356, tab. 2, fig. 1). fig 1 d – f.

TYPE: BRAZIL. Bahia, Cruz das Almas, Campus da Escola Agrônômica da Bahia, G.C.Pinto VI-1950 (holotype: CTES, picture seen)

Perennial vines, climbing stems, velutinous; trichomes 3-4-(5)-armed, the arms equal, not appressed; internodes 0.5-10 cm long. *Leaf blade* 1.5–10 x 1–5.5 cm, chartaceous, entire, ovate, the base rounded to slightly cordate, the apex acute to acuminate, mucronate, densely tomentose; petiole 0.5–2 cm long. *Florescence* compound dichasium, loose, until 12-flowered; peduncles 2–4.5 cm long, axillary, pubescent; bracteoles ca. 3 mm long, lanceolate, pubescent; pedicels ca 8 mm long. *Sepals* unequal, chartaceous, the 2 outer ca. 5–6 x 5–6.5 mm, orbicular, the base rounded, the apex rounded, mucronate, pubescent, 1 middle, asymmetric, the 2 inner, ca. 5–6.5 x 4–5.5 mm, ovate to elliptic, the base rounded, the apex cordate, glabrous or trichomes restrict to the middle region, scarious margins; corolla ca. 2 cm long, funnelform, midpetaline line ciliate, blue; anthers oblong, ca. 1.5 mm, white; nectary present, ovary globose, style usually exserted, stigmatic lobes ca. 1.5 mm long, cylindrical. Capsules 8-valvar, globose, ca. 4 mm long.

Distribution, Habitat and conservation: — Endemic to northeastern Brazil, is found in areas of Atlantic forest from Paraíba to Bahia. According to IUCN, can be considered as DD.

Comments: — This species is clearly related to *J. glaucescens* for the habit, sepals shape, and exserted style. However, can be distinguished for the sepals pubescent, the trichomes not appressed, sepals almost equal in size, and the inner ones with the apex rounded instead of cordate.

Selected specimens examined: — ALAGOAS. Penedo, Faz. Capiatã, 29.VII.2008, R.D.Ribeiro 1024 (RB, MAC); BAHIA. Conde, Faz. Do Bu, 27.IV.1995, T.Jost 90 (IPA, CEPEC); PARAÍBA. Mamanguape, 17.IX.1979, E. Nunes et al. s.n. (EAC, JPB); PERNAMBUCO. Igarassu, Usina São José, 19.V.2007, P. Ojima 32 (UFP); SERGIPE. Itaporanga, 31.VIII.2007, A.B. Sales 36 (RB).

3. *Jacquemontia bifida* (Vellozo) Hallier (1843: 543). fig 1 g – h.

BASIONYM: *Convolvulus bifidus* Vellozo (1829: 71). *Aniseia velloziana* Choisy (1845: 430). *Montejacquia bifida* (Vellozo) Roberty (1952: 33). *Jacquemontia velloziana* (Vellozo) O'Donnell (1952b: 208). TYPE: In Herb. Martii, s.n. (BR!, **lectotype designed here**).

Perennial vines, climbing stems, pubescent; trichomes 3-armed equal or unequal; internodes 4.3–10.5 cm long. *Leaf blade* 3.5–8.5 x 2–6 cm, chartaceous, entire, ovate to oval, the base commonly cordate, rare rounded or subtruncate, the apex acuminate to acute, pubescent; petiole 1–2.5 cm long. *Florescence* compound dichasium, loose, 3–25-flowered; peduncles 4–14 cm long, axillary, pubescent to lanate; bracteoles ca. 3–7 mm, linear, two per pedicel; pedicel 0.8–1 cm. *Sepals* unequal, membranaceous with the nervures apparent, the 2 outer ca 0.5–1.4 x 0.4–1.2 cm, ovate to rotund, the base cordate, the apex rounded to acuminate, pubescent, 1 middle asymmetric, 0.45–1.3 x 0.35–0.8 cm, when pubescent only on the exposed side, the 2 inner, 2–5 x 1–2 mm, ovate, trichomes restrict to the medium region; corolla 1–1.5 cm long, funellform, midpetaline line ciliate, blue; anthers sagittate, ca. 1 mm long, white; nectary absent, ovary globose, stigmatic lobes 0.5–1 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 4 mm in diameter; seeds 2–3 mm long, aerolate, with the ring.

Distribution, Habitat and Conservation: — Occurs from Brazil to Argentina. In Brazil occurs on areas of Atlantic forest from Pernambuco to Espírito Santo. Must be classified as LC.

Comments: — *J. bifida* is included among the species described at some point under *Aniseia* – species with the outer sepals cordate. It is similar to *J. heterantha*, but can be distinguished by the inflorescence dichasium loose with more than three flowers.

Selected specimens examined: — BAHIA. Castro Alves, 26.IV.1994, L.P.de Queiroz & N.S.Nascimento 3839 (HST); ESPÍRITO SANTO. Vila Velha, Morro do Moreno, 28.VI.1984, B. Weinberg s.n. (SP); PERNAMBUCO. Maraial, Serra do Urubu, I.2012, B. Amorim s.n. (UFP).

4. *Jacquemontia blanchetii* Moricand (1838: 41. t. 27). fig 1 j.

TYPE: BRAZIL. Sepes et in Sylvis, in provincial Bahiensis, *Blanchet 104* (lectotype design. here: G!).

Perennial vines, climbing stems, glabrescent; trichomes, 3–(5)-armed; internodes 2.5–9 cm long. *Leaf blade* 3.8–7 x 1.8–4.5 cm, chartaceous, entire, oval to ovate, the base rounded to slightly cordate, the apex acute to acuminate, usually glabrescent, rare pubescent; petiole 1–4 cm long. *Florescence* compound dichasium, loose, 3–15-flowered; peduncles 2.5–8 cm long, axillary, glabrescent; bracteoles ca. 2 mm long, ovate to obovate, escarious margins, ciliate to pubescent; pedicels 0.5–1.5 cm. *Sepals* unequal, chartaceous, the 2 outer ca. 4–5 x 2.5–3 mm, ovate to oblong, the base truncate to rounded, the apex rounded, glabrous, the 3 inner, ca. 4.5–6 x 3–4 mm, broadly ovate to rotund, the base rounded, the apex rounded to acute, glabrous, escarious margins; corolla 1.5–2.3 cm long, funnelform, midpetaline line ciliate, blue; anthers oblong, ca. 2 mm long, white; nectary 5-lobate, ovary oblong, stigmatic lobes oval-flattened, ca. 0.5 mm long. *Capsules* 8-valvar, globose, ca. 5 mm in diameter. Seeds ca. 2.5 mm long, smooth, with the ring present.

Distribution, Habitat and conservation: — From Peru to Argentina. In Brazil occurs either on the Atlantic and Amazon forest borders, and on Cerrado and Caatinga. According with IUCN criteria, can be considered as LC.

Comments: — *Jacquemontia blanchetii* belongs to a group composed for many species closed related, characterized by loose dichasium florescences and chartaceous sepals. It is the widely distributes species of this group, and due to present some variable characters, the correct identification is difficult. The closest species are *J. martii*, that is distinguishes for present distinctly acuminate and reflexed apices on the outer sepals. Besides *J. uleana*, that presents the same shape of sepals, but is distinctly pubescence with discolor leaves and the bracts lacking.

Since no type specimen is designate on the protologue, the Blanchet's collection cited as examined by Moricand, is here defined as the type.

Selected specimens examined: — BAHIA. Amélia Rodrigues, 20.III.1987, L.P. de Queiroz 1445 (MAC, HUEFS); MINAS GERAIS. Botumirim, Serra da Canastra, 21.XII.2004, R.C.Forzza 3803 & R.Mello-Silva (JBRJ); SÃO PAULO. Paulo Farias, 22.III.1994, V.Stranghetti 280 (SPSF); SERGIPE. Japaratuba, 13.IX.1996, A.B.Sales 36 et al. (ASE); PARANÁ. Sapopema, 8.XI.1997, C.Medri 503 et al. (SPSF); RORAIMA. Santa Bárbara, 23.V.1982, L.O.A.Teixeira 647 et al. (JBRJ).

5. *Jacquemontia capitellata* Choisy (1845: 396). fig 1 k – m.

TYPE: BRAZIL. Martius 829 (holotype: M!)

Jacquemontia prostrata Choisy (1845: 399). TYPE: BRAZIL. Martius 531, obs. 881 (holotype: M!)

Perennial shrubs, prostrate or ascending stems, pubescent; trichomes 3-armed with the arms equal; internodes 2.5–5.5 cm long; *Leaf blade* 2.5–7.5 x 1–3.2 cm, chartaceous, entire, elliptic, the base commonly cuneate to rounded, rare slightly cordate, the apex acuminate, acute to rounded with a mucron, adaxial face glabrescent, serous, abaxial face lanate, brownish when dried; petiole 0.1–1.5 cm long. *Florescence* compound dichasium, condensed, ca. 7-flowered; peduncles 2–5.5 cm long, axillary, pubescent; bracteoles ca. 6–15 x 1–2 mm, oblanceolate, elliptic or linear, base truncate, apex acute, two per pedicel; pedicel ca 1 mm long. *Sepals* unequal, membranaceous, the 2 outer ca. 6–7.5 x 3–3.5 mm, slightly rhombic to ovate, the base cuneate, the apex acuminate, pubescent, 1 middle, asymmetric, ca 6 x 2.5 mm, pubescent only on the exposed side, the 2 inner, 5–5.5 x 2–2.5 mm, ovate, trichomes restrict to the medium region, escarious margins; corolla 1–1.5 cm long, rotaceous to funellform, midpetaline line ciliate, blue; anthers sagittate, ca. 1 mm long; nectary entire, ovary globose, stigmatic lobes 0.5 mm long, oval-flat. *Capsules* 8-valvar, globose ca. 4 mm in diameter; seed ca. 3 mm.

Distribution, Habitat and Conservation: — Endemic to Brazil and known only to the Espinhaço range region (Minas Gerais State). It is usually found in rocky slopes and must be considered as Vulnerable, since there are register a few populations in a very restrict distribution.

Comments: — It resembles the *J. pentathos* group by the inflorescence arrangement and the sepals shape which the central one is asymmetric. However, its shrubby habit and leaves elliptic usually with the adaxial face serous make easily distinguish among the other species.

Selected specimens examined: — MINAS GERAIS. Caeté, Serra da Piedade, 07.VI.1997, A. Salino 3133 (SP, HBCB); Itabirito, Serra do Itabirito, 25.V.1995, W.

A.Teixeira s.n. (SP); Serra do Cipó, Santana do Riacho, 06.IV.1995, J. A. Lombardi 720 (SP).

6. *Jacquemontia cephalantha* (Dammer) Hallier f. (1899: 30). fig 1 n.

BASIONYM: *Ipomoea cephalantha* Dammer (1897: 39). *Jacquemontia hallieriana* Ooststroom (1936: 216). **syn nov.** TYPE: BRAZIL. Brasilia, Minas Gerais, Glaziou 19670 (holotype: B!, isotype: K!).

Perennial shrubs, erect stems, unbranched, lanate; trichomes 3-armed with the arms equal or subequal; internodes 1.5–3.5 cm long. *Leaf blade* 2.8–4.2 x 1.4–2.8 cm, chartaceous, entire, oval to oboval, the base cuneate to rounded, the apex acute, aristulate, rare rounded, lanate, ferrugineous when dried, the veins apparent on the abaxial face; petiole 1–2 mm long. *Florescence* compound dichasium, condensed, ca. 17-flowered, sessile, terminal; bracteoles ca. 1 x 0.5 cm, ovate; pedicels ca. 1 mm long. *Sepals* equal, membranaceous, ca. 6 x 2.5 mm, lanceolate, the base rounded, the apex acuminate, densely pubescent; corolla ca. 1.5 cm long, funellform, slightly lobate, midpetaline line glabrous, blue; anthers sagittate, ca. 2 mm long; nectary not observed, ovary oblong, stigmatic lobes 0.5–1 mm long, oval-flat. *Capsules* not seen.

Distribution, Habitat and Conservation: — Endemic to Brazil, is registered to cerrado areas in São Paulo and Minas Gerais. Must be considered as Vulnerable.

Comments: — Van Ooststroom considered this species under a new name and as the type of J. Section Capituliflorae which includes species with terminal and sessile inflorescences.

It can be misidentified as *J. fusca*, but differs by the presence and shape of bracteoles, and the sepals membranaceous and lanceolate instead of chartaceous and oblong. Also can be confused with *J. sphaerocephala*, for the inflorescence structure, the indument and sepals shape. However, this last one presents florescences terminal and axillary, longer leaves and bracteoles linear.

7. *Jacquemontia choisyana* Meisner (1869: 302). fig 1 o – p.

Thyella choisyana (Meisner) House (1906: 313). *Thyella bracteosa* (Meisner) House (1906: 313).

TYPE: BRAZIL. Ackerman s.n. Minas Gerais (BR!) **lect. desig. here**

Jacquemontia bracteosa Meisner (1869: 304). TYPE: BRAZIL. Lagoa Santa prov. Minarum rarissima: Warming. (holotype: BR!). **syn. nov.**

Perennial herbs, climbing or prostrate stems, velutinous to pubescent; trichomes 3-armed; internodes 2–8.5 cm long. *Leaf blade* 3.5–7.5 x 2.4–5.5 cm, chartaceous, entire to slightly repand, usually ovate, rare rotund, the base commonly cordate, the apex rounded with a mucron to acuminate, velutinous to pubescent; petiole 0.5–1.5 cm long. *Florescence* compound dichasium, condensed, ca. 7-flowered; peduncles 3–7.5 cm long, axillary, pubescent; outer bracteoles 1–1.5 x 0.5–1 cm, ovate, long acuminate to caudate apex, sinuate margins, inner ca. 1 x 0.5 cm, lanceolate to ovate, caudate apex, sinuate margins; pedicels ca. 1 mm. *Sepals* unequal, membranaceous, the 2 outer ca. 7–8.5 x 3–5 mm, slightly sinuate, lanceolate to ovate, the base rounded, the apex caudate, pubescent, 1 middle asymmetric, 6.5–7 x 2–4 mm, the 2 inner 3.5–4.5 x 1–2 mm, lanceolate to ovate, usually glabrescent; corolla 2–3 cm long, funellform, lobate, midpetaline line pubescent, white; anthers elliptic, ca. 2.5 mm long, white; nectary entire, ovary oblong, stigmatic lobes 1.5–2 mm long, oval-flat. Capsules 8-valvar, globose, 4–5 mm in diameter.

Distribution, Habitat and conservation: — Endemic to Brazil, occurs in areas of Caatinga, Cerrado and rarely in borders of fragments of Atlantic forest, from Pernambuco to Minas Gerais. It is usually associated to open vegetation and often to disturbed areas. A few populations are registered, thus, can be considered as DD according to IUCN.

Comments: — *Jacquemontia choisyana* part of the group with capituliform inflorescence, and can be distinguished by the bracts with caudate apex and sinuate margins, corolla 2–3 cm long, and sepals lanceolate to ovate.

The specimen collected by Ackerman, deposited at BR herbarium, cited by Meisner as *J. choisyana*, actually included two pieces of different species. One was recognized as *J. lasiocladus* (Choisy) O'Donnell (= *J. rufo-velutina* Meisn. – name used on Flora Brasiliensis), and the other named as *J. choisyana*. However, this piece clearly belongs to the same entity that was recognized by Meisner as *J. bracteosa*. By the priority rule, since the description of *J. choisyana* comes first on the protologue, this was the name adopted. Since the specimen was not designated as a type on Flora Brasiliensis, the lectotype is proposed here.

Selected specimens examined: — BAHIA. Barreiras, 4.II.2000, T. Ribeiro 48 et al. (HUEFS); Feira de Santana, 18.X.1980, L. R. Noblick 2059 (HUEFS); MINAS GERAIS. Serra do Espinhaço, 23.II.1969, H. S. Irwin 23720 et al. (SP, UB, NY); PERNAMBUCO. Floresta, 8.VII.2008, A. M. Miranda et al 5704 (H.ST); SERGIPE. Japarutuba, 19.V.2003, L. M. O. Rodrigues 67 (ASE).

8. *Jacquemontia chrysanthera* Buril (2011: 436). fig 1 q – r.

TYPE: BRAZIL. Bahia: Mun. Caetité, near Brejinho das Ametistas, Caatinga, 14°11'60"S 41°39'36"W, 13 Feb 2009, M. T. Buril et al. 224 (holotype: UFP; isotypes: NY, SP).

Perennial vine, climbing stems, velutinous; trichomes 5(–7)-armed, the rays usually equal, not appressed; internodes 5.7–10.3 cm long. Leaf blades 5.7–8.6 × 3.4–6.2 cm, chartaceous, entire to slightly sinuate, ovate, the base subcordate, the apex acuminate to apiculate, velutinous, hoary, yellowish when dried, the trichomes on the adaxial side longer than on the abaxial side; petiole 0.8–2.3 cm long. *Florescences* compound dichasium, loose, usually ca. 30-flowered, rarely 7-12-flowered; peduncles 3.5–5.2 cm long, axillary, velutinous; bracteoles 5–8 × 1 mm, linear, two at the base of each cyme; pedicels ca. 3 mm long. *Sepals* unequal, chartaceous, the 2 outer 1.0–1.1 × 0.4–0.45 cm, thick, e oblong, the base truncate, the apex acuminate, velutinous, the 3 inner 0.7–0.8 × 0.3–0.35 cm, ovate, the base rounded, the apex acuminate, trichomes restrict to the middle region; corolla ca. 2 cm long, funnelform, midpetaline line ciliate, blue; anthers bright yellow; nectary 5-lobate, ovary globose, stigmatic lobes oval-

flattened. *Capsules* 8-valvar, globose, ca. 5×4 mm, sepals acrescent; seeds 3–3.2 mm long, the dorsal face rounded, the margins with a thin, striate lateral ridge, ca. 0.2–0.4 mm wide, the surface minutely areolate

Distribution, Habitat and conservation: — Endemic to Brazil, is known only to the Campos rupestres and Caatinga from Pernambuco to Bahia. It was considered as vulnerable according to IUCN criteria.

Comments: — Included on the morphological group of species with loose dichasium florescences and chartaceous sepals, can be related to *J. martii*, by the sepals acuminate even though are velutinous instead of glabrous. Also can be distinguished and the bright yellow colored anthers.

Selected specimens examined: — BAHIA. Bom Jesus da Lapa, 12.I.2008, A. Rapini et al. 1484 (HUEFS); Maracás, 26.IV.1978, S. Mori et al. 9928 (CEPEC, NY); Morro do Chapéu, 9.III.2003, de Queiroz, L. P. 7703 et al. (HUEFS).

9. *Jacquemontia ciliata* Sandwith (1930: 156). fig 2 a – b.

TYPE: TRINIDAD. In open places on the outskirts of Irois Forest, Broadway 6718 (holotype: MO!; isotypes: K!, BM!).

Perennial vines, climbing stems, glabrescent to pubescent; stellate trichomes, 3-(4)-armed, with the arms equal, and T-shape; internodes 2.5–6.5 cm long. *Leaf blade* 3.8–9.5 x 1.8–6.5 cm, chartaceous, entire, ovate to oval, the base cordate to rounded or truncate, the apex acuminate, usually glabrescent, rare pubescent; petiole 1–3.5 cm long. *Florescence* compound dichasium, loose, 1–30-flowered; peduncles 2.5–14 cm long, axillary, glabrescent; bracteoles linear, pubescent to glabrescent, ca. 1.5 mm long, sometimes lacking; pedicels 0.4–1 cm. *Sepals* equal, chartaceous, 5–5.5 x 2–2.5 mm, lanceolate to obovate, the base rounded to truncate, the apex acuminate to acute, ciliate; corolla 1.5–2.5 cm long, funnelform, entire or slightly lobate, midpetaline line ciliate, white; anthers sagittate, ca. 1.5–3.5 mm long; nectary 5-lobate, ovary oblong, stigmatic lobes cylindrical, 1.5–2 mm long. *Capsules* 8-valvar, globose, ca. 4–5 mm in diameter; seeds ca. 2 mm long, smooth, with the ring present.

Distribution, Habitat and conservation: — Occurs in Central America, Venezuela, Colombia, French Guiana, Brazil, Peru and Ecuador. In Brazil is known from the Amazon forest and the Atlantic forest in the southeastern region. Can be considered as LC.

Comments: — Its one of the species on the group with chartaceous sepals and loose dichasium florescences. Can be distinguished for the evident ciliate sepals. Other species with very distinct ciliate sepals are *J. hosericea* and *J. velutina*, but these are easily recognized by the shape of sepals. *Jacquemontia ciliata* also presents one variety (*J. ciliata* var. *nelsonii* (House) Robertson), but this is reported only to Mexico and can be distinguished for the corolla ca. 6 cm long.

Selected specimens examined: — RIO DE JANEIRO, Niterói, 28.V.1999, M. C. F. dos Santos s.n. (JBRJ); Rio de Janeiro, Tijuca, Morro da Urca, 2.IX.1980, G.V. Freire 79 & N.N. Silva (NY); PARÁ, Tucuruí, 01.01.1980, M. S. Silva s.n. (INPA); PARANÁ, Rio Branco do Sul, 27.X.1967, G. Hatschbach s.n. (JBRJ); RONDÔNIA, Ariquemes, 16.V.1982, L. O. A. Teixeira et al. 505 (INPA, NY); SÃO PAULO, Rio Claro, Faz. São José, 24.III.2001, R. G. Udulutsch 233 (HRCB).

10. *Jacquemontia corymbulosa* Benth (1844: 137). fig 2 c – e.

TYPE: ECUADOR. Guayas: Guayaquil, Sinclair s.n. (holotype: K!)

Jacquemontia guayaquilensis Meisner (1869: 297). TYPE: ECUADOR. Montibus Cerro de Santana, Guayaquil: Jameson 596 (NY!, K!). **syn. nov.**

Jacquemontia cearensis Huber (1901: 320). TYPE: BRAZIL. Entre les rochers, prés du grand Réservoir de Quixadá, J. Huber 294 (holotype: G!). **syn. nov.**

Jacquemontia weberbaueri Helwing (1927: 1136). 1136. 1927. TYPE: PERU. Weberbauer 4154; no date (holotype: B!)

Jacquemontia asarifolia L. B. Smith (1937: 37). TYPE: BRAZIL. F. Drouet 2395 (holotype: F!) **syn. nov.**

Perennial vines, climbing stems, velutinous to pubescent; trichomes 3-armed; internodes 3.5–8.5 cm long. *Leaf blade* 1.2–9.5 x 0.8–4.5 cm, chartaceous, entire to slightly repand, ovate, to rotund, the base cordate to subtruncate, the apex acuminate, acute with a mucron, emarginated, apiculate or rounded with a mucron, usually pubescent, sometimes ferrugineous when dried; petiole 0.5–2 cm long. *Florescence* compound dichasium, loose to slightly condensed, 3–25-flowered; peduncles 2.5–10 cm long, axillary, pubescent; bracteoles 2–5 mm, linear, two per pedicel; pedicel 3 – 6 mm. *Sepals* unequal, membranaceous, the 2 outer ca 3.5–6 x 2–3 mm, usually obelliptic to lanceolate, rare ovate, the base cuneate to rounded, the apex acute to long acuminate, pubescent, 1 middle asymmetric, 4.5 x 1.5 mm, pubescent only on the exposed side, the 2 inner 2–2.5 x 1–1.5 mm, lanceolate to ovate, glabrescent or with trichomes restrict to the medium region, escarious margins; corolla 0.8–1.2 cm long, funellform, slightly lobate, midpetaline line ciliate, blue; anthers sagittate, ca. 1 mm long, white; nectary absent, ovary oblong, stigmatic lobes 0.5–2 mm long, oval-flat to cylindrical. *Capsules* 8-valvar, globose, 3.5 - 4 mm in diameter; seeds ca. 2 mm long, smooth, with the ring.

Distribution, Habitat and conservation: — It is known to Peru, Ecuador and Brazil, where is reported to Caatinga areas. Less often also found in borders of atlantic forest. Since is a very frequent species, is considered as LC according to IUCN.

Comments: — Belongs to a very difficult morphological group that comprises *J. pentanthos*, *J. ferruginea* and other related species. It can be distinguished by the set of indument, bracteoles linear and outer sepals lanceolate to ovate, usually shorter than on the other species. *Jacquemontia cearensis*, despite its ferrugineous indument, that resembles *J. ferruginea*, it is considered a synonym of *J. corymbulosa*, by the same inflorescence structure, bracts and sepals shape representing an extreme expression of their velutinous state.

Three new synonyms are proposed here. All of them were species described based on tenuous variation of *J. corymbulosa* morphology, such as indument density and congestion of flowers.

Selected specimens examined: — ALAGOAS. Piranhas, 28.IV.2004. C. F. Fonseca 02 (UFP, MAC); BAHIA. Itatim, Morro do Letreiro, 03.VII.2005, A. O. Moraes et al. 35 (HUEFS); CEARÁ. Brejo Santo, 14.V.2009, M. T. Buril et al. 316 (UFP, BM); PERNAMBUCO. Arcoverde, Serra do Mimoso, 03.VIII.1996, A. Gomes et al. 18 (UFP,

PEUFR); RIO GRANDE DO NORTE. Serra da Pindoba, 12.VII.1966, J. S. Sobrinho 308 (HST).

11. *Jacquemontia cuyabana* Hoehne (1922: 56).

TYPE: BRAZIL. Coxió da Ponte, perto de Cuiabá, Mato-Grosso, Comissão Rondon 3064 (holotype: SP).

Annual herbs, erect to prostrate stems, glabrescent; trichomes 3-armed, with the arms equal or unequal; internodes ca. 1.5 cm long. *Leaf blade* 2–3.5 x 0.4–0.8 cm, membranaceous, entire, elliptic, the base rounded or equilateral, the apex rounded to acute, glabrescent; petiole ca. 1 mm long. *Florescence* monochasium, loose, 1–2-flowered; peduncles 2–2.5 cm long, axillary, pubescent; bracteoles ca. 2 mm long, ovate, ciliate; pedicel 3–5 mm, reflexed. *Sepals* unequal, membranaceous, the 2 outer 5–8 x 4.5–7.5 mm, ovate, the base slightly cordate, the apex rounded, glabrescent, ciliate, 1 middle, asymmetric, the 2 inner ca. 4–7 x 2.5–5.5 mm, ovate, the base cuneate, the apex acute, glabrescent; corolla 0.8–1 cm long, funnelform with a short tube, blue. *Capsules* 8-valvar, ca. 4 mm in diameter, sepals acrescent, lignified and with the venation apparent; seeds ca. 3 mm long.

Distribution, Habitat and conservation: — Endemic to Brazil with disjunct records to Cerrado of Mato Grosso and Bahia States. It is possible undercollected in the States of Goias and Tocantins. Since is a poorly collected, it can be considered as DD according to IUCN.

Comments: — It is similar to *J. gracillima*, but can be distinguished by the corolla blue, instead of white with the tube vinaceous, and by the outer sepals ovate instead of deltoid.

Selected specimens examined: — BAHIA. Juazeiro, Serra do Mulato, 28.III.2000, M. R. Fonseca 1342 et al. (SP, HUEFS); Palma de Monte Dentro, 01.IV.2001, J. G. Jardim 3355 et al. (SP, HUEFS).

12. *Jacquemontia decipiens* Ooststroom (1936: 216). fig 2 f – h.

TYPE: BRAZIL. Brasília, in arenosis prope Tejuco, Riedl 1336 (holotype: LE; isotype: NY!).

Perennial shrubs, erect stems, lanate; trichomes 5–6-armed with the arms equal or unequal; internodes 2–8 mm long, congested leaves. *Leaf blade* 1–3.5 x 0.5–1.7 cm, chartaceous, entire, elliptic, ovate or obovate, the base rounded to cuneate, the apex acute, rare rounded, velutinous, gold, nervures not apparent; sessile. *Florescence* compound dichasium, condensed, until 5-flowered, sessile, terminal; bracteoles absent; pedicels ca. 1 mm long. *Sepals* unequal, membranaceous, the 2 outer 6–6.5 x 1.5–2 mm, lanceolate, the base rounded, the apex acuminate, vilose, 1 middle asymmetric, the 2 inner ca. 4–4.5 x 1.5–2 mm, ovate, trichomes only on the apex; corolla ca. 1 cm long, funellform, slightly lobate, midpetaline line sparsely pubescent, blue; anthers oblong, ca. 1 mm long; nectary absent, ovary oblong, stigmatic lobes 0.5 mm long, oval-flat. *Capsules* 8-valvar, globose, 4 mm in diameter; seeds ca. 3 mm.

Distribution, Habitat and Conservation: — Endemic to Brazil, on the Espinhaço Range from Minas Gerais. Few populations are known, thus, must be considered as Vulnerable.

Comments: — This species is similar to *J. robertsoniana*, due to the habit, the congested leaves, the veins not apparent on the leaves, and the inflorescence structure. Although, the indument ramification and the apex of the leaves never caudate, differentiate those species. Van Ooststroom discussed that because the similarity of *J. decipiens* with some *Evolvulus* species, by the habit, inflorescence structure and flower colours, it was frequently misidentified among *Evolvulus helichrysoides* Moric sheets. However he pointed out the stigmatic lobes shape, as a typical *Jacquemontia*. *Jacquemontia decipiens* is included in a very particular morphological group, composed by shrubs with capituliform cymes, highly diverse on the Espinhaço Range.

Selected specimens examined: — MINAS GERAIS. Presidente Kubitscheck. F. França 4562 et al. 18.II.2003 (HUEFS, SP).

13. *Jacquemontia decumbens* O'Donell (1950a: 422). fig 2 j.

TYPE: ARGENTINA. Candelaria, Misiones, Gramajo, C.A. O'Donell 5533 (MO!)

Annual herbs, prostrate or climbing stems, hirsute; trichomes of 3 kinds – glandular, 3-armed with the arms equal or almost equal, and T-shape; internodes 0.8–2.5 cm long. *Leaf blade* 0.9–2.5 x 0.5–2.0 cm, membranaceous, repand, narrowly to broadly ovate, or elliptic, the base rounded, the apex acute, pilose, sometimes the adaxial face with trichomes only on margins or nervures; petiole 0.2–2 cm long. *Florescence* monochasium, loose, 1–3-flowered; peduncles 0.8–3.8 cm long, axillary, hirsute; bracts absent; pedicel 2–4 mm. *Sepals* equal, membranaceous, ca. 7 x 1.5 mm, elliptic to lanceolate, the base rounded or cuneate, the apex acute, glabrescent, with glandular and/or stellate trichomes; corolla ca. 2 cm long, funnelform, midpetaline line ciliate, white; anthers ovate, ca. 1 mm long, white; nectary absent, ovary ovate, stigmatic lobes cylindrical, ca. 0.6 mm long. *Capsules* 8-valvar, subglobose, ca. 5 cm in diameter; seeds 3 – 4 mm long, verrucate.

Distribution, Habitat and Conservation: — This species is reported to Argentina, Paraguay and at the extreme South of Brazil, in open vegetations. There are insufficient data on abundance of individuals of this species, thus, is considered here as Data deficient.

Comments: — Morphologically, *J. decumbens* is very similar to *J. agrestis*, and considering the wide morphologic variability of this last one, is difficult to define it. However, this group of individuals from the temperate grassland presents very conservative characteristics, as the leave ovate to elliptic with the base rounded, and the corolla white and longer than 2 cm.

Selected specimen examined: — RIO GRANDE DO SUL. Itaqui, João Arregue, 15.II.2010, P. P. A. Ferreira 368 (ICN, UFP).

14. *Jacquemontia diamantinensis* Buril (2013). fig 2 k – m.

TYPE: BRAZIL. Bahia: Andaraí, road to Igatu, 12°47'S, 41°18''W, 27 Jun 2009, M. T. Buril and R. Rodrigues 391 (holotype: UFP; isotypes: HUEFS, NY)

Perennial vine, glabrescent; trichomes 8– (9)-armed, the rays equal or subequal, appressed; *internodes* 2.2–8.5 cm long. *Leaf blades* 2–6.5 × 1.2–4.4 cm, chartaceous, entire, ovate to oval, the base slightly cordate to rounded, the apex acuminate to acute, mucronate, pubescent, with very short stellate hairs 8(-12)-armed, the adaxial face darker than the adaxial one when dried; petiole 0.4–1.5 cm long. *Florescences* compound dichasium, loose, usually ca. 12-flowered; peduncles 2–3.8 cm long, axillary, densely pubescent; bracts lacking or 1 pair on the base of pedicels, ca. 1.5 mm long, linear, glabrescent; pedicels 4–6 mm. *Sepals* unequal, chartaceous, the 2 outer 5–6 × 1.8–2.2 mm, oblong, the base rounded to aequilateral, the apex slightly acute, mucronate, densely pubescent, greyish when dried, 1 middle, ca. 4.8 × 2 mm, asymmetric, the 3 inner 4 × 1.5–2 mm, lanceolate, the base rounded, the apices acute, scarious margins, with few cilia on the base; corolla ca. 1.8 cm long, funnelform, midpetaline line ciliate, blue; anthers sagittate, white; nectary 5-lobate, ovary conical, glabrous, stigmatic lobes ca. 0.8 mm long, oval-flattened. *Capsule* 8-valvar, oval, ca. 5 × 6 mm; seeds 2.5–3 mm long, rounded, lateral ridge lacking, the surface smooth.

Distribution, Habitat and Conservation: — Endemic to Brazil, on the Espinhaço Range of Bahia, on the Campos rupestres vegetation. It is considered as Vulnerable for its very restrict distribution.

Comments: — It resembles *J. glaucescens* and *J. bahiense* by the appressed and 8-armed trichomes, but is distinguished by the shape and pubescence on the sepals.

Selected specimens examined: — BAHIA. Andaraí, 7.VII.2009, M.T.Buril 387 et al. (UFP, BM); Lençóis, Rio São José, 29.VII.1998, R. Funch 111 (HUEFS); Mucugê, road Andaraí-Mucugê, near to Rio Paraguaçu, 21.VII.1981, R. Pirani et al. CFCR 1613 (NY, SPF).

15. *Jacquemontia estrellensis* Krapovickas (2009: 61–63). fig 3 a – c.

TYPE: ARGENTINA. Salta: Dep. Orán, 13 km E de Estrella, 3-V-1999, A. Krapovickas & G.Seijo 47679 (CTES, LIL, NY, SP).

Perennial vine, climbing stems, velutinous; trichomes 7–(8)-armed, the arms often unequal; internodes 2.5–7.6 cm long. *Leaf blade* 3.5–6.2 x 2.2–4.3 cm, chartaceous, entire, oboval to ovate, rare deltoid, base rounded to subcordate, rare truncate, apex acuminate to apiculate, greyish, velutine; petiole 1–3 cm long. *Florescences* compound dichasium, loose, ca. 7 flowered; peduncles 4–6 mm long, axillary, velutinous; outer bracteoles foliaceous 1.4–1.8 x 0.9–1.3 cm, ovate, base cordate, apex acute, mucronate, velutinous, hiding ca. of 2/3 of the corolla, inner bracteoles 0.8–0.9 x 0.3–0.4 cm, oblong to lanceolate, base rounded, apex acute, velutinous. *Sepals* unequal, chartaceous, the 2 outer, 5.5–6 x 1.5–2 mm, oblong to lanceolate, base truncate, apex long-acuminate, velutinous, the 3 inner, 4.5–5 x 1.5–2 mm, oblong to lanceolate, base rounded, apex long acuminate, velutinous; corolla 1.4–1.5 cm long, funnelform, midpetaline line ciliate, pale blue; anthers oval ca. 2 mm; nectary 5-lobate, ovary oblong, stigmatic lobes ca. 1 mm long, oval-flat. Capsules oblong, recovered by the inner sepals, monoespermatic; seed oval, with the ring lacking.

Distribution, Habitat and Conservation: — Occurs in Bolivia, Brazil, Argentina and Paraguay. In Brazil is only known to Cerrado and Campos rupestres in Bahia and Minas Gerais.

Comments: — It is a very distinct species, easily recognized by the foliaceous outer bracteoles, cordate, hiding the flowers.

Selected specimens examined: — BAHIA. Bom Jesus da Lapa, Road to Ibotirama, 30 April 2003, A. B. Xavier 12 et al. (SPF); Caetité, road near to the vile, 14 Feb. 2009, M. T. Buril 230 et al. (UFP, BM); MINAS GERAIS, Road from Matias Cardoso to Manga, 20 Jun. 1974, M. Magalhães 172 (RB).

16. *Jacquemontia ferruginea* Choisy (1838: 139). fig 3 d – e.

TYPE: BRAZIL. In prov. S. Pauli, Lund 765 (holotype: G!; isotype: K!)

Jacquemontia grandiflora Meisn. in Martius (1869: 300). TYPE: Claussen n 240 (holotype: M!; isotypes: BR!, G!).

Ipomoea velloziana var. *densiflora* Martius (1838: 64). TYPE: BRAZIL. Herb. Fl. Bras. n 240 (syntypes: BR!, P!, K!).

Jacquemontia mucronifera Hallier (1893: 543). TYPE: GUYANA. Ule 1207 (holotype: B!). **syn. nov.**

Jacquemontia ferruginea var. *elongata* Choisy, (1945: 396). Martius 240 (holotype: BR!).

Jacquemontia ferruginea var. *rufa* Choisy (1945: 396). Achermann, Claussen in prov. Minarum (Holotype: G!; isotypes: BR!, P!).

Perennial vines, velutinous to pubescent; trichomes 3-armed with the arms equal; internodes 5–10 cm long. *Leaf blade* 3.2–7.8 x 1–3.6 cm, chartaceous, entire, ovate to lanceolate, the base aequilateral to rounded, rare slightly cordate, the apex acuminate to acute, mucronate or not, velutinous, ferrugineous or brownish when dried; petiole 0.5–4 cm long. *Florescence* compound dichasium, loose to condensed, until 25-flowered, axillary; peduncle 4–14 cm; bracteoles 5–8 x 0.6–2 mm, linear, pubescent, sometimes with 2 foliaceous bracteoles on the base, lanceolate, ca. 1–2.5 x 0.5–0.7 cm, and with linear bracteoles, ca. 1 cm long, velutinous; pedicels 1.5–4 mm. *Sepals* unequal, membranaceous, the 2 outer 7–10 x 3.5–4.5 mm, rhombic to obovate, the base cuneate, concave, the apex abruptly acuminate, densely pubescent, 1 middle ca 7 x 3 mm, asymmetric, the 2 inner, 3–5 x 2–3 mm, lanceolate, the base rounded, the apex acute to acuminate, with trichomes restrict to the middle region, escarious margins; corolla 1.5– 2.5 cm long, funellform, midpetaline line ciliate, blue; anthers sagittate, ca. 1.5 mm long; nectary present, ovary globose, stigmatic lobes 0.6 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 4 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil and widely distributed in the Atlantic forest, but also occurs in Caatinga and Cerrado areas.

Comments: — It is very variable, and with characteristics similar to a complex of species around *J. pentanthos*, mainly the variety *J. ferruginea* var. *ambigua*. Usually is possible to distinguish by the shape and pubescence on the sepals. The typical variety is more similar to *J. guyanensis*, and to distinguish it is necessary to check the sepals base and usually the inflorescences are more dense in *J. guyanensis*.

Selected specimens examined: — MINAS GERAIS. Poços de Caldas, F. C. Hoehne 2845 (SP); PARANÁ. Chopinzinho, Rio Iguaçu, 11.IV.1975, G. Hastschbach 36629 (SP, MBM); RIO DE JANEIRO. Paraty, 3.VII.1992, L. C. Giordano s.n. (RB); SÃO PAULO, São Paulo, Reserva biológica Parque estadual das Fontes do Ipiranga, 18.I.1978, M. M. R. F. de Melo 52 et al. (SP, SPF); Serra do Japi, 15.IV.1989, R. S. Bianchini 115 (SP).

16.1. *Jacquemontia ferruginea* var. *ambigua* Meisner (1869: 300).

TYPE: BRAZIL. Bahia, Blanchet 2629 (holotype: P!; isotypes: G!, K!)

Jacquemontia euricola Ridl. (1890: 47). TYPE: BRAZIL. Fernando do Noronha, Ridley 94 (K!, *lectotype designed here*) **syn. nov.**

Leaf blade 2.5–8 x 1.5–5 cm, ovate to lanceolate, rare rotund, the base cordate to rounded, rare slightly cordate, the apex acuminate to rounded, apiculate; petiole 0.5–2.5 cm long. *Florescence* compound dichasium, loose to condensed, until 15-flowered; peduncle until 10 cm; bracteoles 5–1.5 x 0.5–2 mm, linear to elliptic, oblanceolate or falcate, velutinous; pedicel 1.5–3 mm. *Sepals* unequal, membranaceous, the 2 outer 5–11 x 3–5 mm, rhombic to obovate, the base cuneate, concave, the apex abruptly acuminate, densely pubescent, 1 middle ca 7–9 x 2–3 mm, asymmetric, the 2 inner, 4–6 x 2–3 mm, lanceolate, the base rounded, the apex acute to acuminate, with trichomes restrict to the middle region, escarious margins; corolla 1–1.5 cm long.

Selected specimens examined: — ALAGOAS. Pão de Açúcar, Margem do riacho Pau Ferro, 24.3.2002, R. P. Lyra-Lemos 6466 et al. (HUFPI, MAC); BAHIA. Palmeiras, Cachoeira da Fumaça, 27.VI.2001, A. A. Conceição 943 (HUEFS, SP); CEARÁ. Maranguape, próximo ao Mundo Novo, 8.X.1980, P. Martins s.n. & E. Nunes (EAC, JBRJ); PARAÍBA. Sousa, II.1945, J. Falcão 74 (JBRJ); PERNAMBUCO. Ilha de Fernando de Noronha, trilha da Pontezinha, 27.IX.2002, A. M. Miranda 4013 (HST).

17. *Jacquemontia fruticulosa* Hallier f. (1899: 45). fig 3 f – g.

TYPE: PARAGUAY. Balansa 4400 (holotype: G!)

Jacquemontia evolvuloides (Moric.) Meissn. var. *tweediei* Meisner (1869: 307).

TYPE: BRAZIL. In Banda Oriental, Tweedie s.n. (holotype: M!).

Jacquemontia heterotricha O'Donnell (1950b: 488). TYPE: BRAZIL. In Banda Oriental, Tweedie s.n. (holotype: M!) **syn. nov.**

Perennial subshrub, erect stems, pubescent, often ferrugineous when dried; trichomes of 3 kinds – glandular pluricellular with the gland apical, 3-armed with the arms almost equal, and T-shape; internodes 2–8 mm long. *Leaf blade* 0.6–3.2 x 0.4–1.7 cm, membranaceous, entire or slightly sinuate, ovate to lanceolate or elliptic, the base rounded to subtruncate, the apex usually acute, or obtuse mucronate, pubescent to densely tomentose, with trichomes with the 3 arms subequal, and sometimes with the glandular trichomes; petiole 3–15 mm long. *Florescence* monochasium, loose, 2–(4)-flowered, or with solitary flowers at the axil or at the apex of the branches; peduncles 0.3–2.8 cm long, axillary, pubescent with the 3 kinds of trichomes; bracteoles ca 2.5–8 x 1.5–2 mm, elliptic. *Sepals* subequal, membranaceous, the 3 inner a little smaller, 6–8 x 2–3 mm, lanceolate, the base rounded to subtruncate, the apex acute, pubescent, with T-shape and glandular trichomes; corolla 2–2.5 cm long, funellform, distinctly lobate, midpetaline line ciliate, white or blue; anthers elliptic, ca. 2 mm long, white; nectary absent, ovary subglobose, stigmatic lobes broadly elliptic-flattened. *Capsules* 8-valvar, subglobose, ca. 4 cm in diameter; seeds ca. 4 mm long.

Distribution, Habitat and Conservation: — It is reported to the extreme south of South America, in Paraguay, Argentina and Brazilian Centre and South, in open vegetation. Despite their restrict distribution, several populations are known, with a high number of individuals reported. Thus, can be classified as LC.

Comments: — It belongs to the *J. agrestis* group, with the same indumentum, inflorescence structure and sepals shape and consistence. Can be distinguished first for the habit erect, added to the leaves with the base rounded to subtruncate, and short peduncles. It is proposed the synonymization of *J. heterotricha* that was previously distinguished by O'Donnell only by the size and shape of bracteoles – 2.5 mm instead of 8 mm long, and linear instead of elliptic. Although, this unique character is not strongly

supported as conservative in many other species, and several intermediate expression specimens were found.

Selected specimens examined: — GOIÁS. Serra Geral do Paraná, São João da Aliança, H. S. Irwin 31906 et al. (SP, UB); MATO GROSSO. Miranda, Serra do Bodoqueuna, 12.VI.1973, J. S. Silva 169 (SP); RIO GRANDE DO SUL. Porto Alegre, Morro Santana, 15.XII.2009, P. P. A. Ferreira 312 (ICN, UFP).

18. *Jacquemontia fusca* (Meisner) Hallier f. (1893: 543). fig 3 h – j.

BASYONIM: *Ipomoea fusca* Meisner (1869: 247 TYPE: BRAZIL. Burchel 6700 (holotype: P!; isotype: K!) **lect. design. here**

Jacquemontia rufa Dammer (1897: 41) TYPE: BRAZIL. Brasilia, Glaziou 21796 (holotype: B!; isotype: G!). **Syn. nov.**

Jacquemontia turneroides Hassler (1911: 194). TYPE: PARAGUAY. Hassler 5849 (holotype: G!; isotype: MO!, BM!)

Perennial shrubs, erect stems, unbranched, velutinous; trichomes 3-armed with the arms equal or unequal; internodes 2–4.5 cm long. *Leaf blade* 3–5 x 1.2–4 cm, chartaceous, entire, oval to orbicular, the base cuneate to rounded, the apex usually apiculate, lanate, ferrugineous when dried, petiole 3–7 mm long. *Florescence* compound dichasium, condensed, 3–9-flowered, sessile, axillary or terminal; bracteoles ca. 1 mm, linear, two per pedicel; pedicel 2–5 mm. *Sepals* equal or the 2 outer ca. 1 mm longer, chartaceous, 7–8 x 2–3 mm, oblong, the base truncate, the apex rounded to acute, lanate; corolla ca. 1.5 cm long, funellform, slightly lobate, midpetaline line pubescent, white; anthers elliptic, ca. 2 mm long; nectary present, ovary oblong, stigmatic lobes 1 – 1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, 5 mm diam.; seeds globose.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs on Cerrado areas of Bahia, Minas Gerais and Goiás states. This is a poorly collected species, and only a few populations are known. Thus, is considered as Vulnerable according to IUCN.

Comments: — It is a very distinct shrub species, with short pedunculate florescences, with linear bracteoles, similar to *J. spicaeflora*. However, the sepals are lanate instead of glabrous.

Selected specimens examined: — DISTRITO FEDERAL. Chapada da Conagem, Córrego Covanças, 10.I.1966, H. S. Irwin 11536 et al. (SP, UB); DF 495, Clube Águas Correntes, Região de Saia Velha, 4.VI.2004, C. Proença 2776 & F. D. Martins (SP); GOIÁS. Cavalcante, GO-12, 28.VI.2005, G. Hatschbach 36890 (SP, MBM); Serra Dourada, 19.I.1966, H. S. Irwin 11767 et al. (SP, NY); MINAS GERAIS. Morro das Pedras, 28.I.1970, H. S. Irwin 25512 et al. (SP, NY).

19. *Jacquemontia glaucescens* Choisy (1838: 64). fig 3 k – m.

TYPE: BRAZIL. Bahia, Blanchet 3164 (G!), *lect. design. here*

Perennial vines, climbing stems, velutinous; trichomes (6)–8–(10) -armed, the arms equal, appressed; internodes 3.5–5 cm long. *Leaf blade* 2.5–11 x 1.2–5.5 cm, chartaceous, entire, ovate to oval, the base rounded to cordate, the apex acute with a mucron to acuminate, adaxial face pubescent, with the trichomes usually sparsely distributed, brownish when dried, adaxial densely pubescent, grayish when dried, the trichomes very short, arms ca. 0.1 mm long; petiole 0.8–1.5 cm long. *Florescence* compound dichasium, loose, until 12-flowered; peduncles 2.5–7.5 cm long, axillary, pubescent; bracteoles absent; pedicels ca 5 mm. *Sepals* unequal, chartaceous, the 2 outer ca. 4.5–6.5 x 2.5–3.5 mm, rotund, the base cuneate to rounded, the apex rounded, glabrous to pubescent on the medium region or concentrated on the base, 1 intermediate, assymmetric, the 2 inner, ca. 6.5–8 x 3.5–5 mm, obcordate, the base rounded, the apex cordate, glabrous, escarious margins; corolla 1.5–2.5 cm long, funnelform, lobate, midpetaline line ciliate, blue; anthers ca. 1 mm, oblong; nectary entire, ovary oblong, style usually exserted, stigmatic lobes oval-flattened, 1-1.5 mm long. *Capsules* 8-valvar, globose, ca. 7 mm in diameter; seeds ca 4 mm long.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs on the Atlantic Forest from the Northeastern to the Southeastern. Less often in areas of brejos

and dry forests in Northeast. Is considered here as Vulnerable because its areas of distribution in continuous deforestation process.

Comments: — It is very similar to *J. holosericea* mainly by the obcordate inner sepals, but can be distinguished by the appressed trichomes, usually more than 8-armed, and the sepals usually glabrous or with a few trichomes restricted to the medium region or at the base, and the inner sepals are never ciliate.

Selected specimens examined: — BAHIA. Seabra, 15.XI.1983, J. C. A. Lima 212 & G. C. P. Pinto (JBRJ, HUEFS); Maraú, 17.V.1980, H. M. Harley 22157 (CEPEC, K); ESPÍRITO SANTO. Linhares, Reserva Florestal da Cia. Vale do Rio Doce, 27.IX.1978, G. Martinelli 5010 (JBRJ); Guarapari, 3.V.1981, L. Krieger s.n. (SP); SÃO PAULO. Pariqueira-Açu, 20.XII.1995, N. M. Ivanuskas 664 (SP).

20. *Jacquemontia gracilis* Choisy (1845: 399). fig 4 a – b.

TYPE: BRAZIL. Terra nova versus fl. S. Francisco, prov. Pernambucanae, m. Majo. Martius 836 (holotype: M!).

Perennial shrub, ascending stems, pubescent; trichomes, 3-(5)-armed, with the rays equal; internodes 4.5–5.3 cm long. *Leaf blade* 3–5.2 x 1.1–2.5 cm, chartaceous, entire, lanceolate to ovate, the base rounded, the apex acute, mucronate, glabrescent to pubescent, with a reddish-brown color when dried; petiole 2–3 mm long. *Florescence* monochasium, loose, 1–2(3)-flowered; peduncles 2–4 cm long, axillary, pubescent; bracteoles 2–3 mm long, 2 at the base of each pedicel, linear, pubescent; pedicels 3–4 mm long. *Sepals* subequal, the 2 outer a little smaller, chartaceous, 5–6.5 x 2–2.5 mm, lanceolate to oblong, the base rounded, the apex acute to mucronate, glabrous or sparsely ciliate; corolla ca. 2 cm long, funnelform, entire or slightly lobate, white; anthers elliptic, ca. 1 mm long; nectary absent, ovary conical, stigmatic lobes oval-flattened, ca. 0.8 mm long each. *Capsule* not known.

Distribution, Habitat and Conservation: — It occurs in Bolivia and Brazil, on Chaco and Cerrado biomes. In Brazil, is found in Bahia, Piauí, Mato Grosso and Goiás.

Comments: — Despite its inflorescences with usually only 2 flowers, in opposite to what believed Meissner, *J. gracilis* do not seems to be related to the “Anomalae” Section. It shared more characters with the group of umbelliform cymes and chartaceous sepals, as *J. blanchetii*. But from them, can be distinguished by the habit.

Selected specimens examined: — BAHIA. Catolândia, 24.I.2010, K. Yoshida-Arns BHRG 43 (UFP); GOIÁS. Monte Alegre de Goiás, 13.III.1973, W. R. Anderson 7015 (NY); MATO GROSSO. Norther Mato Grosso Expedition, 9.X.1978, J. A. Ratter et al. 900 (K, UB); Barra do Garças, D. Philcox s.n. (UB); MATO GROSSO DO SUL. Coxim, 10.VII.1974, G. Hatschbach s.n. (JBRJ).

21. *Jacquemontia gracillima* (Choisy) Hallier f. (1893: 541). fig 4 c – d.

BASIONYM: *Aniseia gracillima* Choisy (1845: 430). TYPE: BRASIL. Piauí, in pascuis, Martius 19 (Lectotype: M)

Annual herbs, erect, rare climbing stems, glabrescent to pubescent; trichomes, 3-5-(6)-armed; internodes 2.8–6.3 cm long. *Leaf blade* 3–6.3 x 1.4–2.6 cm, membranaceous, entire, oblongs to obelliptic, elliptic, rare ovate, the base rounded or aequilateral, the apex obtuse, rare acute, glabrescent; petiole 0.1–1.5 cm long. *Florescence* monochasium, loose, 4–(2-5)-flowered; peduncles 2.3–5.5 cm long, axillary, pubescent; bracteoles ca 3 x 1 mm, oblanceolate, the base cuneate, the apex acute, ciliate; pedicels ca. 2 mm. *Sepals* unequal, membranaceous, with the nervures apparent, the 2 outer 5–6 x 4.4–5.5 mm, deltoid, the base commonly cordate, rare rounded, the apex obtuse, pubescent to glabrescent, one middle asymmetric, ca. 4 x 3 mm, the 2 inner 3–3.5 x 1.5–3 mm, oblanceolate, the base cuneate, the apex acute, pubescent; corolla 0.8–1 cm long, funnelform with a short tube, white with the tube vinaceous; filaments vinaceous, anthers elliptic, ca. 1 mm long, white to pale pink; nectary 5-lobate, ovary oblong, stigmatic lobes cylindrical, ca. 0.7 mm long. *Capsules* 8-valvar, cubical to globose, ca. 4 mm in diameter, with the sepals acrescent, lignified and with the venation standing out; seeds ca. 3 mm long.

Distribution, Habitat and Conservation: — Occurs disjunctly in Panama, Venezuela and Brazil, where occurs from the setentrional Northeast, from Rio Grande do Norte to Piauí, and on spots of savannah vegetation on the Amazon forest.

Comments: — It is closest related to *J. cuyabana*, but is clearly distinct to all other Brazilian species of the genus. *Jacquemontia gracillima*, *J. heterantha* and *J. bifida* were described under *Aniseia* due to the cordate base of the outer sepals which is rare in *Jacquemontia*.

Selected specimens examined: — CEARÁ. Morada Nova, Estrada para Jaguaretama, 5.VI.1984, J. E. R. Collares 170 & L. Dutra (JBRJ, EAC); RIO GRANDE DO NORTE. Serra Negra do Norte, Estação Ecológica de Seridó, 24.V.2006, R. T. Queiroz 946 (HUFRN); PARAÍBA. São João do Cariri, Estação Experimental, 19.V.1994, C. M. L. Aguiar 82 (JPB); PERNAMBUCO. Salgueiro, Subestação Negreiros, 14.V.2009, M. T. Buril et al. 328 (UFP, BM); PIAUÍ. Oeiras, Chapada das Panelas, 15.IV.2007, F. C. S. Oliveira 96 (HUFRN); RORAIMA. Ule 8278 (INPA).

22. *Jacquemontia grisea* Buril, In Buril & Alves (2012: 29). fig 4 e – f.

TYPE: BRAZIL. Bahia, Barra da Estiva, Road on directon to Fazenda Brejões, 13°34'41''S 41°23'41''W, 1236 m alt., 3 Jul 2004, E. R. de Souza 473 & M.N.S. Stapf (holotype: HUEFS; isotype: SP).

Perennial shrubs, vilose, hoary; trichomes T-shape, with the longer arm ca. 3mm, or 3-armed with the arms equal or unequal; internodes 1–5 mm long, congested leaves, articulate branches. *Leaf blade* 1–2.4 x 0.5–1 cm, chartaceous, entire, elliptic, ovate or obovate, the base rounded to cuneate, the apex acute to acuminate, densely vilose, hoary, silver sometimes tending to blue or yellow ; sessile. *Florescence* compound dichasium, condensed, until 25-flowered, sessile, terminal; bracteoles ca. 7 mm long, falcate to linear; pedicels ca. 1 mm long. *Sepals* unequal, membranaceous, the 2 outter 7–8 x 2.5–3 mm, oblanceolate, the base cuneate, the apex acuminate, vilose, 1 middle, asymmetric, the 2 inner ca. 6 x 1.5 mm, lanceolate, pubescent; corolla 1.2–1.5 cm long, funellform, slightly lobate, midpetaline line pubescent, blue; anthers oblong,

ca. 1 mm long; nectary absent, ovary long, oblong, stigmatic lobes 0.5 mm long, oval-flat. *Capsules* 8-valvar, globose, 4 mm in diameter.

Distribution, Habitat and conservation: — Endemic to Brazil, it is known only to the Espinhaço Range in Bahia. Despite its very restrict distribution and for the low number of individuals for population, this species can be considered as Vulnerable according IUCN.

Comments: — *Jacquemontia grisea* differs from *J. decipiens*, by the presence of T-shape and very long and silver trichomes, instead of 5-6-armed; the inflorescences are capitulliform multi-flowered, while in *J. decipiens* it has up to 7 flowers, and sometimes a few axillary ones; the bracts are present in *J. grisea* and lacking in *J. decipiens*; and the outer sepals are oblanceolate instead of lanceolate.

Selected specimens examined: — BAHIA. Abaíra, between Serra do Barbado and Serra da Itabira, 20.X.1993, W. Ganey 2522 (HUEFS); Catolés, road Catolés to Boa Vista, 23.VII.1992, W. Ganey 710 (HUEFS, NY); Mucugê, C. M. Pigozzo 54 (HUEFS).

23. *Jacquemontia guaranitica* Hassler (1911: 193). fig 4 g.

TYPE: PARAGUAY. Hassler 9749 (holotype: G!, isotype: B!)

Jacquemontia warmingii O'Donell (1950b: 472). TYPE: BRAZIL. Minas Gerais, Lagoa Santa, Warming 39 (CP!) *syn. Nov.*

Jacquemontia anomala O'Donell (1950b: 460. tab. 2). TYPE: PARAGUAY. In regions fluminis Alto Paraná, K. Friebrig 6278 (SI, LIL, BM!) *syn. Nov.*

Perennial subshrub, erect or decumbent stems, hirsute; trichomes of 3 kinds – glandular, sometimes lacking, 3-armed, with the arms equal, or T-shape; internodes 0.6–1.7 cm long. *Leaf blade* 1.2–3 x 0.6–1.7 cm, membranaceous, entire, obovate to elliptic, the base cuneate, the apex usually acuminate to acute, mucronate, pubescent, ciliate, with T-shape trichomes, reddish when dried; petiole ca. 1 mm long. *Florescence* compound dichasium, loose to condensed, 1–3-flowered; peduncles 2–2.5 cm long,

axillary, hirsute; bracteoles ca 1–1.5 x 0.2–0.3 cm, elliptic, pubescent, ciliate. *Sepals* equal, membranaceous, 0.8–1 x 0.1–0.2 cm, lanceolate, the base rounded to subtruncate, the apex acuminate, pubescent, ciliate. corolla 1.2–1.7 cm long, funnelform, entire to slightly lobate, midpetaline line ciliate, white; anthers elliptic, ca. 1.5 mm long, white; nectary absent, ovary subglobose, stigmatic lobes broadly elliptic-flattened, ca. 2 mm long. *Capsules* 8-valvar, subglobose, ca. 4 mm in diameter; seeds ca. 3.5 mm long.

Distribution, Habitat and Conservation: — Occurs in Paraguay, Argentina and Brazilian South and Centre, in grasslands. Is poorly collected, thus, there is no data about abundance, being considered as DD.

Comments: — It is related to the *J. agrestis* morphological group, by the habit, trichomes types, and equal sepals. However, is easily distinguished by the obovate to elliptic and ciliate leaves, and the reddish color when dried.

Selected specimens examined: — GOIÁS. Chapadão do Céu e Mineiros, Parque Nacional das Emas, 4.I.1999, M. A. Batalha 2636 (SP); MATO GROSSO. Pedra, 11.X.1938, J. E. Rombouts s.n. (SP); Xavantina – Cachimbo road, 5.VI.1966, D. R. Hunt 5814 (NY, SP).

24. *Jacquemontia guyanensis* (Aublet) Meisner (1869: 301). fig 4 h.

BASIONYM: *Convolvulus guianensis* Aublet (1775: 136. t.52). TYPE: Schomburgk 101 (P!). ***lectotype desig. here***

Jacquemontia ferruginea var. *mucronata* Meissn., Fl. Bras. 7: 300. 1869. TYPE: Pará, Wulfschlaegel s.n. (BR!) ***syn. nov.***

Perennial vines, climbing stems, lanate; trichomes 3-armed with the arms equal. internodes 5–10 cm long. *Leaf blade* 3–8.5 x 1.4–3.5 cm, chartaceous, entire, slightly repand, oval to ovate, the base subcordate to rounded or truncate, the apex rounded to acute or emarginated, mucronate, lanate, ferrugineous when dried; petiole 5–8 mm long. *Florescence* compound dichasium, condensed, until 30-flowered, axillary; peduncle 4–12 cm; bracteoles ca. 8 mm long, linear, two per pedicel, pubescent; pedicel ca. 3 mm. *Sepals* unequal, membranaceous, the 2 outer 5–8 x 2–2.5 mm, rhombic, the base

truncate, the apex acuminate to acute, lanate, 1 middle, 5–7.5 x 1.5–2 mm, asymmetric, the 2 inner, 3–6.5 x 1–1.5 mm, lanceolate, the base rounded, the apex acute, mucronate, glabrescent, with trichomes restrict to the middle region, escarious margins; corolla 1.5–1.8 cm long, funellform, slightly lobate, midpetaline line pubescent, white; anthers sagittate, ca. 1.5 mm long, white; nectary entire, ovary conical, stigmatic lobes 1–1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 4 mm in diameter.

Distribution, Habitat and Conservation: — Occurs on the Guianas, Venezuela and Brazil, on borders of the Amazon Forest. Classified as Vulnerable according to IUCN, in respect to the constant degradation of its natural area of occurrence.

Comments: — Is related to the *J. ferruginea* complex of species. Besides the morphological characters (repand leaves, always condensed dichasium, midpetaline line pubescent), is important to attempt to the geographic distribution of this species, exclusive to the Amazon.

Selected specimens examined: — AMAZONAS. Tapuruquara, 16.X.1981, G. Prance et al. 15316 (INPA, NY); RONDÔNIA. Along BR-364, 22.V.1984, D. Frame et al. 123 (INPA, NY); Fazenda Canadá, 7.II.1979; N. A. Rosa 3078a (INPA, NY); RORAIMA. Limão, 21.IX.1927, G.H.H. Tate 102 (NY); Fazenda Quixabeira, 15.X.1977, L. Coradin 676 & M. R. Cordeiro (INPA, NY).

25. *Jacquemontia heterantha* (Nees von Esenbeck & Martius) Hallier f. (1893: 543). fig 4 j.

BASIONYM: *Dufourea heterantha* Nees & Mart. (1823: 79). *Prevostea heterantha* George Don (1837: 299). *Aniseia heterantha* (Nees von Esenbeck & Martius) Choisy (1945: 430). TYPE: BRAZIL. Circa Barra das Varedas, 1817, Martius s.n. (holotype: M!; isotype: BR!)

Perennial herbs, climbing stems, pubescent; trichomes, 3–(5)-armed; internodes 0.4–5 cm long. *Leaf blade* 2.5–4.5 x 1.2–2.3 cm, chartaceous, entire, ovate to broadly elliptic, rare rotund, the base usually cordate, rare rounded, the apex acuminate to rounde, apiculate, pubescent to glabrescent; petiole 5–1.7 cm long. *Florescence*

monochasium, loose, (1)–2(3–4)-flowered; peduncles 2.5–4.5 cm long, axillary, pubescent; bracteoles absent; pedicels 2–4 mm long. *Sepals* unequal, membranaceous, the 2 outer 5.5–7.5 x 4.5–6.5 mm, broadly ovate to deltoid, the base cordate to subcordate, the apex acuminate, pubescent, 1 middle, asymmetric, the 2 inner, ca. 4.5–5 x 2.5–3 mm, lanceolate to oblanceolate, the base cuneate to rounded, the apex acute to acuminate, glabrous or with trichomes restrict to the middle regions, escarious margins. *Corolla* 1–1.5 cm long, funnelform with a short tube, entire or slightly lobate, midpetaline line ciliate, blue; anthers ovate, ca. 1 mm long, white; nectary 5-lobate, ovary oblong, stigmatic lobes oval-flattened, ca. 0.5 mm long. *Capsules* 8-valvar, globose, ca. 4 mm in diameter; seeds ca. 3 mm long.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs on the Caatinga from Piauí to Bahia, on Cerrado vegetation in Minas Gerais and Mato Grosso do Sul. Occasionally on borders of the Atlantic forest in Espírito Santo and Rio de Janeiro. According to IUCN criteria, is considered as LC.

Comments: — It is related to the species with cordate outer sepals which most of them were previously described under *Aniseia*. It is similar to *J. velloziana*, but can be differentiated mainly by the monochasial and few flowered florescence instead of dichasium with more than 3 flowers.

Additional specimens examined: — BAHIA. Itatim, 24.V.1997, V.de Monteiro et al. 61 (HUEFS); Itiuba, caminho da filadelfia, 1.XII.1992, M. M. Arbo 5459 et al. (SP, ALCB); Xique-xique, 19.III.1996, R. Atkinson et al. 2531 (HUEFS); RIO DE JANEIRO. [Rio de Janeiro] Guanabara, Restinga de Jacarepaguá, 10.V.1969, D. Sucre 5002 et al. (JBRJ); Ssquarema, Jaconé, 24.V.1988, C. Farney 2131 & L.S.Sarahyba (JBRJ).

26. *Jacquemontia holosericea* (Weinmann) O'Donell (1953: 357). fig 4 k – l.

BASIONYM: *Ipomoea holosericea* Weinmann (1828: 17-18). TYPE: BRAZIL. Rio de Janeiro, Gaudichaud 566 (holotype: G!)

Jacquemontia menispermoides Choisy (1838: 63). TYPE: Gardner 80 (G!, K!, *lectotype designed here*)

Jacquemontia menispermoides var. *canescens* Meisner, in Martius (1869: 295).

TYPE: BRAZIL. Warming s.n. (C)

Perennial vines, climbing stems, velutinous; trichomes (3) –4– (5)-armed, the arms equal, usually ferrugineous when dried; internodes 1.8–12 cm long. *Leaf blade* 3.5–10 x 1.2–6.5 cm, chartaceous, entire to slightly repand, ovate to oval, the base usually rounded, to cuneate or cordate, the apex acute with a mucron to acuminate, velutinous on both faces or denser on adaxial face, rare glabrescent; petiole 0.5–2.5 cm long. *Florescence* compound dichasium, loose, until 15-flowered; peduncles 4–8 cm long, axillary, pubescent; bracteoles lanceolate to linear, ca. 2 mm long; pedicels 0.5–1 cm long. *Sepals* unequal, chartaceous, the 2 outer ca. 4–6 x 2–3 mm, obovate, the base cuneate, the apex rounded to slightly emarginate, glabrous to glabrescent on the medium region or with trichomes concentrated on the apex, 1 middle, asymmetric, the 2 inner 6–7 x 3–4 mm, obcordate, the base rounded, the apex cordate, ciliate, escarious margins; corolla 1.5–2.5 cm long, funnelform, lobate, midpetaline line ciliate, white; anthers oblong, ca. 1.5 mm long; nectary entire, ovary conical, stigmatic lobes oval-flattened to cilindric, ca. 2.5 mm long. *Capsules* 8-valvar, globose, ca. 5-6 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs mostly in the Atlantic forest, from Espírito Santo to Paraná. Considered as LC according to IUCN.

Comments: — Closest related to *J. glaucescens*, can be distinguished by the indument – size and ramification, and sepals shape and pubescence. Besides that, is usually ferrugineous and the leaves are not discolor when dried.

Selected specimens examined: — RIO DE JANEIRO. Barra da Tijuca, 26.II.1988, W. W. Thomas 6173 (JBRJ, NY); Marica, Restinga de Marica, 21.I.1982, L. R. Landrun 4179 (NY); Rio de Janeiro, Restinga de Jacarepaguá, 10.V.1969, D. Sucre et al. 5007 (JBRJ, NY); SÃO PAULO. Cananéia, Itapitanguí, Parque Estadual de Jacupiranga, 26.III.2005, A. C. C. Destefani 139 et al. (SPSF); PARANÁ. P. I. S. Braga s.n. (JBRJ).

27. *Jacquemontia lasioclados* (Choisy) O'Donell (1950a: 425). fig 4 m.

BASIONYM: *Ipomoea lasioclados* Choisy (1945: 357). TYPE: BRAZIL. PR. In campis sterilibus petrosis pr. Lagoa Santa, Warming s.n. (BR!, shares a samples with an *J. choisyana* specimen).

Jacquemontia rufo-velutina Meisner (1869: 305). *Thyella rufo-velutina* (Meisner) House (1906: 314). TYPE: Riedel 1154 in prov. Minarum campis glareosis.

Perennial shrubs, erect or decumbent stems, velutinous; trichomes 3-armed with the arms equal, or T-shape; internodes 0.8–2.4 cm long; *Leaf blade* 3–7.5 x 2–5 cm, chartaceous, entire to slightly sinuate, oval to ovate or rotund, the base subcordate to rounded, the apex rounded to acute or emarginated, mucronate, velutinous, ferrugineous when dried; petiole 2–5 mm long. *Florescence* compound dichasium, condensed, until 12-flowered, axillary, peduncle 2.5–6 cm; bracteoles ca. 4–10 x 1.5–2 mm, elliptic, lanceolate to oblanceolate, two per pedicel, velutinous; pedicel ca. 2 mm long. *Sepals* unequal, membranaceous, the 2 outer 7–8 x 3 mm, lanceolate, the base rounded to aequilateral, the apex acuminate to acute, velutinous, 1 middle, ca. 6 x 3 mm, ovate, the 2 inner, 5 x 2.5–3 mm, ovate, the base rounded, the apex acute, with trichomes restrict to the middle region, escarious margins; corolla 1.5–1.8 cm long, funellform, slightly lobate, midpetaline line pubescent, blue; anthers sagittate, ca. 1.5 mm long; nectary present, ovary conical, stigmatic lobes 1–1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 4 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil, known to Minas Gerais, Goiás e São Paulo, on cerrado, usually in rocky slopes. Due to their restrict distribution and to the low number of populations known, it is considered as Vulnerable, according to IUCN.

Comments: — In general, is similar to *J. capitellata*, but usually has larger leaves, frequently rotund, instead of elliptic. Moreover, the indument has T-shape trichomes, and the sepals are lanceolate instead of rhombic.

Selected specimens examined: — MINAS GERAIS. Serra do Espinhaço, ca. 16km SW de Diamantina, 19.I.1969, H. S. Irwin 22245 et al. (SP, UB, NY); Lagoa Santa, Santa Luzia, 25.III.1933, M. Barreto 10580 (SP); Presidente Kubitschek, estrada Tombadouro/Costa Sena, 21.I.2004, J. G. Jardim 4179 et al. (SP); Congonhas do Norte, estrada para Gouveia, 21.I.2007, J. R. Pirani 5642 et al.; Goiás. Cavalcante, 06.III.2003, F. Pastore 409 (CEN).

28. *Jacquemontia linarioides* Meisner (1869: 208). fig 5 a – b.

TYPE: BRAZIL. Minas Gerais, Serra da Moeda, Sello s.n. (NY!).

Annual herb, erect or prostrate stems, glabrescent to pubescent; trichomes 3– (4–5)-armed; internodes 0.5–1.2 cm long; *Leaf blade* 0.7–4 x 0.2–2 cm, membranaceous, entire to slightly sinuate, oblong to elliptic or obovate, the base cuneate to aequilateral, the apex acute, mucronate, pubescent, with stellar trichomes 3-armed, trichomes on depressions on the adaxial face; petiole 2–10 mm long. *Florescence* simple dichasium, condensed, 1–3-flowered; peduncles 2–5 cm long, axillary, pubescent; bracteoles 2–8 mm long, 2 at the base of each peduncle, linear to elliptic, glabrescent; pedicels 1–2.5 mm long. *Sepals* unequal, membranaceous, the 2 outer 7–7.5 x 3–4 mm, rhombic to oblanceolate, the base truncate, the apex acute to acuminate, pubescent, 1 middle 6.5–7 x 2.5–3 mm, asymmetric, the 2 inner 6–7 x 2 mm, lanceolate, the base rounded, the apex acuminate, pubescent on the middle region, ciliate, escarious margins; corolla 1.5–1.8 cm long, funnelform, lobate, midpetaline line ciliate, blue with the tube vinaceous; anthers elliptic, ca. 1.5 mm long, pale blue; nectary absent, ovary subglobose, stigmatic lobe oval-flat, ca. 0.5 mm long. *Capsules* 8-valvar, angulose, ca. 4 mm; seeds ca. 3 mm long.

Distribution, Habitat and Conservation: — It is endemic to the Espinhaço Range in the state of Minas Gerais, Brazil. It is often collected among Campos rupestres in high altitudes.

Comments: — Considering the habit and the leaves shape, resembles *J. linoides* and *J. guaranitica*. However, it can be easily distinguished from the first one by the dichasial florescence, and from the second one by the unequal sepals.

Selected specimens examined: — MINAS GERAIS. Brumadinho, Serra da Moeda, 3.XI.1989, L. A. Martens 249 (SP); Brumadinho, Retiro das Pedras, 14.XII.1998, J. R. Stehmann 2405 & C. E. S. Ferreira (SP); Itabirito, Pico do Itabirito, 29.I.1994, W. A. Teixeira s.n. (SP); Ituiritate, Faz. Santa Terezinha, 11.II.1949, Macedo 1650 (JBRJ).

29. *Jacquemontia linoides* (Choisy) Meisner (1969: 308). fig 5 c.

BASIONYM: *Ipomoea linoides* Choisy (1845: 354). TYPE: BRAZIL. Certão, Bahia, Blanchet 2923 (holotype: G!; isotype: BM!).

Jacquemontia linoides var. *major* (Choisy) Meisner (1969: 308). TYPE: BRAZIL. habitat in pascuis ad flum. Itapicurú, prov. Maranhão, Herb. Martius 842 (holotype: M!).

Annual herb, erect or decumbent stems, glabrescent; trichomes 3-armed; internodes 1.7–2.5 mm long. *Leaf blade* 2–4.5 x 0.2–0.5 cm, membranaceous, entire, elliptic to linear, the base rounded to cuneate, the apex acute, glabrescent to pubescent, trichomes 3–5-armed subequal; petiole 4–7 mm long. *Florescence* monochasium, loose, 3–5-flowered; peduncles 3–5.2 cm long, axillary or terminal, pubescent; bracteoles ca. 1 mm long, 2 at the base of each peduncle, linear, glabrous; pedicels 2–3 mm long, slightly reflexed. *Sepals* equal, chartaceous, ca. 4.5–5 x 2 mm, ovate, the base rounded, the apex acuminate to acute, glabrous; corolla 7–9 mm long, funnelform to rotaceous, distinctly lobate, midpetaline line ciliate, blue with the tube vinaceous; anthers elliptic, ca. 1 mm long, pale blue; nectary absent, ovary subglobose, stigmatic cylindrical, ca. 0.5 mm each. *Capsules* 8-valvar, angulose, ca. 4 mm in diameter, sepals accrescent, paleaceous; seeds ca. 3 mm long.

Distribution, Habitat and Conservation: — *Jacquemontia linoides* is found in Paraguay and Brazil, where occurs in caatinga areas of Bahia, Pernambuco and Ceará. It is poorly collected, thus, must be considered as DD according to IUCN.

Comments: — Having an habit erect or decumbent herb combined with leaves membranaceous and elliptic to linear, turns this species very particular and easily recognized.

Selected specimens examined: — BAHIA. Remanso, Estrada para Pilão Arcado, 16.VI.2001, T. S. Nunes 459 et al. (HUEFS, SP); Pilão arcado, 28.IV.2001, L. P. de Queiroz 6576 (HUEFS); CEARÁ. Aiuaba, Estação Ecológica de Aiuaba, 30.V.1996, M. I. Bezerra-Loiola 184 et al. (EAC, SP); PERNAMBUCO. Petrolina, Estação Experimental do CRAD, 15.V.2009, M. T. Buril et al. 336 (HVASF, UFP); Parnamirim, Estrada Parnamirim-Fazenda Travessia, 14.VI.1984, F. Araújo 143 (IPA).

30. *Jacquemontia macrocalyx* Buril (2013). fig 5 d – e.

TYPE: BRAZIL. Bahia, Parque Estadual Morro do Chapéu, Lagedo Bordado, 11°16'20" S, 41°05'05" W, 736m alt., 06 Feb. 2011, *B. S. Amorim et al.* 752 (holotype: UFP; isotypes: SP, MO).

Perennial subshrub, erect stems, velutinous; trichomes 4–5-armed, of two lengths, the shorter more dense, the longer more sparse; internodes 1.7–3.2 cm long. *Leaf blade* 2.5–3.6 x 1.7–2.2 cm, chartaceous, entire to slightly repand, ovate to broadly elliptic, base rounded to subcordate, apex apiculate to acuminate, yellowish when dried, velutinous; petiole 4–6 mm long. *Florescences* monochasium or dichasium, 2–(3)-flowered; peduncles 2–4.5 cm long, axillary, velutinous; bracteoles 2, ca. 5 mm long, linear, velutinous; pedicels 3–4 mm long. *Sepals* unequal, membranaceous, the 2 outer 1.2–1.8 x 0.8–1.5 cm, ovate to deltoid, rarely lanceolate, base subcordate, apex acuminate, pubescent, 1 middle 1–1.2 x 0.3–0.4 cm, asymmetric, the 2 inner 0.3–0.5 x 0.2–0.25, ovate to lanceolate, base rounded, apex acuminate, pubescent; corolla 1.4–1.5 cm long, funnelform, midpetaline line ciliate, lilac with the tube light pink; anthers oval, ca. 1.5 mm long, white; nectary absent, ovary oblong, stigmatic lobes ca. 0.5 mm long, oval-flat. *Capsules* 8-valvar, oblong, ca. 5 mm long.

Distribution, Habitat and Conservation: — Endemic to Brazil and known only to the Espinhaço Range in Bahia. Occurs in campos rupestres and it is a rare species. It was considered as Endangered according with IUCN criteria.

Comments: — It belongs to the morphological group which the outer sepals are cordate. Even though, because of the habit, size of the sepals and the inflorescence structure, it becomes a very distinctive species.

Selected specimens examined: — BAHIA. Morro do Chapéu, Lages, on the Road of Feijão, 30.I.2003, F. França et al. 4103 (HUEFS).

31. *Jacquemontia martii* Choisy (1845: 398). fig 5 f – h.

TYPE: BRAZIL. Prov. Bahia, prope Joazeiro, Martius 845 (M!)

Jacquemontia parviflora Choisy (1845: 398). TYPE: BRAZIL. Cujabá, Silva-Manso 980 (holotype: NY!).

Perennial vines, climbing stems, glabrescent to pubescent; trichomes, 3–(4–6)-armed, not appressed; internodes 2–7 cm long. *Leaf blade* 2.5–7 x 1.2–3.5 cm, chartaceous, entire, ovate, the base cordate to slightly cordate, the apex acuminate, usually glabrescent, rare pubescent; petiole 0.5–3.5 cm long. *Florescence* compound dichasium, loose, until 15-flowered; peduncles 2.5–14 cm long, axillary, glabrescent; bracteoles lanceolate to ovate or rotund, or lacking, pubescent to glabrescent, ca. 1 mm long; pedicels 0.5–1 cm. *Sepals* unequal, chartaceous, the 2 outer ca. 6–7 x 3 mm, ovate, the base rounded, the apex acuminate to acute, reflexed, glabrous or with a few cilia on the apex, the 3 inner, ca. 5–6 x 2–2.5 mm, ovate, the base rounded, the apex acuminate to acute, glabrous. corolla 1–2 cm long, funnelform, entire or slightly lobate, midpetaline line ciliate, blue; anthers oblong to sagittate, ca. 1.5 mm long, white; nectary 5-lobate, ovary oblong, stigmatic lobes oval-flattened, ca. 0.5–1 mm long. *Capsules* 8-valvar, globose, ca. 4 mm in diameter; seeds ca. 2 mm long, smooth, with the ring present.

Distribution, Habitat and Conservation: — Is endemic to Brazil, but widely distribute, on caatinga since Ceará to Bahia, cerrado, and Atlantic Forest, from Pernambuco to Rio de Janeiro. Must be considered as LC, according to IUCN.

Comments: — It is very close to *J. blanchetii*, but is distinguished by the sepals almost equal in size instead of unequal, and the apex of sepals are acuminate and reflexed.

Selected specimens examined: — ALAGOAS. Quebrangulo, Parque Estadual da Pedra Talhada, 25.IX.1987, R.P. Lyra-Lemos 1402 (MAC); BAHIA. Amélio Rodrigues,

20.III.1987, L. P. de Queiroz 1445 & I. C. Crepaldi (HUEFS); CEARÁ. Estrada Exú,
13.III.2007, J. P. Araújo 52 (HURCA); PERNAMBUCO. Chã Grande, Chapada da
Borborema, Serra das Russas, 29.IX.2001, P. M. Pinheiro 28 (UFP); RIO DE JANEIRO.
Niterói, Parque Estadual da Serra da Tiririca, 25.II.2000, M. C. F. dos Santos 517 et al.
(JBRJ).

32. *Jacquemontia nodiflora* (Desrousseaux) George Don (1838: 283). fig 5 j – m.

BASIONYM: *Convolvulus nodiflorus* Desrousseaux (1745: 557). TYPE: MEXICO.
San Domingo, Martin s.n. (holotype: P-Lam!).

Convolvulus mucrunatus Benth. (1839: 120). TYPE: Hartweg 673 (holotype: K!;
isotypes: NY!, W).

Jacquemontia confusa Meisner (1869: 294. t. 106). TYPE: BRAZIL. Bahia,
Martius n. 2298 (holotype: M!).

Jacquemontia simulata House (1906: 314-315). TYPE: MEXICO. Yucatan. G. F.
Gaumer 574 (holotype: NY!).

Jacquemontia mollissima Standley (1926: 15). TYPE: MEXICO. Chiapas, banks
of creeks, Monserrate, Purpus 47 (holotype: US; isotypes: M!, NY!, UC).

Perennial vines, climbing stems, velutinous to glabrescent; trichomes, 3–(5)-
armed, equal sizes or not; internodes 0.5–6 cm long. *Leaf blade* 2–6 x 1.2–5 cm,
chartaceous, entire to slightly repand, oval, broadly elliptic, ovate, rare lanceolate or
orbicular, the base rounded to slightly cordate, the apex acute, acuminate, mucronate,
aristulate or rounded, usually velutinous, rare glabrescent; petiole 1–3.2 cm long.
Florescence compound dichasium, loose, 2–30-flowered; peduncles 0.5–1.5 cm long,
axillary, pubescent rare glabrescent; bracteoles deciduous, linear, ca. 1 mm; pedicels 4–
8 mm. *Sepals* equal or almost equal in size, chartaceous, 1.5–3 x 2–3.5 cm, the 2 outer,
ovate to rotund, the base rounded, the apex rounded to acute, glabrous or pubescent, the
3 inner, usually rotund, the base rounded, the apex rounded to cordate, glabrous or with
trichomes restrict to the middle region, escarious margins; corolla 0.7–1.2 cm long,
funnelform, slightly lobate between episepalic nervures, midpetaline line ciliate, white,

sometimes with the tube light pink; anthers elliptic, ca. 1 mm long, white or pink; nectary 5-lobate, ovary globose, style usually exsert, stigmatic lobes oval-flattened to cylindrical, 1 – 5 mm long. *Capsules* 8-valvar, globose, ca. 3 mm diam.; seeds ca. 1.5 mm long, smooth, ring present.

Distribution, Habitat and Conservation: — Widely distributed from Mexico to Brazil. It is often found in caatinga, but also occurs in cerrado. It is classified as LC, on IUCN criteria.

Comments: —The stigmatic lobes from oval-flattened to cylindrical; pubescence 3–4-armed; and outer sepals from glabrous to pubescent are three characteristics which stands out on the variability of this species. However, it is possible to found intermediate specimens which can be result of natural hybridization. Robertson (1971) used the extremes of the morphological characters to accept two names: *J. nodiflora* with sepals pubescent + oval-flattened stigma + 4-armed trichomes (common in Mexico), and *J. confusa* with sepals glabrous + cylindrical stigma + 3-armed trichomes (common in South America). Both morphotypes were found in Brazil and here are considered under the same species. Different tools would help clarify the gene flow among the especimens and possible better understand the range of morphological variation.

Selected specimens examined: — CEARÁ. Crateús, Serra das Almas, 25.III.2002, F. S. Araújo 1370 (HUEFS, EAC); BAHIA. Caetité, em direção a Mamiaçu. 12.IV.2005., E. B. Miranda 783 et al. (HUEFS); GOIÁS. Niquelândia, 20.VI.1995, M. L. Fonseca s.n. (JBRJ); PARAÍBA. Sumé, RPPN Fazenda Almas, 4.IV.2009, M. T. Buril et al. 283 (UFP, BM); PIAUÍ. Cocal, Jacarandá, 18.V.2003, E. M. F. Chaves 344 (IPA); SERGIPE. N.S.da Glória, Fazenda Olhos D'água, 01.VIII.1986, G. Viana 1550 (ASE).

33. *Jacquemontia ochracea* Simão-Bianchini & Pirani (2005: 298-300).

TYPE: BRAZIL. Minas Gerais, Grão-Mogol, Vale do riacho Ribeirão, 21-V-1987, J.R. Pirani & R. Mello-Silva CFCR 10746 (holotype: SP!, isotypes: SPF!, NY!).

Perennial shrubs, erect stems, lanate; trichomes 8-armed with the arms equal or unequal; internodes 0.3–1.2 cm long, congested leaves. *Leaf blade* 1.5–4.7 x 1.2–3.2 cm, chartaceous, entire, oval to orbicular, the base rounded to slightly cordate, the apex rounded to acute with a mucron, densely pubescent, usually discolor when dried, nervures apparent on abaxial face; petiole 2–10 mm long. *Florescence* compound dichasium, loose, until 7-flowered, axillary or terminal, peduncle 0.5–1.5 cm; bracteoles 2–5 mm long, linear, two per pedicel; pedicel ca. 2 mm. *Sepals* unequal, chartaceous, the 2 outer 5–6 x 2–2.5 mm, ovate, the base cuneate, the apex long acuminate, pubescent, 1 middle, asymmetric, the 2 inner 4–5 x 3–4 mm, ovate, the base slightly cordate, the apex acuminate; corolla ca. 1 cm long, funellform, slightly lobate, midpetaline line ciliate, blue; anthers sagittate, ca. 1 mm long; nectary absent, ovary oblong, stigmatic lobes 0.5–1 mm long, oval-flat. *Capsules* 8-valvar, globose, 4 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil, is known only to the Espinhaço Range in Minas Gerais. Is a rare species and must be classified as Vulnerable according to IUCN.

Comments: — From the shrubby species, is similar to *J. cephalantha* and *J. fusca*, but can be distinguished by the axillary inflorescence umbelliform, sepals ovate and 8-armed trichomes.

Selected specimens examined: — MINAS GERAIS. Diamantina, caminho a Conelheiro da Mata, 18.V.1990, M. M. Arbo 4344 et al. (SP); Grão Mongol, subida da trilha da Tropa, 27.V.1988, D. C. Zappi CFCR 11996 et al. (SP); São Gonçalo do Rio Preto, Parque Estadual do Rio Preto, 8.IV.2000, J. A. Lombardi 3887 et al. (SP).

34. *Jacquemontia pentanthos* (Jacquin) George Don (1838: 283). fig 5 n – o.

BASIONYM: *Convolvulus pentanthus* Jacquin (1791: 210). TYPE: Hb. Jacquin, Hort. Schombr. (holotype: W; isotype: G!).

Convolvulus azureus Desrousseaux (1792: 107). TYPE: GUYANE-FRANCAISE. Anno 1792, Leblond (holotype: P-Lam!; isotype: G!)

Convolvulus violaceus Vahl (1794: 29). TYPE: Habitat in Insula St. Crucis. Dn. Rector West (no specimen known).

Convolvulus nummularius Vahl (1798: 12). TYPE: von Rohr s.n. (holotype: C).

Convolvulus canescens Kunth (1819: 99). TYPE: Humboldt & Bonpland (holotype: P!).

Jacquemontia violacea (Vahl) Choisy (1837: 61). (holotype: G!)

Jacquemontia violacea var. *abbreviata* Choisy (1837: 62). (holotype: G!).

Jacquemontia violacea var. *canescens* (Kunth) Choisy (1837: 62). *Ipomoea canescens* (Kunth) George Don (1838: 273). (holotype: G!)

Jacquemontia violacea var. *rotundifolia* Choisy (1837: 62). (No specimens cited or known).

Jacquemontia azurea (Desrousseaux) Choisy (1837: 62).

Jacquemontia violacea var. *glabriuscula* Meisner (1869: 296).

Jacquemontia violacea var. *guatemalensis* Meisner (1869: 296). TYPE: GUATEMALA. Friedrichstahl 1 (W).

Jacquemontia multiflora Hallier (1893: 543). TYPE: Martius s.n. (M!). **syn. nov.**

Convolvulus umbellatus Sessé & Mocino (1894: 32). TYPE: MEXICO. Sessé et al. (MA).

Jacquemontia elongata Britton (1926: 470). TYPE: TRINIDAD. Manzanilla, Britton 2191 (holotype: NY!; isotype: US).

Jacquemontia houseana Standley (1932: 140). TYPE: BRITISH HONDURAS. El Cayo, Bartlett 12928 (holotype: F!).

Jacquemontia saxicola L. B. Smith (1937: 37. pl2. fig. 53). TYPE: BRAZIL. F. Drouet 2485 (holotype: F!). **syn. nov.**

Perennial vines, climbing stems, usually glabrescent to pubescent; trichomes 3-armed; internodes 2.5–12.5 cm long. *Leaf blade* 2.5–15.5 x 1.6–7.8 cm, chartaceous, entire to slightly repand, usually ovate, oval, rotund, lanceolate, the base commonly cordate, rare rounded or subtruncate, the apex acuminate, acute with a mucron, apiculate or rounded with a mucron, glabrescent to pubescent; petiole 1–2.5 cm long. *Florescence* compound dichasium, loose to condensed, 3–17(25)-flowered; peduncles 4–15 cm long, axillary, glabrescent to pubescent; bracteoles ca. 1–2.4 x 0.1–0.2 cm, oblanceolate, rhombic, rare linear, two per pedicel; pedicel 2–5 mm. *Sepals* unequal, membranaceous, the nervures apparent, the 2 outer ca 4.5–9 x 2–5 mm, rhombic, ovate, lanceolate, oblanceolate or obelliptic, the base cuneate to rounded, the apex acute to long acuminate, glabrescent to pubescent, 1 middle asymmetric, 4.5–8.5 x 2–4.5 mm, when pubescent only on the exposed side, the 2 inner, 2.5–5 x 1–2 mm, lanceolate to ovate, commonly glabrescent or with trichomes restrict to the medium region; corolla 1–1.8 cm long, funellform, lobate to entire, midpetaline line ciliate, blue or white; anthers sagittate, ca. 1 mm long, white; nectary absent; ovary oblong, stigmatic lobes 0.5–2 mm long, oval-flat. *Capsules* 8-valvar, globose, 3.5–4.5 mm in diameter; seeds 2–3 mm long, aerolate, with the ring.

Distribution, Habitat and Conservation: — It is widely distributed from Mexico to Argentina. Must be classified as LC according to IUCN.

Comments: — It is a very variable species, and the most confusing species in the genus in terms of morphology. In Mexico, it is closely related to *J. pycnocephala* Benth., *J. abutiloides* Benth., *J. cumanensis* Kuntze, *J. polyantha* (Schltdl. & Cham.) Hallier f., *J. pinetorum* Standl. & Steyerl. In South America, it is very similar to *J. corymbulosa*, *J. prominens* and *J. ferruginea*. The delimitation of all this complex of species is sometimes challenging. One supposed idea is that this group of species are in a current process of speciation. And that is the reason it is difficult to find remarkable and constant morphological characters. Due to that, many new names were proposed unnecessarily. To identify *Jacquemontia pentanthos* from Brazil, besides the sepals and bracts shape, usually the plants are glabrescent to pubescent, but never densely ferrugineous as *J. ferruginea*.

Selected specimens examined: — BAHIA. Coribé, Alagoinha, 10.IV.2005, R. M. Castro 1162 (HUEFS); CEARÁ. General Sampaio, Barragem, 8.VII.2005, J. R. Lemos

361 & M.J.X. Santos (HUEFS, MAC); GOIÁS. Minaçu, Reserva da Serra da Cana Brava, 08.VI.1995, M. A. Barboza et al. s.n. (UB, NY); MINAS GERAIS. Ituiutaba, 16.I.1956, A. Macedo 4151 (JBRJ); PARAÍBA. Solânea, Curimataú, 21.VI.2001, T. Grist 221 (IPA); SÃO PAULO. Mogi Guaçu, Reserva biológica e Estação experimental de Mogi Guaçu, 17.III.1995, S. Romaniuo-Neto 1368 et al. (SP); SERGIPE. Canindé do São Francisco, Prainha, 06.V.1999, R. A. Silva et al. 257 (UFP).

35. *Jacquemontia pycnocephala* Benth (1845: 137). fig 6 a.

Thyella pycnocephala (Benth) House (1906: 314). TYPE: MEXICO.

Acapulco, Sinclair s.n. (K!, BM!)

Perennial vines, climbing or prostrate stems, pubescent; trichomes 3-armed; internodes 3.2–8.5 cm long. *Leaf blade* 3.5–7.5 x 1.8–4.5 cm, chartaceous, entire, ovate, the base cordate, the apex acuminate, acute, rare rounded, mucronate, glabrescent to pubescent; petiole ca 1 cm long. *Florescence* compound dichasium, condensed, 3–15-flowered; peduncles 3.5–14 cm long, axillary, pubescent; bracteoles ca. 1–1.5 x 0.7–1 cm, broadly ovate to subcircular, the base truncate or cordate, the apex acute to acuminate, two per pedicel; pedicel 1–2 mm. *Sepals* slightly unequal, membranaceous, the 2 outer exceeding the inner, ca 1–1.2 x 0.4–0.6 cm, ovate, pubescent, 1 middle, asymmetric, the 2 inner 6–10 x 2–3 mm, ovate, acuminate apex, glabrescent to pubescent; corolla 1.5–2 cm long, funelliform, slightly lobate, midpetaline line ciliate, blue; anthers sagittate, ca. 2–2.5 mm long; nectary present, ovary globose, stigmatic lobes 1–1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 4 mm in diameter; seeds 2–2.5 mm long, areolate, with the ring.

Distribution, Habitat and Conservation: — It occurs usually in dry areas from Mexico to Brazil.

Comments: — This species was known only to Mexico. However, some specimens found in Brazil presents the sepaloïd bracteoles, usually reddish when dried. And this is the main characteristic to distinguish it from *J. pentanthos*.

Selected specimens examined: — BAHIA. Morro do Chapéu, Fazenda Guariba, 30.VI.2007, E. Melo 4839 et al. (HUEFS); CEARÁ. Crato, Floresta Nacional do Araripe, 14.I.1999, A. M. Miranda & D. Lima 3166 (HST). PERNAMBUCO. Maraiá, Engenho Curtume, 14.IX.2007, M. S. Leite 464 (UFP); SERGIPE. Serra de Itabaiana, 13.VIII.1987, G. Viana 1973 (ASE).

36. *Jacquemontia racemosa* Meisner (1869: 308-309). fig 6 b.

TYPE: BRAZIL. Piauí, pascuis et campis herbosis pr. Praedia Campo Grande et Castello, Martius s.n., obs. 2459 (lectotype defined here: M).

Convolvulus breviacuminatus Martius ex Choisy (1845: 409).

Ipomoea breviacuminata (*Nomen manuscriptum*)

Annual herbs, climbing or prostrate stems, somewhat woody on the base, hirsute; trichomes of 3 kinds – glandular, 3-armed very short and dense, and T-shape, with the longer arm ca. 3 mm; the glandular ones sometimes lacking; internodes 1.4–2.3 mm long. *Leaf blade* 1–1.2 x 0.7–0.9 cm, chartaceous, sinuate, ovate, the base cordate, the apex acuminate, pubescent, usually with only the shorter 3-armed trichomes; petiole 0.5–1 cm long. *Florescence* monochasium, loose, 2-(4)-flowered, the fertile leaves or bracts are very reduced, ca. 5 mm long, linear to lanceolate, synflorescence resembles a panicle; peduncles 1.8–2.2 cm long, axillary, pubescent; bracteoles ca. 2 mm long, linear, glabrous; pedicels ca. 2 mm long. *Sepals* equal, membranaceous, ca. 4.5–5.5 x 1–1.5 mm, lanceolate, the base rounded to subtruncate, the apex acuminate, pubescent, with the T-shape on the margins and sometimes glandular trichomes; corolla 8–9 mm long, funnelform, with a short tube, distinctly lobate, midpetaline line ciliate, blue; stamens insert, anthers elliptic, ca. 1 mm long; nectary absent, ovary subglobose, stigmatic lobes oval-flat, ca. 0.5 mm each. *Capsules* 8-valvar, subglobose, ca. 3.5 mm in diameter; seeds ca. 3 mm long.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs in areas of caatinga from Piauí to Bahia and cerrado in Bahia and Goiás. It is a very poorly known and collected species. Must be classified as DD according to IUCN.

Comments: — *Jacquemontia racemosa* is very similar to *J. agrestis*, especially considering all the variability of this species. However, as *J. decumbens*, seems to be one of its extremes of variation well established in nature. The fertile leaves extremely reduced to linear, giving the appearance of a panicle is remarkable to recognize the species.

Selected specimens examined: — BAHIA. Água Fria, estrada Irará-Água Fria, 3.IX.2006, A. M. Amorim 6200 et al. (CEPEC, SP); Mucugê, Estrada para Guiné, 29.X.2005, G. Carvalho-Sobrinho 534 & A. J. Neto (HUEFS, SP); Côcos, Riacho do Meio, 18.III.2010, K. Yoshida-Arns BHRG 636 (UFP).

37. *Jacquemontia revoluta* Simão-Bianchini (1999: 104-106).

TYPE: BRAZIL. Minas Gerais, Santana do Riacho, Serra do Cipó, Rodovia Belo Horizonte – Conceição do Mato Dentro km 108, R. Simão & V.C. Souza CFSC 10090 (SPF, SP, K).

Perennial shrubs, erect or ascending stems, pubescent; trichomes 5-armed, appressed; internodes 0.5–2.5 cm long. *Leaf blade* 2–5 x 0.05–0.1 cm, membranaceous, entire, margins revolute, attenuate to linear, the base cuneate, the apex acute, glabrescent, trichomes 5-armed equal or one of the arms much longer; petiole 2 mm long. *Inflorescence* monochasium, loose, 1–3-flowered; peduncles 3–7 cm long, axillary, pubescent; bracteoles ca. 1 mm long, linear, glabrous; pedicels 1 – 5 mm. *Sepals* subequal, chartaceous, ca. 2–4 x 1–3 mm, ovate, the base rounded, the apex acuminate to apiculate, glabrous; corolla 7–10 mm long, funnelform, pale blue; anthers ovate; stigmatic lobes ellipsoid. *Capsules* 4-valvate.

Distribution, Habitat and Conservation: —It is endemic to Serra do Cipó – on the Espinhaço range in the State of Minas Gerais (Brazil). It is a rare species and can be considered as Vulnerable (Simão-Bianchini 1999).

Comments: — It is similar to *J. linoides*, but presents revolute leaves and trichomes always 5-armed, with the arms equal or one much longer than the others.

38. *Jacquemontia robertsoniana* Buril & Simão-Bianchini, In Buril et al. (2012: 455). fig 6 c – d.

TYPE: BRAZIL. Bahia, Mucugê, Serra do Esbarrancado, 17 Apr 2005, 12°43'S 43°30'W, A.A. *Conceição* & D. *Cardoso* 1293 (holotype: HUEFS!)

Perennial shrub, erect stems, tomentose, grayish to ochraceous; trichomes 3-armed, the arms usually equal; internodes 0.2–0.6 cm long, congested leaves. *Leaf blade* 1–1.6 x 0.9–1.3 cm, chartaceous, entire, oval to orbicular, rare elliptic, oblong, ovate or obovate, base rounded, apex apiculate to acuminate and on the leaves of the terminal branches becoming longer, caudate to obtuse with an acumen, tomentose, grayish, with the veins not evident; petiole 0.5 – 1 mm long. *Florescence* coumpound dichasium, condensed, ca. 6-flowered, sessile, terminal; bracteoles absent; pedicels ca. 1 mm long. *Sepals* chartaceous, unequal, the 3 outer 0.7 – 0.75 x 0.2 – 0.25 cm, lanceolate to ovate, base rounded, apex long acuminate, lanulose, the 2 inner 0.55 – 0.6 x 0.1 – 0.15 cm, lanceolate, base rounded, apex acute, trichomes restrict to the middle region, scarious margins; corolla ca. 1.2 cm long, funnelform, slightly lobate, midpetaline line sparsely pubescent, blue. anthers elliptic, ca. 1.5 mm long, white; nectary absent, ovary globose, stigmatic lobes ca. 1 mm long, oval-flat. *Fruits* not seen.

Distribution, Habitat and Conservation: — Endemic to Bahia, Brazil, on the Espinhaço range. Occurs on rocky fields. It was considered as Vulnerable, due to its occupation area and number of populations found.

Comments: — It is included on the shrub group of species, similar to *J. ochracea*. However, it is easily recognized by the congested leaves that become caudate on the apices of the branches.

Selected specimens examined: — BAHIA. Abaíra, Catolés, 01.VI.2006, A. A. *Conceição* et al. 617 (HUEFS, SP); Mucugê, Serra do Esbarrancado, 08.IX.1981, A. Furlan et al. CFCE 1583 (SP, SPF); Palmeiras, 28.V.2002, A.A. *Conceição* & L.R. Lima 1046 (SP, SPF).

39. *Jacquemontia rojasiana* O'Donell (1950a: 427). fig 6 e.

TYPE: PARAGUAY. Sierra de Amambay, Cerro Torín. T. Rojas 4163 (CTES).

Perennial subshrub, erect stems, glabrous; internodes 1–1.2 cm long, congested leaves. *Leaf blade* 1–3.5 x 0.5–1.5 cm, coriaceous, entire, elliptic to lanceolate or oblanceolate, the base cuneate to rounded, the apex acute, glabrescent, 3-armed trichomes, brownish when dried; petiole 1–4 mm. *Florescence* simple dichasium, 2–3-flowered; peduncles 0.5–3 mm long, axillary or terminal, glabrous; bracteoles ca 1 – 2.5 mm long, linear; pedicels ca. 3 mm long. *Sepals* unequal, chartaceous, the 2 outer 7–9 x 3.5–5 cm, ovate, elliptic or obovate, the base rounded, the apex acute to acuminate, pubescent, 1 middle, asymmetric, the 2 inner, 6–8 x 3.5–4 mm, ovate, the base rounded, the apex acuminate, scarious margins, glabrous; corolla ca. 2 cm long, funnelform, slightly lobate, midpetaline line glabrous, white; nectary present, ovary subglobose, stigmatic lobes elliptic-flattened to cylindrical, ca. 1.5 mm long. *Capsules* 4-valvar, subglobose, ca. 6 mm in diameter; seeds ca. 4 mm long.

Distribution, Habitat and Conservation: — Occurs in Paraguay and Brazil, on pantanal vegetation, in Mato Grosso. It is a very rare species, and can be considered as Vulnerable.

Comments: — *J. rojasiana* is similar to *J. densifolia* Hassl. which does not occur in Brazil. It can be distinguished by the elliptic lanceolate or oblanceolate leaves instead of linear. Among the Brazilian shrub species, *J. rojasiana* can be easily recognized because it is an erect shrub, and glabrous.

Specimen examined: — MATO GROSSO DO SUL. BR-642, 5 km to Tacuru, 18.XII.1983, G. Hatschbach et al. 47311 (MBM, SP).

40. *Jacquemontia selloi* Hallier (1893: 543). fig 6 f – h.

TYPE: BRAZIL. Sello s.n. (B, G!)

Jaquemontia loefgrenii Hoehne (1922: 55. pl. 11) TYPE: BRAZIL. São Paulo, Itapetininga, Löefgren 120 (SPF!) *syn. Nov.*

Aniseia minor Pilger (1922: 1252). TYPE: BRAZIL. Hoehne 335 (B *destroyed*, picture seen; SP)

Jacquemontia minor nomen manuscriptum by O'Donnell on: BRAZIL. São Paulo and Rio, Weir 355 (K!)

Perennial subshrub, erect or decumbent stems, pubescent; trichomes of 3-armed, homogeneous; internodes 0.6–3.2 cm long. *Leaf blade* 1.5–7.5 x 0.5–2.5 cm, membranaceous, entire, elliptic to broadly elliptic, rarely obovate or rutund, the base cuneate, the apex usually acute to acuminate, mucronate, glabrescent to sparsely pubescent, 3-armed trichomes, usually yellowish when dried; petiole 1–5 mm. *Florescence* compound dichasium, condensed, 1–7-flowered; peduncles 2–8.5 cm long, axillary or terminal, pubescent; bracteoles ca 6 mm long, linear, pubescent; pedicels 3–5 mm long. *Sepals* unequal, membranaceous, the 2 outer, 0.8–1.2 x 0.4–0.6 cm, ovate, the base rounded to slightly cordate, the apex acute to acuminate, pubescent to glabrescent, 1 middle, 0.7–1 x 0.3–0.5 cm, asymmetric, the 2 inner, 5–6 x 1.5–2 mm, lanceolate, the base rounded, the apex acute; corolla 2–3 cm long, funnelform, slightly lobate, midpetaline line ciliate, white; anthers elliptic, ca. 2.5 mm long, white; nectary entire, ovary subglobose, stigmatic lobes elliptic-flattened to cylindrical, ca. 2 mm long, stigmatic lobes elliptic-flattened to cylindrical, ca. 2 mm long. *Capsules* 8-valvar, subglobose, ca. 6 mm in diameter; seeds ca. 4 mm long.

Distribution, Habitat and Conservation: — Occurs in Argentina, Paraguay and Brazil, on the South region, from Mato Grosso do Sul to Rio Grande do Sul. It is found in areas of grassland (Cerrado and Pampas) vegetation from where many populations are known. Thus, it may be considered as LC.

Comments: — *J. selloi* is similar to *J. paraguayensis*, which does not occur in Brazil. Among the Brazilian shrub species, might be compared to *J. capitellata*, but is easily distinguished by the membranaceous leaves usually pubescent, outer sepals ovate and bracts linear.

Selected specimens examined: — MATO GROSSO. Campo Grande, Olho D'Água, 4.IX.1936, V. W. Aichir & A. Gehrt s.n. (SP); MATO GROSSO DO SUL. Sidrolândia, 21.VIII.1980, J. G. Guimarães 1101 (JBRJ); Bonito, 1.X.1995, A. Pott 7460 et al. (SP);

PARANÁ. Jaguariaíva, Parque Estadual do Cerrado, 22.X.2000, von Linsingen 573 (SP);
RIO GRANDE DO SUL. Porto Alegre, 13.X.193, J. E. Rombouts s.n. (SP).

**41. *Jacquemontia sphaerocephala* Meisn., in Martius (1869: 306). fig 6 j –
k.**

Thyella sphaerocephala (Meisner) House (1906: 314). TYPE: BRAZIL. Riedel
s.n. campis siccis petrosis pr. Paracatú prov. Minarum. (holotype: NY!)

Jacquemontia acrocephala Meisner (1969: 306). **Syn. Nov.** *Thyella acrocephala*
(Meisner) House (1906: 313). TYPE: BRAZIL. Riedel 574, campis arenosis ad f. Rio
Pardo prov. S. Pauli. (holotype: BR!; isotype: NY!)

Perennial shrubs, erect stems, unbranched, lanate; trichomes 2–3-armed with the
arms equal; internodes 2.5–4 mm long. *Leaf blade* 6–8.5 x 2.5–5.2 cm, chartaceous,
entire, oval, rare obovate or oblanceolate, the base cuneate, the apex acute to rounded,
apiculate, velutinous, ferrugineous when dried; petiole 0.5–2 cm long. *Florescence*
compound dichasium, condensed, ca 12-flowered, sessile, axillary or terminal;
bracteoles 1–1.5 x 0.1–0.2 cm, linear to elliptic, four per pedicel, densely velutinous;
pedicel ca. 1 mm. *Sepals* equal, membranaceous, 6–7 x 1–1.5 mm, lanceolate, the base
rounded, the apex acuminate, velutinous; corolla 1.5–2 cm long, funellform, slightly
lobate, midpetaline line pubescent, blue; anthers sagittate, ca. 1 mm long, white; nectary
entire, ovary conical, stigmatic lobes 1–2 mm long, oval-flat to cylindric. Capsules 8-
valvar, globose, ca. 5 mm diam.

Distribution, Habitat and Conservation: — Endemic to Brazil, occurs on cerrado
areas from Bahia to Mato Grosso. A few specimens area available and no data about
size of populations. Then, it must be considered as DD on IUCN criteria.

Comments: — This is a very remarkable shrub species, recognized by its
condensed floescences, axillary or terminal, densely bracteolate, velutinous and
ferrugineous when dried.

Selected specimens examined: — BAHIA. Barreiras, 15.IV.1966, H. S. Irwin
14888 et al. (SP, UB, NY); DISTRITO FEDERAL. Samambaia, Parque Boca da Mata,

10.XII.1995, J. M. Rezende 260 (SP, UB); GOIÁS. Planaltina de Goiás, Serra da Biboca,
20.III.2003, M. L. Fonseca 4392 et al. (SP); MINAS GERAIS. Morro das Pedras,
29.I.1970, H. S. Irwin 25588 et al. (SP, NY); MATO GROSSO. Itaquiré, 11.II.1974,
Hatschbach 34043 et al. (SP, MBM).

**42. *Jacquemontia sphaerostigma* (Cavanilles) Rusby (1899: 151). fig 6 l –
n.**

BASIONYM: *Convolvulus sphaerostigmus* Cavanilles (1799: 54. pl. 481).

Jacquemontia hirsuta Choisy (1837: 63). Nom. illegit. TYPE: MEXICO. “Habitat in
Mindanao, floret Decembri; et in diversorio vulgo del Alto Camaron Regni mexicani
ubi floret April et Mayo. Vidi siccum in eodem herbario” (holotype: MA, not seen;
isotype: F!).

Convolvulus apocynoides Schlechtendal & Chamisso (1830: 117). *Jacquemontia*
apocynoides (Schlechtendal & Chamisso) Urban (1921: 560). TYPE: MEXICO. Vera
Cruz: Hacienda de la Laguna, Schiede & Deppe (holotype: B!; isotype: HAL).

Convolvulus coeruleus Martens & Galeotti (1845: 254). Non Schumacher. TYPE:
MEXICO. Zacuapan et de Mirador, Galeotti 1359 (holotype: BR!; isotypes: G!, K!,
W).

Jacquemontia viscidulosa Hoehne (1922: 51. pl. 7). TYPE: BRAZIL. Mato
Grosso: Porto Esperanca, Kuhlman 1272 (holotype: SP!; isotype: LIL).

Jacquemontia agricola Rusby (1927: 337) TYPE: BOLIVIA. A weed in
cultivated ground, at Canamina, alt 4000 ft, Rusby 80 (holotype: NY!).

Jacquemontia laxiflora O’Donell (1960a: 14. tab. 1). TYPE: ARGENTINA.
Misiones, Dep. San Ignacio, Puerto Nuevo, Schwartz 2211 (LIL, not seen) *syn nov.*

Perennial herbs, climbing stems, pubescent to glabrescent; trichomes of 3 types
– glandular with a globose apical gland, more common in young stems, peduncles and
pedicels, 3-armed with the arms equal or subequal, and T-shape; internodes 1.5–7.5 cm
long. *Leaf blade* 1.5–6.8 x 0.8–3.6 cm, chartaceous, commonly repand to entire,

narrowly to broadly ovate, rare elliptic to lanceolate, the base commonly cordate, rare rounded to subtruncate, the apex acute with a mucron to acuminate, pubescent to glabrescent, the base of trichomes sometimes in depressions of leaf blade, petiole 0.5–1.5 cm long. *Florescence* compound dichasium, loose to condensed, 3–15-flowered; peduncles 2.5–8 cm long, axillary, pilose; bracteoles ca. 2–5 mm long, linear to lanceolate, one per pedicel, commonly absent, often redish when dried ; pedicel 2–5 mm. *Sepals* equal or subequal, membranaceous, 5–8 x 1–3 mm, lanceolate, the base rounded, the apex long acuminate, pubescent to glabrescent, the inner commonly glabrescent, with glandular and/or stellate trichomes; corolla 0.8–1.7 cm long, funellform, lobate to entire, midpetaline line ciliate, blue; anthers elliptic, ca. 1 mm long, white; nectary absent; ovary oblong, stigmatic lobes oval-flat, ca. 0.5 mm long. *Capsules* 8-valvar, subglobose, 4–5 mm in diameter; seeds 2–3 mm long, smooth.

Distribution, Habitat and Conservation: — Widespread, found from Mexico to Argentina. In Brazil occurs in almost all the territory, from the Amazon forest to Cerrado and Caatinga. For this, must be considered LC.

Comments: — Despite *J. sphaerostigma* presents the florescence pattern of *J. pentanthos*, with loose dichasial florescences, it shares more characters with the *J. agrestis* group, with the equal sepals and presence of glandular trichomes. It differs from *J. agrestis* by the umbelliform inflorescences.

The synonym to *Jacquemontia laxiflora* O'Donnell is proposed based on the protologue that clearly describes a variation on morphology of *J. sphaerostigma*.

Selected specimens examined: — BAHIA. Salvador, 25.V.1980, L. R. Noblick 1814 (SP, ALCB); ESPÍRITO SANTO. Linhares, Reserva florestal de Linhares, 11.V.1999, D. A. Folli 3418 (SP); GOIÁS. São João D'Aliança, Faz. Corrente, 30.XII.1979, F. C. Silva & R. C. Mendonça 155 (TEPB); MINAS GERAIS. Paraopeba, Horto Florestal, 20.V.1954, E. P. Heringer 3405 (HUEFS); PARÁ. Rio Curuá do Norte, 1973, L. F. Coêlho 42137 (INPA); PIAUÍ. Serra da Capivara, L. Empereira 542 (IPA); RORAIMA. Normândia, 1995, I. S. Miranda s.n. (INPA); SÃO PAULO. Suzanópolis, 8.VIII.1995, M. R. Pereira-Noronha et al. 1629 (SP); SERGIPE. Canindé do São Francisco, Faz. Jerimum, 12.XII.2005, D. Coelho 876 (MAC).

43. *Jacquemontia spicaeflora* (Choisy) Hallier (1893: 543). fig 7 a – b.

BASIONYM: *Ipomoea spicaeflora* Choisy (1838: 54). TYPE: BRAZIL. Pará, Riedel 2756 (holotype: NY!)

Jacquemontia spiciflora nomen illegitimum

Perennial shrubs, erect stems, unbranched, velutinous; trichomes 3-armed with the arms equal or unequal; internodes 1.5–7.5 cm long. *Leaf blade* 4–7.5 x 1.5–4.5 cm, chartaceous, entire, elliptic, oval to obovate, the base cuneate, the apex usually apiculate, acute or rounded with a mucron, velutinous, ferrugineous when dried; petiole 2–4 mm long. *Florescence* compound dichasium, condensed, until 12-flowered, sessile, axillary or terminal; bracteoles ca. 1 mm, linear, two per pedicel; pedicel 2–5 mm. *Sepals* equal or the 2 outer ca. 1 mm shorter, chartaceous, 6–8 x 2–3 mm, oblong to oval, the base rounded, the apex acute to rounded with a mucron, glabrous, escarious margins; corolla 1.5– 2 cm long, funellform, slightly lobate, midpetaline line sparsely pubescent, white; anthers sagittate, ca. 1.5 mm long; nectary absent, ovary oblong, stigmatic lobes 1–1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, 5 mm diam.

Distribution, Habitat and Conservation: — Endemic to Brazil, and occurs in cerrado areas from Pará to São Paulo. There are no sufficient information about number of individuals for populations, and since it is a poorly collected species, must be classified as DD.

Comments: — The erect habit and the sessile flowers resembles *J. fusca*, although, the sepals are completely glabrous.

Selected specimens examined: — DISTRITO FEDERAL. ca 5 km NE from Planaltina, 12.II.1970, H. S. Irwin 26357 et al. (UB, SP, NY); GOIÁS. São João da Aliança, 18.II.1975, G. Hatschbach 36268 (MBM, SP); MINAS GERAIS. 25km S from Ituiutaba, 3.I.1989, A. Krapovickas 42771 & C.L.Cristóbal (CTES, SP); MATO GROSSO. Terrenos, 20.II.1970, G. Hatschbach 23881 (MBM, SP); SÃO PAULO. Pedregulho, 28.I.1993, E. E. Macedo 89 (SP, SPF).

44. *Jacquemontia staplesii* Buril, In Buril & Alves (2012: 29). fig 7 c.

TYPE: BRAZIL. Bahia, Lençóis, about 7-10 km, along the main Seabra-Itaberaba road, 41°26'S 12°28'S, 27 May 1980, *R. M. Harley* 22710 (holotype: SP!; isotypes: SPF!, K!, NY!).

Perennial shrubs, erect stems, velutinous; trichomes 3-armed with the arms equal or unequal; internodes 3–8 mm long, congested leaves. *Leaf blade* 1.7–2.4 x 1.2–1.5 cm, chartaceous, entire, margins slightly revolute, ovate to orbicular, the base rounded to slightly cordate, the apex rounded to acute with a mucron, velutinous, discolor when dried; petiole 1–2 mm long. *Florescence* compound dichasium, condensed, until 17-flowered, sessile, terminal; bracteoles 0.5–1.5 x 0.1–0.3 cm, elliptic, margins sinuate, two per pedicel; pedicels ca. 2 mm long. *Sepals* equal, chartaceous, 6–10 x 2–2.5 mm, oblanceolate, the base cuneate, the apex caudate, pubescent; corolla 1.2–1.5 cm long, funellform, blue; anthers sagittate, ca. 1 mm long; nectary absent, ovary oblong, stigmatic lobes oval-flat. *Capsules* 8-valvar, globose, 4 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil, on the Espinhaço Range from Bahia, Chapada Diamantina. Can be considered as Vulnerable, since their very restrict distribution, with a few individuals on populations found.

Comments: — This species was usually misidentified as *J. hallieriana* (= *J. cephalantha*) on Brazilian herbaria. However, these species differ by a serie of some significant characteristics: the leaves congested, the shape of the leaves ovate to orbicular, internode usually shorter, and leaves are not shorter on the apex of the branches.

Specimens examined: — BAHIA. Abaíra, Riacho do Piçarrão de Osmar Campos, 8.V.1994, W. Ganey 3226 (HUEFS, NY); Abaíra, Catolés, Samambaia, 1.VI.2003, A. S. Conceição 617, M.J.G. Andrade and M. V. Moraes (HUEFS); Lençóis, valley of Mucugezinho river, 18.IX.2002, L.P. de Queiroz 7431 (HUEFS).

45. *Jacquemontia subsessilis* Moricand (1838: 42. t. 28). fig 7 d – e.

TYPE: BRAZIL. in provincial Bahiensis, ad ripas fluminum, Blanchet 2090 (holotype: P!; isotypes: G!, K!, FHO!).

Perennial vines, climbing stems, glabrescent; stellate trichomes, 3-armed, the arms equal or T-shaped; internodes 3.5-5 cm long. *Leaf blade* 6–10 x 4.6–5.2 cm, chartaceous, entire, ovate, the base cordate, the apex long acuminate, adaxial face glabrous to glabrescent, adaxial pubescent; petiole 1 – 5 cm long. *Florescence* compound dichasium, condensed, until 12-flowered; peduncles 4 mm long, axillary, pubescent; bracteoles linear to lanceolate, ca. 2 mm long; pedicels 1-3 mm. *Sepals* unequal, chartaceous, the 2 outer ca. 4 x 2 mm, oblong, the base rounded, the apex rounded, thicker and repand, resembling a rostrum, glabrous, the 3 inner, ca. 5 x 2.5 mm, rotund, the base rounded, the apex rounded with a mucron, glabrous, scarious margins; corolla ca 1.5 cm long, funnelform, lobate, midpetaline line ciliate, white; anthers oblong, ca. 1 mm long; nectary entire, ovary oblong, stigmatic lobes oval-flattened, ca. 0.5 mm long. *Capsules* 8-valvar, globose, ca. 4 mm in diameter.

Distribution, Habitat and Conservation: — Endemic to Brazil (State of Minas Gerais). Probably extinct based on the lack of recent records for this species.

Comments: —The sepals with the apex swollen and slightly repand, added to the florescences short-pedunculate, distinguish this species from any other Brazilian ones.

Specimen examined: — MINAS GERAIS. 1816-1821, Saint-Hillaire 1068 (P).

46. *Jacquemontia tamnifolia* (Linnaeus) Griseb. (1862: 474). fig f – g.

BASIONYM: *Ipomoea tamnifolia* Linnaeus (1753: 162). *Convolvulus tamnifolia* (Linnaeus) G. F. W. Meyer (1818: 95). *Thyella tamnifolia* Rafinesque (1836: 84).
TYPE: Illustration in Dillenius, Hortus Elthamensis, p. 428, t. 318 f. 414. 1732 taken as the type.

Convolvulus capitatus Desvaux in Lamarck (1791: 554). TYPE: SENEGAL. Goeffroy (P-Herb. Jussieu!).

Convolvulus ciliatus Vahl (1798: 13). TYPE: “Cajenna,” von Rohr (C).

Convolvulus guineensis Schumacher (1827: 90). TYPE: GHANA. Thonning (C-Herb. Schumacher).

Jacquemontia capitata (Desvaux) George Don (1838: 283).

Ipomoea guineensis (Schumacher) George Don (1838: 269).

Ipomoea capitata (Desvaux) Choisy in De Candolle (1845: 365).

Convolvulus pycnanthus Choisy (1845: 365) TYPE: SUDAN. Kordofan, Hogel, Kotschy 212 (G!, K!, M!).

Convolvulus praelongus S. Moore (1895: 403). TYPE: BRAZIL. Moore 1101a (BM!).

Jacquemontia macrocephala Brandege (1905: 219). *Thyella macrocephala* (Brandegee) House (1909: 68). TYPE: MEXICO. Sinaloa: vicinity of Culiacan, 5 Nov 1904, Brandege s.n. (UC, holotype; isotypes GH, US).

Jacquemontia rondonii Hoehne (1922: 53. pl. 8). TYPE: BRAZIL. Matto Grosso: Serra dos Pacahas-Novos, Rondonia, em a regio do Cautario Grande, Kuhlmann 2263 (RB!).

Jacquemontia mattogrossensis Hoehne (1922: 54. pl. 9). TYPE: BRAZIL. Matto Grosso: Porot Esperança, sul de Matto-Grosso, Kuhlmann 1273 (RB!).

Perennial herbs, climbing, glabrescent to pubescent; trichomes 3-armed; internodes 3.5–9.5 cm long. *Leaf blade* 2.5–7 x 1–5.5 cm, membranaceous, entire, ovate, the base commonly cordate, rare rounded, the apex acuminate, glabrescent, ciliate, greenish when dried; petiole 1–2.5 cm long. *Florescence* compound dichasium, condensed, until 15-flowered; peduncles 2–14.5 cm long, axillary, pubescent; outer bracteoles foliaceous, ovate to obovate, the base rounded to attenuate, ca. 2.5 x 1.2 cm, hirsute, inner bracteoles ca. 1cm long, linear to elliptic, densely hirsute; pedicel ca 1 mm long. *Sepals* equal, membranaceous, ca. 6–7.5 x 1–1.5 mm, lanceolate, the base rounded, the apex acuminate, densely hirsute, trichomes gold when dried; corolla 1.5 –

2 cm long, funellform, entire, midpetaline line ciliate, blue; anthers sagittate, ca. 1.5 mm long; nectary entire, ovary globose, stigmatic lobes 1 mm long, oval-flat. *Capsules* 8-valvar, globose 4 – 5 mm in diameter; seeds ca. 2.5 mm long, minutely verrucate.

Distribution, Habitat and Conservation: — It is the most widespread species of *Jacquemontia*, occurring in the New and Old World. In Brazil is known to the entire territory in the Amazon and Atlantic forests, Cerrado and Caatinga vegetation.

Comments: — It is related to the species with capitulliform inflorescences but easily distinguished by the two ovate to lanceolate foliaceous bracts below the inflorescences.

Selected specimens examined: — AMAZONAS. Tefé, 26.VII.1980, L. Krieger & L. T. Souza s.n. (JBRJ, INPA); BAHIA. Santa Cruz Cabralia, Estação ecológica do Pau-Brasil, 29.VIII.1983, F. S. Santos 35 (HUEFS); CEARÁ. Aracati, Propriedade Corguinho, 18.V.1970, J. E. M. Couceiro s.n. (IPA); MARANHÃO. Loreto, beira do Rio Parnaíba, 25.V.1962, G. Eiten 4721 & L. T. Eiten (SP); MATO GROSSO DO SUL. Lodário, 10.VI.1990, L. F. Boobaid s.n. (SP); PARÁ. Serra dos Carajás, 1987, G. S. Staudohar 20 (JBRJ); PERNAMBUCO. Tamandaré, Restinga de Ariquindá, 19.IX.2003, S. S. Lira 636 (IPA); RIO GRANDE DO NORTE. São Miguel do Gostoso, Paraíso, 19.V.2007, G. B. C. Paterno & M. I. B. Loiola 170 (HUFRN); TOCANTINS. Ilha do Bananal, Parque Nacional do Araguaia, 21.III.1999, M. A. daSilva 4043 et al. (JBRJ).

47. *Jacquemontia uleana* Hallier (1899: 31). fig 7 h.

TYPE: BRAZIL. Estado de Rio de Janeiro, in der restinga do Harpoador, Ule Dec. 189G no. 4388 (holotype: B!).

Perennial vines, climbing stems, velutinous; trichomes 5-armed; internodes 2–9 cm long. *Leaf blade* 2.5–7.5 x 1.5–4 cm, chartaceous, entire, ovate to oval, the base rounded to cuneate or slightly cordate, the apex acute to acuminate, densely velutinous, grayish when dried; petiole 1–2.5 cm long. *Florescence* compound dichasium, loose, 3–15-flowered; peduncles 4–8.5 cm long, axillary, velutinous, greyish; bracteoles ca. 1 mm, scalariform, pubescent; pedicels 1–1.5 cm long. *Sepals* unequal, chartaceous, the 2

outer ca. 5–6 x 3–4 mm, ovate, the base truncate, the apex rounded, glabrous, the 3 inner, ca. 5.5–7 x 3.5–5 mm, broadly ovate to rotund, the base rounded, the apex rounded, glabrous, escarious margins; corolla ca. 2 cm long, funnelform, lobate, midpetaline line ciliate, blue; anthers oblong, ca. 2.5 mm long, white; nectary 5-lobate, ovary oblong, stigmatic lobes oval-flattened, ca. 1 mm long. *Capsules* 8-valvar, globose, ca. 5 mm in diameter; seeds ca. 2.5 mm long, smooth, with the ring present.

Distribution, Habitat and Conservation: — Endemic to Brazil, is known to restinga and decidual forests from Bahia to Rio de Janeiro. Must be considered as DD according to IUCN.

Comments: — It is very similar to *J. blanchetii*, by the inflorescence structure, the outer sepals slightly shorter than the inner ones, and glabrous. However, the dense indument resembles *J. bahiensis* or *J. holosericea*. Usually presents discolor leaves.

Selected specimens examined: — BAHIA. Umburanas, Serra da Empleitada, 21.IX.2006, J. A. Siqueira-Filho et al. 1774 (HUEFS, HVASF, HUFRN); Abaíra, Mata do Engenho, 8.I.1999, R.M. Harley 35416 (HUEFS, K); Utinga, 10.IX.1999, R.P. Oliveira 202 et al. (HUEFS); Rio de Contas, 17.I.2003, R. M. Harley 54562 et al. (HUEFS, K); Campo Formoso, 20.X.2005, A. C. de Moraes 75 et al. (HUEFS).

48. *Jacquemontia unilateralis* (Roemer & Schultes) O'Donell (1950b: 470).

BASIONYM: *Convolvulus unilateralis* Roemer & Schultes (1819: 284). TYPE:

PERU. Pongo et Lurin circuitu ad Pachacamae tractum (K!)

Convolvulus secundus Ruiz & Pavon (1799: 10). *Jacquemontia secunda* Choisy (1838: 62). TYPE: PERU. Ruiz & Pavon s.n. (G!)

Perennial vines, climbing to decumbent stems, lanate to pubescent; trichomes 4–7-armed; internodes 2.5–14 cm long. *Leaf blade* 2.5–9.5 x 1–6 cm, chartaceous, entire, ovate to broadly elliptic, the base rounded, truncate or slightly cordate, the apex acute to acuminate, rare rounded, mucronate, pubescent; petiole ca 0.5–3 cm long. *Florescence* compound dichasium, loose, 2–24-flowered; peduncles 2.5–15 cm long, axillary, pubescent; bracteoles 4–8 mm long, linear; pedicel 0.2–2.5 cm. *Sepals* slightly unequal,

membranaceous, the 2 outer 7–10 x 4–7 mm, ovate, the base rounded, concave, the apex acute to subrounded, rare acuminate, pubescent, concave on the base, the 3 inner 5–7 x 3.5–4.5 mm, ovate, acute to acuminate apex, rare rounded, glabrescent to pubescent on the middle region, scarious margins; corolla 1.5–2.5 cm long, funellform, slightly lobate, midpetaline line ciliate, blue; anthers sagittate, ca. 2–2.5 mm long; nectary entire, ovary globose, stigmatic lobes 1–1.5 mm long, oval-flat. *Capsules* 8-valvar, globose, ca. 2.5–3 mm in diameter. Seeds 2–2.5 mm long, aerolate, with the ring.

Distribution, Habitat and Conservation: — *J. unilateralis* is known to Peru, Bolívia and Brazil. Where is recorded to open vegetation areas from Mato Grosso do Sul to Santa Catarina. Might to be classified as LC on IUCN criteria.

Comments: — Belongs to the *J. pentanthos* group of species, with unequal and membranceous sepals and loose dichasium floescences. Can be distinguished by the ramification of the trichomes and for sepals concave on the base.

Selected specimen examined: — SÃO PAULO. Rio Claro, Floresta Estadual Navarro de Andrade, 27.V.1998, L. C. Moura 12 & V. B. Ziparro (HRCB).

49. *Jacquemontia velutina* Choisy (1845: 398). fig 7 j – k.

TYPE: BRAZIL. Brasilia, Pohl s.n., in Herb. Martii n. 67 (holotype: BR!)

Perennial vines, climbing stems, velutinous; trichomes, 3-armed, the arms equal; internodes 4–7 cm long. *Leaf blade* 2.3–7 x 1.5–3.6 cm, chartaceous, entire, oval to ovate, rarely rotund, the base rounded to cordate, the apex acute with a mucron to acuminate or rounded, velutinous; petiole 1–1.5 cm long. *Florescence* compound dichasium, loose, until 12-flowered; peduncles 2–7 cm long, axillary, pubescent; bracteoles linear ca. 1 mm long; pedicels ca. 7 mm. *Sepals* equal in size, chartaceous, 4–4.5 x 2.5 cm, the 2 outer ovate, the base rounded, the apex acute with a mucron, velutinous, occasionally pubescent, the 3 inner, rotund with extended escarious margins, the apex rounded with a mucron, ciliate; corolla ca 1.7 cm long, funnelform, lobate, midpetaline line ciliate, white; anthers oblong, ca. 1 mm long; nectary present, ovary

oblong, stigmatic lobes oval-flattened to cylindrical, ca. 1 mm long. *Capsules* 8-valvar, globose, ca. 5-6 mm in diameter; seeds ca. 3 mm, with the ring present.

Distribution, Habitat and Conservation: — Is known to Paraguay, Argentina and Brazil, on Cerrado areas, from Bahia to São Paulo. Even with its wide distribution, this species is not well collected. Thus can be defined as DD on IUCN criteria.

Comments: — *J. velutina* was included as a synonym of *J. lorentzii* by O'Donnell (1960). However, analyzing the types of both species, there is no reason to consider them as the same entitie. The most remarkable characterists that clearly distinguishes those species are the sepals: chartaceous, with the apex rounded, mucronate in *J. velutina*; and membranaceous, with the apex acuminate in *J. lorentzii*. In relation to the Brazilian species, *J. velutina* is similar to *J. holosericea*, but can be distinguishes for the indument 3-armed, and for the shape of the inner sepals.

Selected specimen examined: DISTRITO FEDERAL. Samambaia, Parque Boca da Mata, 25.V.1996, J. M. Rezende 501 (SP, UB); GOIÁS. Pirenópolis, Serra dos Pirineus, 29.VII.2006, R. S. Bianchini 1591 (SP, SPF); Nerópolis, Parque Estadual Altamiro de Moura Pacheco, 30.III.200, M. L. Fonseca 5713 et al. (SP, SPF); MINAS GERAIS. São Sebastião do Paraíso, Morro do Cristo, 25.V.1994, R. S. Bianchini 459 (SP, SPF); SÃO PAULO. Jundiaí, 12.IV.1994, L. C. Bernacci 36 et al. (SP).

50. *Jacquemontia villosissima* Ooststroom (1936: 218. fig. 3). fig 7 l.

TYPE: BRAZIL. Brasilia, Pohl s.n., Herb. Martii 17 (BR!).

Perennial shrubs, erect stems, vilose to hirsute; trichomes 3-armed with the arms equal and T-shape; internodes 1.7–2.2 cm long. *Leaf blade* 1.8–2.6 x 0.5–1.5 cm, chartaceous, entire, oval to oboval, the base cuneate, the apex acute, vilose, brownish when dried, with grey trichomes; petiole ca. 2 mm. *Florescence* compound dichasium, condensed, until 7-flowered, sessile, terminal; bracteoles linear to lanceolate, ciliate; pedicels ca. 1 mm long. *Sepals* equal, membranaceous, ca 6.5 x 2 mm, lanceolate, the base rounded, the apex acuminate, vilose, the inner ones with scarious margins; corolla ca. 1.5 cm long, funellform, slightly lobate, midpetaline line glabrous, blue; anthers

oblong, ca. 1 mm long; nectary present, ovary conical, stigmatic lobes 0.3 mm long, oval-flat. *Capsules* not know.

Distribution, Habitat and Conservation: — Endemic to Brazil, and referred only to the State of Minas Gerais. This species is poorly known, and must be considered as DD.

Comments: —Van Ooststroom pointed out a group of specimens misidentified as *Evolvulus*. One of them was published as *J. villosissima* and he also proposed a new section (Capituliflorae). Because of the lack of samples available for analyse, the description provided here is based on the protologue and on the type material. No other specimen was observed on Brazilian collections. *Jacquemontia villosissima* is similar to *J. cephalantha*, due to the membranaceous sepals, florescence structure and leaves shape, but is easily distinguished by the indument hirsute and by its ciliate bracteoles.

Additional species comments:

***Jacquemontia crassifolia* Scheele (1848: 751)**

This species also described by Scheele and cited by Meissner on Flora Brasiliensis. The specimen cited was: in prov. Minarum: Hartleben (not seen by Meissner). By the characteristic stand out on the original description, this species resembles *J. fruticulosa*, by the tomentose-ferrugineous indument. Although, the voluble habit do not match with this species. Besides that, the thick (coriaceous) added to inflorescences similar to a racemous was not observed in any specimen on the herbaria visited during this revisionary study.

***Jacquemontia hispida* Scheele (1848: 752)**

Type collections for this species were not found. Meissner, on Flora Brasiliensis, cited the same specimen present on the protologue: In prov. Minarum, Hartleben s.n. (not

seen by him). According to the description, Meissner suggested that is similar to *J. hirsuta* (= *J. sphaerostigma*), buw with distinctive sepals, that presents cordate base. Still based on the protologue, besides the cordate sepals, the inflorescence is described as 1-2-flora, for me, this resembles a *J. heterantha*. However, this is not enough information to consider this species as a synonym.

Excluded species

The species *Jacquemontia montana* (Moric.) Meisn. and *Jacquemontia serrata* Moric. clearly do not belongs to *Jacquemontia*. Both presents simple trichomes, yellow flowers, twisted anthers and 4-valvate capsules. On the current circumscription of Convolvulaceae genera, they would be better positioned on *Merremia*. However, according to Stefanovic (2003), *Merremia* was confirmed as a polyphyletic genus. Since there is an ongoing study with the “Merremioid” clade, and probably many genera will be described, we prefer to do a new combination when this study is finished.

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Figure 1: A– C. *Jacquemontia agrestis*. A. habit; B. trichomes type; C. Sepals, from left to right, the outer to inner. D – F. *Jacquemontia bahiensis*. D. habit; E. trichome; F. sepals, left outer, right inner. G – H. *Jacquemontia bifida*. G. habit; H. sepals, from left to right, the outer to inner. J. *Jacquemontia blanchetii*, sepals. K – M. *Jacquemontia capitellata*. K. habit; L. leaves details, up abaxial face, down adaxial face; M. sepals, from left to right, the outer to inner. N. *Jacquemontia cephalantha*, habit. O – P. *Jacquemontia choisyana*. O. habit; P. sepals, from left to right, the outer to inner. Q – R. *Jacquemontia chrysanthera*. Q. sepals, from left to right, the outer to inner; R. fruit.

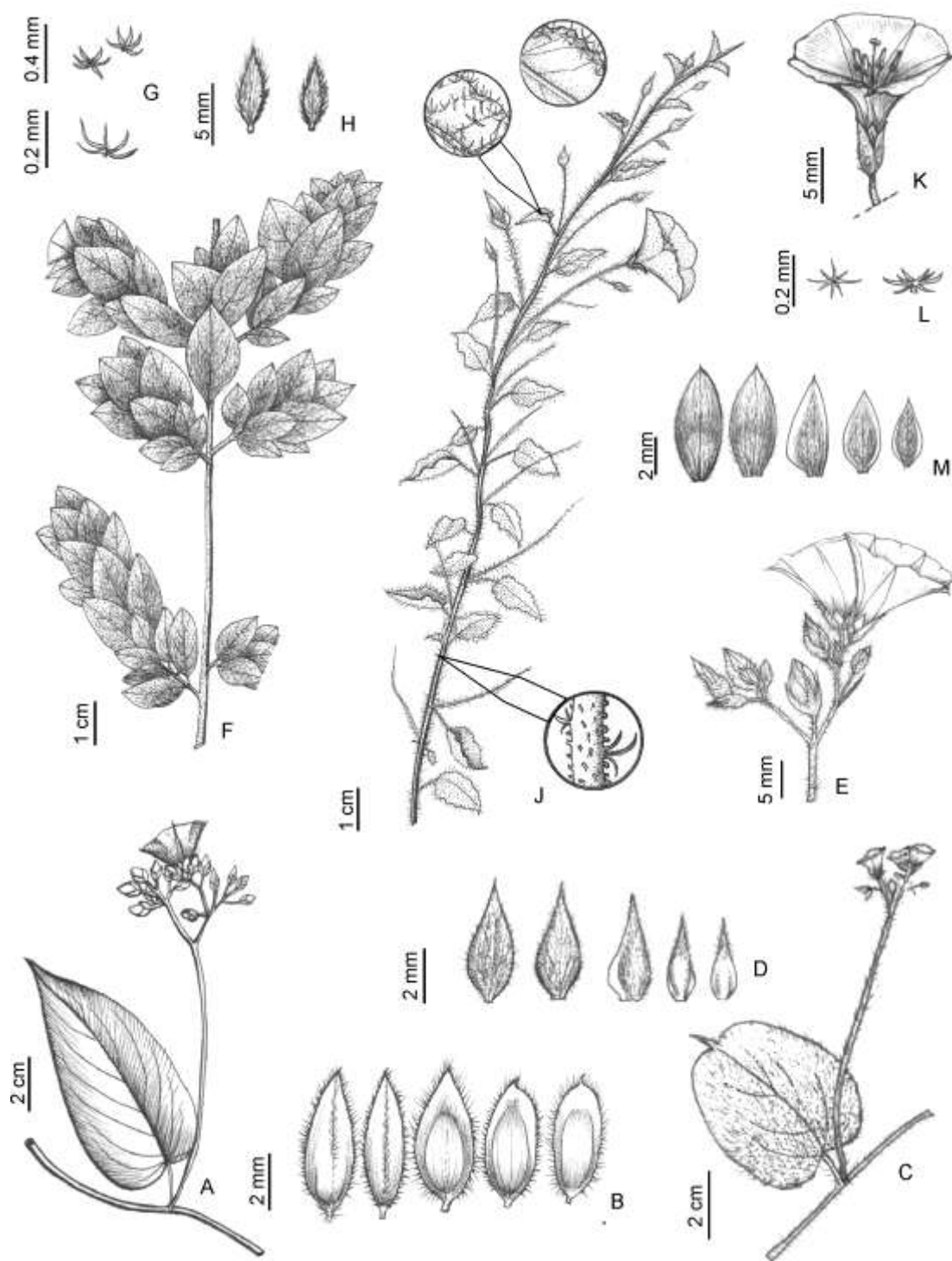


Figure 2: A – B. *Jacquemontia ciliata*. A. habit; B. sepals, from left to right, outer to inners. C – E. *Jacquemontia corymbulosa*. C. habit; D. sepals, from left to right, outer to inners; E. inflorescence. F – H. *Jacquemontia decipiens*. F. habit; G. trichomes; H. sepals, left outer, right inner. J. *Jacquemontia decumbens*, habit K – M. *Jacquemontia diamantinensis*. K. flower; L. trichomes; M. sepals, from left to right, outer to inners.



Figure 3: A – C. *Jacquemontia estrellensis*. A. habit; B. inflorescence; C. fruit and seed. D – E. *Jacquemontia ferruginea*. D. inflorescence; E. sepals, from left to right, outer to inner. F – G. *Jacquemontia fruticulosa*. F. habit; G. sepals, from left to right, outer to inner. H – J. *Jacquemontia fusca*. H. habit; J. inflorescence. K – M. *Jacquemontia glaucescens*. K. sepals, from left to right, outer to inner. L. leaves detail, left abaxial face, right adaxial face; M. trichomes.

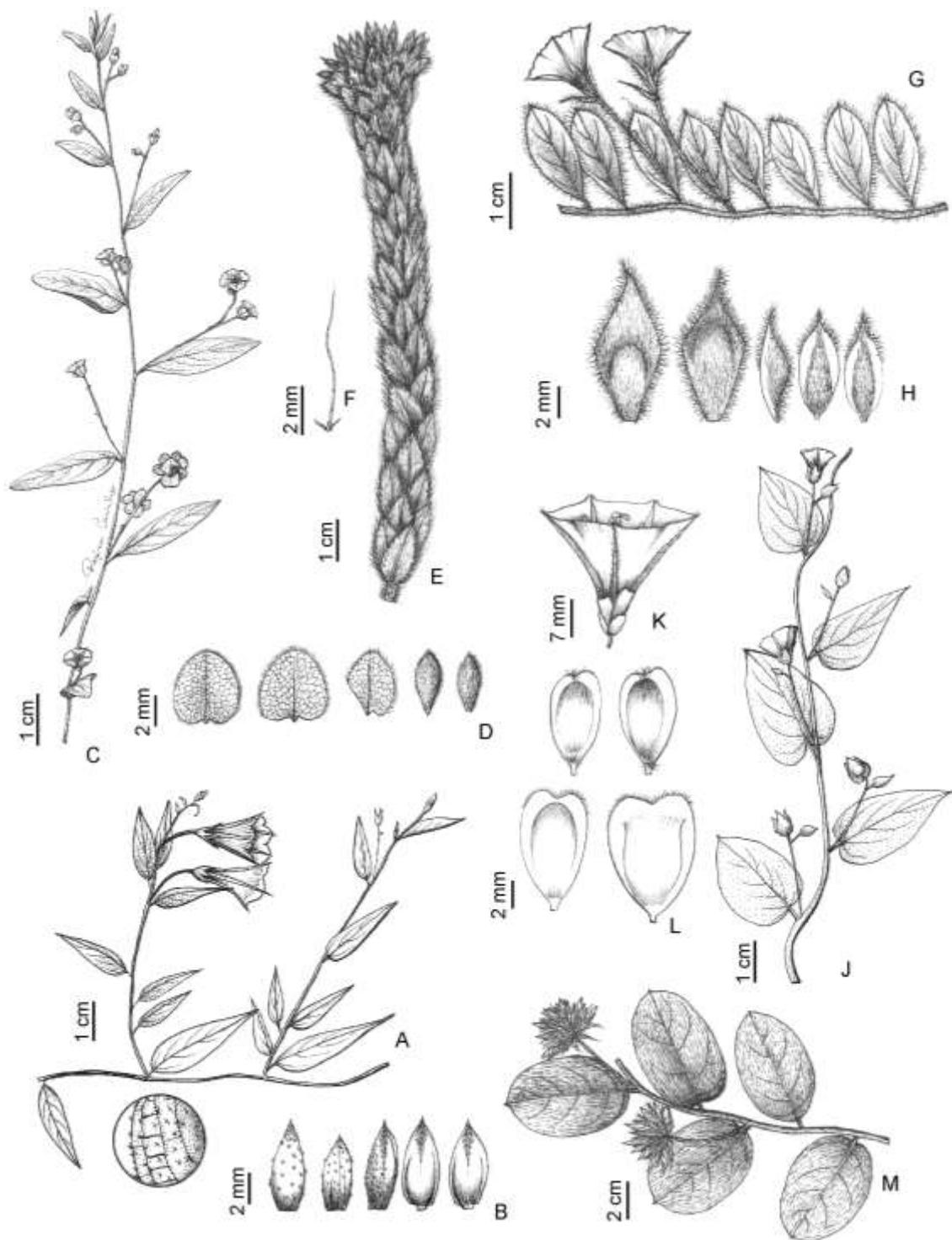


Figure 4: A – B. *Jacquemontia gracilis*. A. habit; B. sepals, from left to right, outer to inners. C – D. *Jacquemontia gracillima*. C. habit; D. sepals, from left to right, outer to inners. E – F. *Jacquemontia grisea*. E. habit; F. trichome. G. *Jacquemontia guaranitica*, habit. H. *Jacquemontia guyanensis*, sepals, from left to right, outer to inners. J. *Jacquemontia heterantha*, habit. K – L. *Jacquemontia holosericea*. K. flower; L. sepals, up outer, down inner. M. *Jacquemontia lasiocladus*, habit.

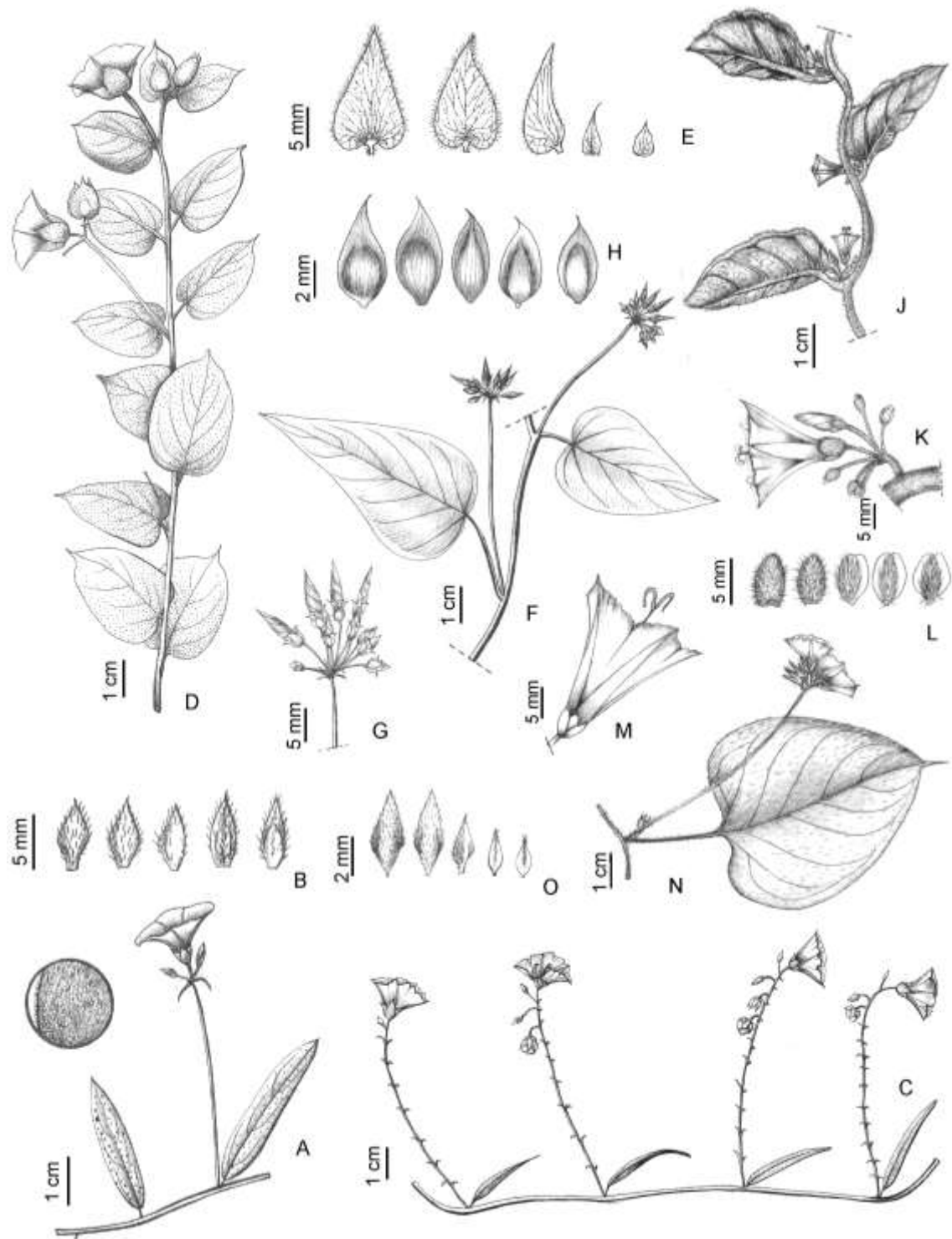


Figure 5: A – B. *Jacquemontia linarioides*. A. habit; B. sepals, from left to right, outer to inner. C. *Jacquemontia linoides*, habit. D – E. *Jacquemontia macrocalyx*. D. habit. E. sepals, from left to right, outer to inner. F – H. *Jacquemontia martii*. F. habit; G. inflorescence; H. sepals, from left to right, outer to inner. J – M. *Jacquemontia nodiflora*. J. habit; K. inflorescence; L. sepals, from left to right, outer to inner; M. flower with stigmatic lobes variation shape, and sepals glabrous; N – O. *Jacquemontia pentanthos*. N. habit; O. sepals, from left to right, outer to inner.

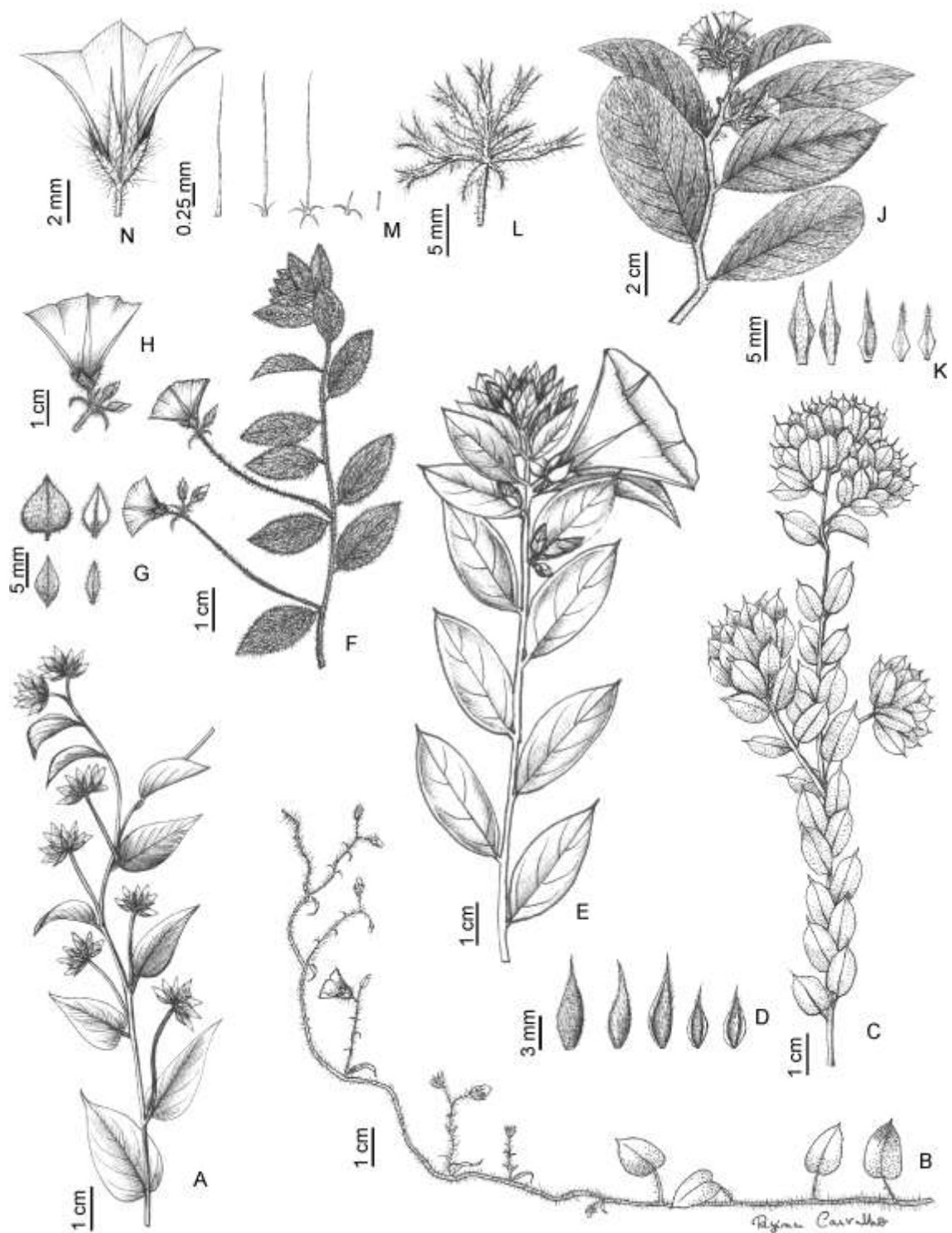


Figure 6: A. *Jacquemontia pycnocephala*, habit. B. *Jacquemontia racemosa*, habit. C – D. *Jacquemontia robertsoniana*. C. habit; D. sepals, from left to right, outer to inner. E. *Jacquemontia rojasiana*, habit. F – H. *Jacquemontia selloi*. F. habit.; G. sepals variation, left outer, right inner; H. inflorescence detail. J – K. *Jacquemontia sphaerocephala*. J. habit; K. sepals, from left to right, outer to inner. L – N. *Jacquemontia sphaerostigma*. L. inflorescence detail. M. trichomes types; N. flower.

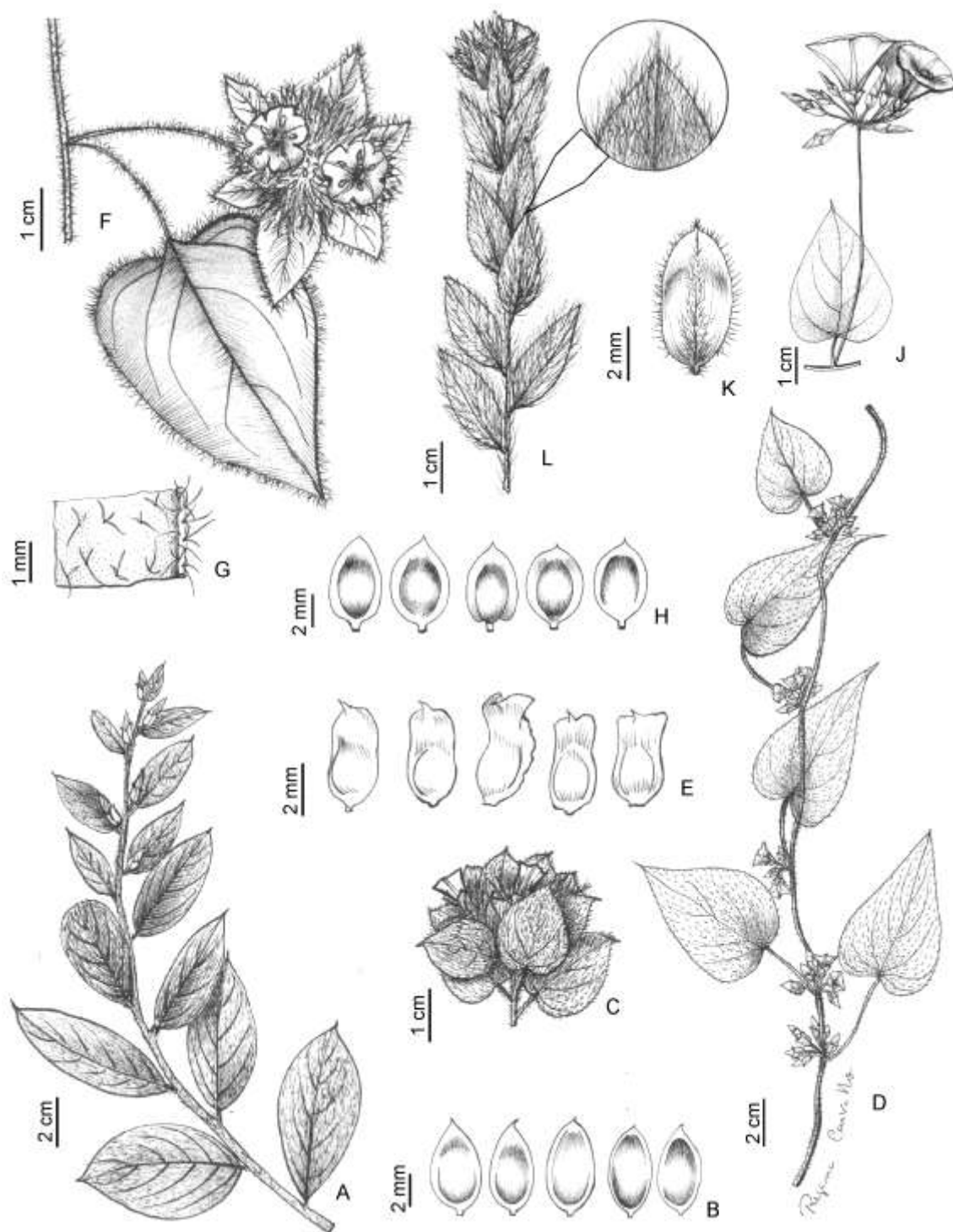
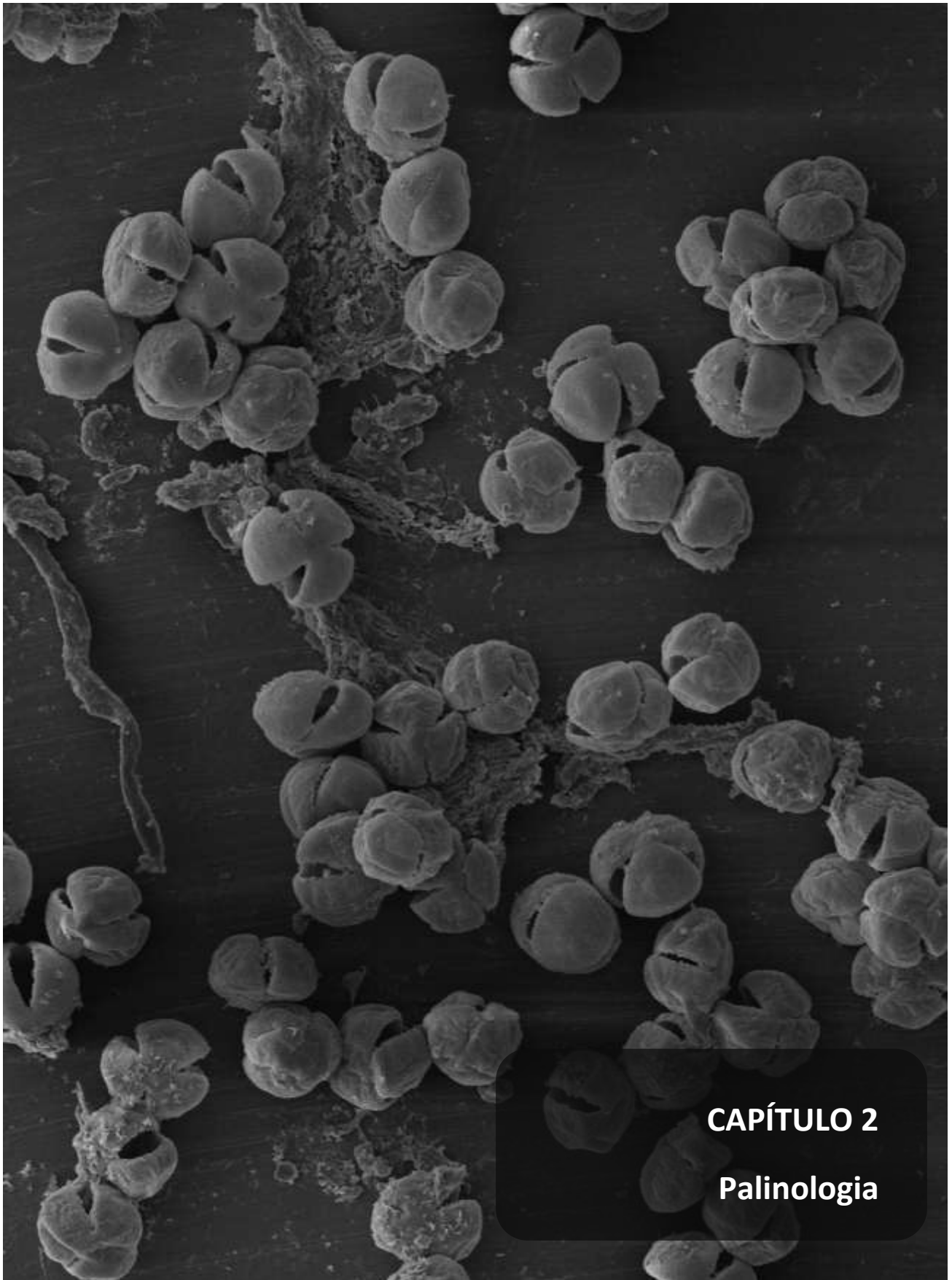


Figure 7: A – B. *Jacquemontia spicaeflora*. A. habit; B. sepals, from left to right, outer to inner. C. *Jacquemontia staplesii*, inflorescence. D – E. *Jacquemontia subsessilis*. D. habit; E. sepals, from left to right, outer to inner. F – G. *Jacquemontia tamnifolia*. F. habit; G. leaf detail, adaxial face. H. *Jacquemontia uleana*, sepals, from left to right, outer to inner. J – K. *Jacquemontia velutina*. J. habit; K. outer sepal. L. *Jacquemontia vilosissima*, habit.



CAPÍTULO 2

Palinologia

**Pollen morphology and taxonomic implications in *Jacquemontia* Choisy
(Convolvulaceae)**

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SUBMETIDO AO PERIÓDICO GRANA

**Pollen morphology and taxonomic implications in *Jacquemontia* Choisy
(Convolvulaceae)**

Short title: *Pollen morphology in Jacquemontia*

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Abstract. *Jacquemontia* is one of the largest genera in Convolvulaceae, with around 120 species, and is considered taxonomically difficult. The family has been considered as eurypalinous, and pollen morphology is an important taxonomic character. Pollen morphology of 60 species (ca. 50%), representing all morphological groups of *Jacquemontia* was analyzed with LM and/or SEM. A Principal Component Analysis was performed using the following characters: apertural position; number of apertures; apex of the spines; shape of the base of spines; scattering of perforations; and microspine density. Three pollen types were established. These pollen types do not corroborate the current circumscription of Sections in *Jacquemontia*, delimited by inflorescence structure. However, some morphological features are discussed that support groups found by pollen analysis.

Keywords: Bireticulum; Palinotaxonomy; Pantocolpate; Tricolpate.

Introduction

Variation in pollen morphology of Convolvulaceae species has traditionally been used as an important taxonomic character (Sengupta, 1972). Hallier (1893) proposed a classification for the family based mostly on the pollen surface. He divided Convolvulaceae into two groups: Echinoconie, comprising the genera with spiny pollen, and Psiloconiae, including the genera with smooth pollen grains. Later, Erdtman (1952) considered the family as eurypalinous. Sengupta (1972) and Van Campo (1976) suggested an evolutionary hypothesis connected to the apertures, where tricolpate is the plesiomorphic condition and pantocolpate is apomorphic, from which the pantoporate type is derived. Even though there are other modern and currently used tribal classifications (Austin, 1998; Stefanovic et al., 2003), pollen morphology is still considered as an important character to recognize tribes in the family.

Jacquemontia is one of the largest genera (ca. 120 species) in the family and is mostly Neotropical. It is characterized morphologically by the presence of stellate trichomes and an entire style, with two oval, flattened stigmatic lobes. It has been considered a taxonomically difficult genus, and many questions surround it (Robertson, 1971). Meissner (1869) and van Ooststroom (1936) proposed 4 sections: Cymosae, Capitatae, Anomalae and Cephalanthae, based exclusively on inflorescence structure. However, these sections do not seem to compose natural groups when other morphological characters are considered (Buriel & Alves, 2011). Phylogenetically, the genus has been related to the tribe Convolvulae, based on morphological data (Austin, 1998) and more recently to the clade Dicranostyloideae, that comprises the genera with bifid styles, based on molecular data (Stefanovic et al., 2003; Stefanovic & Olmstead, 2004).

On the basis of pollen morphology, *Jacquemontia* stands out for presenting two distinct aperture patterns. Tellería and Daners (2003) found tricolpate pollen grains in *J. blanchetii* Moric., while for other taxa the pantocolpate type is the most common. In addition, they found those two different patterns corroborated by the branching of collumelae, simple in the first taxon and branched in the others. The ornamentation is referred to as perforate with microspines, without apparent variation among species (Tellería & Daners, 2003; Vij & Sachdeva, 1974; Vital et al., 2008).

Considering the importance of pollen morphology to the classification of the family, as well as the variation presented in *Jacquemontia*, this study aims to provide pertinent evidence for a new assessment of infrageneric taxonomy, based on the diversity of pollen grains in this genus.

Material and Methods

Pollen morphology of 43 species (ca. 40%), representing all morphological groups of *Jacquemontia* was analyzed with light microscopy (LM) and/or scan electron microscopy (SEM) (table 1). The anthers were collected from dried herbarium material or from living specimens during field trips in Brazil.

The anthers were acetolyzed (Erdtman, 1960), and permanent slides were mounted with glycerin jelly, and added to the PUEFS collection. For SEM analysis, the samples were submitted to alcoholic series (50, 70, 80, 90 and 100% ethanol), and then to metallization procedures. Pollen and aperture sizes and exine thickness were measured under LM. For pollen size, the measurements were taken from 25 grains, while the exine measures were taken from 10 grains. The arithmetic mean, standard deviation and the maximum and minimum values were calculated using Excel for Windows 2007. Details on the surface were observed on the Jeol JEM 1230 SEM. Microspine density was determined within an area of 100 μm^2 . The descriptive terminology follows Punt et al. (2007).

Cluster analysis (CA) was conducted using the R 2.15.2 for MacOS (R Development Core Team, 2012), using the FactoMineR R package (Lê & Husson, 2008). To perform the analyses, five characters were considered as variables and taxonomically informative. Then, they were polarized: 1. Apertural position (0 – zonoperturate, 1 – pantoaperturate); 2. Number of apertures (0 – three only, 1 – 3 and 6-aperturate, 2 – 15-aperturate, 3 – 28-aperturate); 3. Apex of the spines (0 – 1- or 2-tipped, 1 – ≥ 3 -tipped); 4. Shape of the base of spines (0 – constricted at the base, 1 – straight at the base); 5. Scattering of perforations (0 – randomly scattered, 1 – scattered in circular areas, composing a bireticulum). Microspine density was counted in an area of 100 μm^2 (Figure 1). Morphological characters were not included in the analysis, in

order to focus only on pollen variables and to check if the pollen grains can reflect a more natural, infrageneric classification.

Results

Based on LM and SEM observations, pollen grains are monads, apolar or isopolar, spherical to suboblate, medium to large; zono- or pantoaperturate, usually with 3, 6 or 15 colpi, apertures often with a membrane; exine tectate, sexine thicker than the nexine, with perforations and microspines, with constricted or straight base, and acute, simple to multi-tipped microspines (Table 1).

Table 1. Vouchers analyzed and morphometric values. PD: polar diameter; ED: equatorial diameter; EDp: equatorial diameter in polar view; DS: density of spines; Sect: sections, AN- Anomalae, CY- Cymosae, CA- Capitatae, CP- Capituliflorae.

Species	Voucher	PD (μm)	ED (μm)	EDp (μm)	Exine (μm)	DS	Sect
<i>J. abutiloides</i> Benth.	<i>A.Carter 4782</i>	54.8±0.56	-	-	4.15	40	CY
<i>J. acuminata</i> Rusby*	<i>Britton & Rusby 1263</i>	58.0	-	-	N.O.	62	CY
<i>J. agrestis</i> (Mart. ex Choisy) Meissn.	<i>M.T.Buril 358</i>	59.8±0.52	-	-	5.0	41	AN
<i>J. blanchetii</i> Moric.	<i>Mroginskie 754</i>	65.9±0.63	-	-	5.6	64	CY
<i>J. bracteosa</i> Meisn.	<i>J.R.Noblick 2064</i>	60.4±0.96	82.0±1.19	80.6±1.45	5.5	185	CA
<i>J. cayensis</i> Britton	<i>D.S.Carell 51309</i>	63.6±0.65	-	-	5.0	29	CY
<i>J. chrysanthera</i> Buril	<i>M.T.Buril 224</i>	49.7±0.71	65.8±0.5	65.1±0.7	5.0	98	CY
<i>J. corymbulosa</i> Benth.	<i>M.T.Buril 394</i>	60.0±0.46	-	-	4.5	25	CY
<i>J. cumanensis</i> Kuntze	<i>N.L.Britton 289</i>	75.0±0.88	-	-	6.0	20	AN
<i>J. decumbens</i> O'Donell	<i>G.J.Schwarz 5553</i>	62.2±0.58	-	-	4.6	38	AN
<i>J. diamantinensis</i> Buril	<i>M.T.Buril 227</i>	49.7±0.71	65.8±0.50	65.1±0.70	5.1	30	CY
<i>J. eastwoodiana</i> I.M. Johnst.	<i>A.Carter 4782</i>	56.6±0.65	-	-	4.0	38	CY
<i>J. floribunda</i> (Kunth.) Hallier f.	<i>T.Plowman 14220</i>	65.9±1.37	-	-	5.0	39	CY
<i>J. fruticulosa</i> Hallier f.	<i>H.S.Irwin 31906</i>	63.05±0.94	-	-	4.7	119	AN
<i>J. fusca</i> Hallier	<i>E.Melo 567</i>	54.55±0.87	61.40±0.71	61.65±0.46	5.4	37	CA
<i>J. glaucescens</i> Choisy*	<i>Blanchet 560</i>	60.0	N.O.	N.O.	N.O.	57	CY
<i>J. gracillima</i> (Choisy) Hallier f.	<i>M.T. Buril 290</i>	63.6±0.52	-	-	5.1	34	AN

Species	Voucher	PD (μm)	ED (μm)	EDp (μm)	Exine (μm)	DS	Sect
<i>J. guaranitica</i> Hassl.	<i>D.R.Kunth 5814</i>	49.3±0.34	-	-	4.1	135	AN
<i>J. havanensis</i> (Jacq.) Urb.	<i>Burcher 152</i>	55.7±0.51	-	-	5.0	22	AN
<i>J. heterantha</i> (Nees. & Mart.) Hallier f.	<i>E.Melo 6118</i>	59.1±1.05	-	-	4.2	55	AN
<i>J. holosericea</i> (Weinm.) O'Donell	<i>G.Lott 02</i>	61.6±0.86	73.6±0.98	74.5±1.05	5.3	18	CY
<i>J. linarioides</i> Meisn.	<i>A.Krapovickas 45051</i>	64.3±0.67	-	-	5.8	53	
<i>J. martii</i> Meisn.	<i>M.T.Buril 387</i>	45.2±0.54	56.3±0.46	56.5±0.54	5	73	CY
<i>J. mexicana</i> (Loes.) Standl. & Steyerl.*	<i>E. Narvaez 1253</i>	45.0	-	-		32	CY
<i>J. nodiflora</i> (Desr.) G. Don.	<i>M.T.Buril 376</i>	63.8±0.97	76.9±1.15	79.1±0.85	7.7	14	CY
<i>J. oaxacana</i> (Meisn.) Hallier f.	<i>H.Ross 610</i>	71.5±0.91	-	-	5.6	36	CY
<i>J. ovalifolia</i> (Choisy) Hallier f.	<i>Britton 9451</i>	50.5±0.54	-	-	4.1	39	AN
<i>J. paniculata</i> Hallier f.*	<i>Cuming 645</i>	60.0	-	-	N.O.	19	CY
<i>J. pentanthos</i> (Jacq.) G. Don.	<i>M.T.Buril 316</i>	66.0±0.64	-	-	N.O.	30	CY
<i>J. polyantha</i> Hallier f.*	<i>C.G. Pringle 8281</i>	45.0	-	-	N.O.	42	CY
<i>J. pringlei</i> A. Gray	<i>K.F.Parker 8026</i>	61.0±0.65	-	-	5.2	77	CY
<i>J. pycnocephala</i> Benth.	<i>G.B.Hinton 12604</i>	54.7±0.44	-	-	4.0	30	CY
<i>J. selloi</i> Hallier	<i>G.Hatschbach 32958</i>	70.55±0.64	-	-	4.65	28	CY
<i>J. serpyllifolia</i> Urb.	<i>P. Wilson 11635</i>	64.9±0.79	-	-	5.2	79	AN
<i>J. smithii</i> B. L. Rob. & Greenm.	<i>H.D. Hipley 14717</i>	50.8±0.49	-	-	4.1	42	AN
<i>J. solanifolia</i> (L.) Hallier f.	<i>H.Alain & O.Hiogler 29854</i>	66.5±0.61	-	-	5.4	150	CY

Species	Voucher	PD (μm)	ED (μm)	EDp (μm)	Exine (μm)	DS	Sect
<i>J. sphaerocephala</i> Meisn.	<i>M.Brandão 23465</i>	56.2±0.63	65.0±0.76	65.4±0.55	5.3	44	CA
<i>J. sphaerostigma</i> (Cav.) Rusby	<i>E.B.Souza 1060</i>	64.75±0.68	-	-	4.8	44	CY
<i>J. spicaeflora</i> Hallier	<i>M. Kuhlmann 3517</i>	57.3±1.38	66.5±1.2	70.8±1.5	7.0	74	CA
<i>J. staplesii</i> Buril	<i>W.Ganev 3295</i>	52.6±0.6	-	-	4.2	90	CP
<i>J. tamnifolia</i> (L.) Benth.*	<i>J. Williamson 27</i>	55.0	-	-		45	CA
<i>J. tomentella</i> Hallier f.	<i>Mayar 77180</i>	32.75**	47.25**	48.9±0.46	5.5	37	CY
<i>J. uleana</i> Hallier f.	<i>M.L.Guedes 8177</i>	78.1±0.78	-	-	5.9	21	CY

*Data according to Staples et al. (2012); **Measurements made from 10 pollen grains; N.O. = not observed.

The dendrogram resulting from CA is represented in Figure 2. Three large groups can be recognized based mostly on the number and position of apertures.

Type I. Pollen grains tricolpate. Species in this group present mainly pollen grains with 2-tipped spines and were separated into two subgroups based on the morphology of the base of spines.

1 A. Species with straight spine base: *J. bracteosa*, *J. chrysanthera*, *J. diamantinensis*, *J. glaucescens*, *J. holosericea*, *J. martii*, *J. sphaerocephala*, and *J. spicaeflora*. Pollen grains perforate tending to microreticulate, spinulose. Heterobrochate in *J. holosericea* and *J. spicflora*. In *J. chrysanthera*, the surface is wavy, with the spinules on the higher areas and perforations on the valleys (Figure 3 A – J);

1B. Species with globose spine base: *J. nodiflora* and *J. tomentella*. Microreticulate, heterobrochate in *J. nodiflora* (Figure 3 K – M);

Type II. Pollen grains with a variation on the number of apertures on three to six.

2A. Species with spines apex 1 or 2-tipped: *J. blanchetii*, *J. fusca*, *J. staplesii*. Perforate, perforations with diameters heterogeneous (figure 4 A – D);

2B. Specie with spines apex more than 3-tipped: *J. uleana*. Microreticulate (figure 4 E);

Type III. Pantocolpate. Including species with usually 15 colpi, distributed into two connected pentagons, and usually with spines more than 3-branched.

3 A. Pollen grains with 15 colpi, spines 2-tipped and perforations organized randomly: *J. acuminata* and *J. solanifolia*. Microreticulate. (Figure 4 F – G);

3 B. Pollen grains with 15 colpi, spines ≥ 3 -tipped, and perforations organized randomly: *J. cayensis*, *J. corymbulosa*, *J. cumanensis*, *eastwoodiana*, *J. floribunda*, *J. guaranitica*, *J. havanensis*, *J. heterantha*, *J. linarioides*, *J. mexicana*, *J. oaxacana*, *J. ovalifolia*, *J. paniculata*, *J. pentanthos*, *J. pringlei*, *J. polyantha*, *pycnocephala*, *J. selloi*, *J. smithii*, *J. tamnifolia*. Perforate, usually tending to microreticulate, spinulose. Perforations tending

to foveoles in *J. cumanensis*, *J. havanensis* and *J. heterantha*. (Figure 4 H – M, figure 5 A – M);

3 C. Pollen grains with 28 apertures, spines ≥ 3 -tipped, and perforations organized randomly: *J. gracillima* and *J. serpyllifolia*. Perforate, with perforations tending to foveoles. Surface irregular, with spinules on the higher areas and perforations on valleys (Figure 6 A – B);

3 D. Pollen grains with 15 colpi, spines ≥ 3 -tipped, and perforations organized in circular areas: *J. agrestis*, *J. decumbens*, *J. fruticulosa* and *J. sphaerostigma*. Bireticulate, with spinules on the wall of suprareticulum (Figure 6 C – F).

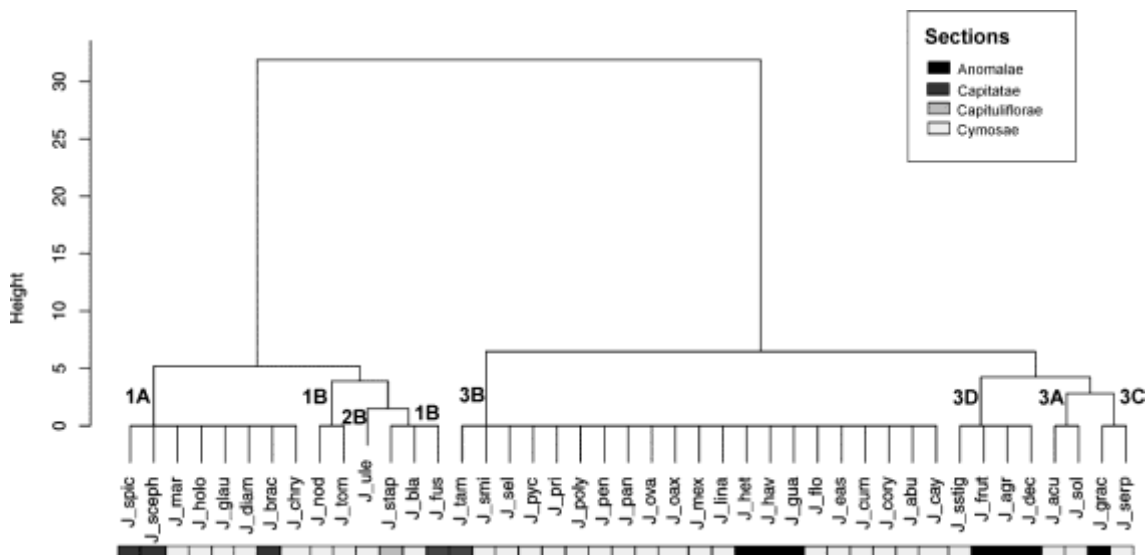


Figure 2: Cluster analysis organized by pollen type, and with legends to sections.

Discussion

Jacquemontia clearly presents three very distinct groups of species based on pollen morphology, the less common condition being 3-colpate pollen, while most species have pantocolpate (25 colpi) pollen (Tellería & Danners, 2003). The presence of variation represented by the 6-colpate type and 28-colpate grains may represent a tendency for increased aperture numbers. In the species with 28-colpate grains, in addition to the higher number of colpi, these are shorter, sometimes resembling a pore.

According to Sengupta (1972), considering the evolutionary history of Convolvulaceae, this trend can be interpreted as an evolutionary trace, where the tricolpate condition is the ancestral expression.

Tricolpate pollen was found in *J. tomentella*, an Asian species, and in a group of South American species (group 1 A and B). Based on pollen data, *J. tomentella* is very closely related to *J. nodiflora*, which is distributed from Mexico to Argentina. Additionally, these species share similar habit (vines), inflorescence type (umbelliform cymes), sepal shape (orbicular) and texture (chartaceous). Most of them belong to the section Cymosae, but *J. spicaeflora*, for example, was first considered to belong to section Capitatae. *Jacquemontia nodiflora* stands out because of its cylindrical stigmatic lobes. This condition has made *J. nodiflora* treated, for a long time, as a *Convolvulus* species. Therefore, tricolpate pollen and a cylindrical stigma in that species has suggested a degree of relationship between *Jacquemontia* and *Convolvulus* (Elsam, 2008). Even though it is clearly included in *Jacquemontia*, due the presence of stellate trichomes, a apparent synapomorphy of the genus.

Two interesting macromorphological features can be discussed within the tricolpate and 6-colpate group. The first remarkable characteristic is that all South American species with umbelliform cymes and coriaceous sepals (paleaceous when dried) analyzed— *J. blanchetii*, *J. chrysanthera*, *J. diamantinensis*, *J. glaucescens*, *J. holosericea*, *J. martii*, *J. nodiflora*, *J. spicaeflora* and *J. uleana* (Meisner 1869, Buril & Alves 2011)— present tricolpate or 6-colpate pollen. The remaining species studied with 3 or 6 colpi have a shrubby habit and are placed within the sections Capitatae (*J. fusca*, *J. sphaerocephala*, *J. spicaeflora*) or Capituliflorae (*J. hallieriana*).

As pointed out by Tellería & Danners (2003), regarding exine ornamentation, little variation can be observed. However, the characters analyzed were helpful to clarify subgroups. The tip of the microspines shows a correlation with the aperture types, with 2-tipped microspines usually present on tricolpate pollen grains, and multi-tipped ones usually present on pantocolpate pollen grains, with a few exceptions (*J. acuminata*, *J. solanifolia*, *J. uleana*). The shape of the microspine base also suggested a relationship between *J. tomentella* and *J. nodiflora*.

The presence of a bireticulum in *J. agrestis*, *J. decumbens*, *J. fruticulosa* (sect. Anomalae) and *J. sphaerostigma* (sect. Cymosae) represents an apparent synapomorphy

(Elsam, 2008). Due to the inflorescence morphology of *J. sphaerostigma*, it was placed in a distinct section. However, if other morphological characters are analyzed, *e.g.* the presence of glandular trichomes, the relationship of that species with *J. agrestis*, *J. decumbens* and *J. fruticulosa* is comprehensible (Austin, 1982).

The pollen grains with 28 apertures are present only in *J. serpyllifolia*, endemic to Cuba, and in *J. gracillima* (Anomala section), a species disjunctly distributed in Brazil, Venezuela and Panama (Robertson, 1971). *Jacquemontia serpyllifolia* shares more morphological characters with other Central American species (in the section Cymosae), and possibly this pollen feature might have evolved independently.

The 15-colpate pollen type was the most common. Most species presenting this pollen type are the American ones and belong to section Cymosae, that in addition to the umbelliform cymes also presents unequal and membranaceous sepals, as in *J. pentanthos* and the Paleotropical *J. paniculata*. Within this pollen type, the most widespread species, *J. tamnifolia*, was also included, which had been placed in the section Capitatae by Meissner (1869).

Ferguson et al. (1977) examined the pollen grains of *Operculina* and *Merremia* species and concluded that there is no correlation between pollen morphology and subgeneric classification. Welsh (2010), studying the pollen evidence for *Cuscuta* phylogeny, concluded that although pollen alone is not enough to reconstruct the history of this genus, it is a useful character for species level classification. Pollen type itself might be not enough to propose a distinct infrageneric classification in *Jacquemontia*. However, considering other morphological characters in addition to pollen features, it is clear that the Sections based only on inflorescence morphology do not correspond to natural groups.

Acknowledgments

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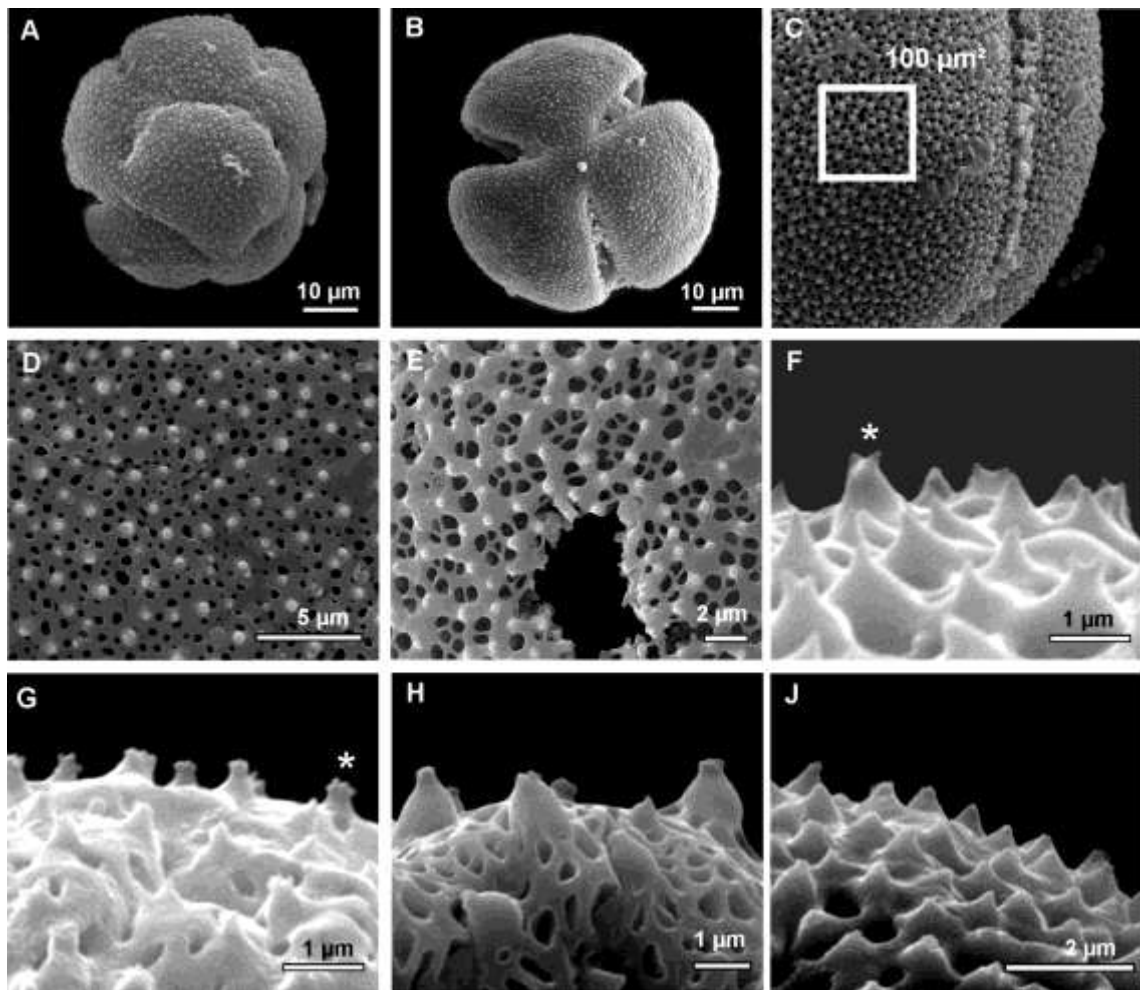


Figure 1. Variation in pollen morphology in *Jacquemontia*. A – B, main apertural patterns. A. pantocolpate, B. tricolpate, C. density of spines, D – E, variation in organization of perforations, D. random, E. in circles forming a bireticulum, F – G. spine ramification, F. bifid, G. multi-branched, H – J. shape of spine, H. base rounded, I. base straight.

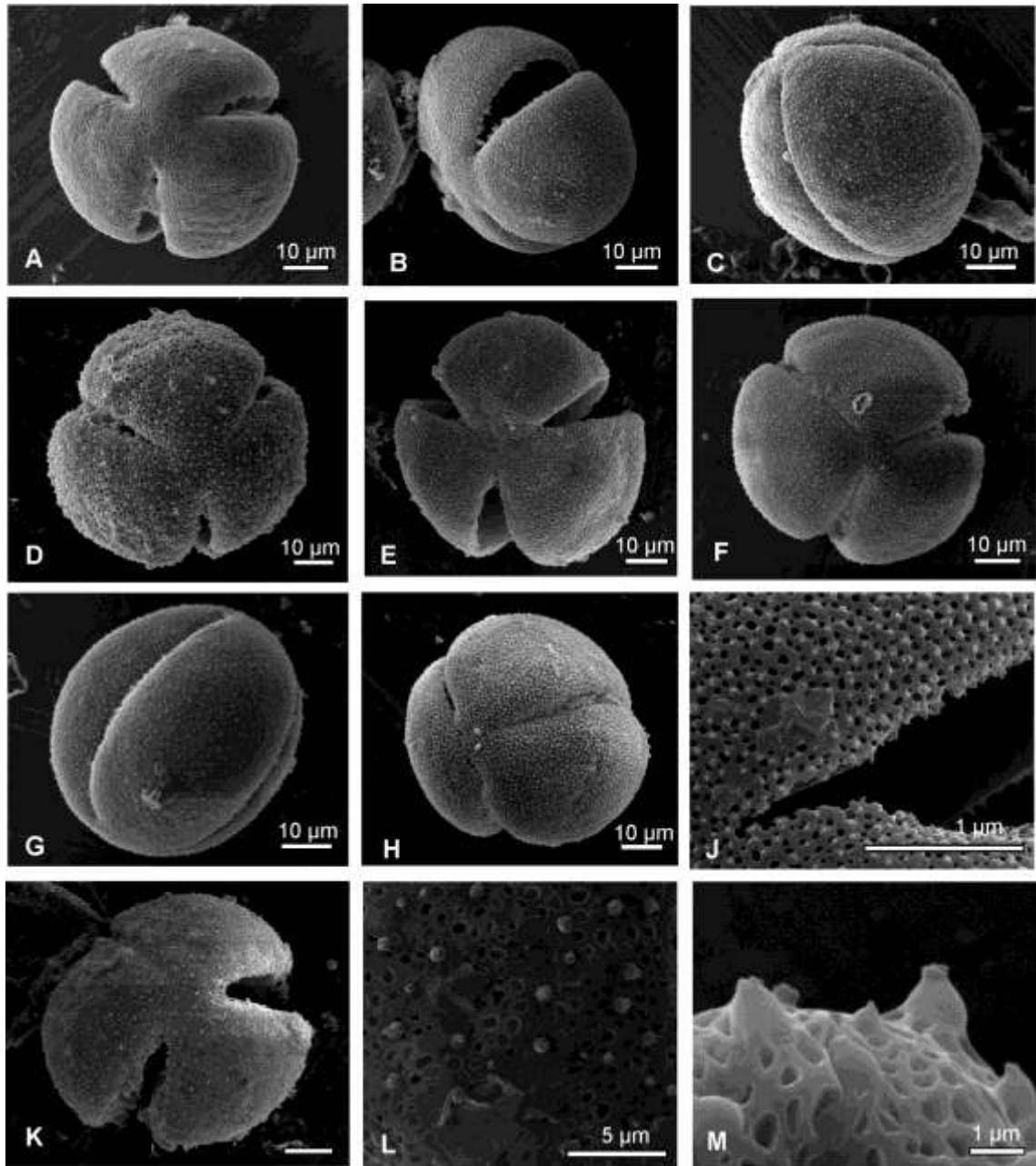


Figure 3: Pollen type 1A. A. *J. bracteosa*, B. *J. chrysanthera*, C. *J. diamantinensis*, D. *J. holosericea*, E. *J. martii*, F-G. *J. sphaerocephala*, H-J. *J. spicaeflora*; pollen type 2B. K-L. *J. nodiflora*, M. *J. tomentella*.

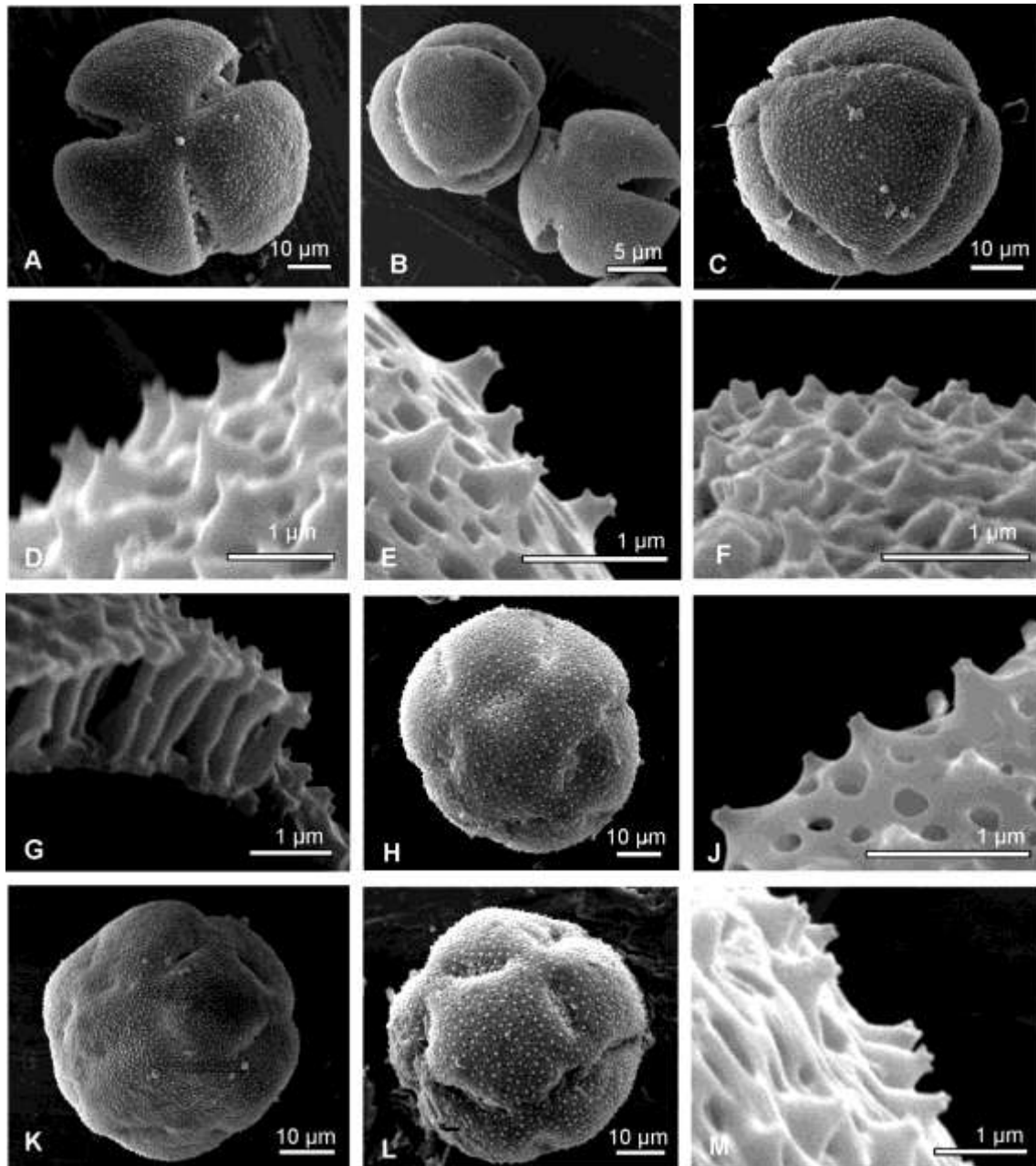


Figure 4: Pollen type 2A. A-B. *J. fusca*, C-D. *J. hallieriana*; pollen type 2B. E. *J. uleana*; pollen type 3A. F-G. *J. solanifolia*; pollen type 3B. H. *J. cumanensis*, J. *J. floribunda*, K. *J. guaranitica*, L-M. *J. havanensis*.

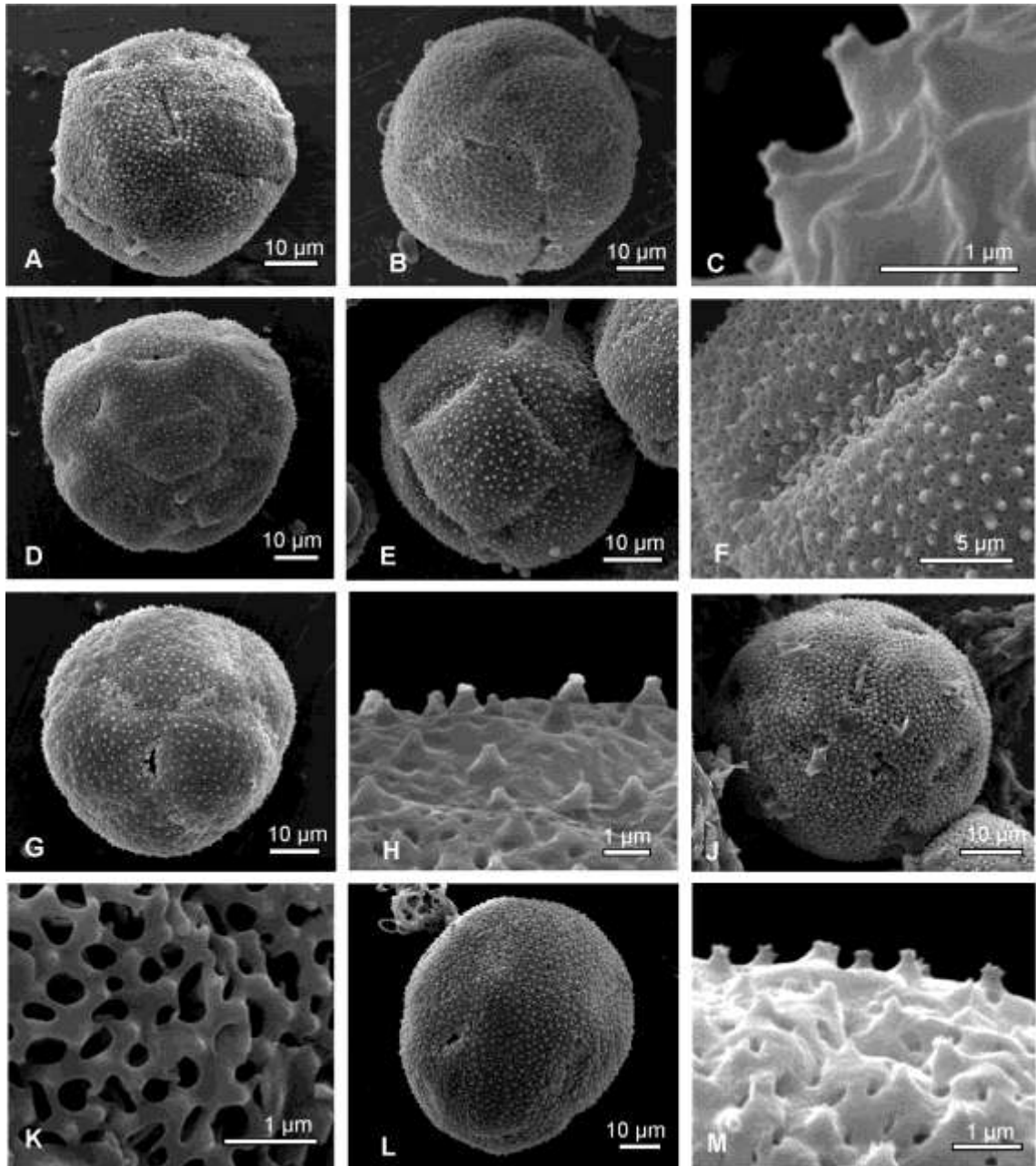


Figure 5: Pollen type 3B. A. *J. heterantha*, B-C. *J. linarioides*, D. *J. oaxacana*, E-F. *J. ovalifolia*, G-H. *J. pentanthos*, I. *J. pringlei*, K. *J. pycnocephala*, L. *J. selloi*, M. *J. smithii*.

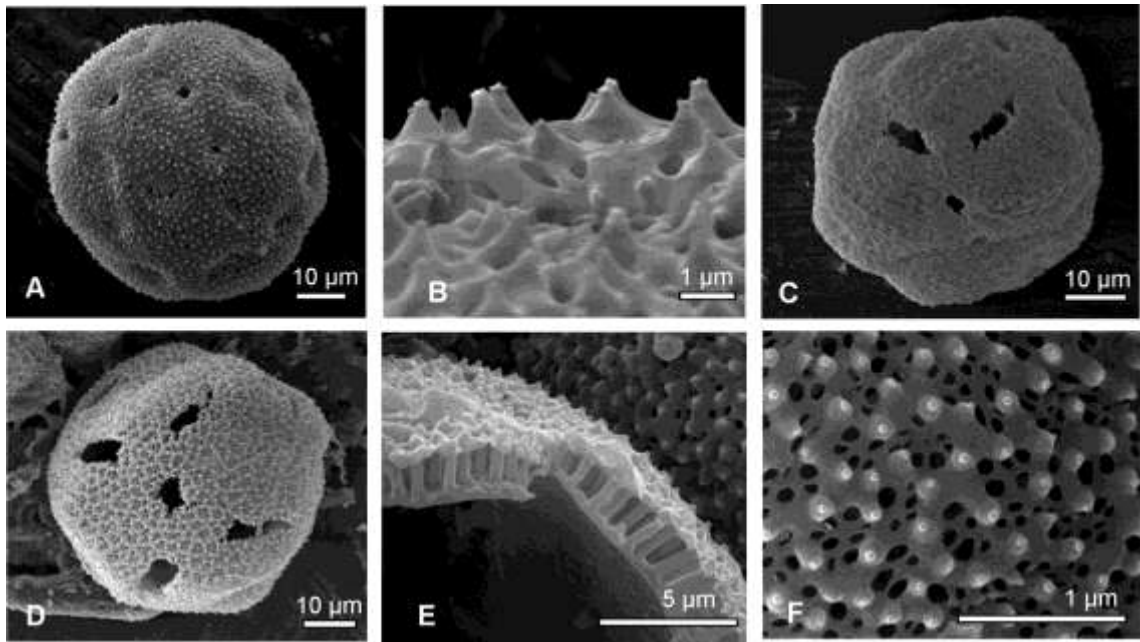


Figure 6: Pollen type 3C. A-B. *J. gracillima*; pollen type 3D. C. *J. agrestis*, D. *J. decumbens*, E. *J. fruticulosa*, F. *J. sphaerostigma*.

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CAPÍTULO 3
Biogeografía

**Distribution patterns and endemism areas for Brazilian *Jacquemontia* Choisy
(Convolvulaceae) species**

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A SER SUBMETIDO AO PERIÓDICO FLORA

Distribution patterns and endemism areas for Brazilian *Jacquemontia* Choisy (Convolvulaceae) species

Buril, M.T.; Maciel, J.R. & Alves, M.

Abstract. This study aims to understand how the species of *Jacquemontia* from Brazil are distributed, and where is found the Brazilian centre of endemism of the genus. For this, was created a data bank with around 2,000 records of samples deposited in 46 herbaria. Twenty one species were classified as widely distributed, being 14 with continuous distribution and seven with disjunct distribution. The remaining 26 were classified as restrict and among that, 14 were considered as endemic and 12 microendemic. The endemism centre of the genus is found on the Espinhaço Range, on both portions at Bahia and Minas Gerais. The distribution patterns are discussed and is suggested a new assessment for the Red List of *Jacquemontia*.

Key-words: Pleistocene Arc, Espinhaço Range, Caatinga, Cerrado, Dry Forests.

Introduction

Convolvulaceae comprises 58 genera and 1,840 species, mostly with cosmopolitan distribution, but with many genera endemic to tropical regions (Staples and Brummitt 2007). Even though a few species are notably known as weeds and pests, more than 1,000 species are not that common. Indeed, there are throughout the family, numerous rare species (Austin 1992).

Jacquemontia is one of the largest genera, with ca. 120 species, distributed mostly on tropical and subtropical New World, with several endemics in Caribbean, North, Central and South Americas, being frequent in savannah vegetation. Few species occurs on tropical Asia, Africa and Australia (Robertson 1971).

Recent studies demonstrate that the probable origins of *Jacquemontia* was on Asia, and then, by dispersion, they occupied the Mesoamerica and then diversified on the entire continent. The phylogenetic relationship among the species from Caribbean and Central America are better understood when compared to the South American species (Namoff et al. 2007, 2009). Namoff et al. (2009) based on a molecular phylogeny, found an exceptional case of disjunction between Tropical Africa, Caribbean and Hawaiian islands. They suggested that *Jacquemontia ovalifolia* (Choisy) Hallier, before treated as three distinct species according to the distribution area, is actually a unique species that linked this rarely exemplified disjunction.

Brazil has 50 species of *Jacquemontia* (Buriel & Alves *in press*), which represents more than 40% of the entire taxonomic diversity of the genus. They occur mostly on Caatinga and Cerrado areas (Bianchini & Ferreira 2012). The country has always been cited as embracing a high level of diversity to the genus, and probably presents one of its diversity centres (Robertson 1971). On the last years, several new endemic species has been described mostly to the Brazilian semi arid region (Bianchini 1999, Bianchini & Pirani 2005, Buriel & Alves 2011, Buriel et al. 2012, Buriel & Alves 2012 a, b, Krapovickas 2009). Understanding how the Brazilian species are distributed is indispensable to clarify some relationships found on the current phylogenetic studies.

This study aims to understand two main questions: 1. How the Brazilian species of *Jacquemontia* are distributed? And 2. Where is found the Brazilian centre of endemism of the genus?

Materials and methods

Data base— Samples were obtained through field trips and herbaria collection, and included a databank with ca. 2,000 records. The herbaria analyzed were: ALCB, ASE, B, BHCb, BM, BR, CEN, CEPEC, DIAM, EAC, EAN, FHO, F, FR, FLOR, G, HB, HRCB, HST, HUEFS, HUESB, HRB, HUFRN, HURCA, HVASF, INPA, IPA, JPB, K, M, MAC, MG, MO, NY, P, PEUFR, R, RB, SING, SP, SPF, SPSF, TEPB, UB, US, and UFP. The species included on the analysis followed Buril & Alves (*in press*). Species known exclusively by the type specimen (*J. cephalantha*, *J. subsessilis*, and *J. vilosissima*) and with doubtful locality were excluded from the analysis.

Analysis— Herbarium samples not georeferenced were adjusted based on the coordinates of toponyms available at gazetteers on line (<http://earth-info.nga.mil/gns/html/>, <http://www.geonames.org/>), or on the data base of Google Earth. In case of lacking the information of toponyms, the location used was the immediate county or similar. Samples with inaccurate location were discarded from the database.

The database was analyzed with the software DIVA-GIS (Hijmans et al. 2001). The default maps were obtained from both the ESRI collection (Environmental Systems Research Institute) and data bank of DIVA-GIS (available at <http://www.diva-gis.org/Data.htm>). This software was also used to realize the distribution modelling for all analyzed species. The algorithm adopted by DIVA-GIS is the BIOCLIM that considers only the known presence records to generate models (Elith et al. 2008, Hijmans et al. 2001).

The data bank of each species was splitted into two: 75% of samples to test the algorithm, and 25% to run the analysis. The data were partitioned following the parameters of two repetitions, and one absence point to each presence point on test data bank. The absence points were taken randomly from the mask grid that delimited the

study area on parameters MinX -122.6040, MaxX -29.4796, MinY -38.4050 e MaxY 36.9703 to all species.

Nineteen climatic variables were used further one relief variable from data base of WorldClim with resolution of five minutes or circa of 10 Km of linear spatial resolution. The WorldClim and the characteristics of climatic data present in it are described in Hijmans et al. (2005).

The distribution patterns were detected by dots plotted on the maps added with the potential distribution. The distribution patterns followed Maciel et al. (2009). The restrict pattern was categorized in endemic, considering the species known from an exclusive vegetation physiognomy, in more than five locations or microendemics, in less than five geographically close locations.

Then, following the process described by Hijmans & Spooner (2001), the data plotted suffered a regional crop to analyze the species richness distribution, in squares of $1^{\circ} \times 1^{\circ}$. All species identified as endemic were analyzed apart, to verify the distribution of endemic richness and the endemism centre following the same process to the complete Brazilian dataset.

Finally, was conducted a parsimonious analysis of endemicity (PAE) to infer the endemism centres. To this, the squares identified with three or more endemic species were numbered on a presence/absence matrix, where the squares were classified as OTU's and the species as characters. The analysis was realized with the software PAST using a heuristic algorithm and the optimization according the method of Wagner with Five rearrangements.

Results

The 47 species analysed on this study were classified in two categories of distribution patterns : widely or restrict (tables 1, 2). The widely distribution was also divided in the categories continuous or disjunct. The species with wide and continuous pattern appeared with an American or South-American distribution, and the wide and disjunct have an American, Central/South-American or only South American

distribution. The restrict species were also divided on endemics, including species with distribution exclusive to a vegetation physiognomy (in more than 5 locations), and microendemics which are known for less than five locations also on the same vegetation physiognomy. The concept of microendemicity includes species with very restrict and geographically close occurrence (Townsend et al. 2011) which was also adopted by McCauley et al. (2010) to *Guaiacum unijugum* Brandege (Zygophyllaceae) that occurs in less than 5% of Mexican territory in Baja California.

Twenty one species were classified as widely distributed, being 14 with continuous distribution and seven with disjunct distribution. The remaining 26 were classified as restrict and among that, 14 were considered as endemic and 12 microendemic (Figs. 1-9, Tab. 2).

The Area Under the ROC Curve (AUC) values ranged from 0.667-1 (Tab. 1). To *J. revoluta* and *J. rojasiana*, the modelling and AUC values calculation were not possible due to the insufficient data. The distribution patterns found and based on the known distribution of the species were confirmed by the models obtained. For *J. ciliata* (AUC 0.781), *J. choysiana* (AUC 0.761), *J. ferruginea* var. *ferruginea* (AUC 0.700), *J. glaucescens* (AUC 0.984), *J. guyanensis* (AUC 0.868), *J. heterantha* (AUC 0.832), and *J. selloi* (AUC 0.816), the models predict a distribution area substantially larger than the actually known.

The results of richness distribution indicate three main centres of richness of *Jacquemontia* in Brazil: extreme North between the states of Pernambuco and Paraíba, the central portion of the State of Bahia, and the central portion of the State of Minas Gerais (Fig. 8a). This pattern partially coincides to the distribution of richness of endemic species, where Bahia and Minas Gerais have a major role (Fig. 10).

The PAE recorded 10 trees equally parsimonious, with 37 steps, CI 0.5946, RI n.a. The majority consensus tree confirms the patterns observed on the simple analysis of richness realized on DIVA-GIS. Thus, effectively two centres of richness can be observed on this study. Both are placed on the Espinhaço Range, one of them refers to the Bahia State and the other one to Minas Gerais (Fig. 11).

Discussion

About 40% of Brazilian *Jacquemontia* species were considered as widely distributed. According to Ritter & Waechter (2004), the widely distributed species in *Mikania* Willd. (Asteraceae), were those ones with a high adaptive capacity. Only four species of *Jacquemontia* were framed on a widely and continuous distribution (*J. agrestis*, *J. pentanthos*, *J. sphaerostigma* and *J. tamnifolia*), and they are usually treated as weeds, easily adapted to different vegetation types, including disturbed environments (Austin 2003).

According to Prado (2000), the Pleistocene Arc and all the historical climatic changes that formed the current seasonal forests in South America, could justify the distribution of many taxa. Thus, the three nuclei represents a phytogeographic unit where are gathered several species, such as *J. fruticulosa*, *J. guaranitica* and *J. sphaerocephala*. Most of the examples known to support this hypothesis are woody taxa (Prado & Gibbs 1993), but few were also reported to Poaceae (Maciel et al. 2009). Examples of lizard distributions also support this hypothesis (Werneck & Colli 2006). Even though the Chaco-Caatingas connections were cited as a long-standing fallacy (Prado 1991), many distribution patterns in South America supported speculations on the influence of past wet-dry climatic fluctuations on the current disjunctions of seasonal forests in America (Prado 2003, Pennington et al. 2004). *Jacquemontia estrellensis* Krapov. for instance, corroborates these speculations. Prado (2003) also provided a list of species with similar distribution - *Schinopsis Brasiliensis* Engl. (Anacardiaceae), *Anadenanthera colubrina* var. *cebil* (Griseb.) Reis, *Amburana cearensis* (Allemão) A.C. Sm., *Pterogyne nitens* Tul (Fabaceae), *Phytolacca dioica* L. (Phytolaccaceae), and *Prosopis ruscifolia* Grisebach (Fabaceae). Caetano et al. (2008), based on the molecular analysis of a species with a disjunct distributed - *Astronium urundeuva* (Allemão) Engl. (Anacardiaceae), also a tree, reinforces the arguments to a previously more continuous formation of Seasonal Dry Tropical Forests in the eastern South America. For Convolvulaceae, this is the first record. Thus, the central portion of South America appears as a diversification centre to several taxa, and these results have important implications for protection policies of rich lineages unique to the “dry diagonal” region.

The disjunction between the North of Venezuela-Colombia and the Caatinga region in Brazil were discussed by Gentry (1982). In his view, the similarity of Antilles and Caatinga floras could be justified by the similar climatic conditions. This hypothesis was also supported by Andrade-Lima (1981) and Grellier (2000), and here is exemplified by the distribution pattern found to *J. gracillima*.

The dry areas in land of South America are outstanding in their high levels of endemism. Gentry (1982) estimates a regional endemism as high as the Atlantic Forest and exceeded only by the Amazon Basin among the major neotropical phytogeographic regions. About 60% of Brazilian *Jacquemontia* species were exclusive to this environment which represents a restrict pattern in our analysis. Similar to *Euploca* and *Heliotropium* (Boraginaceae) (Melo et al. 2009), and *Pfaffia* (Amaranthaceae) (Marchioretto et al. 2009), the Brazilian species of *Jacquemontia* are predominant on open vegetations and semi-arid climatic zones, such as the Cerrado and Caatinga (Bianchini & Ferreira 2012). Besides that, similar results, with the majority considered as restrict, were found for *Baptistonia* (Orchidaceae) (Chiron, 2009), and *Solanum* L. sect. *Petota* Dumort. (Solanaceae) (Hijmans & Spooner, 2001). Even though most species are restrict to the caatinga or cerrado, being restrict to the oriental northeast as *J. bahiensis*, was also found for a few Araceae species, as *Philodendron blanchetianum* (Pontes & Alves 2011).

Jacquemontia is poorly represent in the Atlantic Forest, and most of the species, are widely distributed, such as *J. glaucescens*. Then, the genus is not appropriate to corroborate or refute the hypothesis of a possible center of endemism on the further northern part of the Atlantic Forest (sensu Prance 1982).

Another interesting point is the occurrence of the variety *J. ferruginea* var. *ambigua* on the Fernando de Noronha archipelagos, and mostly on caatinga areas at the continent. This floristic relationship was pointed out by Andrade-Lima (1981).

Table 1. Distribution patterns of *Jacquemontia* Brazilian species.

Widely	Continuous	American
		South American
	Disjunct	American
		Central-South American
		South American
Restrict	Endemic	
	Microendemic	

Table 2: Distribution patterns of Brazilian species of *Jacquemontia* and AUC results of geographical modelling distributions.

Distribution Pattern			Species	AUC
Widely	Continuous	American distribution (Fig 1)	<i>J. agrestis</i> (Martius ex Choisy) Meisner	0.837
			<i>J. ciliata</i> Sandwith	0.781
			<i>J. pentanthos</i> (Jacq.) G. Don	0.814
			<i>J. sphaerostigma</i> (Vahl.) Choisy	0.831
			<i>J. tamnifolia</i> (L.) Griseb.	0.738
		South-American distribution (Figs 2, 3)	<i>J. blanchetii</i> Moric.	0.909
			<i>J. glaucescens</i> Choisy	0.984
			<i>J. guyanensis</i> (Aubl.) Meisn.	0.868
			<i>J. heterantha</i> (Nees. & Mart.) Hallier f.	0.832
			<i>J. gracilis</i> Choisy	0.667
			<i>J. guaranitica</i> Hassl.	0.8
			<i>J. martii</i> Choisy	0.906

Distribution Pattern		Species	AUC
Disjunct	American distribution (Fig. 3)	<i>J. sphaerocephala</i> Meisn.	0.971
		<i>J. velutina</i> Choisy	0.968
		<i>J. nodiflora</i> (Desr.) G. Don.	0.891
		<i>J. gracillima</i> (Choisy) Hallier f.	0.899
		<i>J. bifida</i> (Vell.) Hallier f.	1
		<i>J. corymbulosa</i> Benth.	0.916
		<i>J. estrellensis</i> Krapov.	0.868
		<i>J. holosericea</i> (Weinm.) O'Donell	0.833
		<i>J. unilateralis</i> (Roem. & Schult.) O'Donell	0.83
		<i>J. bahiensis</i> O'Donell	1
Restrict	Endemic		

Distribution Pattern	Species	AUC
(Figs. 5, 6, 7)	<i>J. choisyana</i> Meisn.	0.761
	<i>J. chrysanthera</i> Buri	0.977
	<i>J. cuyabana</i> Hoehne	1
	<i>J. decumbens</i> O'Donnell	0.75
	<i>J. ferruginea</i> var. <i>ambigua</i> Meisn.	0.905
	<i>J. ferruginea</i> var. <i>ferruginea</i> Choisy	0.7
	<i>J. fruticulosa</i> Hallier f.	0.917
	<i>J. fusca</i> (Meisn.) Hallier f.	0.846
	<i>J. linoides</i> (Choisy) Meisn.	1
	<i>J. racemosa</i> Meisn.	0.667
	<i>J. selloi</i> Hallier	0.816
	<i>J. spicaeflora</i> (Choisy) Hallier	0.985
	<i>J. uleana</i> Hallier	1

Distribution Pattern	Species	AUC
Microendemic (Figs. 8, 9)	<i>J. capitellata</i> Choisy	0.85
	<i>J. decipiens</i> Ooststroom	1
	<i>J. diamantinensis</i> Buril	1
	<i>J. grisea</i> Buril	1
	<i>J. lasiocladus</i> (Choisy) O'Donell	1
	<i>J. linarioides</i> Meisn.	1
	<i>J. macrocalyx</i> Buril	1
	<i>J. ochracea</i> Sim-Bianch. & Pirani	1
	<i>J. revoluta</i> Sim-Bianch.	n.d
	<i>J. robertsoniana</i> Buril & Sim.-Bianch.	1
	<i>J. rojasiana</i> O'Donell	n.d
	<i>J. staplesii</i> Buril	1

As observed on endemism richness map (figure 8) and on tree obtained from PAE, the Espinhaço Range emerges as an area where many taxa suffered a significant diversification, as *Schefflera* (Araliaceae), *Leiothrix* (Eriocaulaceae), *Pseudotrimezia* (Iridaceae), *Senna*, *Mimosa* (Leguminosae), *Eriope* (Lamiaceae), and *Barbacenia* (Velloziaceae) (Giulietti et al. 1987, Giulietti & Pirani 1988, Harley 1988, Fiaschi & Pirani 2008, Simon & Proença 2000). Cactaceae also presents as one endemism centre the Espinhaço Range, with the campos rupestres even more important than the caatinga in number of species (Zappi & Taylor 2008). Besides the Espinhaço Range being considered the diversity centre of many groups of plants (Giulietti et al. 1997), the region counts currently with many new species description and occurrence (Rapini *et al.* 2002, Rapini *et al.* 2008), including *Jacquemontia* (Bianchini 1998, Bianchini & Pirani 2005, Buril & Alves 2011, Buril et al. 2012, Buril & Alves 2012 a, b, Krapovickas 2009).

Giulietti & Pirani (1998) presented some examples of plants with discontinuous distribution along the Espinhaço Range Mountains. The authors pointed out how often they are, however mostly can also be found outside this environment (Kamino et al. 2009), or limited to a few areas on the whole range. Both cases can be seen among *Jacquemontia*, as *J. staplesii* which is known to one locality and *J. diamantinensis* which occurs in many distinct localities along the Cadeira do Espinhaço Range.

This Cadeira do Espinhaço Range goes from the state of Bahia to Minas Gerais (north-south arrangement) and, in general, do not shares species of *Jacquemontia* with restrict distribution pattern (endemics). *J. grisea*, *J. staplesii* and *J. robertsoniana* for instance, are exclusive from the portion of Bahia, while *J. decipiens* and *J. revoluta* are exclusive from Minas Gerais. This local pattern is common to several families, considering the geomorphologic distinctions between the southern and northern portions of the Range (Kamino et al. 2009). The set of *Jacquemontia* species restricts to the Espinhaço Range is morphologically related, and very distinct from the rest of the genus. However, is too early to suggest cases of neo or paleoendemism based on a current distribution as relictual or as result of a widely previous distribution.

An interesting taxonomic complex is composed by *J. ferruginea* var. *ferruginea*, *J. ferruginea* var. *ambigua* and *J. guyanensis*. All three emerged as related taxa in recent phylogenetic analysis (Buril et al. 2013, vide capítulo 4), and probably are the result of

a neoendemism, generated from recent speciation. The last one was previously inserted as an additional variety of *J. ferruginea* (Meisner 1869), but nowadays is recognized as a distinct species, and restrict to the Guiana Shield. *Jacquemontia ferruginea* var. *ambigua*, is isolated from the typical variety by geographical barrier, such as the Rio Doce how suggested by Behling & Lichte (1997), or more probably by climatic isolation which the differences could be explained by a differential effect of drier periods in the two regions (Grazziotin et al. 2006). Still, Pennington et al. (2011) suggests that the Seasonally Dry Tropical vegetation imposes more restrictions to species dispersion than other Neotropical vegetation types. This could be a reasonable explanation for the fact that many tree species present a genetic structure strongly related to the geographical distribution within the spectrum of the Seasonally Dry Tropical Forests. These phenomena possibly implies on the distribution of *Jacquemontia ferruginea* complex and in other *Jacquemontia* species analyzed here.

Finally, the distribution of Brazilian species of *Jacquemontia* increases the number of examples that corroborate the expansion of the Seasonally Dry Tropical Forests of South America during the dry periods of Pleistocene. Thus, this study supports the model proposed by Pennington et al. (2000) and suggests that the genus can be an interesting model to test their hypothesis, as from additional studies of cladistic biogeography.

Moreover, the Espinhaço Range is confirmed as a diversity centre of *Jacquemontia*, with many microendemic species represented by small populations and more susceptible to stochastic episodes. This area historically suffers with mining (gold, precious and semiprecious stones, crystals and other minerals), unplanned tourism, “extreme sports” practice, road building, grazing and unplanned use of water resources. All factors composing a long list of threats to the biodiversity of this region (Zappi & Taylor 2008). Therefore, the conservation of this large area with distinct human pressures and physiognomies requires special attention as pointed out by Burman (1991).

And finally, the inclusion of only one species of *Jacquemontia* on current Red List of Brazilian Flora as data deficient (MMA 2008) is clearly underestimated and should be reassessed based on the data presented here by Buril & Alves 2013 (see chapter 1).

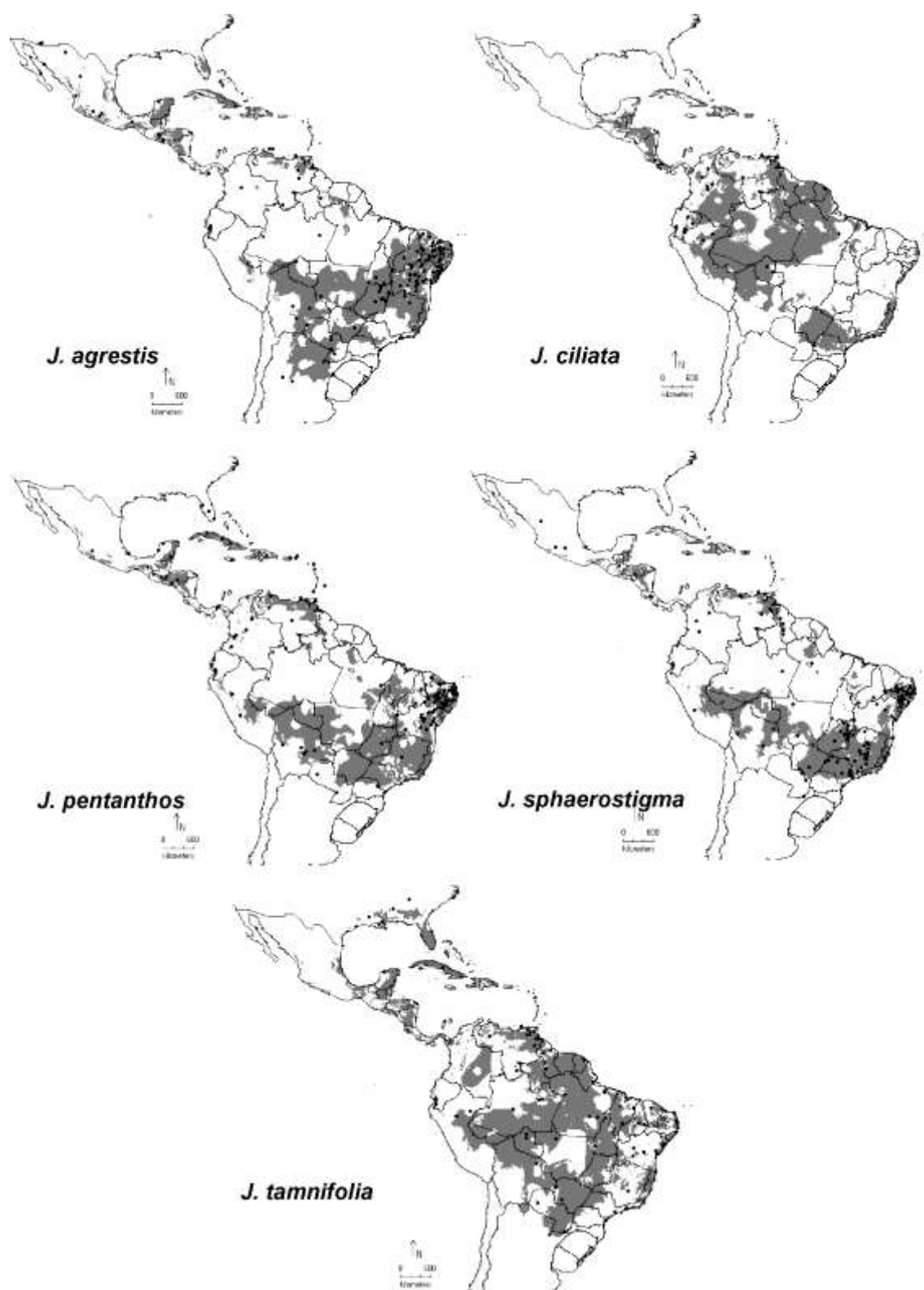


Figure 1: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and American.



Figure 2: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and South American.

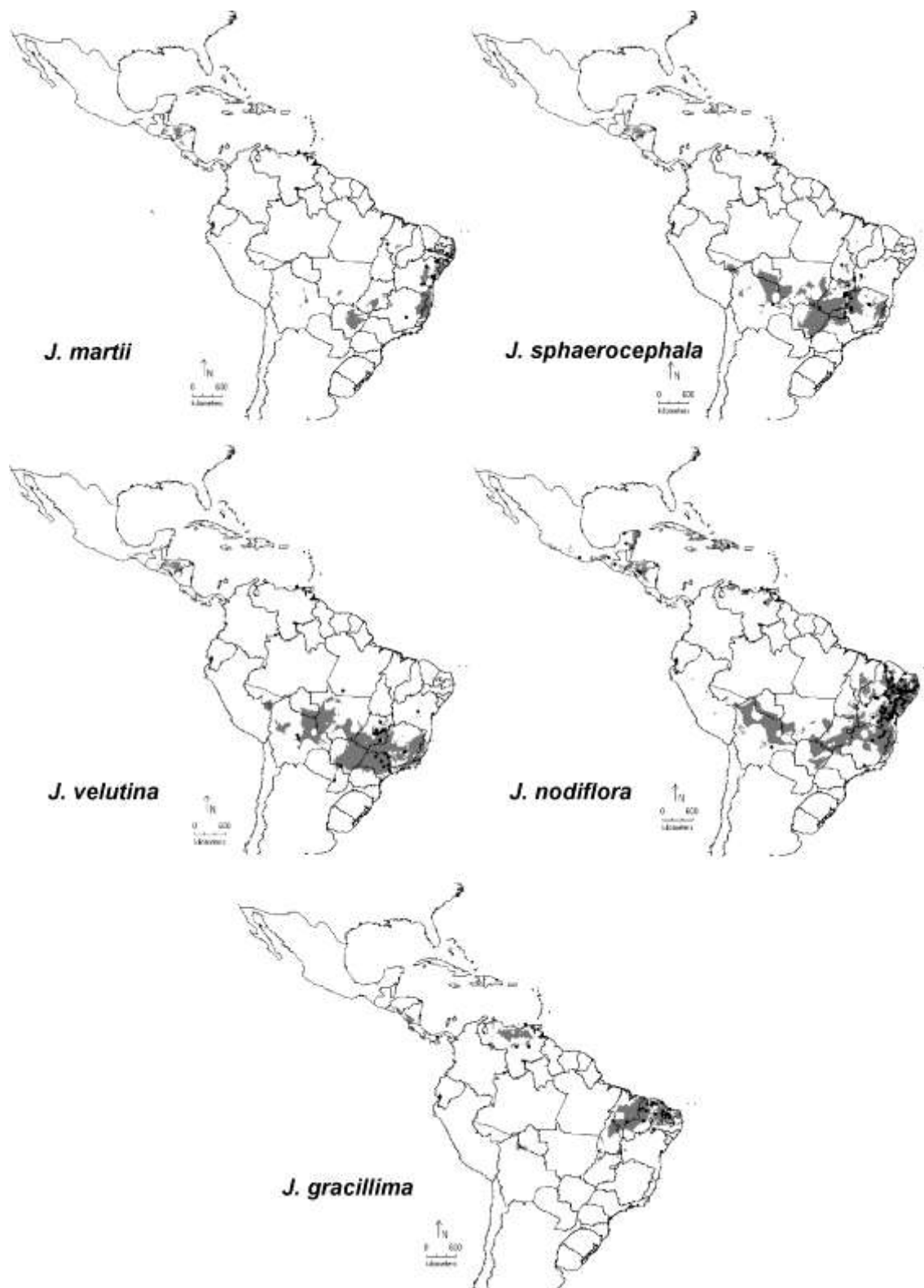


Figure 3: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, continuous and South American; *Jacquemontia nodiflora* pattern widely, disjunct, american; *Jacquemontia gracillima* pattern widely, disjunct, Central – South American.

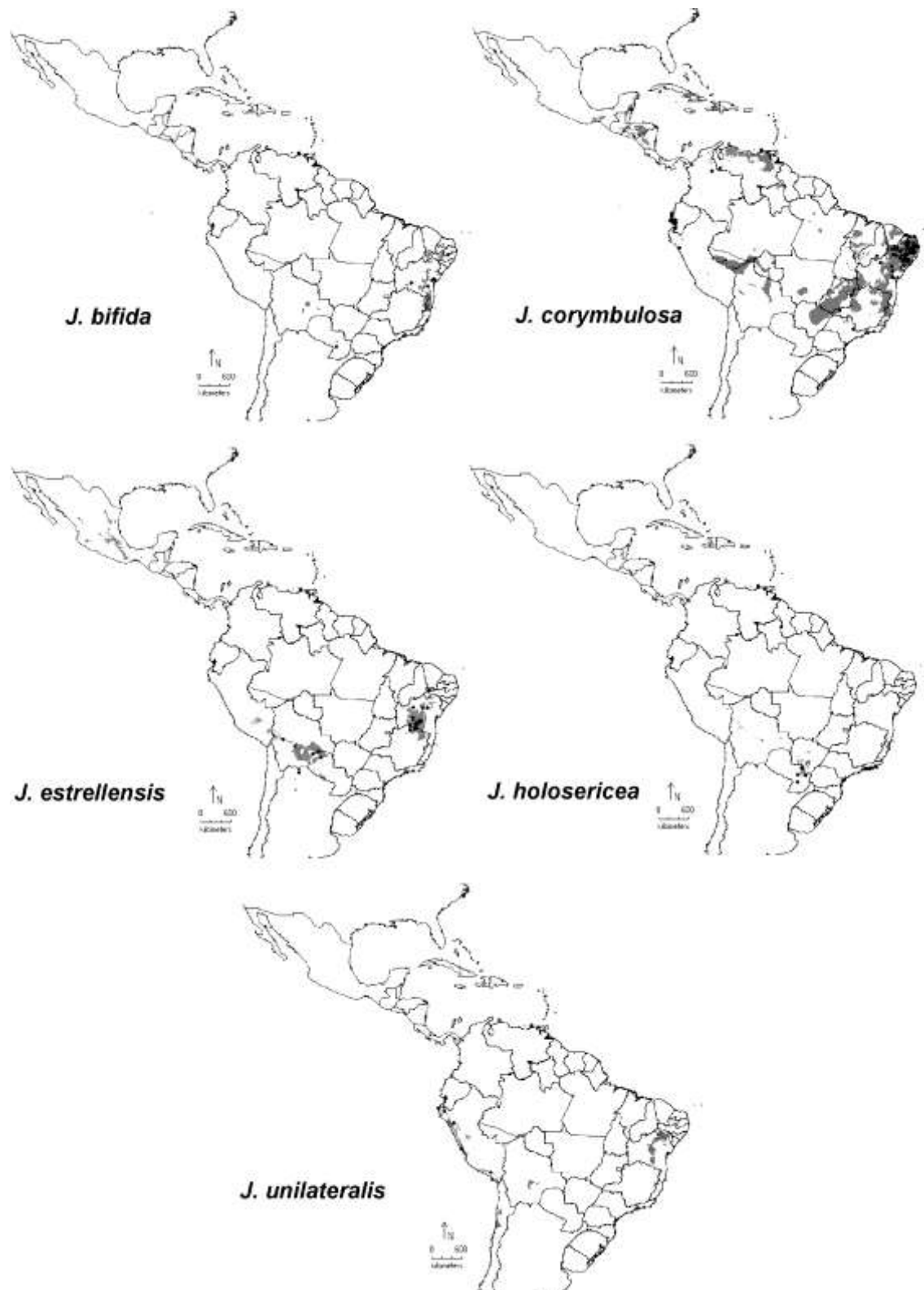


Figure 4: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: widely, disjunct and South American.



Figure 5: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.

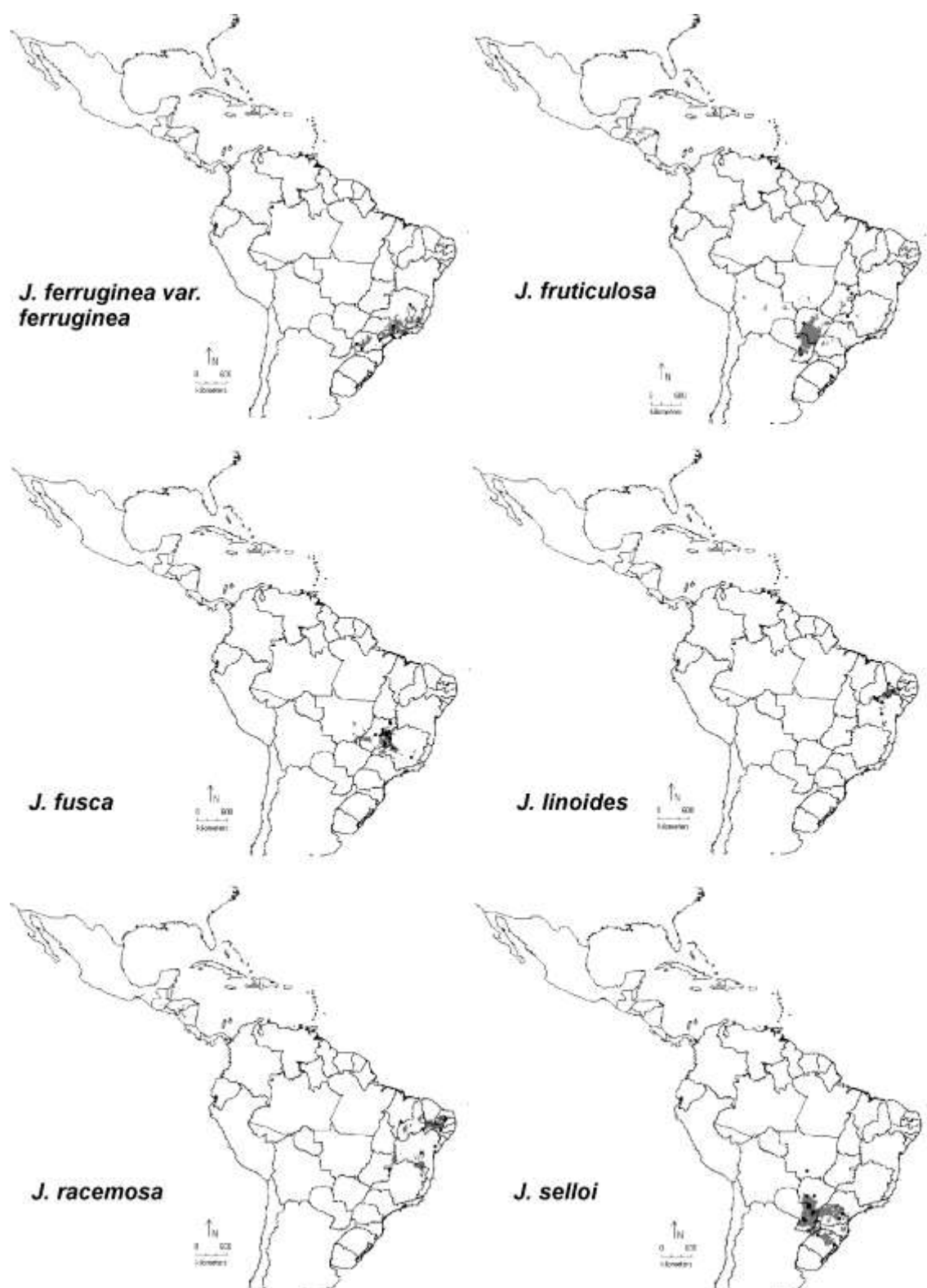


Figure 6: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.



Figure 7: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, endemic.



Figure 8: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, microendemic.



Figure 9: Species observed distribution (dots) and geographical modelling distributions (in gray). Pattern: restrict, microendemic.

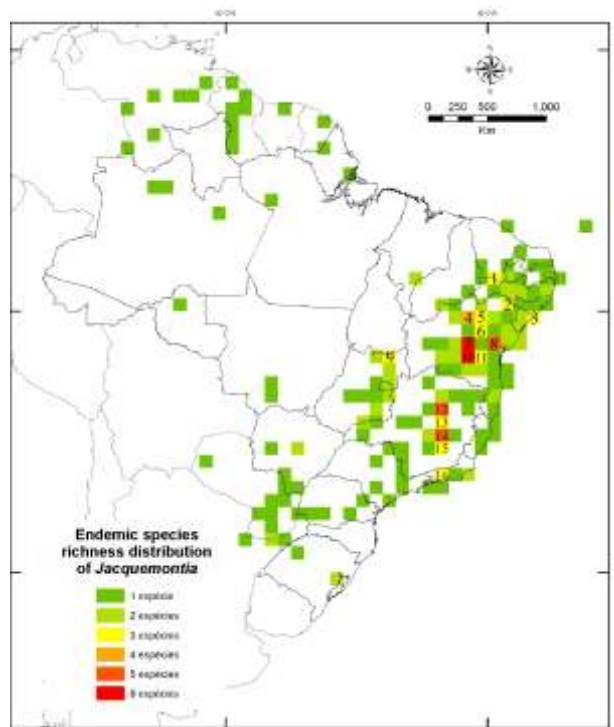


Figure 10: Distribution of *Jacquemontia* endemic species richness in Brazil.

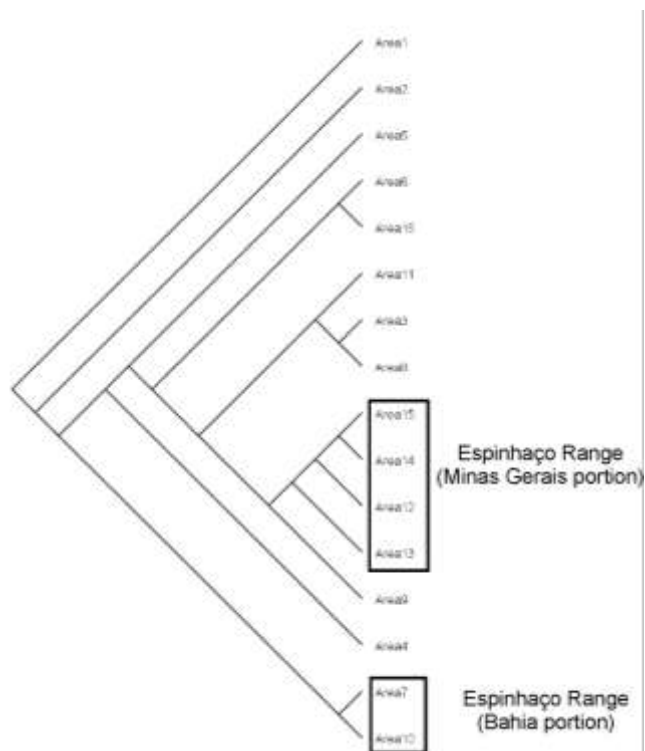


Figure 11: PAE analysis consensus tree.

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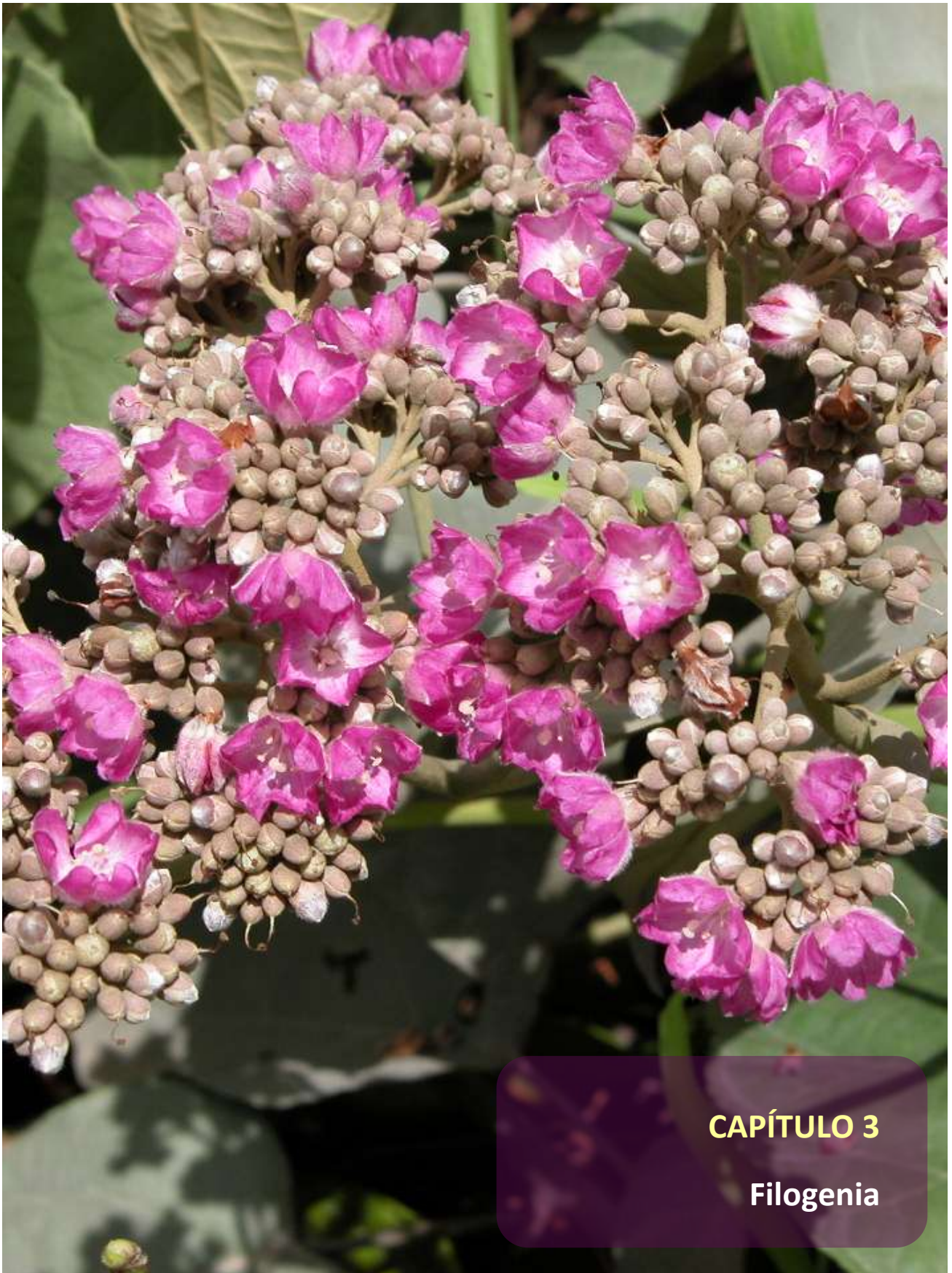
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CAPÍTULO 3

Filogenia

Phylogenetics of *Jacquemontia* (Convolvulaceae) inferred from ITS and *rpS16*, and its taxonomic significance

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A SER SUBMETIDO AO PERÍODICO PLANT SYSTEMATIC AND EVOLUTION

Phylogenetics of *Jacquemontia* (Convolvulaceae) inferred from ITS and *rpS16*, and its taxonomic significance

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Introduction

The Convolvulaceae is a cosmopolitan, though largely tropical, family comprising approximately 1600-1700 species worldwide (Mabberley 1987). As a family, it is well-defined morphologically with strong molecular support for its monophyly (Stefanovic et al. 2003). Within the family however, taxon delimitation from tribal to specific level has been problematic and the taxonomy of *Jacquemontia* Choisy, a genus of around 120 species (Staples & Brummitt 2007) distributed mainly in tropical America with a few species occurring in Asia, Africa and Oceania (Robertson 1971), is particularly difficult.

The genus is considered as taxonomically challenging on species delimitation exacerbated by the high morphological plasticity. However, problems are found also on tribal classification, where *Jacquemontia* has been the subject of many discussions. On morphological grounds, it has long been thought to be closely related to *Convolvulus* and the two genera have been traditionally classified in the tribe Convolvuleae (Hallier 1893; Austin, 1998). *Jacquemontia* and *Convolvulus* have been distinguished on the basis of pollen and stigma morphology (Austin 1998). Thus, *Convolvulus* has been defined by tricolpate pollen and a pair of cylindrical to filiform stigmas whereas *Jacquemontia* has been defined by pantocolpate pollen and two globose to ellipsoid stigmas. However, Sengupta (1972) showed that *Jacquemontia blanchetii* Moric. has tricolpate pollen, while later studies showed that the genus is inconsistent in relation to the pollen type (Tellería & Danners 2003, Vital et al. 2008).

In addition to problems relating to the delimitation of *Jacquemontia* with respect to *Convolvulus*, there is considerable morphological variation within *Jacquemontia* itself and the monophyly of the genus is questionable. Of the remaining taxa, some species stand out as morphologically distinct and conceivably incorrectly placed in the genus (Robertson 1982).

Stefanovic et al. (2003) found that *Jacquemontia*, monophyletic, was closest related to the clade Dicranostyloideae, which includes the genera with bifid stigma, and confined the genus to a new monotypic tribe Jacquemontieae Stefanovic & Austin. Even though that relationship was weakly supported, on a later work Stefanovic and Olmstead (2004) confirmed *Jacquemontia* as sister group of that clade. Their conclusions were also supported by Carine et al (2004) in a phylogenetic analysis of the Macaronesian endemic species of *Convolvulus* based on ITS, where it was confirmed the more distant relationship between *Convolvulus* and *Jacquemontia*. Thus, similarities of pollen and stigma shared between these genera might be the result of a striking process of convergent evolution.

Besides Stefanovic et al. (2003) work, when around 5% of the genus was sampled, a few other works consider *Jacquemontia* on phylogenetic studies. Namoff et al (2007) presented a phylogeny of the Central American species of *Jacquemontia* (15 species) based on both the nuclear ribosomal ITS region and the chloroplast marker *trnH-psbA*. In 2009, Namoff et al. discussed a unique disjunction of *J. ovalifolia* between tropical Africa, Caribbean and Hawaiian islands. It is notable however, that South American species of *Jacquemontia*, where most of the species diversity in the genus occurs, have been largely unsampled.

Regarding the infrageneric classification, three sections were described by Meissner (1869): Cymosae, including species with umbelliform cymes; Capitatae, with capitulliform cymes; and Anomalaе (or Heterogeneae), which the inflorescences are loosely cyme, resembling a racemous. Van Ooststroom (1934) described a new section Capituliflorae to include the species with terminal and globose cymes. However, these sections do not seem to represent natural groups, since sometimes, even on a same taxon, is possible to observe a variation on the inflorescence development (Buriel & Alves *in press*).

We used nucleotide sequence data from the internal transcribed spacer (ITS) region of nuclear ribosomal DNA and the chloroplastidial DNA *rpS16* to establish the phylogenetics relationship within *Jacquemontia*. The faster evolving ITS region has been widely used for phylogenetic reconstructions at low taxonomic levels in Convolvulaceae (Manos et al. 2001; Miller et al. 2002; Carine et al. 2004; Namoff et al. 2007). The *rpS16* region has been used in a variety of plant phylogenetic studies, and Small et al. (1998) demonstrated that it is one of the two potentially phylogenetically informative, when comparing seven chloroplast regions.

Based on combined analysis of both nuclear and chloroplast regions, the aims of this study are understand: 1. If *Jacquemontia*, on this current circumscription, is confirmed as a monophyletic genus; 2. If the infrageneric classification represents natural groups; 3. What is the presumable origins of the genus; and 3. How some morphological characters evolved, according to the phylogenetic topology.

Materials and Methods

Taxons sampling— In total, fifty-six species of *Jacquemontia* (ca. 45%) were included in the analysis in order to represent a considerable sample of the morphological and geographical diversity within the genus. About 80% of all taxa present on Tropical Asia and Asia, besides species restrict to Central or South America, and species widely distributed on Neotropics. Samples were both from fresh or herbarium material. Four species from Australia are newly described and in process of publication (Johnson, personal communication), and are here referred by the voucher number. Species of *Aniseia*, *Bonamia*, *Convolvulus*, *Evolvulus*, *Metaporana*, and *Porana* are used as outgroups. Vouchers specimens and the range of distribution of species included in the analysis are listed on Table 1.

Molecular methods— Protocols for DNA extraction, PCR and sequencing followed Carine et al. (2007). Total genomic DNA was extracted from ~0.5 g of leaf material (silica gel dried or herbarium material) using a modified CTAB microextraction protocol (Doyle & Doyle 1987). Total DNA extraction products were purified, without precipitation, using GFX purification kits (Amershan Biosciences, Little Chalfont, UK).

Standard polymerase chain reaction (PCR) procedures were applied to amplify both ITS and rpS16 regions using a Techgene Thermal Cycler (Techne, Cambridge, UK). ITS 1 and ITS2 regions together were amplified as a single fragment using primers AB101 and AB102. Betaine (1.2 mol/L) was added to prevent the formation of secondary structures and to assist primer annealing. PCR cycles followed the protocol: 94 °C (1 min); 30 cycles of 94 °C (1 min), 54 °C (1 min), 72 °C (3 min); 72 °C (8 min). Amplification products were purified using GFX kits. The region rpS16 was amplified using the primers rpS16x1 and rpS16x2F2, with the parameters 80 °C, 5 min; 35x (94 °C, 30 s; 50–55 °C, 30 s; 72 °C, 1 min); 72 °C, 5 min (Shaw et al. 2005, 2007). Both primers were also used in sequencing reactions.

Dideoxy cycle sequencing (28 cycles: 30 s at 95 °C, 15 s at 50 °C, and 4 min at 60 °C) with big dye terminators was performed in 10 µL volumes using a Hybaid Omnigene Thermal Cycler. Excess dye-labelled nucleotides from the sequence reactions were removed by standard ethanol/sodium acetate precipitation. Sequence products were subsequently resuspended and run on an ABI 3730 DNA capillary sequencer (Applied Biosystems, Foster City, California, USA). Sequence data were edited and assembled using Lasergene Navigator, SeqMan II (DNASTar, Madison, Wisconsin, USA). Verified sequences were then aligned by eye in Bioedit Sequence Alignment Editor (version 7.0.9.0; Hall 1999) prior to phylogenetic analysis. Gaps on rpS16 sequences, not for ITS ones, were coded as informative characters for analysis.

Phylogenetic analysis— The following phylogenetic analyses were performed: (1) ITS data of ingroup and the 2 outgroups (80 taxa in total); (2) ITS data of 19 ingroup and 15 outgroups (3) rpS16 data of the ingroup taxa for which sequences were available with the gaps coded as characters; (4) Combined ITS and rpS16 for all the taxa, considering as missing data when one of the markers sequences were lacking.

Phylogenetic analyses were performed using PAUP version 4.0β5 (Swofford 1998). The strategy proposed by Catalán et al. (1997) was adopted, and the analyses were conducted in three steps. First, a heuristic search comprising 10,000 random replicates was carried out with accelerated transformation (ACCTRAN), saving all minimal trees (MULPARS), and the tree bisection and reconnection (TBR) option, keeping two trees of length greater than two at each replicate. Then, the strict consensus

of these trees was used as a constraint for a second search with the same setting options, but limiting PAUP to save only trees that not match the constraint tree. Finally, a heuristic search with 10,000 random replicates, instructing PAUP to keep all trees that are compatible with the constraint tree. Character states were not ordered or polarized. The consistency index and retention index (CI – Kluge & Farris 1969) and retention index (RI – Farris 1989) were calculated in PAUP. Bootstrap values were determined from 1000 replicates. All characters were unordered and equal weighted

Bayesian and maximum likelihood analysis were performed on Mr. Bayes and PAUP, respectively, but no significant differences were found, when compared to PAUP results. The morphological characters were not included on the analysis, but were interpreted from the trees found.

Results and discussion

Phylogenetic analysis—ITS: The total aligned matrix comprised 765 characters, of which 229 are informative, 456 are constant and 80 are variable but parsimony-uninformative. Was analysed the consensus strict (length: 744) of 14120 trees retained. **rpS16:** This region was sequenced for 63 taxa on the ingroup and 1 specimen of *Aniseia* as outgroup. The positions 470 to 550 was excluded because is troublesome to align. The gaps were coded as informative characters. The total aligned matrix comprised 828 characters, of which 641 are constant, 83 characters variable are uninformative, and 104 are parsimony-informative. The consensus tree (length: 244) of 30 trees was analyzed. **ITS + rpS16:** The combined data analysis resulted on a matrix of 1644 characters, where 1151 are constant, 163 are variable but not informative, and 330 are parsimony-informative. The consensus tree (length: 993) of 7993 trees was analyzed.

On this study, that ca. 50% of all diversity present in *Jacquemontia* was sampled, could confirm the genus as monophyletic, as indicated by Stefanovic et al. (2003), if a few species were excluded from the genus. Thus, the monotypical tribe Jacquemontieae Stefanovic & Austin can be recognized by the following characteristics: 1. Usually vines, herbs or shrubs; 2. Branched trichomes (2–12 branched), glandular trichomes sometimes present; 3. Sepals usually unequal, sometimes equal in size and

shape, usually non-acrescent (exceptions: *J. gracillima*, *J. chrysanthera*); 4. Filaments dilated on the base, usually pubescent; 5. Style one, entire; 6. Stigmas elongated or shortened, flattened, tongue-shaped, or sometimes cylindrical (eg.: *J. nodiflora*, *J. holosericea*); 7. Fruits dehiscent, capsule, usually 8-valvate; 8. Seeds glabrous, smooth or texturized, usually with winged margins; 8. Pollen tri to polycolpate, non-echinate, spheroidal to oblate (Stefanovic 2003).

Jacquemontia tomentella presents a notable morphological divergence (pink flowers, campanulate corolla), even though presents the morphological features recognized as main synapomorphies of *Jacquemontia*, the branched trichomes as tongue-shaped stigma. The ITS analysis including outgroups from many distinct tribes in Convolvulaceae, suggests that probably this species is closest related to *Aniseia*, than to *Jacquemontia* (check additional trees). A similar situation happens to *Jacquemontia montana*, that on our results presents an uncertain position. However, *J. montana* even with only morphological characters stated, clearly do not belongs to *Jacquemontia*, due to the simple trichomes, yellow corolla and twisted anthers (Buriel & Alves *in press*).

The distribution of *Jacquemontia* hypothetically suggests an origins on the Old Worlds and a boom of diversification on the New World. Elsam (2008) suggests the opposite. The data indicated that the most derived position of the genus was occupied by the Mesoamerican and Caribbean species, that arised as the sister group of Australian clade, suggesting the later occupation of Australia in the evolution of the genus. These results contrasted the origins patters of many other clades in Convolvulaceae, as the one found on the tribe Convolvuleae (Carine et al. 2004, Elsam 2008). However, our trees topologies propose other conclusions. The most basal position is occupied by Old World species (*J. browniana*). The combined analysis trees revealed the clade formed by the Old World species. Our results confirmed the relationship between the Mesoamerican and Australian species, with a bootstrap support of 91% (Namoff et al. 2007, Elsam 2008). However, *J. browniana* and a few other new undescribed species, distributed in Australia, were closest related to the African and Asian species *J. paniculata* (bootstrap support: 95%), even though there is no clear morphological support to this clade. *Jacquemontia tamnifolia*, the widely distributed species, did not grouped with any other species.

Our results suggest that the origins of *Jacquemontia* occurred in Asia. The oldest microfossil record attributed to the family Convolvulaceae is known from the Eocene (ca. 40 – 45 million year ago), when the continents were already on the current position (Simpson & Ogorzaly 1995). Implying that the occupation of America was posterior to the continental derive, by dispersion.

Subgeneric classification— The sections recognized in *Jacquemontia* are based mainly on the inflorescences structure (Meisner 1969, van Oostrstroom . Even though all inflorescences in Convolvulaceae are cymes, they are organized in many different arrangements. In *Jacquemontia* is found a extensive variation, from umbelliform (e.g.: *J. pentanthos*), capitulliform (e.g.: *J. tamnifolia*), glomeruliform (e.g.: *J. sphaerocephala*) to a very wide cyme resembling racemous (e.g.: *J. agrestis*). Our results based on molecular data demonstrated that the current Section do not represents monophyletic groups. Since the morphological delimitation is also hardly applicable, we recommend the disuse of this infrageneric classification in *Jacquemontia*. Without not many easily observable morphological synapomorphies, it is difficult to suggest a natural infrageneric classification in *Jacquemontia*.

Groups and morphology— With our results was possible to find out the formation of four main groups. To discuss these groups we use the tree originated of combined analysis excluding missing data. **Old World + Mesoamerican group:** Even though do not shares many morphological characteristics, our study demonstrated that the Old World species (*J. paniculata* and *J. browniana*) are closest related to the group of species endemic to Mesoamerica (*J. reclinata*, *J. curtissii*, *J. havanensis*, *J. sandwicens*), bootstrap support 97% (Namoff et al. 2007). Theses species appears on the origins of *Jacquemontia*, and the phenotypic divergence must be a result of geographic distance. The most surprising was the inclusion of *J. paniculata* that is morphologically very similar to *J. pentanthos* and other American species as a sister group of *J. browniana*. However, on the curse of evolution in *Jacquemontia*, the first group to diverge in South America, with a few species widely distributed, is the “*J. pentanthos* clade”, as sister group of the previous one, with a bootstrap support of 83%.

Membranaceous sepals clade: This group is certainly the most complex on identification of species based on morphology (Robertson 1971). It is characterized by the sepals membranaceous, with dichotomous veins, and unequal, usually with two outer longer, one intermediate asymmetric and two inner shorter. The delimitation of

these species can be product of a recent diversification and a current speciation process. *Jacquemontia tamnifolia*, the most widely distributed species, traditionally included on the section Capitatae, although do not present the unequal sepals, but they are membranaceous, appears as the sister group of those two clades. The species studied from the section Capitatae (*J. tamnifolia*, *J. sphaerocephala*, *J. bracteosa*) do not grouped in any of our analysis, but presents uncertain position on our trees.

Chartaceous sepals clade: This clade grouped all the species that presents chartaceous sepals, with parallels veins, and they can be unequal, but the middle sepal has often the same shape of inner sepals, but can differ in size. This group can be characterized also by the presence of 3-colpate pollen grains and the inflorescences are often umbelliform, but large bracts can be present (e.g.: *J. estrellensis*). *Jacquemontia gracilis*, frequently included on the section Anomalae for presenting inflorescences racemous-like, is clearly related to this clade, and again our study shows the inconsistency of a infrageneric classification. **Glandular trichomes clade:** this clade was the best supported in all the analysis, with a bootstrap of 100%. Besides the presence of glandular trichomes, the species in this clade are also characterized by the equal and membranaceous sepals. Most species are few-flowered and the majority is composed by the section Anomalae, with the exception of *J. sphaerostigma* that presents umbelliform cymes and was previously treated in the section Cymosae. Possibly this could be suggested as a section in *Jacquemontia*, defined by the presence of glandular trichomes. However, in some populations, these trichomes seem to be lost in old branches (Buriel & Alves *in press*). Thus, it hinders the character observation. **Uncertain taxa:** Although a few species evidently appears inside *Jacquemontia*, they do not present a clear relationship with any other taxa. One example is *J. gracillima* that was first described under the genus *Douforea*, then transferred to *Aniseia* and latter to *Jacquemontia* for presenting stellate trichomes. The inflorescences in *J. gracillima* are racemous-like and the sepals are highly unequal in shape and size. One remarkable feature is the acrescent sepals, that is not very common in the genus.

Pollen evolution— Based on hypothesis of pollen evolution in Convolvulaceae (Sengupta 1972), was expected that the tricolpate state would be the basal expression in *Jacquemontia*, and the most derived taxa evolved to a polycolpate state, the sister taxon of the entire genus, presents tricolpate pollen. However, this condition appears again only on the “Chartaceous sepals clade”, and seems to be a synapomorphic condition to

this clade. All other species emerged with the polycolpate condition. The “Glandular trichomes clade” presents a remarkable pollen feature. The perforations among the microspines are organized in circles, and it can be considered an additional morphological synapomorphies that sustains this clade.

Conclusions

This study demonstrates that the current infrageneric classification, based exclusively on inflorescence structure, do not represent monophyletic groups. *Jacquemontia* is a monophyletic genus if a few species are excluded. Characteristic on sepals – consistence and shape – and trichomes appears to be more conservative on the course of evolution of the genus.

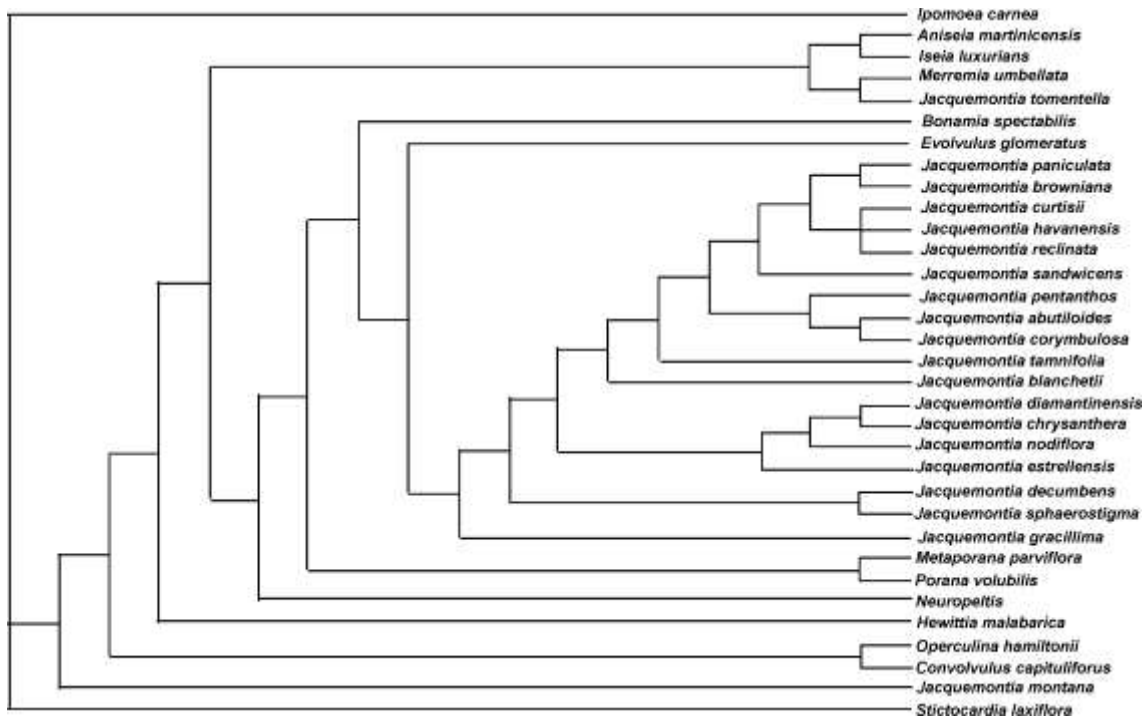


Figure 1: Combined analysis including outgroups

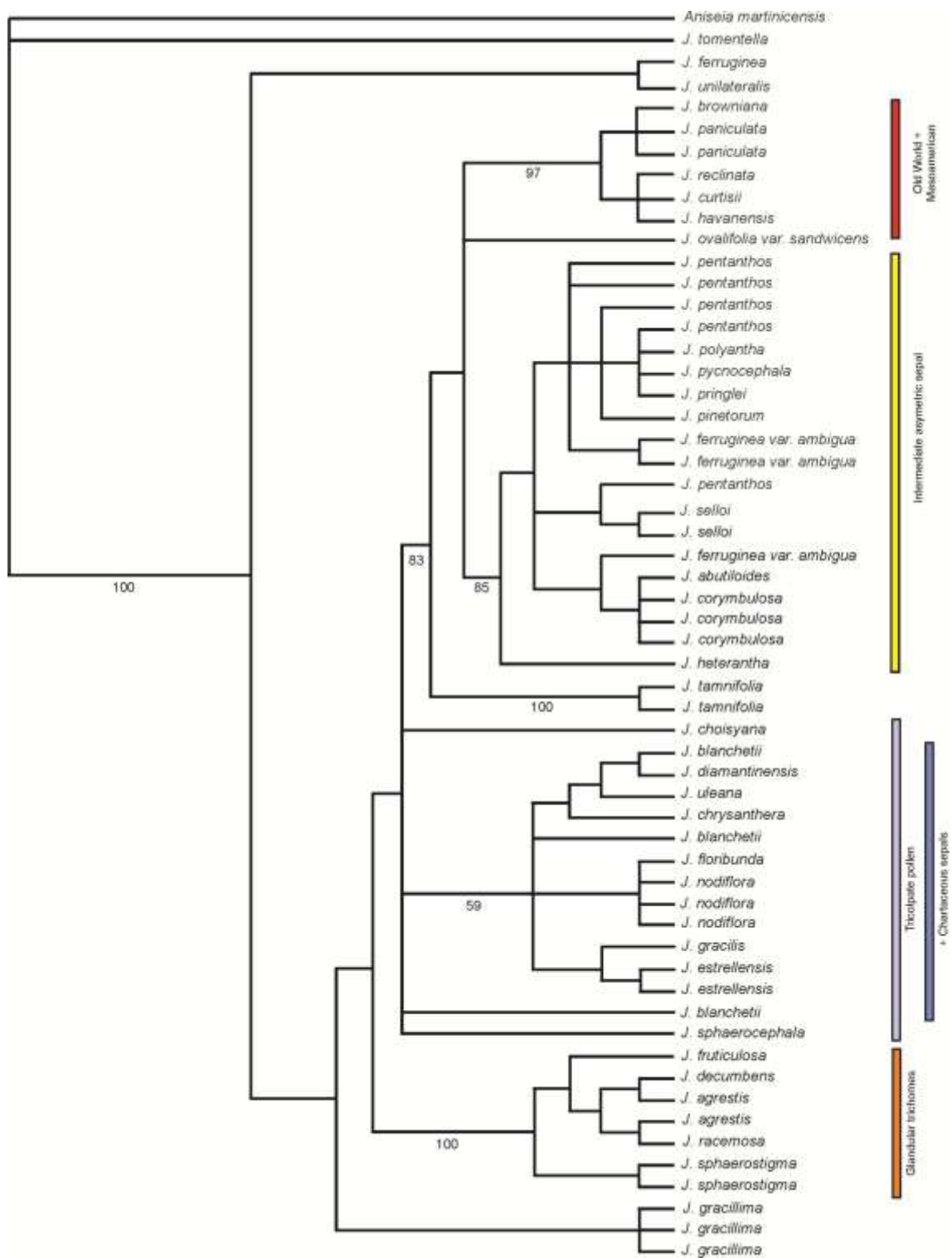


Figure 2: Consensus strict of combined analysis, including groups discussed, with bootstrap values.

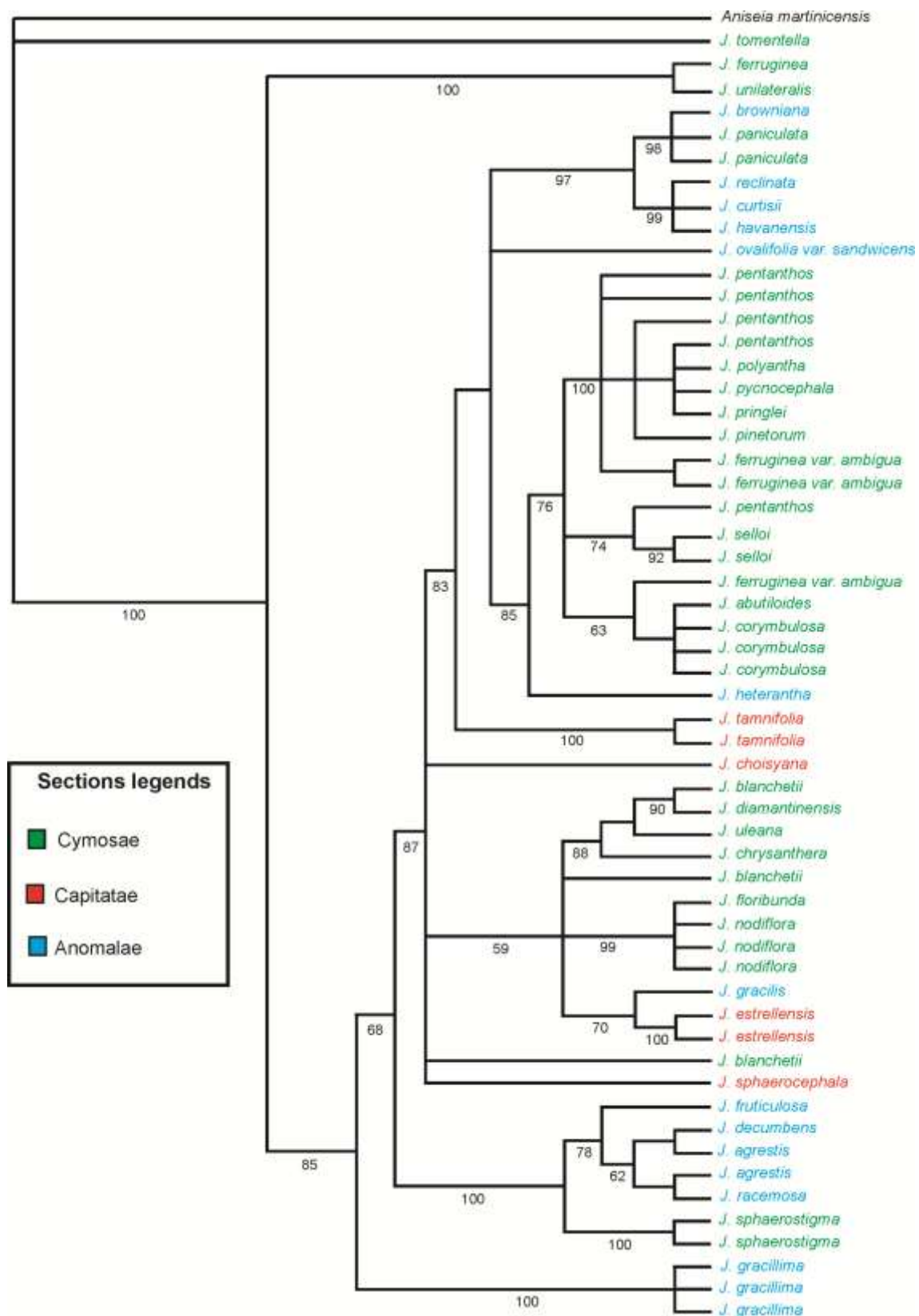


Figure 3: Consensus strict of combined analysis, including Meissner (1869) sections, with bootstrap values.

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Vouchers analyzed List

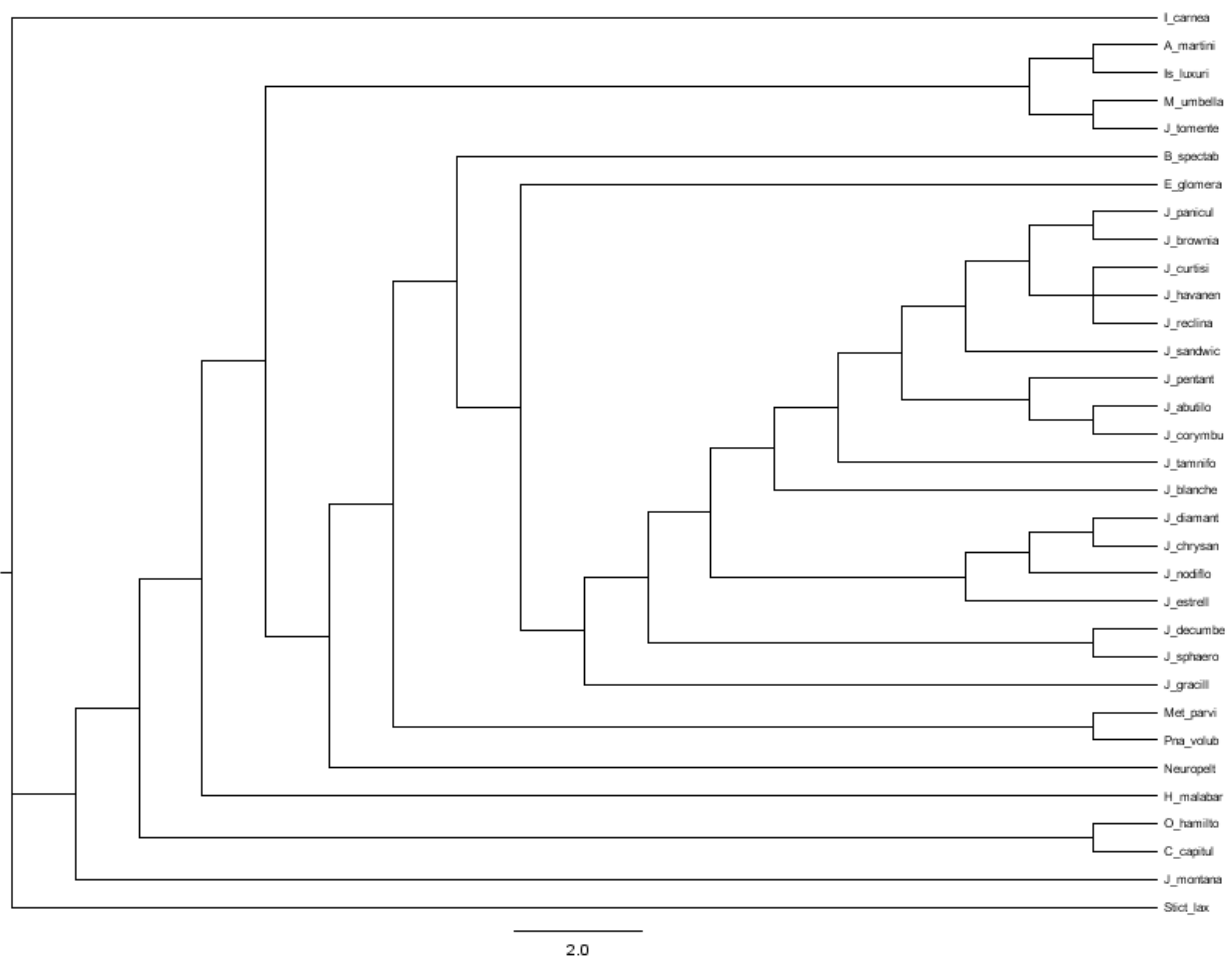
#Sample#	Coll	Species
TB 01	M.T.Buril 391	<i>J. aff blanchetii</i>
TB 02	E. Melo 6118	<i>J. heterantha</i>
TB 03	J.D. Garcia 1117	<i>J. sphaerostigma</i>
TB 04	M.T.Buril 580	<i>J. corymbulosa</i>
TB 05	A. Alves-Araujo	<i>J. gracilis</i>
TB 06	M.T. Buril 310	<i>J. montana</i>
TB 07	F.Franca 4103	<i>J. macrocalyx</i>
TB 08	M.T.Buril 242	<i>J. montana</i>

#Sample#	Coll	Species
TB 09	M.T.Buril 324	<i>J. agrestis</i>
TB 10	M.T.Buril 294	<i>J. pentantha</i>
TB 11	M.T.Buril 292	<i>J. agrestis</i>
TB 12	M.T.Buril 380	<i>J. agrestis</i>
TB 13	A. Alves-Araujo	<i>J. racemosa</i>
TB 14	M.T.Buril 383	<i>J. violacea</i>
TB 15	M.T.Buril 230	<i>J. estrellensis</i>
TB 16	M.T.Buril 246	<i>J. aff blanchetii</i>
TB 17	M.T.Buril 224	<i>J. chrysanthera</i>
TB 18	M.T.Buril 297	<i>J. pentantha</i>
TB 19	A.A.Conceicao 1293	<i>J. robertsoniana</i>
TB 20	M.T.Buril 391	<i>Evolvulus</i>
TB 21	M.T.Buril 389	<i>J. montana</i>
TB 22	M.T.Buril 357	<i>J. aff pentantha</i>
TB 23	M.T.Buril 376	<i>J. nodiflora</i>
TB 24	M.T.Buril 358	<i>J. agrestis</i>
TB 25	M.T.Buril 366	<i>J. violacea</i>
TB 26	M.T.Buril 365	<i>J. nodiflora</i>
TB 27	M.T.Buril 243	<i>J. montana</i>
TB 28	M.T.Buril 228	<i>Jacq. Sp.</i>
TB 29	M.T.Buril 389	<i>J. montana</i>
TB 30	M.T.Buril 322	<i>J. gracillima</i>
TB 31	M.T. Buril	<i>J. grandilflora</i>
TB 32	M.T. Buril 241	<i>Jacq aff blanchetii</i>
TB 33	M.T. Buril 249	<i>J. montana</i>
TB 34	M. T. Buril 350	<i>J. nodiflora</i>
TB 35	M. T. Buril 273	<i>J. abutiloides</i>
TB 36	M. T. Buril 293	<i>J. abutiloides</i>
TB 37	M.T. Buril 227	<i>J. blanchetii</i>
TB 38	M. T. Buril 344	<i>J. montana</i>
TB 39	D.R. Kunth 5814	<i>J. warmingii</i>
TB 40	H.S. irwin 31906	<i>J. heterotricha</i>
TB 41	MTB	<i>J. prostrata</i>
TB 42	K.F. Parker 8026	<i>J. pringlei</i>
TB 43	G.B. Hinton	<i>J. ciliata</i>
TB 44	MTB	<i>J. selloii</i>
TB 45	Blanchet 2090	<i>J. subsessilis</i>
TB 46	J.R. Stehrman 2405	<i>J. linarioides</i>

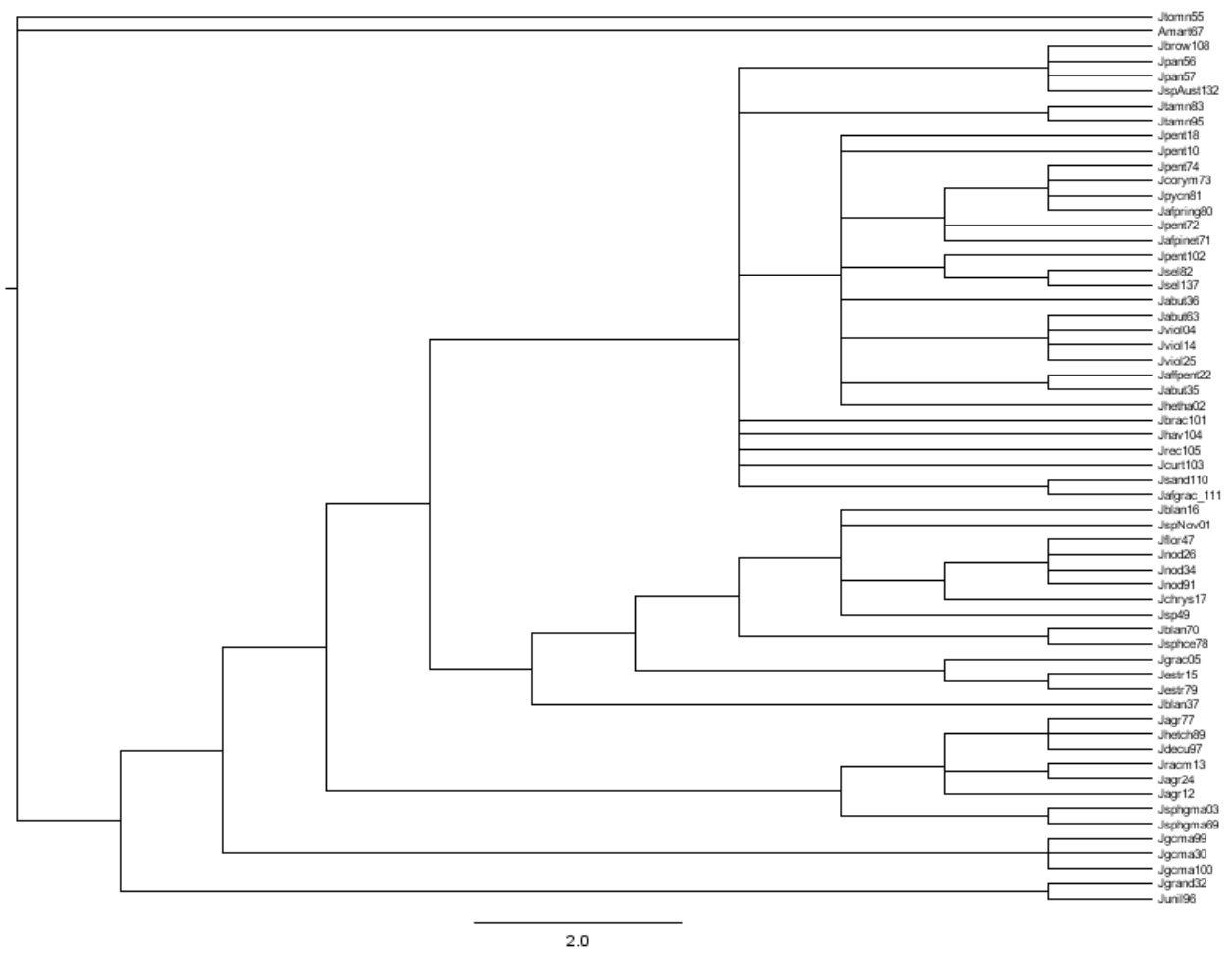
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TB 47	T. Plowman 14220	<i>J. floribunda</i>
TB 48	Hinton 13216	<i>J. polyantha</i>
TB 49	M.T. Buril 244	<i>J. sp. Nov.</i>
TB 50	A. Carter	<i>J. eastwoodiana</i>
TB 51	A. Krapovickas 45171	<i>J. fruticulosa</i>
TB 52	M.T.Buril 375	<i>E. glomeratus</i>
TB 53	M.T. Buril 271	<i>Evolvulus sp.</i>
TB 54	M.T. Buril 389	<i>J. montana</i>
TB 55	SAN 152871	<i>J. tomentella</i>
TB 56	Staples 1314	<i>J. paniculata</i>
TB 57	Simoes 25	<i>J. paniculata</i>
TB 58	Simoes 61	<i>J. violacea (CNC)</i>
TB 59	C.F. Baker	<i>J. mexicana</i>
TB 60	A. Krapovickas45051	<i>J. linoides</i>
TB 61	MTB	<i>J. aff. Ochracea</i>
TB 62	MTB	<i>J. spiciflora</i>
TB 63	A. Carter 4227	<i>J. abutilioides</i>
TB 64	Harley 20671	<i>J. velutina</i>
TB 65	K. Friebrieg 2720	<i>J. blanchetii</i>
TB 66	M.T. Buril 377	<i>E. elegans</i>
TB 67	J. Wood 24427	<i>A. martinicensis</i>
TB 68	J. Wood 17175	<i>J. pentantha</i>
TB 69	J. Wood 24430	<i>J. sphaerostigma</i>
TB 70	J. Wood 22775	<i>J. blanchetii</i>
TB 71	J. Wood 11805	<i>J. aff. Pinetorum</i>
TB 72	J. Wood 13303	<i>J. pentantha</i>
TB 73	J. Wood 10650	<i>J. corymbulosa</i>
TB 74	J. Wood 24058	<i>J. aff. Polyantha</i>
TB 75	J. Wood 27371	<i>J. gracilis</i>
TB 76	J. Wood 27149	<i>J. agrestis</i>
TB 77	J. Wood 20177	<i>J. agrestis</i>
TB 78	J. Wood 18210	<i>J. sphaerocephala</i>
TB 79	J. Wood 13362	<i>J. estrellensis</i>
TB 80	J. Wood 24596	<i>J. aff pringlei</i>
TB 81	J. Wood 26289	<i>J. pycnocephala</i>
TB 82	J. Wood 23708	<i>J. selloii</i>
TB 83	J. Wood 22886	<i>J. tamnifolia</i>
TB 84	J. Wood 23584	<i>Bonamia sp.</i>

#Sample#	Coll	Species
TB 85	Simoes 54	<i>Evolvulus pilosus</i>
TB 86	Simoes 2008 0986	<i>Bonamia spectabilis</i>
TB 87	Staples 1403	<i>Porana volubilis</i>
TB 88	Simoes CNC s.n.	<i>Metaporana parviflora</i>
TB 89	Sebsebe et al. 4373	<i>Convolvulus kilimerdschei</i>
TB 90	Sebsebe 3119	<i>Convolvulus sagittatus</i>
TB 91	M.T. Buril 376	<i>J. nodiflora</i>
TB 92	Gilbert et al. 8277	<i>C. sicundus</i>
TB 93	Gilbert & Sebsebe 8661	<i>C. volleserii</i>
TB 94	Sebsebe 2961	<i>C. stendneri</i>
TB 95	PAAFerreira 399	<i>J. tamnifolia</i>
TB 96	PAAFerreira 389	<i>J. unilateralis</i>
TB 97	PAAFerreira 368	<i>J. decumbens</i>
TB 98	PAAFerreira 312	<i>J. heterotricha</i>
TB 99	J. Wood	<i>J. gracillima</i>
TB 100	J. Wood	<i>J. gracillima</i>
TB 101	CarvalhoSobr. 3187	<i>J. bracteosa</i>
TB 102	Javier	<i>J. pentantha</i>
TB 103	Javier	<i>J. curtisii</i>
TB 104	Javier	<i>J. havanensis</i>
TB 105	Javier	<i>J. reclinata</i>
TB 106	L.P.Gomez 19425	<i>J. seemanii</i>
TB 107	L.G.Pringlei	<i>J. polyantha</i>
TB 108	H.F.M.Broculhard 863	<i>J. browniana</i>
TB 109	A.M.B.Lectae 1263	<i>J. ferruginea</i>
TB 110	Staples 1473	<i>J. sandwicens</i>
TB 111	F.Billiet & Jadin	<i>J. aff. Gracillima</i>
TB 112	J. Miers	<i>J. martii</i>
TB 113	E. Hassler 11412	<i>J. guaranitica</i>
TB 114	E. Hassler 6887	<i>J. fruticulosa</i>
TB 115	E. Hassler 5849	<i>J. turneroides</i>
TB 116	Alston-Lutz 129	<i>J. holosericea</i>
TB 117	E. Hassler 6133	<i>J. fusca</i>
TB118	repeat	<i>J. robertsoniana</i>
TB 119	repeat	<i>J. macrocalyx</i>
TB 120	repeat	<i>J. velutina</i>
TB 135	Dhite 8652	<i>J. diantha</i>
TB 136	Krapovickas 45901	<i>C. hasslerianus</i>

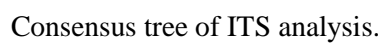
#Sample#	Coll	Species
TB 137	J. Wood 23708	<i>J. selloii</i>
TB 138	M.Alves 1	<i>J. glaucescens</i>
TB 139	M. Alves 2	<i>J. pentantha</i>
TB 140	M. Alves 3	<i>J. tamnifolia</i>
TB 141	M. Alves 4	<i>J. prostrata</i>
TB 142	466T	<i>J. aff pentantha</i>
TB 143	442T	<i>Bonamia burchelii</i>
TB 144	674T	<i>Bonamia burchelii</i>
TB 145	593T	<i>J. nodiflora</i>
TB 146	591T	<i>J. agrestis</i>
TB 147	449T	<i>J. aff nodiflora</i>
TB 148	B.Amorim	<i>Merremia macrocalyx</i>
TB 149	B.Amorim	<i>Merremia int. mata</i>
TB 150	B.Amorim	<i>Merremia umbelatta</i>
TB 151	B.Amorim	<i>M. tuberosa</i>



Unrooted tree (consensus strict) of ITS analysis including additional outgroups and reducing ingroup number of taxa.



Unrooted tree (consensus strict) of rps16, including only *Aniseia* as sister group.





CAPÍTULO 5

Capítulo 5-

Contribuições ao conhecimento de Convolvulaceae no Nordeste do Brasil

Como parte da formação, além dos objetivos propostos no projeto de tese, houve a intenção de colaborar na ampliação do conhecimento de Convolvulaceae no nordeste do Brasil. Apesar de não ser uma família com um elevado número de espécies (cerca de 300 no país), a família tem se mostrado extramente importante na diversidade florística principalmente em áreas de vegetações abertas. E devido à carência de especialistas na região nordeste, estas espécies foram, por muito tempo, negligenciadas.

Assim, aqui são apresentadas duas floras locais: uma para a mata atlântica e outra para a caatinga, além de um guia fotográfico de identificação, para as espécies frequentemente encontradas no Nordeste.

Manuscrito 1: Mata Atlântica

Flora da Usina São José, Igarassu, Pernambuco: Convolvulaceae

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Flora da Usina São José, Igarassu, Pernambuco: Convolvulaceae

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Título abreviado: **Convolvulaceae da Usina São José, PE**

RESUMO

(Flora da Usina São José, Igarassu, Pernambuco: Convolvulaceae) Convolvulaceae é uma família predominantemente tropical e compreende entre 1600 e 1700 espécies. O Brasil é um importante centro de endemismo do grupo, mas sua diversidade ainda é pouco conhecida e subestimada no país. A flora de Convolvulaceae da Usina São José, em Igarassu, Pernambuco, aqui apresentada, portanto, incrementa o conhecimento sobre a diversidade da família no Nordeste. Foram registradas doze espécies e cinco gêneros de Convolvulaceae na região: *Bonamia maripoides*, *Evolvulus nummularius*, *Ipomoea bahiensis*, *I. hederifolia*, *I. nil*, *I. philomega*, *I. quamoclit*, *I. tiliacea*, *Jacquemontia glaucescens*, *J. sphaerostigma*, *Merremia macrocalyx* e *M. umbellata*. O tratamento conta com chave de identificação, descrições, ilustrações e comentários para os táxons.

Palavras-chave: florística, liana, Mata Atlântica, taxonomia, trepadeira.

ABSTRACT

(Flora of the Usina São José, Igarassu, Pernambuco: Convolvulaceae) Convolvulaceae is a predominantly tropical family and comprises between 1600 and 1700 species. Brazil is an important center of endemism of the group, but its diversity is still poorly understood and underestimated in the country. Therefore, the flora of Convolvulaceae from the Usina São José, Igarassu, Pernambuco, presented here, increases the knowledge about the diversity of the family in the Northeast Brazil. Twelve species and five genera of Convolvulaceae is reported in the region: *Bonamia maripoides*, *Evolvulus nummularius*, *Ipomoea bahiensis*, *I. hederifolia*, *I. nil*, *I. philomega*, *I. quamoclit*, *I. tiliacea*, *Jacquemontia glaucescens*, *J. sphaerostigma*, *Merremia macrocalyx*, and *M. umbellata*. The treatment includes identification key, descriptions, illustrations, and comments for the taxa.

Key words: Atlantic rainforest, floristics, liana, taxonomy, vine.

INTRODUÇÃO

Convolvulaceae compreende entre 1600 e 1700 espécies agrupadas em 55 a 60 gêneros, e possui distribuição cosmopolita, com centro de diversidade na região tropical (Mabberley 1987; Austin 1998a). No Brasil, são reconhecidos 18 gêneros, sendo os mais representativos *Ipomoea* L., *Evolvulus* L. e *Jacquemontia* Choisy, aos quais pertence a maioria das cerca de 300 espécies registradas para o país. Ocorrem em formações vegetacionais variadas, desde a Caatinga até a Amazônia, sendo mais frequentes em ambiente de campos abertos e em bordas de mata (Simão-Bianchini & Pirani 1997; Souza & Lorenzi 2005).

São geralmente trepadeiras sem gavinhas, ervas ou subarbustos, raramente arbustos ou holoparasitas áfilas (*Cuscuta* L.), quase sempre latescentes. As folhas são alternas, na maioria simples, por vezes lobadas a compostas, sem estípulas. As flores são dialissépalas, gamopétalas, campanuladas, infundibiliformes ou hipocrateriformes, com áreas mesopétalas proeminentes, estames epipétalos, ovário súpero e fruto do tipo cápsula valvar ou indeiscente (Simão-Bianchini & Pirani 1997; Smith *et al.* 2004).

Grande parte das pesquisas aplicadas conduzidas com a família é focada na utilização e nas propriedades químicas e genéticas da *Ipomoea batatas* (L.) Lam., popularmente conhecida como batata-doce (Padda & Picha 2008). No entanto, estudos recentes vêm demonstrando o potencial de outras espécies, principalmente para a indústria farmacêutica (Cervenka *et al.* 2008; Yen *et al.* 2008).

Segundo Gentry (1991), 26 famílias de angiospermas incluem 85% de todas as trepadeiras do Novo Mundo e Convolvulaceae agrega o segundo maior número de espécies. No Brasil, as discussões sobre a importância ambiental e ecológica da família ainda são pouco enfatizadas, apesar dela ser bem representada em nossa flora (Simão-Bianchini & Pirani 2005; Simão-Bianchini 2009). Em vários inventários florísticos (*e.g.*, Udulutsch *et al.* 2004; Tibiriçá *et al.* 2006; Alves-Araújo *et al.* 2008; Durigon *et al.* 2009), a família aparece entre aquelas com o maior número de espécies, sendo destacada principalmente na diversidade de trepadeiras. Na Região Nordeste, o conhecimento sobre a diversidade de Convolvulaceae é ainda mais restrito, principalmente devido à incipiência de especialistas na Região. A Flora de

Convolvulaceae da Usina São José, em Igarassu, Pernambuco, apresentada a seguir vem portanto contribuir para o conhecimento da diversidade da família na Mata Atlântica ao Norte do rio São Francisco.

MATERIAL E MÉTODOS

A Usina São José localiza-se na Zona da Mata Norte, a 28 km de Recife, no município de Igarassu, Pernambuco (7°40'21,25"-7°55'50,92"S e 34°54'14,25"-35°05'21,08"W) (Trindade *et al.* 2008). Compreende uma área total de 280 km² e possui aproximadamente 100 fragmentos florestais; seis deles foram selecionados para este estudo.

As coletas foram realizadas entre 2007 e 2010, em fragmentos que variam de 30 a 400 ha. Foram ainda agregadas informações obtidas a partir das coleções depositadas nos herbários ASE, HST, HUEFS, HURCA, HVASF, IPA, JPB, K, M, MAC, P, PEUFR, UFRN, UFP (siglas de acordo com Thiers 2009). As amostras botânicas foram processadas de acordo com as técnicas usuais em taxonomia vegetal (Mori *et al.* 1985) e os *vouchers* depositados no Herbário UFP, com duplicatas distribuídas para o IPA e RB.

As identificações foram realizadas com auxílio de bibliografia específica (O'Donnell 1941; Robertson 1971; Austin 1975; Austin & Cavalcante 1982; Gentry 1996; Austin 1998b; Simão-Bianchini 1998; Buril 2009) e comparação com amostras previamente identificadas por especialistas, incluindo os tipos. A caracterização morfológica seguiu o proposto por Harris & Harris (2000), Stearn (2004) e Gonçalves & Lorenzi (2007) apenas para a venação e forma da corola. O presente trabalho adota a organização apresentada para as demais famílias monografadas para a Usina São José (*e.g.*, Alves-Araújo & Alves 2010).

RESULTADOS E DISCUSSÃO

Doze espécies e cinco gêneros de Convolvulaceae foram registrados na Usina São José, sendo *Ipomoea* (6 espécies) o mais representativo em número de espécies,

adicionando quatro à lista florística da área (Alves-Araújo *et al.* 2008). As espécies são, de modo geral, amplamente distribuídas na Mata Atlântica do Nordeste, e em alguns casos, a exemplo de *Ipomoea bahiensis* Willd. *ex* Roem. & Schult., são comumente encontradas em capoeiras, áreas de borda, e com influência antrópica, desde a Caatinga (Buriel 2009) até a Mata Atlântica. Em contraposição, *Bonamia maripoides* Hallier f. ocorre apenas no interior da mata, sendo incomum em áreas perturbadas.

TRATAMENTO TAXONÔMICO

Chave de Identificação para as Convolvulaceae da Usina São José

1. Lianas, látex abundante, ramos rugosos, às vezes com lenticelas verrucosas.
 2. Folhas elípticas, largamente elípticas a ovadas, base cuneada ou arredondada, face abaxial densamente serícea, venação camptódroma 1. *Bonamia maripoides*
 - 2'. Folhas ovadas, base cordada, puberulentas em ambas as faces, venação actinódroma 6. *Ipomoea philomega*
- 1'. Ervas trepadeiras, eretas ou prostradas, subarbustos eretos ou escandentes, látex geralmente escasso, ramos lisos, sem lenticelas verrucosas.
 3. Ervas prostradas, folhas inteiras, orbiculares, inflorescências unifloras axilares, gineceu com 2 estiletes 2. *Evolvulus nummularius*
 - 3'. Trepadeiras herbáceas ou subarbustos eretos a escandentes, folhas compostas ou simples, inteiras ou lobadas, ovadas quando inteiras, inflorescências multifloras, raramente unifloras, gineceu com 1 estilete.
 4. Folhas simples inteiras.

- 5'. Plantas pilosas, tricomas estrelados, frutos 8-valvares, sementes com anel de tricomas rijos na margem
Jacquemontia
6. Tricomas glandulares principalmente nos ramos jovens, sépalas lanceoladas, flores com estilete inserto
 10. *J. sphaerostigma*
- 6'. Tricomas glandulares ausentes, sépalas orbiculares a obcordadas, flores com estilete exserto 9. *J. glaucescens*
5. Plantas glabras a glabrescentes, tricomas simples, frutos 4-valvares, sementes glabras ou pilosas.
7. Tricomas na face abaxial da lâmina foliar restritos às nervuras secundárias, inflorescência em umbela, corola amarela, anteras retorcidas após a antese 12. *Merremia umbellata*
- 7'. Tricomas na face abaxial da lâmina foliar ausentes ou quando presentes nunca restritos às nervuras secundárias, inflorescência em dicásio, corola rósea ou roxa, anteras retas após a antese *Ipomoea*
8. Folhas com 7 pares de nervuras secundárias, 1 sépala externa menor (ca. 6 x 4 mm) que as demais (8 x 5 mm), nunca rostradas 8. *I. tiliacea*
- 8'. Folhas com 6 pares de nervuras secundárias, sépalas externas e internas do mesmo tamanho (ca. 7 x 4 mm), as externas rostradas
 3. *I. bahiensis*
- 4'. Folhas lobadas, pinatipartidas a palmadas.

9. Corola vermelha, hipocrateriforme, estames e estilete exsertos

Ipomoea

10. Folhas pinatipartidas, sépalas lisas..... 7. *I. quamoclit*

10'. Folhas 3-5-lobadas, nunca aparentando uma folha pinada, sépalas com um rostro subapical
4. *I. hederifolia*

9'. Corola branca, azul ou rósea, infundibuliforme, estames e estilete insertos.

11. Folhas palmadas, inflorescência dicasial, anteras retorcidas após a antese 11.
Merremia macrocalyx

11'. Folhas 3-lobadas, inflorescência uniflora axilar, anteras eretas após a antese 5.
Ipomoea nil

Bonamia Thouars, Hist. vég. îsles France: 33. 1804.

Lianas, raramente trepadeiras ou subarbustos. **Folhas** ovadas, elípticas, lanceoladas, oblongas ou lineares, glabras ou seríceas a vilosas na face abaxial. **Inflorescências** axilares, cimeiras, compostas ou simples, raramente flores isoladas, axilares. **Flores** pediceladas ou sésseis, corola azul, purpúrea ou rósea, raramente vermelha ou amarela, geralmente pubescentes na nervura mesopétala. Estames com tricomas glandulares na base dos filetes, anteras eretas. Ovário piloso a glabro, 2-carpelar, 2-locular, 2 estiletos, livres a parcialmente livres, estigmas globosos a capitados, reniforme ou raramente peltado. **Fruto** cápsula, 4-8-valvar. **Sementes** ovais a trigonais, lisas ou punctadas, glabras ou ciliadas.

1. *Bonamia maripoides* Hallier f., Bot. Jahrb. Syst. 16: 529. 1893. Figs. 1a-d

Liana, látex branco, abundante. **Ramos** maduros rugosos, seríceos, lenticelas verrucosas. **Folhas** 7,1-10,9 x 3,7-5,6 cm, cartáceas, inteiras, elípticas, largamente elípticas a ovadas, base cuneada ou arredondada, ápice agudo a acuminado, face abaxial densamente serícea, dourada, tricomas simples, raramente bífidos e assimétricos, face adaxial glabra, acinzentada; venação camptódroma, 7 pares de nervuras secundárias. Pecíolo 0,5-1,3 cm compr., seríceo. **Dicásios** 3-7-floros; pedúnculos ca. 1 cm compr., seríceos. **Cápsula** ca. 1,2 cm compr., globosa, 4-valvar, sépalas persistentes. **Sementes** trigonais ou ovais, lisas, glabras.

Material examinado: Mata da Cruzinha, 26.XI.2009, fr., *J.D. García 1339* (UFP); Mata de Piedade, 18.IX.2009, est., *J.D. García 1216* (UFP); Mata de Vespas, 12.III.2009, est., *J.D. García 976* (UFP).

Material adicional: BRASIL. PERNAMBUCO: Paulista, estrada de Aldeia-Caetés, 14.V.1985, est., *A. Chisppeta 556* (IPA). BAHIA: Uruçuca, 11.IX.1991, fr., *A.M. Carvalho 3511* (HUEFS).

Espécie sul-americana, conhecida para a Amazônia e para a Mata Atlântica. No Nordeste, há apenas registros em Pernambuco e na Bahia. Na Usina São José, é encontrada no interior dos fragmentos ou em áreas mais úmidas, próximas a riachos. Às vezes confundida com representantes de Icacinaceae (Gentry 1996), dos quais difere pelos frutos, que nesta última são drupas. Devido à forma e coloração dos tricomas das folhas, pode ser confundida com espécies de *Maripa*, gênero frequente na Amazônia (Ribeiro *et al.* 1999), mas que apresenta tricomas glandulares na face abaxial das folhas e frutos indeiscentes. As sementes são trigonais quando formadas quatro por fruto e ovais em frutos com menos de quatro sementes.

Evolvulus L., Sp. pl. (ed. 2): 391. 1762.

Ervas ou pequenos arbustos, eretos ou prostrados. **Folhas** inteiras, lineares a orbiculares. **Inflorescências** axilares, pedunculadas ou sésseis, dicasiais, às vezes reduzidas a uma flor. **Flores** com pedicelos tão longos quanto o cálice, ou pedicelo aparentemente ausente, sépalas geralmente iguais entre si, corola infundibuliforme,

hipocrateriforme ou rotácea, geralmente azul ou branca. Estames geralmente exsertos, anteras eretas. Ovário glabro, 2-carpelar, 2-locular, 2 óvulos por lóculo, 2 estiletes, livres ou parcialmente unidos, cada estigma profundamente bifido, lobos estigmáticos filiformes. **Fruto** cápsula, 4-valvar. **Sementes** lisas ou discretamente verrucosas.

2. *Evolvulus nummularius* (L.) L., Sp. pl. (ed. 2): 391. 1762. Fig. 1e

Erva prostrada, sem látex. **Ramos** puberulentos, tricomas simples e longos, raízes nos nós. **Folhas** 4-8 x 3-7 mm, membranáceas, inteiras, orbiculares, base arredondada ou discretamente cordada, ápice arredondado, glabras; venação camptódroma, 3 pares de nervuras secundárias. Pecíolo ca. 1,5 mm compr., puberulento. **Inflorescências** unifloras, axilares, pedicelo ca. 2 mm compr., puberulento, 1 par de bractéolas ca. 1,2 mm compr., lineares. **Sépalas** iguais, ca. 3 x 1 mm, oblanceoladas, ciliadas. Corola ca. 5 mm compr., rotácea, distintamente lobada, glabra, branca. Estames de mesma altura. Disco nectarífero ausente. Ovário 2-locular, 2 óvulos por lóculo. **Cápsula** ca. 3 mm compr., ovoide, pedicelo reflexo.

Material examinado: Mata de Piedade, 16.XII.2009, fl., *D. Cavalcanti* 25 (UFP).

Material adicional: BRASIL. PERNAMBUCO: São Lourenço da Mata, Tapacurá, 11.V.2004, fl. e fr., *M.S. Sobrinho* 576 (UFP).

Amplamente distribuída no Novo e no Velho Mundo, ocorrendo em áreas de clareiras e ambientes antropizados (Austin & Cavalcante 1982; Austin 1998b). Na Usina São José, ocorre ocasionalmente em áreas de borda com solo areno-argiloso.

***Ipomoea* L. Sp. pl.: 159. 1753.**

Trepadeiras ou subarbustos, raramente arbustos ou árvores. **Folhas** inteiras a compostas, glabras ou pubescentes. **Inflorescência** axial na maioria, 1-muitas flores em dicásios. **Flores** em pedicelos longos ou curtos, sépalas geralmente não acrescentes, corola infundibuliforme, campanulada ou hipocrateriforme, frequentemente rósea ou lilás, raramente amarela ou branca, nervura mesopetalina bem definida por duas veias distintas. Estames insertos ou raramente exsertos, triangulares na base, comumente de

tamanhos diferentes, anteras eretas. Ovário às vezes pubescente, 2(3)-locular, 4(-6)-ovulado, estilete 1, estigmas 2(3)-globosos. **Fruto** cápsula, 4-valvar. **Sementes** geralmente 4, glabras ou pubescentes.

3. *Ipomoea bahiensis* Willd. ex Roem. & Schult., Syst. veg. 4: 789. 1819. Figs. 1f-h

Trepadeira herbácea, látex branco, escasso. Ramos glabrescentes. Folhas 6,8-12,3 x 3,2-6,4 cm, membranáceas, inteiras, ovadas, base profundamente cordada a sagitada, ápice acuminado, glabrescentes; venação actinódroma, 6 pares de nervuras secundárias. Pecíolo 2-4,2 cm compr., às vezes com concentração de tricomas na axila. Dicásios 6-7-floros, às vezes com a flor principal truncada; pedúnculo 4,2-6 cm compr., geralmente não ultrapassando a folha subtendente, 1 par de bractéolas persistentes, 2-4 mm compr., lineares. Sépalas 2 externas ca. 7 x 4 mm, largamente elípticas, base truncada, ciliadas, 3 internas ca. 7 x 4 mm, largamente elípticas, com rostro subapical. Corola 2,5-5 cm compr., infundibuliforme, glabra, roxa. Estames heterogêneos, 2 maiores, 3 menores, com tricomas na base; estilete inserto, maior que os estames; disco nectarífero ausente; ovário globoso. Cápsulas ca. 1 cm compr., ovais, 4-valvares. Sementes densamente pilosas.

Material examinado: Mata de Macacos, 10.XII.2007, fl. fr., *P.Y. Ojima 110* (IPA, UFP); Mata de Pezinho, 25.II.2008, fr., *P.Y. Ojima 115* (IPA, UFP); Mata de Piedade, 20.IX.2009, fl., *J.D. García 1159* (UFP); 14.IX.2009, fl. e fr., *J.D. García 1088* (UFP).

Endêmica do Brasil, bastante frequente, principalmente em áreas de capoeira, campos abertos e bordas de mata (Austin & Huáman 1996), incluindo áreas de Caatinga (Buriel 2009) a matas úmidas (Simão-Bianchini 2009). Na Usina São José, apresenta grande variabilidade na forma, de cordadas a sagitadas, e no tamanho foliar. Facilmente reconhecida pelas sépalas rostradas.

4. *Ipomoea hederifolia* L., Syst. nat. (ed. 10): 925. 1759. Figs. 1i-k

Trepadeira herbácea, látex branco. Ramos glabros a glabrescentes. Folhas 5,2-14,5 x 3,9-10,5 cm, membranáceas, 3-5-lobadas, base profundamente cordada, ápice agudo a acuminado; venação actinódroma, 7 pares de nervuras secundárias. Pecíolo até 7,5 cm compr., glabro, raramente com tricomas na região do nó. Cimeiras dicasiais, com paracládios laterais monocasiais, escorpioides ou dicasiais; pedúnculo 5,3-12,4 cm compr., glabro, bractéolas lineares. Sépalas iguais, ca. 6 x 3 mm, oblongas, com um rostro subapical de ca. 3 mm compr.

Corola 3,5-4 cm compr., hipocrateriforme, vermelha, glabra. Estames exsertos, iguais; estilete exserto, pouco maior que os estames; disco nectarífero ausente; ovário cônico. Cápsula ca. 6 mm compr., globosa. Sementes densamente pubérulas.

Material examinado: Mata de Piedade, 13.IX.2007, fl. e fr., *A. Melo et al. 141* (IPA e UFP), 18.IX.2009, fl. e fr., *J.D. García 1212* (UFP).

Amplamente distribuída nas Américas tropical e subtropical, ocorrendo desde o México até o sul da Argentina, comum em áreas de capoeira e bordas de mata (Austin & Huáman 1996). No Brasil, é considerada daninha, principalmente em regiões da Mata Atlântica (Simão-Bianchini 1998), sendo raramente citada para o semi-árido. Na Usina São José, assim como *Ipomoea quamoclit*, diferencia-se das demais espécies do gênero pela corola hipocrateriforme vermelha, mas são facilmente distintas entre si pelas folhas pinatipartidas em *I. quamoclit*.

5. *Ipomoea nil* (L.) Roth., Catal. bot.: 36. 1797. Fig. 2a

Trepadeira herbácea, látex branco. Ramos hirsutos. Folhas 6,2-11 x 7-9,5 cm, membranáceas, 3-lobadas, ovadas, base profundamente cordada, ápice acuminado a caudado, face abaxial glabrescente, a adaxial puberulenta, com tricomas restritos principalmente às nervuras principais; venação actinódroma, 6 pares de nervuras secundárias. Pecíolo 1-3 cm compr., glabrescente. Inflorescências unifloras, axilares; pedúnculo 5-6,5 cm compr., hirsuto, com 1 par de bractéolas lineares, ca. 5 mm compr. Sépalas iguais, 0,8-1 cm compr., lineares, com tricomas hirsutos na base, ca. 2,5 mm compr., dourados. Corola ca. 4 cm compr., infundibuliforme, glabra, branca. Estames heterogêneos, 2 maiores, 3 menores, insertos, tricomas na base, anteras eretas após a antese; estilete inserto, maior que os estames, lobos estigmáticos oblongos; disco nectarífero ausente; ovário globoso. Cápsula ca. 1 cm compr., globosa.

Material examinado: Mata de Piedade, 28.X.2009, fl. e fr., *J.D. García 1251* (UFP).

Material adicional: BRASIL. PERNAMBUCO: Mirandiba, Serra do Tigre, 30.V.2006, fl. e fr., *K. Pinheiro 114* (UFP).

Amplamente distribuída nas Américas (Austin & Huáman 1996), ocorre em capoeiras, campos abertos e bordas de mata (Simão-Bianchini 1998). De uma forma geral, as flores desta espécie são bem marcantes pela coloração azul-celeste com a fauce do tubo alva. Contudo, esse pode ser um caráter plástico na espécie, variando do branco ao róseo. Também é considerada uma espécie invasora e daninha (Simão-Bianchini 1998).

6. *Ipomoea philomega* (Vell.) House, Ann. New York Acad. Sci. 18(6): 246. 1908. Figs. 2b-d

Liana, látex branco, abundante, lenticelas planas. **Ramos** rugosos, quando jovens glabrescentes. **Folhas** 9,5-27 x 7,5-26 cm, cartáceas, inteiras, ovadas, base cordada, ápice acuminado a cirroso, quando jovens lanulosas, as mais desenvolvidas puberulentas em ambas as faces; venação actinódroma, 8 pares de nervuras secundárias, 3 divergindo da base. Pecíolo 1,2-4,8 cm compr., puberulento. **Tirsos** 9-18-floros; pedúnculo 12-16 cm compr., bractéolas caducas. **Sépalas** 2 externas 1,8-2 x 1,5-1,6 cm, ovadas, base levemente cordada, ápice agudo, 3 internas 1-1,2 x 1-1,1 cm, orbiculares, ápice arredondado, mucronulado, côncavas. Estames subiguais, dilatados na base, puberulentos; estilete inserto, maior que os estames; disco nectarífero ausente; ovário globoso. **Cápsula** ca. 2 cm compr., globosa. **Sementes** pilosas.

Material examinado: Mata de Piedade, 24.V.2008, fl., A. Melo *et al.* 358 (IPA, UFP); 7.III.2009, est., J.D. García *et al.* 935 (UFP); 15.IX.2009, fl. e fr., J.D. García 1100 (UFP).

Há registros da espécie desde o México até a América do Sul tropical, no Brasil, Equador, Colômbia, Guianas e Venezuela (Austin & Huáman 1996). Na Usina São José, apesar de também ocorrer em áreas de borda, é frequente no interior da mata, alcançando o dossel, podendo desenvolver caule bastante robusto e lignificado. O látex branco é abundante, as folhas mais velhas podem alcançar 30 cm compr. e, nas folhas jovens, a face abaxial apresenta coloração púrpura.

7. *Ipomoea quamoclit* L., Sp. pl. 1: 159. 1753. Fig. 2e

Trepadeira herbácea, látex escasso e transparente. Ramos delgados, glabros. Folhas 2,2-4,5 x 2-4,2 cm, membranáceas, pinatipartidas, lobos lineares, agudos, gemas 0,5-2 cm compr., semelhantes às folhas, profundamente lobadas, glabras. Pecíolo 0,3-2 cm, glabro. Cimeiras monocasiais, geralmente 2-floras; pedúnculo 4-6 cm compr. Sépalas iguais, ca. 1,2 x 0,6 cm, largamente elípticas, base arredondada, ápice mucronado. Corola até 4 cm compr., hipocrateriforme, glabra, vermelha. Estames e estilete exsertos; disco nectarífero presente; ovário globoso. Cápsula ca. 6 mm compr., elíptica. Sementes com tricomas em blocos.

Material selecionado: Mata dos Macacos, 16.VIII.2007, fl. e fr., A. Alves-Araújo *et al.* 531 (IPA, UFP).

Distribuída do México a Argentina, com exceção de algumas ilhas da América Central (Austin & Huáman 1996). É amplamente cultivada como ornamental, e algumas vezes citada como ruderal. As flores, vermelhas e hipocrateriformes, são semelhantes às de *Ipomoea hederifolia*, porém suas folhas pinatipartidas a distinguem facilmente daquela espécie.

8. *Ipomoea tiliacea* (Willd.) Choisy, Prodr. 9: 375. 1845. Fig. 2f

Trepadeira herbácea, látex branco. Ramos glabros a glabrescentes. Folhas 3,5-13,3 x 2,8-11,2 cm, membranáceas, inteiras, ovadas, base cordada, ápice acuminado, glabras; venação actinódroma, 7 pares de nervuras secundárias, com 4 destas convergindo da base. Pecíolo 4,3-7,8 cm compr., glabro. Dicásios laxos, 3-7-floros; pedúnculo 7,5-11 cm compr., glabro, bractéolas ca. 2 mm compr., subuladas, caducas. Sépalas 1 externa maior ca. 6 x 4 mm, oblanceolada, 1 externa igual às internas, 3 internas ca. 8 x 5 mm, obovadas, ápice cuspidado a acuminado, glabras, paleáceas no fruto. Corola ca. 5 cm compr., infundibuliforme, glabra, rósea. Estames de tamanhos diferentes, 2 maiores e 3 menores, insertos, com tricomas na base; estilete inserto, maior que os estames; disco nectarífero ausente; ovário globoso. Cápsula ca. 8 mm compr., globosa. Sementes densamente pilosas.

Material selecionado: Engenho Campinas, 14.XI.2007, fl. fr., L.M. Nascimento & G. Batista 655 (IPA, PEUFR, UFP).

Registrada para o Brasil, Colômbia, Suriname, Guiana Francesa, Venezuela, México e países da América Central (Austin & Huáman 1996). No Brasil, é referida principalmente para a Mata Atlântica (Simão-Bianchini 1998). Na Usina São José, pode ser diferenciada das demais espécies de *Ipomoea* pela presença de uma sépala externa menor que as internas, com consistência paleácea.

Jacquemontia Choisy, Mém. Soc. Phys. Genève 6: 476. 1833.

Trepadeiras herbáceas ou lianas, ervas ou subarbustos. Folhas inteiras, geralmente cordadas, glabrescente ou densamente pubérulas, tricomas estrelados, 3-7-ramificados. Inflorescência do tipo cimeira com 3-muitas flores, brácteas ausentes ou presentes em grande quantidade. Flores sésseis ou pedunculadas, infundibuliformes, azuis ou brancas, raramente com outra cor. Estames de tamanhos diferentes, puberulentos na base, anteras eretas. Ovário glabro, 2-carpelar, 2-locular, 4-ovulado, estilete 2-lobado, lobos ovais-planos a raramente filiformes. Fruto cápsula, 8-valvar. Sementes trigonais, com anel de tricomas rijos na margem.

9. *Jacquemontia glaucescens* Choisy, Mém. Soc. Phys. Genève 8(1): 64. 1837. Figs. 3a-i

Trepadeira herbácea, látex branco. Ramos com indumento velutino, tricomas 5-(7)-armados. Folhas 5-7,3 x 2,3-4,7 cm, membranáceas, inteiras, ovadas, base arredondada, ápice agudo a obtuso, raramente mucronado, face abaxial densamente velutina, coloração glauca, tricomas 5-7-armados, face adaxial pubescente, quando secas com coloração marrom, tricomas 5-(7)-armados; venação camptódroma, 7 pares de nervuras secundárias. Pecíolo 0,6-2,3 cm compr., velutino. Cimeiras dicasiais umbeliformes, com até 12 flores; pedúnculo de tamanho variável, em ramos jovens as inflorescências podem parecer sésseis ou com pedúnculo bem curto, ca. 5 mm compr., em ramos desenvolvidos alcançam ca. 4 cm compr., bractéolas ausentes. Sépalas 3 externas ca. 4 x 3 mm, coriáceas, orbiculares, côncavas, puberulentas, 2 internas 5-6 x 4-5 mm, obcordadas, ciliadas. Corola 1,9-2,3 cm compr., infundibuliforme, glabra, azul. Estames maiores 2, menores 3, com tricomas na base; estilete exserto, lobos estigmáticos cilíndricos, mais longos que largos; disco nectarífero presente, ovário globoso. Cápsula ca. 6 mm compr., ovoide, 8-valvar. Sementes trigonais, lisas.

Material examinado: Mata de Piedade, 20.IX.2009, est., *J.D. García 1161* (UFP); 15.IX.2009, fl. e fr., *J.D. García 1104* (UFP); 15.IX.2009, fr., *J.D. García 1099* (UFP); 15.IX.2009, fl., *J.D. García 1095* (UFP); 28.VII.2007, fl., *A. Melo et al. 95* (IPA, UFP); Mata de Vespas, 12.III.2009, fr., *J.D. García 977* (UFP); Mata de Zambana, 13.III.2009, fr., *J.D. García et al. 990* (UFP).

Endêmica do Brasil, predominantemente em áreas de Mata Atlântica e nos brejos de altitude do Nordeste. Na Usina São José, é a espécie de Convolvulaceae mais comum, formando densas populações nas bordas dos fragmentos. Devido à base espessa dos caules é aqui tratada como uma liana de caule fibroso persistente. Pertence a um complexo de espécies bastante semelhantes morfológicamente e pode ser relacionada a *J. holosericea* (Weinm.) O'Donell, diferenciando-se principalmente pelas folhas discolores, pela proporção do tamanho entre as sépalas externas e as internas e pelo indumento dos ramos (O'Donell 1953).

10. *Jacquemontia sphaerostigma* (Cav.) Rusby, Bull. Torrey Bot. Club 6: 151. 1899. Figs. 4a-g

Trepadeira herbácea, látex branco, escasso. Ramos pilosos, tricomas simples ou 3-armados homogêneos ou heterogêneos com um dos braços 3 vezes mais longo do que os demais. Folhas 2,4-4,3 x 1,4-2,4 cm, membranáceas, inteiras a sinuosas, lanceoladas a ovadas,

base cordada, ápice agudo a acuminado, puberulentas, tricomas 3-armados com 1 dos braços bem mais longo; venação camptódroma, 6 pares de nervuras secundárias. Pecíolo 0,7-1,5 cm compr., glabrescente. Cimeira monocasial umbeliforme, 4-9-flora; pedúnculo 3,6-9,8 cm, com tricomas 3-armados e glandulares, brácteas ca. 4 mm compr., lanceoladas, quando secas com coloração vinácea. Sépalas iguais, ca. 7 mm compr., lanceoladas, com tricomas 3-armados homogêneos e heterogêneos, e tricomas glandulares, não acrescentes no fruto. Corola infundibuliforme, ca. 1 cm compr., glabra, azul. Estames 3 maiores e 2 menores, com tricomas curtos na base; estilete inserto, lobos estigmáticos oval-planos; disco nectarífero ausente; ovário oblongo. Cápsula 3-4 mm compr., globosa. Sementes trigonais, lisas.

Material selecionado: Mata de Piedade, 17.IX.2009, fl. e fr., *J.D. García 1117* (UFP).

Ocorre desde o sul dos Estados Unidos até o Brasil (Austin & Cavalcante 1982; Austin 1998b). No Brasil, ocorre tanto em áreas fragmentadas de Mata Atlântica quanto na Caatinga. Na Usina São José, está presente em ambientes de capoeiras, sendo mais rara que *J. glaucescens*. Pode ser confundida com *J. agrestis* (Mart. ex Choisy) Meisn. e *J. evolvuloides* Meisn., devido à presença de tricomas glandulares principalmente em ramos mais jovens das duas espécies. Contudo, a estrutura das inflorescências é bastante peculiar, geralmente cimeiras congestionadas com 3-7 flores, enquanto nas outras espécies elas são cimeiras laxas similares a racemos, geralmente 3-floras.

Merremia Dennst., Schlüssel Hortus malab.: 34. 1818.

Trepadeiras geralmente herbáceas e sem látex. Folhas inteiras, lobadas ou digitadas com 3-7 folíolos. Inflorescências axilares, unifloras ou com poucas flores, politélicas. Flores pediceladas, brancas, raramente amarelas ou róseas. Estames geralmente glabros na base, anteras retorcidas na antese. Ovário glabro, 2- ou 3-carpelar, 2- ou 3-locular, 4-6-ovulado, estilete 1, estigma 2-globoso. Fruto cápsula, 4-valvar. Sementes trigonais.

11. *Merremia macrocalyx* (Ruiz & Pav.) O'Donnell. Lilloa 6: 506. 1941. Fig. 4h

Trepadeira herbácea, látex não observado. Ramos glabros, às vezes com tricomas restritos às regiões nodais. Folhas 4-5,2 x 6,2-8,3 cm, cartáceas, palmadas, folíolos com margem inteira ou discretamente serrada, oblanceolados, base cuneada, ápice agudo, glabros. Pecíolo 1-2,3 cm compr., glabro. Cimeira dicasial laxa, 3-7-flora, às vezes com a flor principal truncada; pedúnculo 6,4-8,5 cm, brácteas e bractéolas ausentes. Sépalas subiguais, 1,7-2 x 0,7-0,8 cm, elípticas a ovadas, acrescentes no fruto, paleáceas, coloração dourada. Corola 3,4-3,8 cm

compr., infundibuliforme, glabra, alva. Estames 4 menores e 1 maior, insertos, com tricomas na base; disco nectarífero presente; ovário globoso, 4-locular, 1 óvulo por lóculo. Cápsula ca. 1 cm compr., globosa.

Material examinado: Mata de piedade, 23.XI.2009, est., *J.D. García 1304* (UFP); 19.XII.2007, fl., *A. Alves-Araújo & D. Araújo 723* (IPA, UFP,); Mata de Vespas, 12.XI.2007, fl. e fr., *P.Y. Ojima 103* (IPA, UFP).

Amplamente distribuída na América do Sul (O'Donnell 1941; Austin 1998b). No Brasil, é frequente principalmente em áreas de Mata Atlântica. Na Usina São José, é comum e facilmente reconhecida pelas folhas palmadas e, quando em frutificação, pelas cápsulas com sépalas persistentes, acrescentes e com coloração dourada.

12. *Merremia umbellata* (L.) Hallier f., Bot. Jahrb. Syst. 16(4-5): 552. 1893. Figs. 4i-j

Trepadeira herbácea, látex não observado. Ramos puberulentos. Folhas 3,7-8,8 x 1,8-6,2 cm, membranáceas, inteiras a discretamente sinuosas, ovadas, base profundamente cordada, ápice acuminado a mucronado, face abaxial com tricomas restritos à região das nervuras secundárias, face adaxial glabrescente; venação actinódroma, 6 pares de nervuras secundárias. Pecíolo 1-4,5 cm compr., tomentoso. Umbela 6-8-flora, pedicelos ca. 1,5 cm compr., glabros; pedúnculo 4,8-8,2 cm compr. Sépalas subiguais, 9-10 x 6-8 mm compr., côncavas, largamente elípticas, base arredondada, ápice obtuso, glabras. Corola ca. 3 cm compr., infundibuliforme, tubo muito estreito na base, glabra, tricomas às vezes restritos ao ápice das plicas, amarela. Estames ca. 4 mm compr., insertos, com tricomas na base; disco nectarífero presente; ovário 2-locular, 2 óvulos por lóculo. Cápsula ca. 1,5 cm compr., globosa.

Material examinado: Mata de Piedade, 17.IX.2009, fl., *J.D. García 1121* (UFP); Mata de Zambana, 19.X.2007, fl. fr., *A. Alves-Araújo et al. 665* (IPA, UFP).

Pantropical (Austin 1998b), bastante cultivada como ornamental. Na Usina São José, ocorre principalmente nas bordas dos fragmentos, e pode ser facilmente reconhecida quando em estágio florífero, pela coloração amarela intensa da corola.

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Lista de Exsicatas

Alves-Araújo, A. 531 (8); 665 (12); 723 (11); **Carvalho, A.M.** 3511 (1); **Cavalcanti, D.** 25 (2); **Chisppeta, A.** 556 (1); **García, J.D.** 935 (7); 976 (1); 977 (9); 990 (9); 1088 (3); 1095 (9); 1099 (9); 1100 (6); 1104 (9); 1117 (10); 1121 (12); 1159 (3); 1161 (9); 1212 (4); 1216 (1); 1251 (6); 1304 (11); 1339 (1); **Melo, M.** 95 (9); 141 (4); 358 (7); **Nascimento, L.M.** 655 (5); **Ojima, P.Y.** 103 (11); 110 (3); 115 (3); **Pinheiro, K.** 114 (6); **Sobrinho, M.S.** 576 (2).

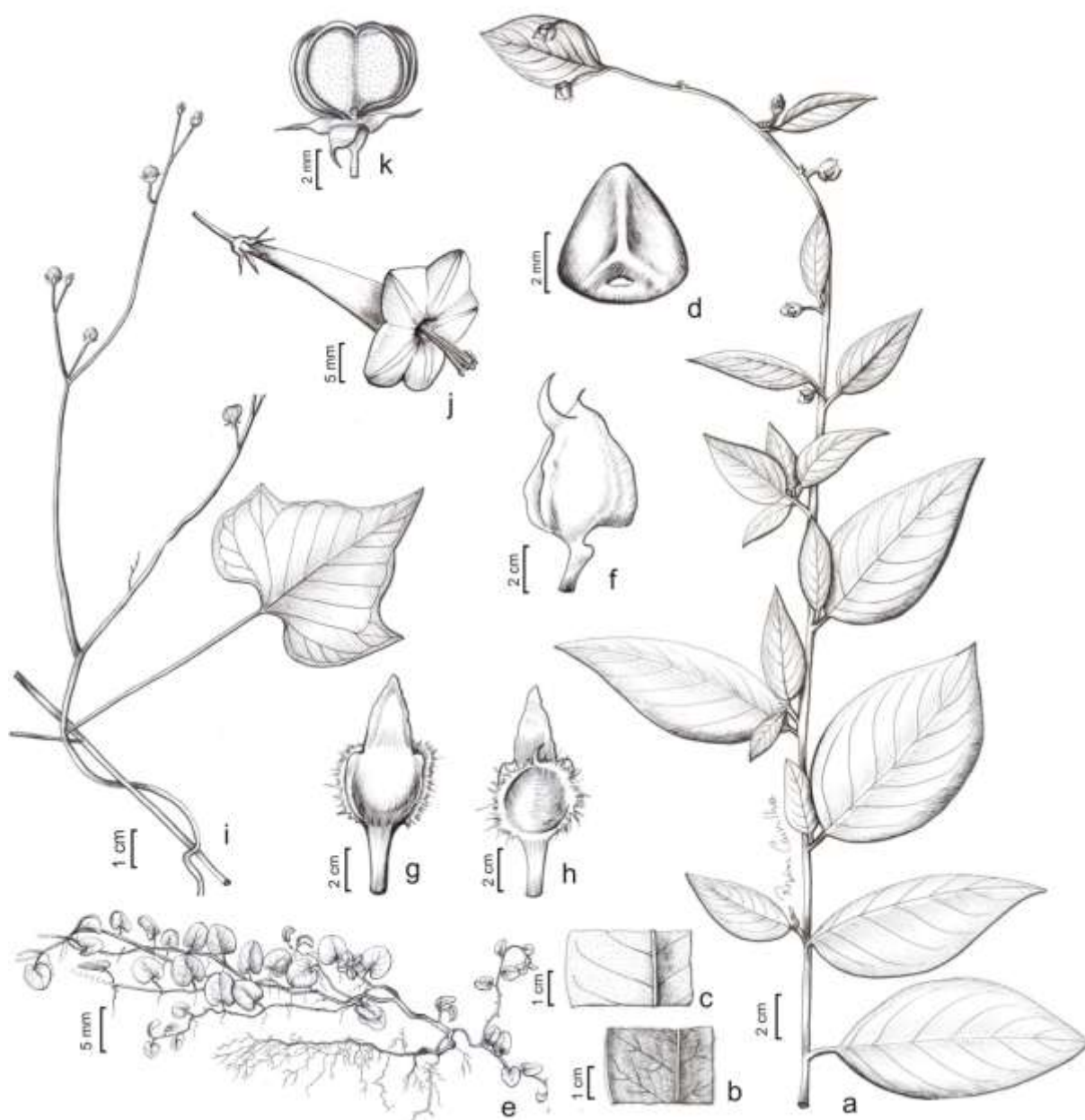


Figura 1 – a-d. *Bonamia maripoides* (García 1339): a. ramo florífero; b. detalhe da face abaxial da folha; c. detalhe da face adaxial da folha; d. semente, vista frontal. e. *Evolvulus nummularius* (Cavalcanti 25): hábito. f-h. *Ipomoea bahiensis* <http://www.tropicos.org/Name/8500299>(García 1159): f. sépala externa; g. sépala interna, vista dorsal; h. sépala interna, vista frontal. i-k. *I. hederifolia* (Melo et al. 141): i. ramo florífero; j. flor, vista lateral; k. fruto com septos persistentes, vista lateral.

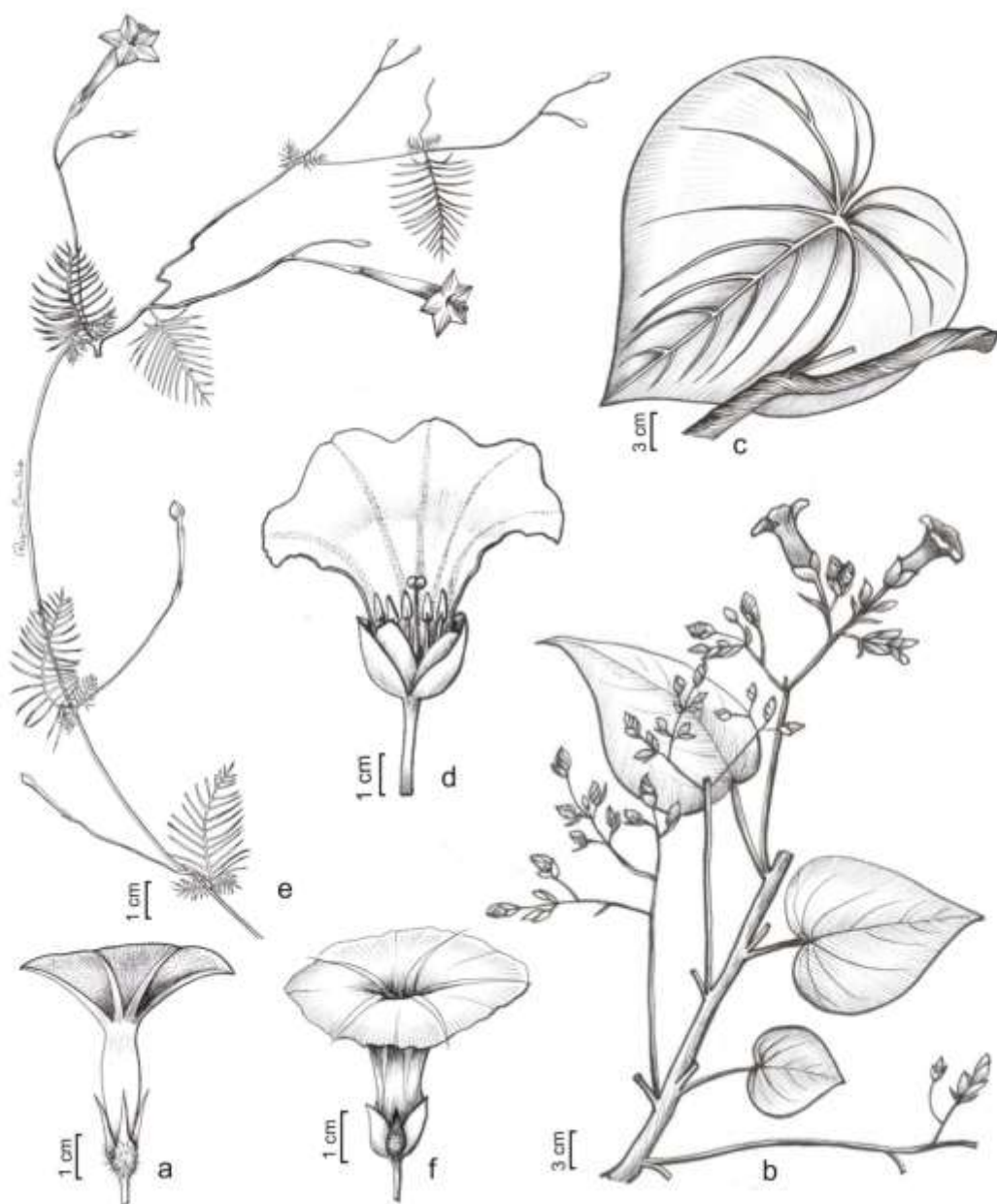


Figura 2 – a. *Ipomoea nil* (García 1251): flor, vista lateral. b-d. *I. philomega* (García 1100): b. ramo florífero; c. detalhe da folha; d. flor sem parte da corola. e. *I. quamoclit* (Alves-Araújo 531): ramo florífero. f. *Ipomoea tiliacea* (Nascimento 655): flor, vista lateral.

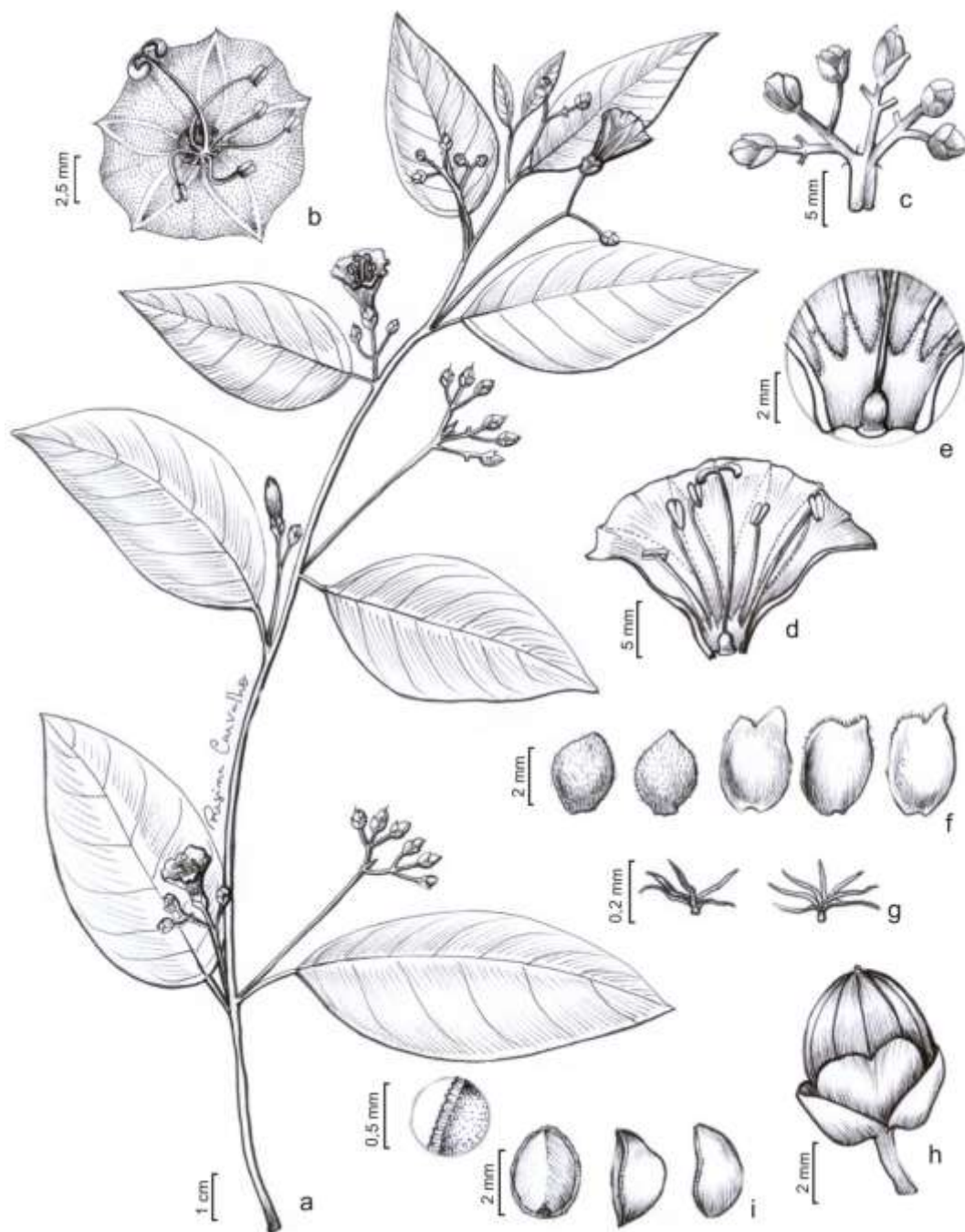


Figura 3 – *Jacquemontia glaucescens* (García 1104): a. ramo florífero; b flor, vista frontal. c. inflorescência; d. corte longitudinal da flor; e. detalhe do ovário e a base dos filetes; f. sépalas externas (2) à esquerda, as internas (3) à direita; g. tricomas; h. fruto; i. semente, da esquerda para direita, detalhe dos tricomas na margem, face ventral e vista laterais.

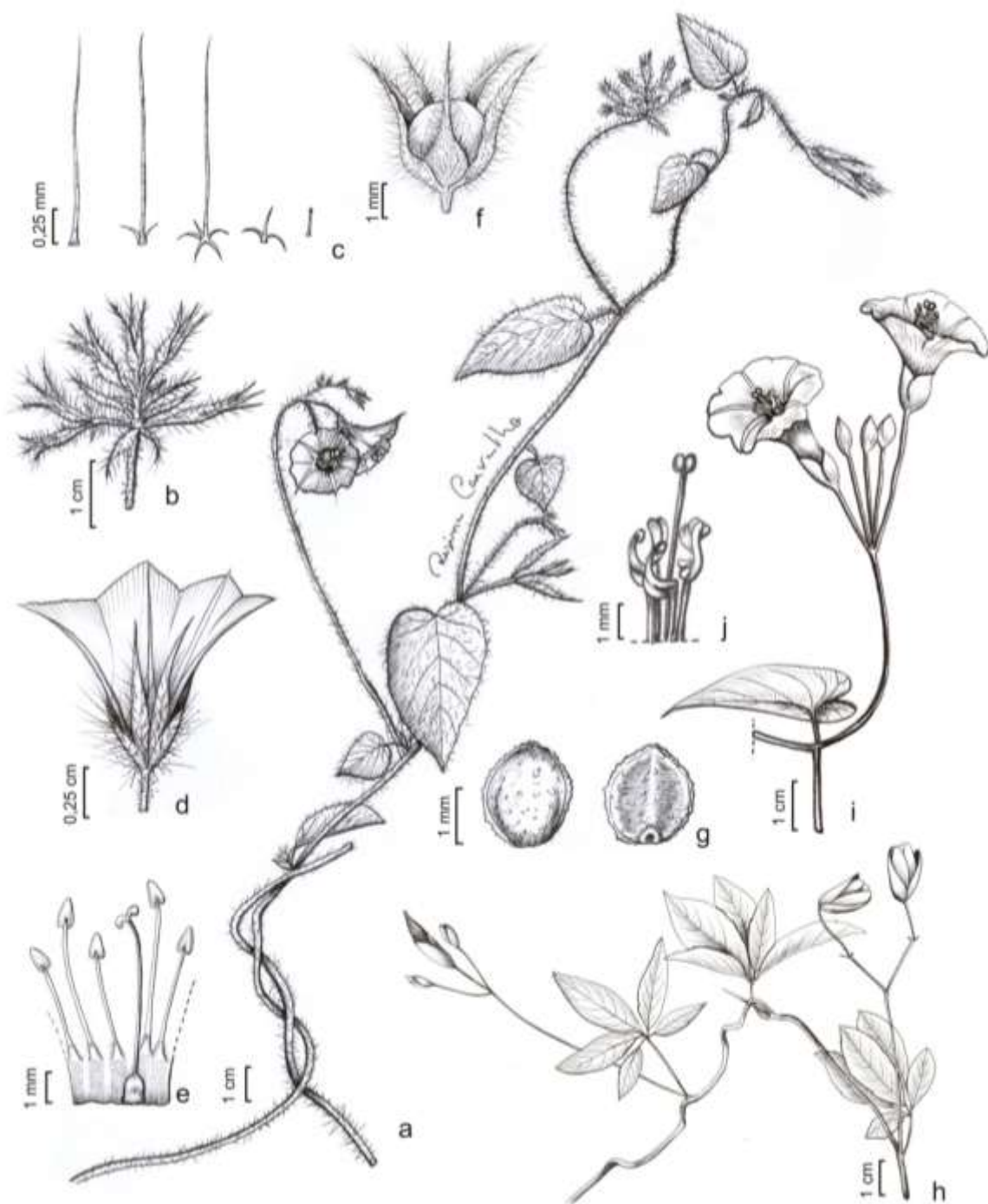


Figura 4 – a-g. *Jacquemontia sphaerostigma* (García 1117): a. ramo florífero; b. inflorescência; c. tricomas, da esquerda para direita, simples, 3-ramificado com 1 braço bem mais longo, 3-ramificado com todos os braços iguais, glandular ; d. flor; e. androceu e gineceu; f. fruto; g. semente, face dorsal à esquerda, face ventral à direita. h. *Merremia macrocalyx* (Ojima 103): ramo florífero. i-j. *M. umbellata* (Alves-Araújo 665): i. ramo florífero; j. detalhe das anteras e lobos estigmáticos.

Convolvulaceae da região do Cariri Paraibano, PB, Brasil

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SUBMETIDO AO PERIÓDICO REVISTA NORDESTINA DE BIOLOGIA

CONVOLVULACEAE DA REGIÃO DO CARIRI PARAIBANO, PB, BRASIL

RESUMO

Convolvulaceae da região do Cariri Paraibano, PB, Brasil. O Cariri Paraibano, composto por 29 municípios, é marcante por apresentar as mais baixas médias pluviométricas do Semiárido brasileiro. Foram reconhecidas 24 espécies em seis gêneros, sendo *Ipomoea* o gênero com maior número de espécies. Destacam-se *I. brasiliiana* e *I. marcellia*, endêmicas da caatinga e *I. rosea*, endêmica do Nordeste.

Palavras-chave: Convolvulaceae, Caatinga, *Ipomoea*, Trepadeira

ABSTRACT

Convolvulaceae from Cariri region, PB, Brazil. The Cariri Paraibano is a micro-region composed of 29 municipalities and is remarkable for presenting the lowest average rainfall of the semi-arid region. This study recognizes 24 species and six genera, with *Ipomoea* comprising the highest number of species. Stands out *I. brasiliiana* and *I. marcellia*, endemic to the caatinga and *I. rosea*, endemic to the Northeast.

Key words: Convolvulaceae, Caatinga, *Ipomoea*, Vine

INTRODUÇÃO

Convolvulaceae é uma família cosmopolita, com cerca de 1.700 espécies e centro de diversidade nos Neotrópicos (MABBERLEY, 1987; AUSTIN, 1998a). No Brasil, são reconhecidas aproximadamente 300 espécies que ocorrem desde formações vegetacionais mais abertas como o cerrado e a caatinga, até as mais densas como a floresta atlântica e amazônica, nessas ocorrendo principalmente em áreas de borda (BIANCHINI e FERREIRA, 2012). Entretanto, o maior número de espécies e de endemismos é referido para as áreas com fitofisionomias de savana (SOUZA e LORENZI, 2005; SIMÃO-BIANCHINI e PIRANI, 2005).

Embora seja considerada uma das famílias mais ricas na composição da flora da caatinga (SAMPAIO *et al.*, 2002), os estudos sobre a diversidade de Convolvulaceae no bioma são recentes e ainda incipientes (BURIL, 2009; JUNQUEIRA e SIMÃO-BIANCHINI, 2008). Todavia, a importância de Convolvulaceae na caatinga está além de sua representatividade em número de espécies. REIS *et al.* (2006) sugerem que esta é importante fonte de recursos para a fauna típica desse ambiente.

A espécie popularmente mais conhecida é a *Ipomoea batatas* (L.) Lam. (batata-doce), pelo uso alimentício de suas raízes. Outras espécies, a exemplo de *Ipomoea subincana* Meisn., endêmica do Semiárido brasileiro, e *Operculina alata* Urb. (batata-de-purga), demonstram potencial farmacológico (MEIRA *et al.*, 2008; MICHELIN e SALGADO, 2004).

MATERIAL E MÉTODOS

A microrregião do Cariri Paraibano, composta por 29 municípios, está localizada no centro-sul do Estado da Paraíba (vide mapa em NASCIMENTO e ALVES, 2008), na mesorregião da Borborema. Compreende 11.192,01 Km² de área, que equivalem a 20% do estado. Situada na “diagonal seca”, as médias pluviométricas do Cariri são as mais baixas de todo o Semiárido brasileiro, variando de 400-600 mm por ano (SOUZA, 2008), com registros de cerca de 250 mm ao ano para o município de Cabaceiras (FIGUEIREDO-GOMES, 1981). A temperatura média anual é 26°C, com médias mínimas inferiores a 20°C, e a umidade relativa do ar inferior a 75%. (BARBOSA *et al.*, 2007).

O solo é raso e pedregoso com vegetação de porte baixo e pouco diversa (SAMPAIO *et al.*, 1981). A degradação dos solos e da cobertura vegetal estão associadas aos processos de desertificação na área (SILVA, 1993). Em virtude disso, a paisagem atual está bastante modificada, com poucos remanescentes de vegetação em bom estado de conservação (BARBOSA *et al.*, 2007).

A elaboração desta flora foi baseada no acervo do herbário Lauro Pires Xavier (JPB), bem como nas amostras coletadas pelos autores na região de estudo, no período de 2009 a 2011. As amostras botânicas foram submetidas às técnicas usuais de herborização (MORI *et al.*, 1985) e depositadas no herbário JPB ou UFP. As identificações foram realizadas com auxílio de bibliografia especializada (OOSTSTROOM, 1934; O'DONELL, 1941; MEISSNER, 1969; ROBERTSON, 1971; AUSTIN, 1975; AUSTIN E CAVALCANTE, 1982; AUSTIN, 1998B; SIMÃO-BIANCHINI e PIRANI, 1997; SIMÃO-BIANCHINI, 1998; JUNQUEIRA e SIMÃO-BIANCHINI, 2008; BURIL, 2009) e de consulta aos acervos dos herbários ASE, HST, HUEFS, HURCA, HVASF, IPA, JPB, K, M, MAC, NY, P, PEUFR, UFRN, UFP (siglas de acordo com THIERS, 2009). A nomenclatura morfológica segue HARRIS e HARRIS (2000) e STEARN (2004).

RESULTADOS E DISCUSSÃO

Convolvulaceae foi apontada por BARBOSA *et al.* (2007) como a quinta família mais diversa no Cariri Paraibano, com 16 espécies. Neste trabalho foram identificadas 24 espécies em seis gêneros, um incremento de oito espécies, sendo *Ipomoea* L. o mais representativo com 11 espécies. As espécies são, num geral, de ampla distribuição, mas destacam-se *Ipomoea brasiliana* Meisn. e *Ipomoea marcellia* Meisn., endêmicas da caatinga e *Ipomoea rosea* Choisy, endêmica do Nordeste (BIANCHINI e FERREIRA, 2012).

TRATAMENTO TAXONÔMICO

Chave para identificação das espécies de Convolvulaceae presentes no Cariri Paraibano

1. Folhas partidas

2. Pedúnculo alado, corola pubescente..... **Operculina macrocarpa**

2'. Pedúnculo cilíndrico, corola glabra, raro pubescente

3. Cálice hirsuto, anteras retorcidas..... **Merremia aegyptia**

3'. Cálice glabro ou glabrescente, anteras retas

4. Cimeira 1-flora, corola amarela com fauce vinácea, ápice das sépalas apiculado..... **Ipomoea longeramosa**

4'. Cimeira 7-flora, corola rosa, ápice das sépalas com rostro subapical..... **Ipomoea rosea**

1'. Folhas inteiras a 3-lobadas

5. Plantas arbustivas ou subarbustivas, ervas eretas, prostradas ou decumbentes

6. Lobos estigmáticos globosos

7. Arbusto ereto > 1 m, folhas ovadas a lanceoladas, látex presente
..... **Ipomoea carnea**

7'. Erva prostrada, Folhas reniformes a deltóides, látex ausente..... **Ipomoea asarifolia**

6'. Lobos estigmáticos filifomes a cilíndricos

8. Plantas pubescentes, tricomas estrelados 3-4-armados; estilete 1, 2 lobos estigmáticos cilíndricos; cápsulas 8-valvares..... **Jacquemontia gracillima**

8'. Plantas glabras ou pubescentes, tricomas simples; estile 2, livres ou unidos na base, cada um com 2 lobos estigmáticos filiformes; cápsulas 4-valvares

9. Subarbustos prostrados ou decumbentes

10. Ramos seríceos, inflorescências glomeruliformes, terminais..... **Evolvulus glomeratus**

10'. Ramos lanulosos, inflorescências monocásios 1-2-flora axilares..... **Evolvulus frankenioides**

9' Arbustos ou subarbustos eretos

11. Ramos hirsutos, folhas ovais a largo-elípticas, pedicelo reflexo..... **Evolvulus ovatus**

11'. Ramos glabrescentes ou seríceos, folhas lineares a estreito-elípticas, pedicelo reto

12. Corola ca. 3 mm compr. **Evolvulus filipes**

12'. Corola ca. 6 mm compr. **Evolvulus linarioides**

5'. Plantas trepadeiras herbáceas ou lenhosas

13. Estames exsertos

14. Ramos tomentosos, folhas inteiras, flores brancas..... **Ipomoea marcellia**

14'. Ramos glabros ou glabrescentes, folhas 3-5-lobadas, flores vermelhas..... **Ipomoea hederifolia**

13'. Estames insertos

15. Plantas glabrescentes ou pubescentes, com tricomas simples, lobos estigmáticos globosos

16. Ramos aculeados..... **Ipomoea parasitica**

16'. Ramos sem acúleos

17. Sépalas com rostro subapical..... **Ipomoea bahiensis**
- 17'. Sépalas sem rostro
18. Frutos indeiscentes..... **Turbina cordata**
- 18'. Frutos deiscentes
19. Sépalas hirsutas, ápice longo-acuminado
..... **Ipomoea nil**
- 19'. Sépalas glabrescentes ou glabras, ápice acuminado a arredondado
20. Folhas glabrescente, sépalas com ápice acuminado..... **Ipomoea triloba**
- 20'. Folhas densamente vilosas na face abaxial, sépalas com ápice arredondado
Ipomoea brasiliana
- 15'. Plantas pubescentes a glabrescentes, com tricomas estrelados, lobos estigmáticos oval-planos ou cilíndricos
21. Ramos com tricomas glandulares, inflorescência racemiforme 1-4-flora, sepals lanceoladas iguais..... **Jacquemontia agrestis**
- 21'. Ramos sem tricomas glandulares, inflorescências em cimeiras dicasiais, sépalas ovadas, lanceoladas desiguais ou orbiculares
22. Sépalas orbiculares, lobos estigmáticos cilíndricos..... **Jacquemontia nodiflora**
- 22'. Sépalas rombóides, oboelípticas ou lanceoladas, lobos estigmáticos oval-planos
23. Bractéolas lanceoladas ou oblanceoladas, sépalas rombóides a oboelípticas Jacquemontia pentanthos

23'. Bractéolas lineares, sépalas oboelípticas a lanceoladas

..... Jacquemontia corymbulosa

Evolvulus L., Sp. pl. (ed. 2): 391. 1762.

Ervas ou subarbustos, eretos ou prostrados; látex geralmente ausente. Folhas inteiras, lineares a orbiculares. Inflorescências axilares, pedunculadas ou sésseis. Corola geralmente hipocrateriforme ou rotácea, azul ou branca. Estames geralmente exsertos, glabros, anteras eretas. Ovário glabro, 2-carpelar, 2-locular, 2 óvulos por lóculo, 2 estiletos, livres ou parcialmente unidos, cada estigma profundamente bifido, lobos estigmáticos filiformes. Fruto cápsula, 4-valvar. Sementes lisas ou discretamente verrucosas.

1. *Evolvulus filipes* Mart., Flora 24 (2, Beibl.):100. 1841. Fig. 1 a.

Subarbusto ereto. **Ramos** delgados, glabrescentes. **Folhas** 0,8-1,5 x 0,3-0,6 cm, membranáceas, inteiras, estreito-elípticas, base arredondada, ápice arredondado a agudo, glabrescentes; venação hifódroma; sésseis. **Inflorescências** 1-2-flora, axilares, pedúnculo ca. 1 cm compr., bractéolas ausentes. **Sépalas** iguais, ca. 3 x 1 mm, base arredondada, ápice agudo. Corola ca. 3 mm compr., hipocrateriforme, lobada, glabra, azul claro ou branca. **Cápsula** globosa, ca. 1 mm compr.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, 11/V/2007, fl., *I. B. Lima* 648 (JPB); RPPN Fazenda Almas, 11/V/2007, fr., *I.B.Lima* 669 (JPB).

Encontrada desde a América Central até o Paraguai, no Brasil é amplamente distribuída (BIANCHINI e FERREIRA, 2012). No Cariri paraibano é uma espécie comum e com muitos indivíduos por população. Distingue-se de *E. linarioides* Meisn. pela corola com ca. de 3 mm comprimento.

2. *Evolvulus frankenioides* Moric., Pl. Nouv. Amer.49, t. 33. 1838. Fig. 1 b.

Subarbusto prostrado. **Ramos** lanulosos, tricomas simples, ca. 3 mm compr. **Folhas** 1-1,8 x 0,6-1,2 cm, cartáceas, inteiras, ovais a orbiculares, base arredondada ou discretamente cordada, ápice agudo a arredondado, lanulosas; venação camptódroma; sésseis. **Inflorescências** monocásios, 1-2-flora, axilares, sésseis, 1 par de bractéolas ca. 5 mm compr., lineares a elípticas. **Sépalas** desiguais, ca. 5 x 1 mm, uma interna menor, ca. 4 x 1 mm, lanceoladas, base arredondada, ápice agudo, lanulosas. Corola ca. 6 mm compr., hipocrateriforme, discretamente lobada, glabra, azul com nervuras mesopétalas brancas. **Cápsula** ovóide, ca. 2 mm compr., pedicelo reflexo.

Material examinado: **São José dos Cordeiros**, RPPN Fazenda Almas, Comadre Florzinha, 04/IV/2009, fl. fr., *M. T. Buril et al. 290* (UFP); **Serra Branca**, Pedra de Serra Branca, 22/II/2002, fl., *M. R. Barbosa 2239* (JPB).

É referida para Bolívia, Venezuela e Brasil, onde ocorre principalmente em áreas de caatinga e de cerrado (BURIL, 2009; BIANCHINI e FERREIRA, 2012). No Cariri paraibano pode ser facilmente reconhecida pelo hábito prostrado e flores axilares.

3. *Evolvulus glomeratus* Nees & Mart., Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur.11(1): 81. 1823. Fig. 1 c.

Subarbusto ereto a prostrado. **Ramos** seríceos, tricomas simples; gemas laterais desenvolvidas. **Folhas** 0,8-1,7 x 0,3-0,4 cm, cartáceas, inteiras, elípticas, oblongas ou lanceoladas, base arredondada a cuneada, ápice agudo, seríceas; venação camptódroma; pecíolo ca. 1 mm compr. **Inflorescências** glomeruliformes, terminais, bractéolas 5-7 x 1,5-2,5 mm, elípticas a oblanceoladas. **Sépalas** iguais, ca. 4 x 1 mm, lanceoladas, base arredondada, ápice agudo, seríceas. Corola ca. 1 cm compr., hipocrateriforme, lobada, glabra, azul, brancas na base do tubo. Estames glabros, anteras oblongas, base sagitada. **Cápsula** ovóide, ca. 2 mm compr.

Material examinado: **Cabaceiras**, Sítio Bravo, 31/III/1992, fl., *V.L. Nascimento 83* (JPB); Sítio Bravo, 18/II/1992, *V. L. Nascimento 29* (JPB); **Gurjão**, 10/V/2006, fl., *P.C. Gadelha Neto 1529* (JPB); **São João do Cariri**, Estação Experimental, 19/V/1994 fl. *C.M.L. Aguiar 83* (JPB); Estação Experimental, 19/V/1994 fl. *C.M.L. Aguiar 84* (JPB).

Ocorre desde a Venezuela a Argentina, e no Brasil é amplamente distribuída (JUNQUEIRA e SIMÃO-BIANCHINI, 2008; BIANCHINI e FERREIRA, 2012). É

uma das espécies mais coletadas no Cariri Paraibano, e distingue-se de todas as outras do gênero por apresentar inflorescências glomeruliformes.

4. *Evolvulus linarioides* Meisn. in Mart., Fl. Bras. 7: 343. 1869. Fig. 1 d.

Subarbusto ereto. **Ramos** seríceos, tricomas simples, esparsos. **Folhas** 0,4-1,5 x 0,1-0,15 cm, membranáceas, inteiras, lineares a estreito elípticas, base oblíqua, ápice agudo a arredondado, concolores, face adaxial rugosa, glabrescente, abaxial serícea; venação hifódroma; pecíolo ca. 0,5 mm compr. **Inflorescências** 1-2-flora, axilares, pedúnculo 0,5-1,5 cm, 1 par de bractéolas ca. 2 mm compr., lineares a elípticas. **Sépalas** iguais, ca. 2,5 x 1 mm, lanceoladas, base arredondada, ápice agudo, glabrescentes. Corola ca. 6 mm compr., hipocrateriforme, discretamente lobada, glabra, azul com o centro branco. Estames com apêndices laterais arredondados. Lobos estigmáticos filiformes subclavados. **Cápsula** ovóide, ca. 2 mm compr.

Material examinado: **Cabaceiras**, lajedo de Pai Mateus, 22/IX/2007, fl., C.E.L. Lourenço 283 (JPB); Sítio Bravo, 31/III/1992, fl., V.L. Nascimento 64 (JPB); **Serra Branca**, rio da Pedra Branca, 22/II/2002, fl., fr., M.R.Barbosa 2244 (JPB); Sítio Tamboril, 21/V/2002, fl., M. F. Agra 5945 (JPB); rio da Pedra Branca, 15/III/2007, fl., M.F.Agra 6779 (JPB).

Ocorre no Paraguai e Brasil, sendo neste anteriormente citado apenas para os estados de Pernambuco, Bahia, Minas Gerais e Paraná (BURIL, 2009; BIANCHINI e FERREIRA, 2012). Pode ser confundida com *Evolvulus elegans* Moric., que não ocorre no Cariri, pelo hábito, forma das folhas e inflorescência, mas difere pelas folhas concolores e corola discretamente lobada (JUNQUEIRA e SIMÃO-BIANCHINI, 2008).

5. *Evolvulus ovatus* Fernald., Proc. Amer. Acad. Arts 33(5): 89. 1987. Fig. 1 e.

Subarbusto ereto. **Ramos** hirsutos, tricomas simples e longos, ca. 2 mm compr., dourados quando secas. **Folhas** 1-3 x 0,5-1,5 cm, membranáceas, inteiras, ciliadas, ovais a largo-elípticas, base atenuada, ápice agudo, hirsutas; venação camptódroma; pecíolo ca. 1 mm compr. **Inflorescências** 1-flora, axilares, sésseis, pedicelo ca. 1 mm compr., reflexo, bractéolas ausentes. **Sépalas** iguais, ca. 4 x 0,5 mm, lineares, hirsutas.

Corola ca. 5 mm compr., hipocrateriforme, discretamente lobada, glabra, azul. **Cápsula** globosa, ca. 2 mm compr.

Material examinado: Cabaceiras, 29/VI/1994, fl., *M.F. Agra 3104* (JPB); **São João do Cariri**, Estação Experimental, 01/VI/1994, fr. *C. M. L. Aguiar 106* (JPB); Estação Experimental, 19/V/1994, fl., *C. M. L. Aguiar 95* (JPB).

Distribui-se de Honduras ao Brasil, onde é referido para a amazônia, caatinga e cerrado (BIANCHINI e FERREIRA, 2012). No Cariri Paraibano é comum e pode ser reconhecida pelo indumento hirsuto com tricomas longos, e pela forma e dimensão das folhas.

Ipomoea L. Sp. pl.: 159. 1753.

Trepadeiras ou subarbustos, raramente arbustos ou árvores, ramos cilíndricos. Folhas inteiras a compostas, glabras ou pubescentes, tricomas na maioria simples. Inflorescência geralmente axial, 1-muitas flores em dicásios. Corola infundibuliforme, campanulada ou hipocrateriforme, frequentemente rósea ou lilás, raramente amarela ou branca. Estames insertos ou raramente exsertos, anteras eretas. Ovário às vezes pubescente, 2(3)-locular, 4(-6)-ovulado, estilete 1, lobos estigmáticos 2(3)-globosos. Fruto cápsula, 4-valvar. Sementes geralmente 4, glabras ou pubescentes.

6. *Ipomoea asarifolia* (Desr.) Roem. & Schult., Syst. Veg. 4: 251. 1819.

Erva prostrada, látex ausente. Ramos glabros. Folhas 3-6,5 x 5-7,8 cm, coriáceas, inteiras, reniformes a deltóides, base cordada a truncada, ápice arredondado, glabras; venação actinódroma; pecíolo 1,7-5,5 cm compr. Cimeira monocasial até 7-flora; pedúnculo 4-8,5 cm, bractéolas 1x0,7 mm, ovadas. Sépalas externas 2, ca. 0,5-0,7 x 0,4 cm, oblongas, base truncada, ápice arredondado com múcron, glabras, internas 3, 1,4-1,6 x 0,7-0,8 cm, obovadas a oblongas, margem escariosa, ápice arredondado, glabras. Corola 4,5-6 cm compr., infundibuliforme, glabra, roxa. Estames e estilete insertos; disco nectarífero presente.

Material examinado: Cabaceiras, 29/VI/1994, fl., *M. F. Agra 3020* (JPB); Monteiro, 02/I/1942, fl., *A. Navarro s.n.* (JPB 0572); São João do Cariri, 29/X/1993, fl., *M. F. Agra 2342* (JPB).

Espécie ruderal que ocorre desde a América Central ao Paraguai (AUSTIN e HUAMAN, 1996). No Brasil é encontrada em áreas antropizadas (SIMÃO-BIANCHINI, 1998; BURIL, 2009). Na região do Semiárido, auxilia na fixação de solos

arenosos por ser uma espécie rasteira pioneira (MONTEFUSCO *et al.*, 2011). É reconhecida pelas folhas reniformes a deltóides e o hábito prostrado.

7. *Ipomoea bahiensis* Willd. ex Roem. & Schult., Syst. veg. 4: 789. 1819. Fig. 1 f.

Trepadeira herbácea, látex branco, escasso. Ramos glabrescentes. Folhas 4,3-5,6 x 2,6-4,2 cm, cartáceas, inteiras, ovadas a sagitadas, base cordada a sagitada, ápice acuminado, glabrescentes; venação actinódroma; pecíolo 1,2-2,3 cm compr., hirsuto na axila. Cimeiras dicasiais umbeliformes até 14-flora; pedúnculo 1,7-3,5 cm compr., geralmente não ultrapassando a folha subtendente, hirsuto, 1 par de bractéolas persistentes, ca. 3 x 1 mm, lanceoladas, glabrescentes. Sépalas externas 4 - 6 mm compr., ovais, ciliadas, com um rostro subapical, às vezes rugosas, internas 6 - 8 mm compr. Corola 2,5-5 cm, infundibuliforme, glabra, roxa. Estames e estilete insertos. Disco nectarífero ausente. Cápsulas ovais, ca. 1 cm compr.; sementes com tricomas brancos nas magens.

Material examinado selecionado: São José dos Cordeiros, RPPN Fazenda Almas, 18/VIII /2010, fl. fr., *G.C. Delgado-Junior 211* (JPB); RPPN Fazenda Almas, 12/VI/2004, fr., *I. B. Lima 178* (JPB).

Endêmica do Brasil e amplamente distribuída, principalmente em áreas de capoeira, campos abertos e bordas de mata (AUSTIN e HUÁMAN, 1996; SIMÃO-BIANCHINI, 1998), incluindo áreas de caatinga (BURIL 2009) e matas úmidas (BURIL, 2011; SIMÃO-BIANCHINI, 2009). No Cariri é encontrado também um morfotipo cujas sépalas, além de possuírem um rostro subapical típico, são rugosas, assemelhando-se a *I. fimbriosepala* Choisy e *I. aristolochiifolia* G. Don., que não ocorrem na região.

8. *Ipomoea brasiliana* Meisn. in Mart., Fl. Bras. 7: 262. 1869. Fig. 1 g.

Trepadeira, látex branco, escasso. Ramos pubescentes. Folhas 4-8,5 x 3,5-8 cm, cartáceas, inteiras, cordadas, base cordada, ápice agudo a acuminado, face adaxial velutina, face abaxial densamente vilosa; venação actinódroma; pecíolo 3-4,5 cm compr., viloso. Cimeiras 1-3-flora; pedúnculo 3,5-5 cm compr., geralmente não ultrapassando a folha subintendente. Sépalas desiguais, externas, 1x 0,8 cm compr., internas 0,8 x 0,6 cm, rotundas a orbiculares, ápice arredondado, glabras a glabrescentes. Corola ca. 8 cm compr., infundibuliforme glabra, rosa. Estames e estilete insertos. Disco nectarífero ausente. Cápsula globosa, ca. 2 cm compr.; sementes glabras.

Material examinado selecionado: Boa Vista, 25/VI/1996, fr., *M. F. Agra 3840* (JPB); Cabaceiras, lajedo de pai Mateus, 22/IX/2007; fl., *G. A. Costa 30* (JPB); Sítio Bravo, 31/III/1992, fl., *V.L. Nascimento 70* (JPB); Serra Branca, 04/IV/1996, fl., *M. F. Agra 3541* (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 20/II/2010, *G. C. Delgado-Junior 70* (JPB); RPPN Fazenda Almas, 04/IV/2009, fl., fr., *M. T. Buril 285b et al.* (UFP); São João do Cariri, Estação Experimental, 10/III/1995, fl., *C. M. L. Aguiar 10* (JPB).

Endêmica, comum na caatinga (BURIL, 2009; BIANCHINI e FERREIRA, 2012). Em geral, é confundida com *Ipomoea subincana* Meisn., que não ocorre na região do Cariri, mas diferencia-se pelas sépalas glabras ou glabrescentes.

9. *Ipomoea carnea* Jacq., Enum. Syst. Pl. 13. 1760. Fig. 1 h.

Arbusto ereto, ca. 3 m alt., látex branco. Ramos fistulosos, pubescentes. Folhas 8-11 x 3-5 cm, cartáceas, ovadas a lanceoladas, base cordada a sagitada, ápice agudo; venação actinódroma; pecíolo 2,5-4,5 cm compr., lanoso. Cimeiras dicasiais, corimbiformes, até 16 flores, pedúnculo 6-8 cm compr., bractéolas lanceoladas, caducas. Sépalas iguais, ca. 7x6 mm, rotundas a amplamente ovadas, base truncada, ápice arredondado. Corola ca. 7 cm compr., infundibuliforme, rosa, glabra. Estames insertos. Estilete inserto, lobos estigmáticos globosos; disco nectarífero presente. Cápsula globosa, ca. 6 mm.

Material examinado: Serra Branca, 19/VI/2011, fl. fr., *M. T. Buril et al. 431* (UFP).

Cosmopolita e amplamente distribuída no Brasil (AUSTIN e HUÁMAN, 1996; BIANCHINI e FERREIRA, 2012). No Cariri distingue-se das demais espécies do gênero pelo hábito arbustivo e estar associada às áreas alagadas.

10. *Ipomoea hederifolia* L., Syst. nat. (ed. 10): 925. 1759. Fig. 1 j.

Trepadeira herbácea, látex branco. Ramos glabros a glabrescentes. Folhas 5,2-14,5 x 3,9-10,5 cm, membranáceas, 3-5-lobadas, base profundamente cordada, ápice agudo a acuminado, glabras; venação actinódroma; pecíolo até 7,5 cm compr., glabro. Cimeiras dicasiais, com paracládios laterais monocasiais, escorpioides ou dicasiais; pedúnculo 5,3-12,4 cm compr., bractéolas lineares. Sépalas iguais, ca. 6 x 3 mm, oblongas, base truncada, ápice arredondado, com um rostro subapical de ca. 3 mm compr., glabras. Corola 3,5-4 cm compr.,

hipocrateriforme, glabra, vermelha. Estames e estilete exserto; disco nectarífero ausente. Cápsula globosa, ca. 6 mm compr.; sementes densamente pubérulas.

Material examinado: Cabaceiras, 29/VI/1994, fl., *M. F. Agra 3037 (JPB)*; São João do Cariri 29/IV/1994, fl., fr. *M. F. Agra 3020 (JPB)*.

Planta invasora e naturalizada em praticamente todo continente Americano (AUSTIN e HUAMAN, 1996). Diferencia-se das *Ipomoea* do Nordeste brasileiro pelas flores vermelho intenso e corola hipocrateriforme com estames e estilete exsertos. Apesar da semelhança floral com *I. quamoclit* L (BURIL, 2011), esta última não ocorre no Cariri Paraibano.

11. *Ipomoea longeramosa* Choisy, Prodr. 9: 384: 1841. Fig. 1 L.

Trepadeira herbácea, látex ausente. Ramos hirsutos, tricomas simples, de diversos tamanhos. Folhas 2,5-4,5 x 3,2-6 cm, membranáceas, 3-7-palmatipartidas, ápice dos lobos agudos a arredondados, ciliadas, as jovens com tricomas nas nervuras; pecíolo 1-4 cm compr., hirsuto. Cimeiras 1-flora; pedúnculo 1-1,5 cm compr., hirsuto, 1 par de bractéolas persistentes, ca. 2 x 1 mm, lanceoladas, glabras, pedicelo 0,5-1 mm compr. Sépalas desiguais, externas 2, 6 - 8 x 2,5 mm, elípticas a oblongas, base truncada, ápice apiculado, internas 3, 8 - 10 x 4 mm, elípticas, base arredondada, ápice apiculado, glabras. Corola 2-2,5 cm compr., infundibuliforme, glabra, amarela com fauce do tubo vinácea. Estames e estilete insertos. Disco nectarífero presente. Cápsula globosa, ca. 7-8 mm; sementes com tricomas longos, ca. 3 mm, nas margens e em três faixas dorsais.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, 29/VIII/2009, fl., G.C. *Delgado-Junior 58 (JPB)*; 15/VIII/2010, fr., *R.M.T Costa 136 (JPB)*.

Ocorre na Venezuela e no Brasil, onde é conhecida na caatinga e no cerrado (AUSTIN e HUAMAN, 1996; BIANCHINI e FERREIRA, 2012). No Cariri, é rara e associada aos ambientes melhor preservados. Pode ser reconhecida pelas folhas partidas e corola amarelada com a fauce vinácea.

12. *Ipomoea marcellia* Meisn. in Mart., Fl. Bras.: 257. 1869. Fig. 1 m.

Liana, látex branco. Ramos tomentosos, tricomas simples. Folhas 7,5-9 x 5,5-8 cm, cartáceas, inteiras, ovadas, base cordada, ápice agudo a acuminado, glabrescentes; nervação actinódroma; pecíolo 3-3,5 cm compr., pubescente. Cimeiras 7-13-flora; pedúnculo 20-29 cm compr., lanoso.

Sépalas iguais 0,8-1,3 x 0,4-0,8 cm, base arredondada, ápice agudo, lanoso. Corola, 4 – 5 cm de compr., campanulada, lanosa, branca-amarelada. Estames e estilete exsertos. Disco nectarífero ausente. Cápsula arredondada a oval, glabra, 0,8-1,5 cm compr.; 4 sementes aladas, tricomas longos na margem dorsal.

Material examinado: Cabaceiras, RPPN Fazenda Almas, 13/XI/2010, fr., *G. C. Delgado-Junior 155* (JPB); Monteiro, Serra de Jabitacá, 12/VI/2008, fl., *P. C. Gadelha Neto 2318* (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 15/I/2010, fl., *G. C. Delgado-Junior 168* (JPB); Serra Branca, Sítio Tamboril, 21/VIII/1997, bt., fr., *M. F. Agra 4139* (JPB).

Endêmica da caatinga (BIANCHINI e FERREIRA, 2012) e associada a ambientes não perturbados (BURIL, 2009). No Cariri é facilmente reconhecida pelas flores branco-amareladas com estilete e estames exsertos.

13. *Ipomoea nil* (L.) Roth., Catal. Bot. 1: 36. 1797. Fig. 1 n.

Trepadeira, látex ausente. Ramos hirsutos, tricomas simples de diversos tamanhos. Folhas 3-10 x 3-13 cm, cartáceas, 3-lobadas, ovadas, base cordada, ápice acuminado, hirsutas; venação actinódroma; pecíolo 1-8 cm compr. Cimeiras 2-3-flora; pedúnculo 4,5-7 cm compr., hirsuto, 1 par de bractéolas persistentes, 3 – 7 x 1 mm, lineares, ciliadas. Sépalas iguais, 2,5-3 x 0,1-0,2 cm lanceoladas, base arredondada, ápice longo acuminado, hirsutas, tricomas fulvos quando herborizada. Corola 4,5-5,5 cm compr., infundibuliforme, glabra, azul com fauce do tubo branca. Estames e estilete insertos; disco nectarífero presente. Cápsula globosa, ca. 1,5 cm compr.; Sementes glabras.

Material examinado: Boa Vista, 25/V/1996, fl., *M. F. Agra 3824*, (JPB); Cabaceiras, 29/VI/1994, fl., *M.F.Agra 3047* (JPB); São João do Cariri, Estação Experimental, 27/X/1994, fl., *C. M. L. Aguiar 68* (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 04/IV/2009, fl. fr., *M. T. Buril et al. 289* (UFP).

Cosmopolita (AUSTIN e HUMAN, 1996), amplamente distribuída no Brasil (BURIL, 2009; BURIL, 2011; BIANCHINI e FERREIRA, 2012) e comum no Cariri. Distingue-se das demais espécies de *Ipomoea* pelas sépalas hirsutas, com o ápice longo-acuminado.

14. *Ipomoea parasitica* (Kunth.) G. Don., Gen. Hist. 4: 275. 1838. Fig. 1 O.

Trepadeira, látex ausente. Ramos aculeados, seríceos, tricomas simples; entrenós 7 – 10,5 cm. Folhas 6,3-11,7 x 7,5-10,7 cm, cartáceas, inteiras, base cordada, ápice acuminado a arredondado, ciliadas, face adaxial glabrescente, abaxial com tricomas nas nervuras; nervação actinódroma; pecíolo 3,8-6,5 cm compr., aculeado, seríceo. Cimeiras umbeliformes 2-5-flora; pedúnculo 2,3-5 cm compr., seríceo, bractéolas ausentes, pedicelo 0,8 – 2,8 cm compr. Sépalas subiguais, externas 2, 8 x 4,5 mm, ovadas, base truncada, ápice mucronado, internas 3, 7 x 5 mm, rotundas, base arredondada, ápice arredondado, glabras, escariosas, acrescentes. Corola 3,5-5,2 cm compr., infundibuliforme, glabra, quando em botão, densamente serícea, rosa. Estames e estilete insertos. Disco nectarífero presente. Cápsula ovóide, ca. 1,8 cm compr., estilete persistente e sépalas paleáceas com margens escariosas; sementes glabras.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, 13/VI/2004, fr., fl., *I. B. Lima* 182 (JPB).

Ocorre do México ao Brasil (AUSTIN e HUAMAN, 1996), onde é conhecida no cerrado e caatinga (BIANCHINI e FERREIRA, 2012). No Cariri é rara e pode ser identificada pelos ramos aculeados.

15. *Ipomoea rosea* Choisy, Prodr. 9: 384. 1945. Fig. 1 p.

Trepadeira, látex branco. Ramos glabros a glabrescentes. Folhas 3 – 7 cm compr., cartáceas, 3-5-partidas, folíolos elípticos, base cuneada, ápice agudo a arredondado, glabros; pecíolo 1,3-2,7 cm compr. Cimeiras dicasiais 7-flora; pedúnculo 1-4,5 cm compr., glabro, 1 par de bractéolas lineares, ca. 1 mm compr. Sépalas iguais, 7 x 3 mm, estreito elípticas a obovadas, base cuneada, ápice arredondado com rostro subapical, glabras, carnosas. Corola 6-7,6 cm compr., infundibuliforme, glabra, rosa. Estames e estilete insertos. Disco nectarífero presente. Cápsula globosa, ca. 5-6 mm compr; sementes com tricomas brancos e longos, marginais, ca. 3 mm compr.

Material examinado: Cabaceiras, 29/VI/1994, fl., *M.F. Agra* 3085 (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 4/IV/2009, fl., fr., *M. T. Buril* 284 *et al.* (UFP); RPPN Fazenda Almas, 24/VIII/2010, fl., *R. M. T. Costa* 139 (JPB); RPPN Fazenda Almas, 22/VI/2010, fl., fr., *G. C. Delgado-Junior* 188 (JPB).

Endêmica do nordeste brasileiro, é conhecida em áreas de caatinga, cerrado e mata atlântica (BIANCHINI e FERREIRA, 2012). No Cariri pode ser diferenciada das demais *Ipomoea* pelas folhas 3-5-partidas e flores rosa.

16. *Ipomoea triloba* L., Sp. Pl. 1:161. 1753. Fig. 1 q.

Trepadeira, látex ausente. Ramos sulcados, glabrescentes, tricomas simples. Folhas 5,2-10,5 x 4,9-8,3 cm, cartáceas, inteiras a 3-lobadas, ovadas, base cordada, ápice acuminado, glabras; venação actinódroma; pecíolo 4-8,2 cm compr. Cimeiras 1-3-flora; pedúnculo 2,1-4,6 cm compr., glabrescente, 1 par de bractéolas persistentes, ca. 1 mm compr., filiformes. Sépalas desiguais, externas 2,7,5 - 7,8 x 3,5 mm, obovadas, base cuneada, ápice acuminado, internas 3,8 x 4,5 mm, obovadas, base cuneada, ápice acuminado a apiculado, glabras. Corola ca. 2 cm compr., infundibuliforme, glabra, branca ou rosa. Estames e estilete insertos. Disco nectarífero presente. Cápsula globosa, ca. 8 mm; semente glabra.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, fl., *Delgado-Junior, G.C.* 290 (JPB).

Amplamente distribuída nas Américas e Ásia (AUSTIN e HUAMAN, 1996), é subespontânea no Brasil, com registro para o cerrado, caatinga e mata atlântica (BIANCHINI e FERREIRA, 2012). Rara no Cariri, é reconhecida pelas cimeiras 1-3-flora, sépalas desiguais entre si, obovadas e glabras.

Jacquemontia Choisy, Mém. Soc. Phys. Genève 6: 476. 1833.

Trepadeiras herbáceas, lianas, ervas ou subarbustos. Folhas inteiras, geralmente cordadas, glabrescente ou densamente pubérulas, tricomas estrelados. Inflorescência do tipo cimeira com 3-muitas flores, brácteas geralmente presentes. Corola, infundibuliformes, azuis ou brancas, raramente com outra cor. Estames puberulentos na base, anteras eretas. Ovário glabro, 2-carpelar, 2-locular, 4-ovulado, estilete 2-lobado, lobos estigmáticos 2 ovais-planos a cilíndricos. Fruto cápsula, 8-valvar. Sementes trigonais, com anel de tricomas rijos na margem.

17. *Jacquemontia agrestis* (Mart. ex Choisy) Meins. in Mart., Fl. Bras. 7: 306–307. 1869. Fig. 2 a – b.

Erva prostrada ou trepadeira, látex ausente. Ramos pilosos, tricomas simples, 3-armados, e glandulares. Folhas 1,4-3,5 x 1-3,8 cm, cartáceas, inteiras a sinuosas, ovadas a lanceoladas, base cordada, ápice agudo a apiculado, glabrescentes, tricomas 3-armados; venação camptódroma; pecíolo 0,4-1,2 cm compr., glabrescente. Cimeira monocasial racemiforme, 1-4-flora; pedúnculo 1,5-8,5 cm, com tricomas 3-armados, simples e glandulares, bractéolas ca. 1 mm compr., lineares. Sépalas iguais, 3 x 1 mm, lanceoladas, base arredondada, ápice atenuado, com os três tipos de tricomas, as internas normalmente glabras. Corola ca. 1 cm compr., hipocrateriforme, glabra, azul com a fauce do tubo vinácea ou raramente branca. Lobos estigmáticos oval-planos; disco nectarífero ausente. Cápsula 4 mm compr., subglobosa; sementes ca. 3 mm, areoladas.

Material examinado: São João do Cariri, Estação Experimental, 22/VI/2011, fl., fr., *M. T. Buril 522 et al.* (UFP); 03/III/1995, fl., *C. M. L. Aguiar 117* (JPB); 19/V/1995, fl., *C. M. L. Aguiar 81* (JPB).

Amplamente distribuída nas Américas (AUSTIN, 1998b), no Brasil é comum em áreas de caatinga e cerrado. No Cariri é ocasional e se distingue das demais espécies do gênero pelos tricomas glandulares e as sépalas iguais e lanceoladas.

18. *Jacquemontia corymbulosa* Benth. Bot. Voy. Sulphur. 137: 21. 1844. Fig. 2 c – e.

Trepadeira, látex ausente. Ramos pubescentes a glabrescentes, tricomas estrelados, 3-armados, pedunculados, de tamanhos diferentes. Folhas 1,2-4,7 x 0,8-2,8 cm, cartácea, inteiras, ovadas, base arredondada a cordada, ápice acuminado a mucronado, tomentosas, tricomas 3-armados; venação camptódroma; pecíolo 0,5-1,3 cm compr., tomentoso. Cimeira dicasial umbeliforme, 1-12-flora; pedúnculo 1-5,5 cm compr., bractéolas ca. 2 mm compr., lineares. Sépalas desiguais, externas 2, 4,5-5 x 2,3-2,5 mm, oboelípticas a lanceoladas, base cuneada, ápice acuminado, pubescentes, intermediária 4,5 x 1,5 mm, assimétrica, internas 2, 3 x 1,2 mm, lanceoladas, margem escariosa, base arredondada, ápice acuminado, glabrescentes. Corola 0,8-1,5 cm compr., infundibuliforme, glabra, azul. Lobos estigmáticos ovais-planos; disco nectarífero ausente. Cápsula globosa, 3-4 mm compr.; sementes ca. 3 mm.

Material examinado: Boa Vista, 25/VI/1966, fl. *M. F. Agra 3854* (JPB); Cabaceiras, 22/10/2007; fl., *G. A. Costa 27* (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 24/IV/2010, fl., *G. C. Delgado-Junior 80* (JPB); Serra Branca, Sítio Tamboril, 21/VIII/1997, fr., fl., *M. F. Agra 4142* (JPB); Sumé, 29/VI/1994, fl., fr., *M. F. Agra 2783* (JPB).

Ocorre da Venezuela (AUSTIN, 1998b) ao Brasil onde é comum em áreas de caatinga. No Cariri, junto a *J. pentanthos*, é uma das espécies mais abundantes do gênero.

19. *Jacquemontia gracillima* (Choisy) Hallier. Bot. Jahrb. Syst. 16 (4-5): 541. 1983.

Fig. 2 f.

Erva ereta, látex ausente. Ramos pubescentes, tricomas estrelados, 3-4-armados. Folhas 2-3,7 x 0,5-1,4 cm, membranácea, inteiras, elípticas a ovais, base arredondada, ápice agudo a mucronado, pubescentes; venação camptódroma; pecíolo 2-3 mm compr. Cimeira monocasial racemiforme, 2-4-flora; pedúnculo 1-2,5 cm compr., bractéolas ca. 1 mm compr., lineares.

Sépalas desiguais, externas 2, 4 x 3 mm, deltóides, base cordada, ápice obtuso, intermediária 1, 4 x 2,5 mm, assimétrica, internas 2, 3 x 1,5 mm, oblanceoladas, base cuneada, ápice agudo, pubescentes, acrescentes no fruto. Corola ca. 8 mm compr., infundibuliforme, glabra, branca com a fauce vinácea. Lobos estigmáticos cilíndricos; disco nectarífero presente. Cápsula cúbica, 4 mm diam.; sementes ca. 2,5 mm, lisas.

Material examinado: São João do Cariri, Estação Experimental, 19/V/1994, fl. fr., *C. M. L. Aguiar* 82 (JPB).

Ocorre na Bolívia, Venezuela e Brasil (ROBERTSON, 1971; AUSTIN, 1998b), onde é conhecida no nordeste setentrional e nas savanas amazônicas. No Cariri é ocasional. Individualiza-se pelo hábito ereto, folhas elípticas a ovais e flores brancas com a fauce vinácea.

20. *Jacquemontia nodiflora* (Desr.) G. Don., Gen. Hist. 4: 283. 1838. Fig. 2 g – L.

Trepadeira, látex ausente. Ramos velutinos, tricomas estrelados, 5-armados sésseis e 3-armados pedunculados. Folhas 4,3-5,2 x 2-2,8 cm, cartáceas, inteiras, ovais a ovadas, base arredondada a subcordada, ápice agudo a mucronado, face adaxial pubescente, abaxial velutina, tricomas 3-armados; venação camptódroma; pecíolo 1-1,5 cm compr., pubescente. Cimeira dicasial umbeliforme, até 30-flora; pedúnculo 0,2-1,5 cm compr., bractéolas ausentes. Sépalas iguais ou externas um pouco menores, 3 x 2 mm, orbiculares, base arredondada, ápice arredondado, glabrescentes ou pubescentes na base. Corola ca. 1,5 cm compr., infundibuliforme, lobada, glabra, branca. Estilete inserto ou exserto, lobos estigmáticos cilíndricos; disco nectarífero presente. Cápsula globosa, 4 mm compr.; sementes ca. 3 mm, verrucosas.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, 04/IV/2009, fl., fr., *M. T. Buril* 283 *et al.* (UFP); 18/VIII/10, fl., *G. C. Delgado-Junior* 204 (JPB); 24/IV/10, fl., *G. C. Delgado-Junior* 81 (JPB).

Distribui-se do México (AUSTIN, 1998b) ao Brasil, onde é conhecida em áreas de caatinga e cerrado (BIANCHINI e FERREIRA, 2012). No Cariri diferencia-se pelo pedúnculo curto e sépalas com ápice arredondado.

21. *Jacquemontia pentanthos* (Jacq.) G. Don., Gen. Hist. 4: 283. 1838. Fig. 2 m – n.

Trepadeira, látex ausente. Ramos velutinos a glabrescentes, tricomas estrelados, 3-armados com todos os ramos iguais ou com um dos ramos maior que os outros. Folhas 2,4-7,8 x 2-3,5

cm, cartáceas, inteiras a discretamente repandas, ovadas a raramente orbiculares, base arredondada a cordada, ápice acuminado a caudado, face adaxial pubescente a velutina, abaxial velutina, tricomas 3-armados; venação camptódroma; pecíolo 0,3-2,5 cm compr. Cimeira dicasial umbeliforme a capituliforme, usualmente 9-flora; pedúnculo 3-14 cm compr., bractéolas 1,5-2 x 0,1-0,2 cm, lanceoladas ou oblanceoladas, base atenuada, ápice agudo, glabrescentes. Sépalas desiguais, externas 2, 7,5-8 x 3,5-4 mm, rombóides a oboelípticas, base cuneada, ápice agudo a acuminado, pubescentes, intermediária 1, 7,5 x 3,5, assimétrica, internas 2, 5 x 1,5 mm, lanceoladas, margem escariosa, base arredondada, ápice agudo, glabrescentes. Corola ca. 1,5 cm compr., infundibuliforme, glabra, branca ou azul. Lobos estigmáticos ovais-planos; disco nectarífero ausente. Cápsula globosa, ca. 4 mm compr.; sementes ca. 3,5 mm, areoladas.

Material examinado: São José dos Cordeiros, RPPN Fazenda Almas, 29/VIII/2009, fl., fr., G. C. Delgado-Junior 56 (JPB); São João do Cariri, 3/IV/2009, fl., fr., M. T. Buril 282 (UFP).

Amplamente distribuída nas Américas (ROBERTSON, 1971). Devido a elevada plasticidade pode ser confundida com *J. corymbulosa*, *J. abutiloides* Benth. e *J. cumanensis* Kuntz. Na região do Cariri é abundante e se diferencia de *J. corymbulosa* pelas bractéolas lanceoladas a oblanceoladas.

Merremia Dennst., Schlüssel Hortus malab.: 34. 1818.

Trepadeiras geralmente herbáceas e sem látex. Folhas inteiras, lobadas ou digitadas com 3-7 folíolos. Inflorescências axilares, unifloras ou com poucas flores. Corola branca, raramente amarela ou rosa. Estames geralmente glabros na base, anteras retorcidas na antese. Ovário glabro, 2- ou 3-carpelar, 2- ou 3-locular, 4-6-ovulado, estilete 1, lobos estigmáticos 2-globosos. Fruto cápsula, 4-valvar. Sementes trigonais.

22. *Merremia aegyptia* (L.) Urb., Symb. Antill. 4(3): 505–506. 1910. Fig. 2 O.

Trepadeira lenhosa. Ramos pilosos, tricomas simples, dourados. Folhas palmadas, digitadas, 3 folíolos centrais 3,5-5 x 1,5-2 cm, 2 folíolos periféricos 3,35 x 0,8-1 cm, lanceolados, lanosas, base cuneada, ápice agudo; venação actinódroma; pecíolo 3,5-4 cm compr., hirsuto. Cimeiras 4-5-flora; pedúnculo 9-11 cm, hirsuto, 1 par de bractéolas, 3 – 7 x 1 mm, lineares. Sépalas iguais, 2x1 cm, margem inteira, oval, base arredondada, ápice agudo, densamente hirsutas. Corola 4,5-5,5 cm compr., infundibuliforme, glabra, branca. Estames e estilete insertos. Cápsula globosa, ca. 1,5 mm, sépalas persistentes; sementes glabras.

Material examinado: Cabaceiras, 29/VII/1993, fl., *M. F. Agra* 2226 (JPB); São João do Cariri, Estação Experimental, 20/IV/1994, fl., *C. M. L. Aguiar* 71 (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 18/VIII/2010, fl., *G. C. Delgado-Junior* 212 (JPB).

Amplamente distribuída na América e associada a ambientes antropizados (O'DONELL, 1941). No Brasil é conhecida para a amazônia, mata atlântica, cerrado e caatinga (SIMÃO-BIANCHINI e FERREIRA, 2010). Diferencia-se das espécies de *Ipomoea* pelas anteras retorcidas, e de *Operculina macrocarpa* (L.) Urb. pelo cálice densamente hirsuto.

Operculina Silva Manso, Enum. Subst. Braz. 16: 49. 1836.

Lianas, látex geralmente presente. Folhas geralmente digitadas com 3-7 folíolos. Inflorescências axilares, unifloras ou com poucas flores. Corola geralmente branca ou amarela. Estames geralmente glabros na base, anteras retorcidas na antese. Ovário glabro, 2-carpelar, 2-locular, 4-ovulado, estilete 1, lobos estigmáticos 2-globosos. Fruto cápsula, com epicarpo operculado e endocarpo com deiscência 4-valvar. Sementes trigonais, geralmente glabras.

23. *Operculina macrocarpa* (L.) Urb., Symb. Antill. 3: 343. 1902. Fig. 2 p.

Liana, látex branco abundante. Ramos glabros. Folhas palmadas, digitadas, 3 folíolos centrais 6-9 x 3,5-4 cm, 2 folíolos periféricos 3, 5 x 1-2,5 cm lanceolados, base cuneada, ápice agudo, glabrescentes; venação actinódroma; pecíolo 3-4,5 cm compr. Cimeiras 1-2-flora, pedúnculo 8-9,5 cm compr., alado, hispido na base, 1 par de bractéolas, 1-1,3– 0,5x 0,7cm, oblongas, pedicelos alados. Sépalas iguais, 3 x 1,5 cm, oval, base arredondada, ápice arredondado, cônvacas, glabras. Corola ca. 5 cm compr., infundibuliforme, pubescentes, branca. Disco nectarífero presente. Cápsula globosa, ca.1,5 cm compr.; sementes ca. 8 mm compr., glabras.

Material examinado: Boa Vista, 25/VI/1996, fr., *M. F. Agra* 3828 (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 29/VIII/2009, fr., *G.C. Delgado-Junior* 60 (JPB); Serra Branca, sítio Tamboril, 21/VIII/1997, fl., fr., *M.F.Agra* 4163 (JPB).

No Brasil é citada para caatinga, cerrado e mata atlântica (BIANCHINI e FERREIRA, 2012). No Cariri está associada a áreas preservadas. Apresenta anteras

retorcidas como em *Merremia*, porém os frutos são globosos e os pedúnculos e pedicelos alados.

Turbina Raf., Fl. Tellur. 4: 81. 1836 [1838].

Lianas, látex geralmente presente. Folhas inteiras, cordadas. Inflorescências axilares, unifloras ou com poucas flores. Sépalas seríceas e acrescentes. Corola geralmente rosa, pubescente. Estames geralmente glabros na base, anteras retas. Ovário glabro, 2-carpelar, 2-locular, 4-ovulado, estilete 1, lobos estigmático 2-globosos. Fruto indeiscente com pericarpo coriáceo; semente geralmente 1, pubescente.

24. *Turbina cordata* (Choisy) D.F. Austin & Staples, J. Arnold Arbor. 64: 488. 1983. Fig. 2 q.

Liana, látex branco. Ramos vilosos, tricomas simples. Folhas 6-15 x 4-12 cm, ovadas, base cordada, ápice agudo, face adaxial glabra com indumento nas nervuras, face abaxial densamente vilosas; venação actinódroma; pecíolo 3-5 cm compr. Cimeiras dicasiais ca. 12-flora, pedúnculo 6,5-10 cm compr., lanoso. Sépalas iguais a subiguais, ca. 2 x 1,3 cm, oblongas, base arredondada, ápice arredondado, pubescentes. Corola ca. 6 cm compr., infundibuliforme, rosa. Estames e estilete insertos. Estilete piloso, persistente no fruto. **Frutos** elipsóides, 1,5-2 cm compr., pubescentes; semente ca. 1 cm compr., elipsóide, escariosa,.

Material examinado: São João do Cariri, Estação Experimental, 21/X/1993, fl. *C. M. L. Aguiar 11* (JPB); Estação Experimental, 04/V/1994, fl. *C. M. L. Aguiar 67* (JPB); São José dos Cordeiros, RPPN Fazenda Almas, 18/VIII/2010, fr., *G. C. Delgado-Junior 210* (JPB); RPPN Fazenda Almas, 22/VI/2010, fr., *G. C. Delgado-Junior 187* (JPB).

Ocorre do Peru ao Brasil, onde é citada para áreas de caatinga, cerrado e mata atlântica (BIANCHINI e FERREIRA, 2012). Diferencia-se de *Ipomoea* pelos frutos indeiscentes.

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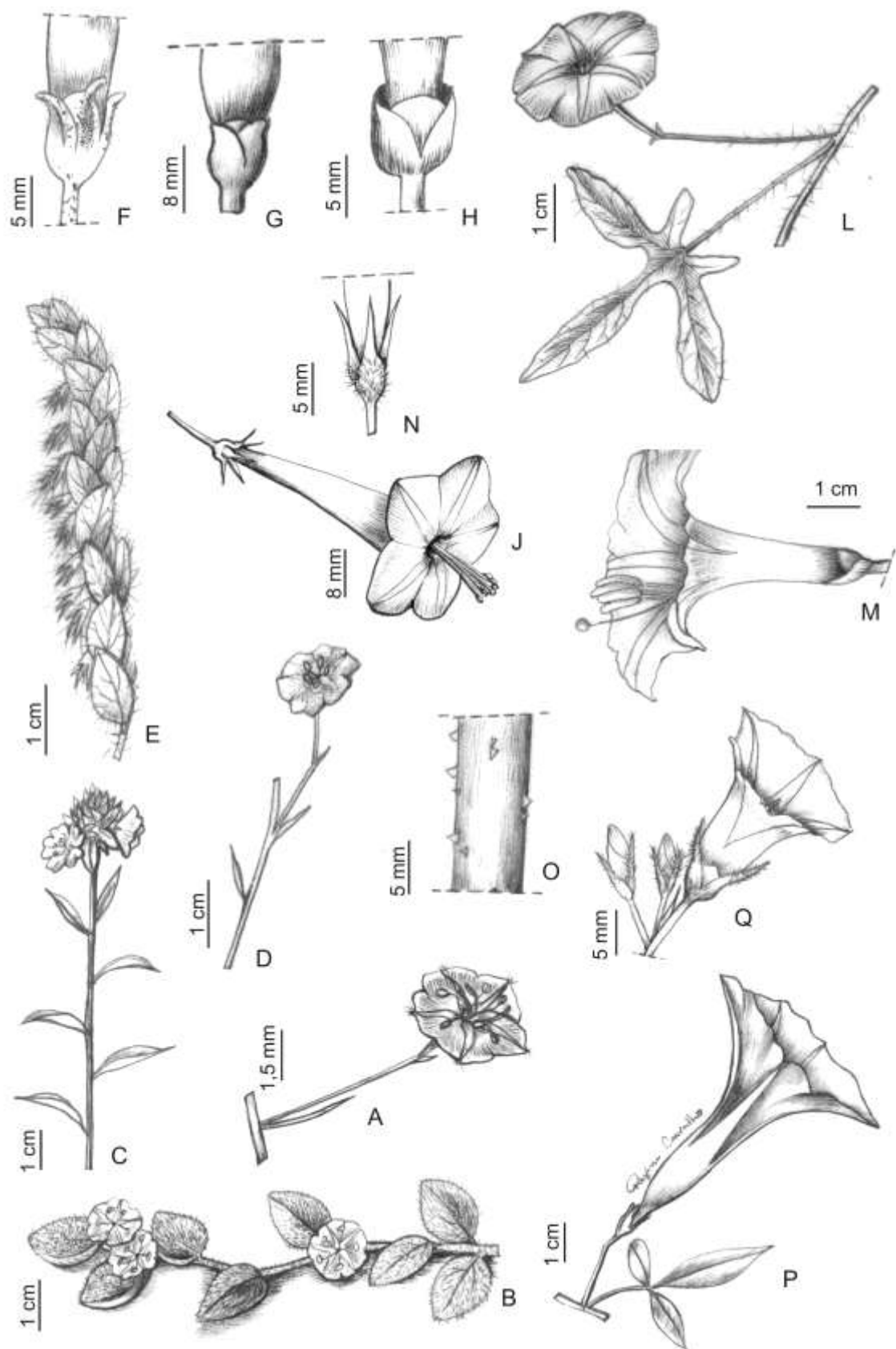


Figura 1. Convolvulaceae do Cariri Paraibano. A. *Evolvulus filipes*, inflorescência; B. *Evolvulus frankenioides*, ramo florífero; C. *Evolvulus glomeratus*, ramo florífero; D. *Evolvulus*

linarioides, inflorescência; E. *Evolvulus ovatus*, ramo florífero; F. *Ipomoea bahiensis*, cálice; G. *Ipomoea brasiliana*, cálice; H. *Ipomoea carnea*, cálice; J. *Ipomoea hederifolia*, flor; L. *Ipomoea longeramosa*, ramo florífero; M. *Ipomoea marcellia*, flor; N. *Ipomoea nil*, cálice; O. *Ipomoea parasitica*, detalhe dos ramos aculeados; P. *Ipomoea rosea*, ramo florífero; Q. *Ipomoea triloba*, inflorescência.

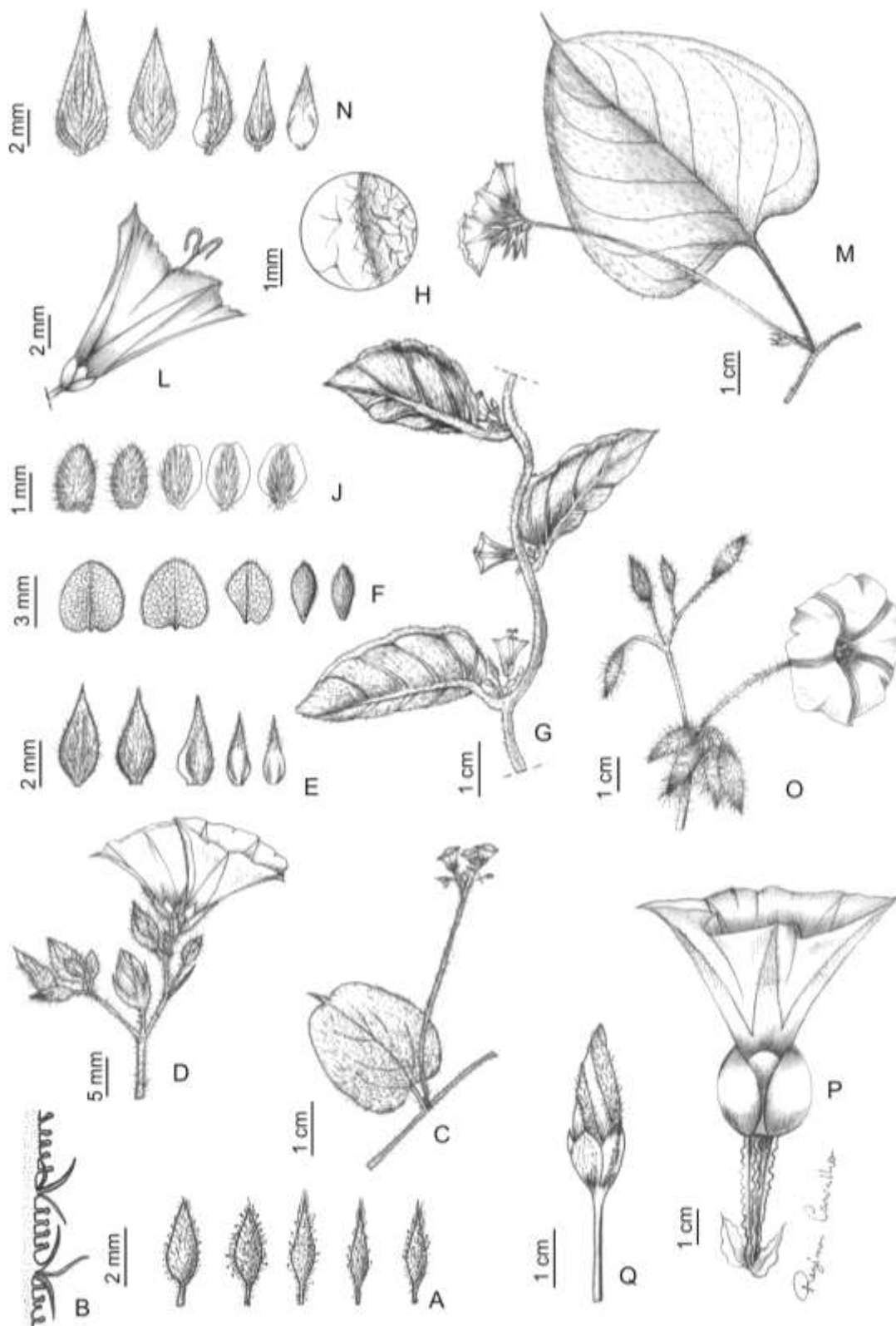


Figura 2. Convolvulaceae do Cariri Paraibano. A – B. *Jacquemontia agrestis*, A. sépalas externas (esquerda) a internas (direita), B. detalhe do indumento dos ramos; C – E. *Jacquemontia corymbulosa*, C. ramo florífero, D. inflorescência, E. sépalas externas (esquerda) a internas (direita); F. *Jacquemontia gracillima*, sépalas externas (esquerda) a internas (direita);

G – L. *Jacquemontia nodiflora*, G. ramo florífero, H. detalhe dos tricomas, J. sépalas externas (esquerda) a internas (direita), L. flor; M – N. *Jacquemontia pentanthos*, M. ramo florífero, N. sépalas externas (esquerda) a internas (direita); O. *Merremia cissoides*, inflorescência; P. *Operculina macrocarpa*, flor; Q. *Turbina cordata*, botão floral.

Lista de exsicatas

A. Navarro s.n. (6); **C.E.L. Lourenço** 283 (4); **C.M.L. Aguiar** 10 (8), 11 (24), 67 (24) 68 (13), 71 (22), 81 (17) 82 (19), 83 (3), 84 (3), 95 (5) 106 (5), 117 (17); **G.A. Costa** 27 (18), 30 (8); **G.C. Delgado-Junior** 56 (21), 58 (11), 60 (23), 70 (8), 80 (18), 81(20) 155 (12), 168 (12), 187 (24), 188 (15), 204 (20) 210 (24), 211 (7), 212 (22), 290 (16); **I.B. Lima** 178 (7), 182 (14), 648 (1), 669 (1); **M.F. Agra** 2226 (22), 2342 (6), 2783 (18), 3104 (5), 3020 (6), 3037 (10), 3047 (13), 3085 (15), 3541 (8), 3824 (13), 3828 (23), 3840 (8), 3854 (18), 4139 (12), 4142 (18), 4163 (23), 5945 (4), 6779 (4); **M.R. Barbosa** 2239 (2), 2244 (4); **M.T. Buril** 282 (21), 283 (20), 284 (15), 285b (8), 289 (13), 290 (2), 431 (9), 522 (17); **P.C. Gadelha Neto** 1529 (3); **R.M.T. Costa** 136 (11) 139 (15); **V.L. Nascimento** 29 (3), 83 (3), 64 (4), 70 (8).

Guia de Identificação do Field Museum

Convolvulaceae of Northeast Brazil

M. T. BURIL, J. D. GARCÍA-GONZÁLES & M. ALVES

PUBLICADO ON LINE



1 *Bonamia burchellii*



2 *Bonamia maripoides*
(from J.D. García-Olivares)



3 *Bonamia maripoides*
(from J.D. García-Olivares)



4 *Cuscuta globosa*



5 *Cuscuta partita*



6 *Evolvulus elegans*



7 *Evolvulus frankenioides*



8 *Evolvulus glomeratus*



9 *Evolvulus linarioides*



10 *Evolvulus linarioides*



11 *Evolvulus pterocaulon*



12 *Ipomoea asarifolia*



13 *Ipomoea asarifolia*



14 *Ipomoea bahiensis*



15 *Ipomoea brasiliana*



16 *Ipomoea incarnata*



17 *Ipomoea littoralis*



18 *Ipomoea littoralis*



19 *Ipomoea longiramosa*



20 *Ipomoea marcellia*





Com a conclusão do presente estudo, o cenário atual no conhecimento de *Jacquemontia* avançou em vários aspectos.

- Apesar de, numericamente, o total de espécies aqui apresentado não diferir significativamente do apresentado nos levantamentos mais recentes na Lista do Brasil (Bianchini & Ferreira, 2012), apenas 42 dos 59 nomes adotados naquela lista são aqui considerados. Assim, com as novas sinonimizações, novas combinações e seis novas espécies descritas a partir deste trabalho, são reconhecidas 50 espécies de *Jacquemontia* para o Brasil;
- Vinte e seis espécies são endêmicas do Brasil, e destas, quatorze apresentam distribuição bastante restrita, conhecidas apenas para menos de cinco localidades geograficamente próximas. O centro de diversidade do gênero no país, é a Cadeia do Espinhaço, tanto na porção da Bahia quanto na de Minas Gerais, e cada uma mostra espécies particulares, não compartilhadas;
- O número de espécies vulneráveis ou em risco de extinção é muito mais alto do que trazem as indicações da Lista Vermelha de Espécies, e esta deve ser reavaliada;
- Dados morfológicos, palinológicos e moleculares demonstraram que as seções descritas por Meisner, com base na estrutura das inflorescências não constituem grupos monofiléticos;
- O grupo de espécies que possuem tricomas glandulares, no entanto, se mostrou monofilético a partir de evidências tanto palinológicas quanto moleculares;
- Além dos tricomas glandulares, outro caractere indicado como filogeneticamente informativo, é referente à morfologia das sépalas. São importantes a forma, a proporção entre sépalas internas e externas e a consistência das mesmas;
- Com base nos marcadores ITS e rpS16, *Jacquemontia* é considerado monofilético a partir da transferência de espécies cuja morfologia já indicava uma possível exclusão do gênero, sendo estas *J. montana*, *J. serrata* e *J. tomentella*;

- *Páginas dos Periódicos* -

Os produtos desta tese foram submetidos ou serão adaptados às normas para serem submetidos aos seguintes periódicos:

BRITTONIA	http://www.springerlink.com/content/120947/?MUD=MP
KEW BULLETIN	http://www.springerlink.com/content/120946/
NOVON	http://www.bioone.org/loi/novo
NORDIC JOURNAL OF BOTANY	http://www.wiley.com/WileyCDA/WileyTitle/productCd-NJB.html
PHYTOTAXA	http://biotaxa.org/Phytotaxa
GRANA	http://www.tandfonline.com/doi/abs/10.1080/00173138009424998
FLORA	http://www.elsevier.com/wps/find/journaldescription.cws_home/701764/description#description
PLANT SYSTEMATIC AND EVOLUTION	http://www.springer.com/life+sciences/plant+sciences/journal/606
RODRIGUESIA	http://rodriguesia.jbrj.gov.br/
REVISTA NORDESTINA DE BIOLOGIA	http://periodicos.ufpb.br/ojs2/index.php/revnebio/about/index

Examined Material List

Abraham, A.: 67 (46); **Acevedo, D.**: 862 (34), 4100 (34), 7053 (34); **Agra, M. F.**: 5852 (01), 5893 (32); **Aguiar, L.**: 05 (34); **Aké-Assi, L.**: 11833 (46), 13706 (46); **Albuquerque, U. P. de**: 37 (10); **Alencar, M. E.**: 1310 (21); **Allem, A.**: 510 (42); **Almeida, C.**: 19 (01); **Almeida, J. C.**: 589 (46); **Almeida, M. N.**: 01 (32); **Alonso, P.**: 6966 (34); **Alves, J. L. H.**: 133 (16); **Amaral, I. L. do**: 1990 (46); **Amorim, A. M.**: 1998 (19), 6200 (36); **Amorim, B.**: 752 (30), 980 (03), 1998 (19), 2733 (07); **Andei, P.**: 1960 (46); **Anderson, W. R.**: 1972 (05), 7009 (34), 7015 (20), 8696 (04), 8907 (43); **Anderson, W. R.**: 36461 (01), 36684 (41), 37057 (01); **Andrade, I. R.**: 10168 (05), 10208 (05); **Andrade, P. M.**: 10792 (05); **Andrade, R.**: 560 (28); **Andrade-Ferreira, R. C.**: 15 (42); **Andrade-Lima, D.**: 1115 (10), 50679 (32), 55227 (42), 716368 (42), 716494 (42), 71638 (42); **Andre, I.**: 134 (09); **Andrew, N.**: 8454 (46); **Andrews, A.**: 134 (09), 641 (34); **Angolense, W. J.**: 6216 (46); **Antezana, O.**: 622 (15); **Araújo, F. S.**: 1063 (32), 1370 (32), 1500 (21); **Araújo, F.**: 143 (29); **Araújo, R. C. M. S.**: 07 (34); **Arbo, M. M.**: 4344 (33), 5447 (25), 5459 (25); **Arbo, O.**: 6080 (17), 7138 (32); **Árbocz, G. F.**: 8903 (41); **Arenas, P.**: 726 (42); **Aristeguieta, A.**: 5855 (21), 5896 (42); **Arndt, H. M. L.**: 1589 (25); **Arouck, J. D. C.**: 447 (32); **Arraes, A.**: s.n. (34); **Arruda, L. J.**: 701 (28); **Asplund, E.**: 7664 (10), 15953 (10); **Assis, E. C.**: 611 (27); **Assis, M. C.**: 33 (41); **Assis, V.**: 190 (49); **Ataide, M.**: 31 (36); **Atha, O.**: 641 (34); **Atkins, S.**: 5081 (15); **Atkison, R.**: 2531 (25); **Austin, D.**: 7831 (01); **Ayala, N.**: 288 (34); **Azevedo, A. A.**: 56 (42); **Baçarica, E. M.**: 760 (42); **Badcock, T.**: 580 (01); **Baehni, C.**: 251 (46), 374 (46), 388 (46); **Baitello, J. B.**: 82 (04); **Balansa, E.**: 3233 (04); **Bally, I.**: 12674 (46); **Bang, E.**: 615 (42), 1067 (01), 1393 (04); **Baracho, G. S.**: 251 (01); **Barbosa, J. I. S.**: 76 (34), 78 (34); **Barreto, A. C.**: 42 (01), 45 (32); **Barreto, H. L. M.**: 409 (05), 1345 (27), 1890 (27), 1883 (27), 1885 (27), 2076 (27), 2134 (27), 2339 (31), 2367 (42); **Barreto, K. D.**: 2274 (49); **Barreto, M.**: 2385 (27); **Barreto, V.**: 18 (34); **Barros, A.**: 28 (28), 169 (28); **Barros, M.**: 312 (34); **Barros, R.**: 1453 (01); **Barthelat, P.**: 370 (46); **Bastos, B. C.**: 262 (25); **Batalha, M. A.**: 2202 (23), 3585 (41); **Batista, J. A. N.**: 278 (28), 281 (28); **Beck, G.**: 9276 (34); **Beishaw, A.**: 3240 (34); **Belém, P.**: 1577 (19); **Bénguín, D.**: 80 (46); **Berg, O.**: 644 (46); **Bernacci, L. C.**: 36 (49); **Bezerra, P.**: 22 (01); **Bezerra-Loiola, I.**: 183 (01), 184 (29), 645 (01), 651 (21), 981 (34), 1133 (34); **Bianchini, R. S.**: 14 (49), 115 (16), 124 (42), 459 (49), 1562 (49), 1591 (49), 1593 (46), 8761 (33), 9716 (05); **Bicudo, L. R. H.**: 939 (42); **Biganzoli, F.**: 382 (04); **Billiet, M.**: 6366 (09); **Blanchet, J. S.**: 1770 (04), 1842 (04), 1859 (19), 2090 (45), 2879 (32), 3164 (19); **Boadway, A.**: 3125 (34); **Bocage, A.**: 814 (42); **Bohrer, C. B. de**: 16 (32); **Boivin, T.**: 2093 (46); **Boldingh, N.**: 700 (01); **Boom, P.**: 6204 (34); **Borba, B. C.**: 385 (42); **Borba, E. L.**: 2196 (31); **Boudet, H. Q.**: 2651 (19); **Bovini, M. G.**: 74 (04); **Brade, A. C.**: 5568 (42); **Braga, A.**: 2714 (26); **Braga, D. V.**: 451 (10), 548 (10); **Braga, D. V.**: 712 (34), 873 (34), 875 (34); **Braga, H. do N.**: 303 (19), 662 (19); **Braga, M. M. N.**: 13574 (05); **Brandão, M.**: 11192 (42), 12232 (41), 12556 (42), 23465 (41); **Brandbyge, A.**: 42736 (05); **Braz, E.**: 45 (34); **Brenes, K.**: 14590 (42); **Britton, P.**: 23 (34), 47 (34), 159 (34), 594 (34), 1127 (34), 3119 (01), 4072 (34), 5507 (34), 5927 (34), 13035 (34); **Brooks, F.**: 280 (42); **Brunchtjen, L.**: 606 (04); **Brunner, G.**: 1613 (01); **Burgos, D.**: 17 (07); **Buril, M. T.**: 14 (10), 25 (10), 38 (32), 45 (42), 99 (34), 131 (34), 224 (08), 230 (15), 246 (14), 387 (14), 391 (14), 517 (21), 590 (20); **Burkart, K.**: 30068 (01); **Caballero, C.**:

1174 (40); **Cajaiba, A. F. F.:** 05 (34); **Callado, I.:** 24 (34); **Campos, A.:** 04 (46); **Cano, O.:** 512 (34); **Cano, O.:** 698 (10), 702 (32), 839 (10); **Cardoso, D.:** 70 (25), 166 (07), 189 (04), 517 (32), 761 (01), 1317 (32); **Carneiro, E.:** 291 (01), 351 (01), 405 (04), 433 (10), 743 (01); **Carneiro-Torres, D.S.:** 213 (16), 235 (32); **Carrasco, L.:** 112 (32); **Carreira, B.:** 912 (01); **Carter, L.:** 4839 (01), 4997 (01), 5535 (01), 5632 (01); **Carvalho, A. M.:** 894 (19), 2719 (25); **Carvalho, A.:** 238 (21); **Carvalho, C. A. L.:** 659 (25); **Carvalho-Sobrinho, J. G.:** 492 (25), 534 (36), 634 (36), 2139 (32); **Casas, Z.:** 6258 (42); **Castellanos, H.:** 23579 (26); **Castillo, L.:** 2716 (32); **Castro, A. J.:** 98 (46), 114 (34); **Castro, A. S. F.:** 12 (21); **Castro, A.:** 45 (10); **Castro, I. F.:** 20 (07); **Castro, R. M.:** 1162 (34), 1232 (31); **Cavalcanti, G.:** 22 (01), 334 (01); **Cavalcanti, G.:** 334 (42); **Cesari, C.:** 283 (26); **Chagas-Mota, E.:** 1028 (31), 1135 (42); **Charpin, D.:** 21225 (04), 21405 (01); **Chaves, E. M. F.:** 344 (32); **Chung, F.:** 186 (16); **Cielo-Filho, R.:** 1054 (16); **Cocuooci, A.:** 13961 (01); **Coelho, D. F.:** 80 (46), 113 (42); **Coelho, D.:** 548 (10), 723 (34), 873 (16), 876 (42); **Coelho, L.:** 12 (01); **Coelho, M. M.:** 109 (32); **Colaço, M.:** 100 (32); **Colella, L.:** 1461 (24); **Coleman, M. A.:** 111 (49); **Collares, J. E. R.:** 151 (21), 170 (21), 172 (01); **Collejos, J.:** 8911 (09); **Conceição, A. A.:** 486 (08), 617 (38), 1293 (38), 1046 (38), 226 (38), 614 (38), 823 (38), 942 (38), 943 (16); **Conceição, A. S.:** 447 (04), 1045 (10), 1072 (10); **Coradin, L.:** 676 (24), 900 (24), 2463 (42), 6539 (49), 76183 (01); **Cordovil, S. P.:** 256 (49); **Córdula, E.:** 371 (16); **Corinoto, R.:** 25 (19); **Correia, C.:** 24 (32); **Correia, C.:** 31 (15); **Correia, M.:** 333 (10); **Correia, S. J.:** 09 (25); **Costa, A. C. G.:** 12 (34); **Costa, A.:** 07 (19); **Costa, J. M.:** 11 (21); **Costa, J. T.:** 5467 (10); **Costa, J.:** 452 (07); **Costa, S. M.:** 207 (01); **Couto, A. P. L.:** 312 (31); **Cremers, G.:** 9727 (46), 12405 (09); **Croizart, B.:** 158 (46); **Cruz, G.:** 1602 (24), 1754 (24), 2332 (24), 2809 (24); **Cruz, N. R. S.:** 16 (34); **Curtiss, A. H.:** 4560 (46); **Cyrino, B.:** 3157 (42); **Czemark, U.:** 588 (17); **Dach, B.:** 392 (34); **Damasceno, G.:** 45 (46); **Damasceno-Junior, G. A.:** 2329 (46); **Dantas, J.:** 04 (01); **Darwin, J.:** 2084 (34); **Davidse, S.:** 4573 (42), 4579 (46), 4580 (01), 4671 (01), 4900 (09); **Delprete, L.:** 789 (18); **Deniardi, F.:** 18741 (17); **Destefani, A. C. C.:** 139 (26); **Dias, N. M.:** 173 (07); **Dias, T. A. B.:** 361 (43); **Diaz, J.:** 3366 (17); **Dilon, M.:** 4089 (48); **Dodge, C. W.:** 16894 (46); **Dodson, C. H.:** 12432 (01); **Dombey, T.:** 845 (04); **Drummond, M. T.:** 720 (46), 2206 (46); **Duarte, D.:** 4544 (37), 14004 (42); **Dusén, P.:** 11792 (04), 13739 (04); **Dusén, V.:** 1979 (09); **Dutra, R.:** 35 (32); **Dwyer, W.:** 8480 (34); **Eiten, G.:** 2623 (49), 4721 (46); **Ekman, E. L.:** 1410 (13), 1414 (04), 5499 (04), 5733 (34), 11840 (46); **Empereire, L.:** 542 (42); **Emyddgie, A.:** 1357 (26); **Escobar, J.:** 1291 (10); **Eskuche, K.:** 5210 (13); **Esteves, G. L.:** 514 (10); **Esteves, G. L.:** 514 (10), 753 (42), 2577 (32), 2578 (07); **Falcão, J. I. A.:** 74 (16), 777 (46); **Farias, R. R.:** 488 (12); **Farney, C.:** 2131 (25); **Félix, L. P.:** 7920 (01); **Fenoler, D.:** 590 (34); **Ferguson, V.:** 1117 (46); **Fernandes, A.:** 549 (21); **Fernandes, A.:** s.n. (01), 430 (21), 570 (32); **Fernandez, B.:** 228 (24); **Fernandez, K.:** 7545 (24); **Ferrari, J. M.:** 356 (42); **Ferreira, F. M.:** 584 (42); **Ferreira, M. B.:** 7769 (41); **Fiaschi, H.:** 1687 (19); **Fiaschi, P.:** 1327 (19); **Fiebrig, K.:** 2234 (40), 2387 (03), 2720 (04); **Figueiredo, M. A.:** (34); **Figueiredo, M. A.:** 213 (46); **Fiuza, M. M. R.:** 52 (16); **Folli, D. A.:** 2829 (42), 3418 (42), 3897 (19), 4406 (19); **Fonseca, C. F.:** 02 (10); **Fonseca, C. G.:** 34 (16); **Fonseca, M. L.:** 4392 (41), 5713 (49); **Fonseca, M. R.:** 1320 (32), 1342 (11); **Fonseca, W. N. da:** 06 (34); **Forero, J.:** 6217 (34); **Fortunato, D.:** 3774 (15); **Forzza, R.:** 1238 (08), 1239 (01), 3803 (04); **Fosberg, R.:** 21994 (34); **Fotius, G.:** 3411 (32); **Frame, D.:** 123 (24); **Frames, D.:** 119 (46); **França, F.:** 1514 (16), 2325 (25), 3506 (07), 3750 (08), 3944 (01), 4098 (32), 4103 (30), 4403 (27), 4562 (12), 4710

(32), 5314 (31); **Freire, A.:** 79 (09), 87 (19); **Freitas, J. D.:** 608 (36); **Freitas-Filho, F.:** 118 (34); **Friebrig, F.:** 6278 (23); **Furlan, D.:** 1583 (38); **Fuentes, A.:** 587 (04); **Funch, L.:** 1520 (01), 1603 (14); **Funch, R.:** 111 (14); **Furlan, A.:** 460 (14); **Gabriel, M.:** 1802 (46); **Ganev, W.:** 235 (32), 631 (32), 710 (22), 877 (34), 2522 (22); **Ganev, W.:** 3226 (44); **García-Barriga, J.:** 14191 (34); **Gardner, G.:** 2250 (01), 2247 (21), 2264 (32); **Gaumer, A.:** 331 (34); **Gaumer, G. F.:** 2477 (46); **Gehrt, G.:** 677 (42); **Gentry, A.:** 5528 (32), 15459 (10), 73862 (04), 75194 (32); **Giacomi, L. L.:** 72 (42); **Gillespie, P.:** 875 (42), 1954 (24); **Gilman, M. F.:** 113 (01); **Giordano, L. C.:** 359 (26); **Giorni, H.:** 448 (46); **Giulietti, A. M.:** 1815 (25), 1912 (34), 2021 (47), 3417 (33), 3986 (05); **Giullén, G.:** 3710 (46); **Glaziou, A. F.:** 4130 (31), 11267 (27), 15264 (01), 19670 (06), 21796 (05); **Godding, L. N.:** 272 (01); **Gomes, A. P. S.:** 126 (34), 664 (42); **Gomes, A.:** 18 (10), 20 (32); **Gomes, B. M.:** 23 (10), 49 (34), 75 (34), 111 (34); **Gomes, E.:** 194; **Gomes, J. C.:** 2277 (42); **Gomes, J. M. L.:** 118 (19); **Gomes, M. L.:** 178 (10); **Gomes, P.:** 33 (10); **Gonçalves, L. M. C.:** 174 (15); **Gonzaga, L. P.:** 73 (32); **Gonzaga, M. A.:** 445 (05); **González, J. D.:** 983 (09); **Goodland, B.:** 206 (01), 221 (01), 1221 (01); **Gottsberger, G.:** 2386 (41); **Goudout, J.:** 1833 (46); **Graham, R. V.:** 668 (46); **Grandi, T. S. M.:** 6077 (5), 6892 (42); **Grimes, R.:** 3286 (24); **Grisi, T.:** 12 (34), 44 (34); **Grist, T.:** 221 (10); **Griz, L.:** 10 (10); **Groger, C.:** 119 (24); **Grupo Flora Pedra do Cavalo:** 126 (32), 222 (25), 343 (32), 441 (31), 731 (31); **Guedes, M. L.:** 5284 (15), 5511 (01), 7294 (25), 7814 (46), 8177 (47); **Guimarães, J. G.:** 1101 (40); **Guimes, A.:** 2640 (42); **Gutiérrez, N.:** 5064 (34); **Hammel, L.:** 712 (09), 955 (01); **Hansen, C.:** 5895 (04), 5953 (04), 9546 (04); **Hansen, C.:** 5953 (04), 9058 (46), 9233 (34), 9546 (04); **Harley, R.:** 16434 (32), 18892 (14), 18960 (01), 19879 (15), 21219 (08), 21232 (08), 21575 (32), 21630 (01), 21817 (01), 22157 (19), 22710 (44), 24794 (46), 25229 (32), 25618 (16), 26485 (08), 28114 (01), 35416 (47), 53788 (34), 54562 (47), 54919 (47), 55064 (08); **Harriman, T.:** 17553 (34); **Harris, P.:** 12473 (34); **Harrison, C.:** 1322 (01); **Harrola, N.:** 232 (46); **Hashimoto, G.:** 90 (42), 93 (42), 117 (18), 167 (49); **Hassler, E.:** 2674 (46), 2826 (34), 3444 (04), 3557 (09), 3976 (49), 6106 (17), 6278 (23), 6282 (49), 6802 (17), 7028 (17), 7340 (01), 8476 (40), 8845 (49), 9125 (40), 10008 (40), 11296 (40), 11412 (23), 12138 (04), 12597 (34), 12617 (01); **Hassler, E.:** 2752 (04); **Hatschbach, G.:** 19105 (04), 23881 (43), 25176 (42), 31602 (05), 32958 (40), 34043 (41), 36268 (43), 36629 (16), 36890 (18), 38334 (01), 39510 (15), 41375 (01), 47311 (39), 56541 (15), 56831 (15), 59880 (41), 64968 (15), 65040 (15), 152665 (34); **Hens, F.:** 1035 (46); **Heringer, E. P.:** 61 (32), 227 (36), 320 (01), 437 (34), 521 (15), 875 (42), 1251 (01), 1251 (01), 1955 (05), 3405 (42), 3810 (01), 4359 (18); **Heyligers, D.:** 67 (24); **Hill, V.:** 11003 (34), 21888 (46), 34423 (46); **Hinds, F.:** 662 (24); **Hinton, G. B.:** 2474 (01), 4704 (42), 8507 (01), 9508 (01), 9718 (42), 9810 (01), 11615 (42); **Hinton, G. B.:** 5207 (46), 6715 (46); **Hitchcock, D.:** 17426 (24); **Hoehne, F. C.:** 2845 (16), 4798 (46), 6184 (27), 20253 (49), 27640 (16); **Hoehne, W.:** 290 (49); **Hoff, S.:** 5233 (24); **Hoffmann, W. A.:** 212 (19); **Holm-Nielsen, L.:** 2046 (10), 2177 (10), 2265 (10), 2381 (10); **Holt, K.:** 14 (01), 149 (21); **Holy, M.:** 1975 (01); **Hopkins, A.:** 96 (42); **Howard, T.:** 106689 (34); **Hunt, D.:** 5814 (23); **Hunter, A. A.:** 439 (46); **Hutchinson, J.:** 3091 (34), 5027 (10); **Irwin, H. S.:** 1968 (05), 1969 (05), 1971 (05), 11009 (01), 11536 (18), 11767 (18), 12093 (43), 12161 (41), 12464 (41), 14245 (42), 14520 (41), 14888 (41), 15819 (01), 16729 (01), 21269 (01), 22081 (27), 22245 (27), 22281 (27), 23242 (07), 23720 (07), 24264 (43), 25512 (18), 25588 (41), 26357 (43), 28060 (42), 28786 (05), 30376 (28), 31906 (17), 33102 (18); **Isabelle, M.:** 101 (13); **Ivanuskas, N. M.:** 664 (19); **Jansen-Jacobs, M. J.:** 1024 (01), 1326 (42), 1347 (46), 1811 (09), 3276

(42), 4056 (01), 4418 (01), 4474 (26), 4835 (34), 5542 (24); **Jardim, J. G.:** 189 (19), 328 (01), 3355 (11), 3517 (15), 3571 (01), 4179 (27); **Jativa, D.:** 499 (10), 614 (09); **Jesus, J. A. de:** 1562 (25); **Jesus, N. G.:** 1842 (01); **Joly, A. B.:** 1714 (05), 1867 (05), 2913 (05), 3089 (05); **Jost, T.:** 90 (19), 444 (32); **Junqueira, M. E. R.:** 04 (01), 200 (32); **Kaab, E.:** 1182 (24); **Karam, C. M.:** 338 (42); **Kawasaki, M. L.:** 885 (27); **Kearney, T. H.:** 14978 (01); **Kiil, L. H.:** 892 (42); **Killip, E. P.:** 14432 (34), 14549 (34), 15435 (42), 16287 (34), 20885 (34), 23492 (34), 24975 (42), 29088 (46), 37139 (42); **Kirkbride, S.:** 57 (18); **Klug, C.:** 2098 (09), 3065 (46), 4334 (34); **Klug, G.:** 3005 (46); **Knowles, O. H.:** 772 (46); **Kotschy, F.:** 212 (46); **Krapovickas, A.:** 2352 (04), 24234 (04), 41061 (04), 41090 (13), 42771 (43), 42832 (4), 44195 (13), 44539 (13), 45005 (42), 45171 (17), 45858 (13), 47679 (15), 98445 (04); **Krieger, L.:** 5548 (32); **Kulmann, M.:** 3517 (43); **Kummrow, D.:** 489 (04); **Kurtz, F.:** 790 (01), 6741 (01); **La Cruz, D.:** 1888 (46), 2809 (24), 4187 (46); **Lakela, B.:** 27876 (34); **Landim, M.:** 483 (04), 531 (04), 969 (04), 994 (04), 1014 (04), 1541 (04); **Landrum, R.:** 4179 (26); **Langlassé, T.:** 531 (01); **Lawrence, R.:** 110 (09); **Leal, C. G.:** 175 (34); **Leite, K. B. L.:** 360 (25); **Lemos, I. C.:** 88 (10); **Lemos, J. R.:** 166 (07), 184 (32), 361 (34), 493 (34), 536 (16), 601 (01); **Lemos, J. R.:** 87 (08), 223 (32); **Lemos, M. J. S.:** 07 (07), 145 (15); **Leon, G. B.:** 579 (09); **Levi, D.:** 9490 (34); **Lewis, G. P.:** 571 (34); **Liesner, F.:** 5738 (24), 30220 (48); **Liesner, R.:** 21900 (01); **Lima, A.:** 3703 (43); **Lima, G. C.:** 14 (36); **Lima, H. C. de:** 1237 (25); **Lima, J. C. A.:** 108 (25), 212 (19); **Lima, J. L. C.:** 28 (10), 150 (21); **Lima, J. L. C.:** 64 (10); **Lima, L. R.:** 361 (05); **Limas, J. E. G.:** 76 (42), 77 (42); **Lima-Verde, L. W.:** 207 (01), 225 (32), 258 (01), 3462 (34); **Lindemann, B.:** 1214 (46), 4576 (07); **Linden, C.:** 3879 (04); **Linsingen, V.:** 573 (40); **Lira, S. S.:** 636 (46); **Lôbo, C. M. B.:** 77 (34), 79 (42), 80 (31); **Locatelli, E.:** 412 (10); **Lombardi, J. A.:** 49243 (05); **Lombardi, J. A.:** 720 (05), 901 (42), 2800 (49), 3507 (27), 3887 (33), 64837 (01); **Lopes, C. G.:** 92 (21); **Lott, G.:** 02 (26); **Louirteg, K.:** 2935 (04); **Lourteig, A.:** 3166 (04), 2935 (04); **Lowell, W.:** 359 (09); **Lugo, S.:** 238 (09), 1289 (26), 3783 (09), 5516 (09); **Lyra-Lemos, R. P.:** 687 (10), 1090 (10), 1402 (31), 1826 (25), 3962 (07), 4713 (42), 4769 (10), 4801 (10), 5029 (42), 5597 (07), 6233 (01), 6466 (16), 6770 (42), 6793 (10), 6984 (10), 6886 (34), 6912 (34), 6984 (10), 8254 (10), 8282 (10), 9629 (31), 9679 (10), 10692 (42); **Maas, N.:** 2506 (09), 3625 (01), 4011 (01), 7177 (24), 7278 (42); **Maas, P. J. M.:** 3625 (01); **MacBryde, M.:** 572 (10); **Macedo, A.:** 4151 (10); **Macedo, E. E.:** 89 (43); **Macedo, J. F.:** 3878 (42); **Macedo, M.:** 18 (02), 1650 (28); **Machado, I. C.:** 1123 (16); **Machado, M.:** 173 (47); **Machado, R. F.:** 05 (16), 47 (01), 99 (01), 131 (32), 137 (01), 165 (01), 248 (34), 254 (01); **Maciel, A. A.:** 58370 (01), 81927 (01); **Madsen, C.:** 63812 (10); **Madsen, I. T.:** 5729 (46); **Magalhães, G. M.:** 412 (05), 415 (05), 719 (05), 777 (31), 851 (42), 855 (42); **Magalhães, M.:** 152 (15), 4819 (10), 4822 (42); **Maguire, B.:** 35837 (42), 35844 (24); **Marcondes-Ferreira, W.:** 199 (49), 1130 (42); **Marinho, A. M.:** 31 (34), 35 (34); **Marinis, G.:** 338 (42); **Marlúcia, S.:** 03 (01); **Marquete, R.:** 1919 (19); **Martens, L. A.:** 249 (28); **Martin, I.:** 709 (40), 10648 (13); **Martinelli, G.:** 5010 (19), 5484 (01); **Martínez, J.:** 1981 (32), 2931 (34), 17312 (34), 29788 (32); **Martins, P.:** 552 (01), 632 (32); **Matos, I. S.:** 49 (01); **Mattos, J.:** 11577 (43); **Matuda, M. F.:** 986 (34); **McDaniel, G.:** 16557 (46); **McDonald, J.:** 3267 (01), 4100 (01); **McDowell, A.:** 2130 (24), 3223 (42); **Medri, C.:** 24034 (04), 24035 (04), 50373 (04), 50378 (04); **Medri, C.:** 503 (04); **Mello, B.:** 2836 (02), 3358 (08), 6696 (08), 7489 (08), 10033 (27), 10580 (27); **Mello-Silva, R.:** 1351 (05), 9975 (33); **Melo, E.:** 152 (08), 567 (18), 1069 (07), 1185 (25), 3020 (19), 3604 (32), 4314 (25), 4565 (32), 5030 (34), 5501 (32), 5503 (32), 6118 (25), 7387 (04), 7636

(32); **Melo, E.:** 1633 (10); **Melo, G. A. R.:** 153 (10), 154 (25); **Melo, L. M. R.:** 34 (34), 126 (34); **Mendes, K.:** 01 (34); **Meireles, C.:** 4146 (13); **Mexia, N.:** 4002 (48); **Meyer, V.:** 8654 (04); **Michel, P.:** 2682 (15); **Mille, O.:** 105 (10); **Miranda, A. M.:** 318 (19), 449 (34), 760 (31), 871 (16), 1030 (16), 1431 (19), 1652 (31), 1866 (32), 2347 (42), 2367 (16), 2426 (16), 2476 (10), 2641 (32), 2744 (01), 2744 (47), 2847 (32), 2850 (32), 3290 (16), 3363 (16), 3418 (32), 3535 (10), 4013 (16), 4429 (16), 5438 (01), 5704 (07), 5722 (32); **Miranda, E. B.:** 783 (32), 855 (34), 965 (25), 1060 (42), 1353 (16); **Miranda, I. S.:** 781 (08), 1156 (42), 2901 (46), 2902 (46), 7298 (01), 7491 (01); **Miranda-Silva, E.:** 309 (47); **Moldenke, T.:** 341 (34), 782 (34); **Molina, D.:** 700 (32), 24638 (34), 24947 (34); **Mondes, B.:** 1632 (04); **Monteiro, V. de M.:** 61 (25); **Montes, R.:** 27531 (42); **Moraes, A. C. de:** 75 (47); **Moraes, A. O.:** 18 (10), 35 (10), 189 (32); **Moraes, M. V.:** 673 (29); **Moraes, O.:** 661 (08); **Morais, A. C. A.:** 79 (10); **Mori, S.:** 9928 (08), 10351 (46), 11834 (07), 12210 (07); **Moritz, D.:** 660 (04); **Morong, T.:** 638 (04); **Morrone, O.:** 2047 (04); **Mota, R. C. da:** 14335 (18), 14451 (05), 15148 (05), 16900 (05); **Moura, D. C.:** 737 (34); **Moura, D.:** 662 (10), 1090 (10), 1187 (10); **Mronginski, V.:** 734 (04); **Murphy, F.:** 671 (34); **Nascimento, J. G.:** 64 (25), 94 (25), 105 (25); **Nascimento-Junior, J. E.:** 48 (04); **Nash, G. V.:** 2516 (46); **Nee, M.:** 35806 (04), 35807 (42), 40817 (34), 41547 (46), 48596 (04), 48618 (04), 48680 (04), 48736 (04), 48869 (04), 49203 (04), 49751 (04), 51980 (34), 52091 (04); **Neil, P.:** 10360 (10); **Neves, S. P. S.:** 209 (01), 219 (01); **Noblick, L. R.:** 1638 (04), 1814 (42), 2059 (07), 2064 (07), 2124 (46), 3385 (19), 3570 (25), 4064 (25), 4282 (32), 17634 (31); **Novara, E.:** 10158 (04); **Novara, R.:** 10158 (04); **Nunes, E.:** 48 (01), 56 (32), 128 (32), 146 (46), 347 (19); **Nunes, T. S.:** 230 (47), 319 (10), 327 (42), 972 (01), 319 (10), 459 (29), 471 (29), 581 (34), 591 (32), 967 (01), 1219 (34); **O'Donell, A.:** 5327 (04), 5522 (17), 5553 (13), 5580 (13); **O'Neill, D.:** 229 (34); **Oliveira, A. M.:** 04 (01); **Oliveira, C. T.:** 14198 (05); **Oliveira, E. L. G. P.:** 742 (01); **Oliveira, F. C. S.:** 100 (46); **Oliveira, F. C. S.:** 96 (21); **Oliveira, L. B.:** 09 (01), 19 (32), 25 (16), 106 (32); **Oliveira, M.:** 1734 (16), 1744 (21), 2446 (16), 2929 (10), 2938 (32), 3382 (01); **Oliveira, M.:** 2929 (10), 2938 (32), 3382 (01), 3497 (10), 3668 (10); **Oliveira, N.:** 23 (34); **Oliveira, P. F.:** 02 (14); **Oliveira, P. P.:** 99 (19); **Oliveira, R. C.:** 1651 (21), 1895 (01); **Oliveira, R. P.:** 199 (32), 202 (47), 228 (34), 249 (32), 361 (07), 1038 (07); **Oliveira, U. R.:** 26 (32); **Onishi, E.:** 48 (42); **Ortiz, D.:** 265 (42), 462 (34), 645 (42), 1016 (26); **Paiva, J. C. G.:** 14 (21); **Palacios, D.:** 578 (09); **Palmer, A.:** 221 (01); **Passos, L.:** 391 (32); **Paterno, G. B. C.:** 167 (10), 170 (46); **Paula, J. A.:** 666 (28); **Paula, S. de:** 1304 (19); **Paula-Souza, J.:** 3844 (22); **Paula-Zárate, E. L.:** 290 (34), 292 (16); **Pedersen, P. L.:** 3019 (13), 5895 (04), 9546 (04), 12409 (13); **Pelli, A.:** 502 (28); **Pennel, J. M.:** 1881 (09), 4232 (34), 5516 (42), 022 (42), 10705 (42); **Pereira, E.:** 7915 (16); **Pereira, R.:** 2615 (10), 3044 (10); **Pereira-Noronha, M. R.:** 1629 (42); **Pereira-Silva, G.:** 9098 (15); **Perrottet, H.:** 288 (46), 723 (46), 2000 (46); **Pessoa, M. C.:** 1701 (32); **Philcox, D.:** 13882 (20), 15832 (20); **Pick, R. A.:** 199 (01), 251 (34), 309 (21), 314 (34); **Pickel, B.:** 3689 (10); **Pickersgill:** 392 (34); **Pierotti, S. A.:** 643 (04); **Pigozzo, C. M.:** 54 (22); **Pinheiro, K.:** 177 (32); **Pinheiro, P. M.:** 11 (31), 28 (31); **Pinheiro, R. S.:** 2191 (31); **Pinto, G. C.:** 42 (01); **Pirani, J. R.:** 2128 (41), 2614 (19), 5642 (27), 8105 (05), 51365 (02), 52365 (19); **Pires, B.:** 6158 (27); **Pittier, L.:** 2520 (34), 4779 (34), 4842 (21); **Pizziolo, R. M.:** 31 (42); **Poilecot, P.:** 2787 (46), 7921 (46); **Popovkin, A. V.:** 79 (19); **Pott, A.:** 7460 (40); **Prance, G.:** 15316 (24); **Proctor, I.:** 42621 (34); **Proença, C.:** 2776 (18); **Queiroz, E. P.:** 266 (19); **Queiroz, L. P. de:** 344 (34), 382 (32), 1107 (34), 1334 (25), 1445 (04), 1552 (07), 2656 (01), 3039 (32), 3185 (32), 3839 (25), 4573 (34), 4596 (34), 5633 (16),

5756 (25), 5854 (15), 5856 (46), 5867 (03), 6576 (29), 7078 (32), 7201 (34), 7244 (34), 7262 (32), 7351 (10), 7408 (32), 7655 (32), 7668 (01), 7703 (08), 9483 (10), 9985 (31), 10044 (01), 10113 (16), 10148 (21), 10592 (32); **Queiroz, R. T.:** 161 (21), 175 (01), 224 (21), 227 (01), 438 (21), 670 (21), 705 (10), 946 (21), 976 (10), 1041 (32); **Rabelo, F.:** 170 (24); **Ramírez, R.:** 621 (32); **Rapini, A.:** 1079 (02); **Ratter, J. A.:** 33199 (20); **Ratter, J. A.:** 900 (20); **Rego, M. C. S.:** 14 (21); **Reitz, W.:** 3679 (04); **Remella, L.:** 6815 (15); **Rezende, J. M.:** 260 (41), 501 (49); **Ribeiro, R. D.:** 1024 (19); **Ribeiro, S.:** 91 (24); **Ribeiro, T.:** 48 (07); **Riedley, H. N.:** 1336 (12); **Rocha, E. A.:** 368 (32), 1569 (42); **Rocha, S. K.:** 44 (16); **Rodrigues, A.:** 01 (10), 24 (10); **Rodrigues, D. B. F.:** 13 (34); **Rodrigues, L. M. O.:** 67 (07), 79 (19); **Rodrigues, W.:** 62 (01); **Rojas, H.:** 10062 (40); **Romanio, S.:** 1368 (10); **Rombouts, J. E.:** 200 (40); **Romero, M.:** 2973 (04); **Roque, A. A.:** 143 (46), 147 (10), 114 (10), 118 (01), 97 (21), 136 (21), 162 (01), 302 (10), 505 (01), 506 (21); **Rosa, A.:** 3078 (24), 3422 (34), 11367 (32); **Rosa, N. A.:** 3744 (16); **Roth, Pe. L.:** 14658 (07); **Roubik, D.:** 143 (24); **Rusbi, J.:** 82 (34), 100 (01), 1844 (42); **Rusby, H. H.:** 311 (46); **Saavedra, M.:** 1006 (07); **Sagastegui, P.:** 10492 (48), 10918 (48); **Sales, A. B.:** 36 (04); **Salino, A.:** 3133 (05); **Salino, A.:** 40381 (04); **Samall, B.:** 12762 (34); **Sambou, T.:** 96 (46); **Sandley, P. C.:** 74932 (46); **Sandwith, N. Y.:** 1534 (46); **Sant'Ana, R.:** 736 (32); **Sant'Ana, S. C.:** 93 (19), 420 (07), 711 (19); **Santana, M. C.:** 85 (01); **Santos, C. S.:** 185 (42); **Santos, E. B. dos:** 80 (19), 214 (19); **Santos, F. S.:** 35 (46); **Santos, H. G. P. dos:** 17 (18); **Santos, M. C. F. dos:** 517 (31); **Santos, P.:** 598 (08); **Santos, T. J.:** 1984; **Santos, V. J.:** 317 (31), 431 (31); **Sarmento, A. C.:** 763 (21); **Sasaki, D.:** 319 (42); **Schettini, C. M. dos:** 09 (19); **Schinini, Z.:** 8796 (01), 10706 (40), 20445 (40), 33662 (40), 36578 (01); **Schipp, W. A.:** 387 (46); **Schombugk, L.:** 693 (46); **Schulz, E.:** 7143 (04); **Schwarz, G. L.:** 5499 (04); **Schwarz, H.:** 5556 (17); **Schwindt, G.:** 1764 (04); **Seiva, L.:** 15231 (48); **Semir, J.:** 515 (05), 2735 (05), 3746 (05); **Sena, V. R. R.:** 42 (21); **Senra, L. C.:** 11 (32); **Serrao, M.:** 12 (32); **Shafer, S.:** 496 (34), 12278 (34); **Sharper, V.:** 10980 (46); **Sheng-Zehn, Y.:** 788 (46); **Silva, A. G.:** 30 (16), 31 (16); **Silva, B. M.:** 84 (19); **Silva, F. C.:** 155 (42); **Silva, F. H. M.:** 504 (10); **Silva, F. V.:** 08 (16), 33 (16), 31 (34), 52 (10), 09 (34); **Silva, F.:** 01 (16); **Silva, G. P.:** 1186 (49), 2266 (42); **Silva, J. B.:** 514 (23); **Silva, J. O. N.:** 35 (34); **Silva, L.:** 169 (17), 1000 (46), 2976 (46), 3027 (01), 38821 (24); **Silva, M. A.:** 4043 (46); **Silva, M. L.:** 71 (32); **Silva, M. M.:** 230 (32), 286 (32); **Silva, M. M.:** 309 (07), 342 (31); **Silva, P. G. G.:** 82 (34); **Silva, R. A.:** 257 (10), 656 (10); **Silva-Castro, M. M.:** 644 (32); **Silveira, V. M.:** 34 (28); **Simão, C. F.:** 10090 (37); **Simeão, R. M.:** 488 (28); **Sintenis, P.:** 692 (46); **Siqueira, J.:** 1654 (27); **Siqueira-Filho, J. A.:** 214 (42), 1554 (32), 1676 (10), 1774 (10), 1777 (16); **Skurtch, W.:** 3063 (09), 4073 (09), 4090 (42); **Small, P.:** 2960 (34), 3552 (34), 3894 (34), 3914 (34); **Smith, A. C.:** 2206 (46); **Smith, H. H.:** 1585 (46); **Smith, R.:** 1576 (34), 2206 (24); **Soares, A. A.:** 06 (34); **Soares, D. O.:** 173124 (24); **Soares, S. M.:** 565 (23); **Sobrinho, J. S.:** 308 (10); **Soeiro, R.:** 2796 (01); **Solheim, M.:** 1035 (42); **Sologa, F.:** 244 (17); **Solomon, J.:** 13473 (34); **Soria, M.:** 213 (26), 235 (09), 6161 (26); **Souza, C. F.:** 10075 (37); **Souza, E. R. de:** 107 (32), 108 (34), 118 (34), 193 (07), 210 (34), 226 (25), 269 (32), 391 (01); **Souza, E. R.:** 473 (22); **Souza, H. C.:** 16195 (05); **Souza, N. K. R.:** 05 (32), 07 (31); **Souza, V. C.:** 335 (05); **Souza-Novais, R.:** 27 (01), 36 (01); **Sparre, D.:** 1333 (17), 19969 (10); **Spuce, R.:** 1850 (46); **St. Hillaire:** 1068 (45); **Standley, P.:** 74199 (01); **Stapf, M.:** 455 (01); **Staudohar, G. S.:** 20 (46); **Staviski, M. N. R.:** 55 (19); **Staviski, M. N. R.:** 635 (10); **Stehmann, J. R.:** 2325 (28), 2405 (28), 103126 (04); **Steinbach, J.:** 7040 (49); **Steinmann, U.:** 9464 (01); **Stergios, K.:** 6007 (24); **Steyermark, J. A.:** 900

(32), 44060 (42), 50774 (34), 88213 (42), 88243 (01), 88247 (42), 88392 (24), 88931 (46), 99152 (34), 101520 (09), 102904 (24), 108299 (32), 120904 (24), 121257 (34), 126922 (34), 127695 (42), 131211 (21); **Stranghetti, V.:** 280 (04); **Stuckert, I.:** 3890 (01), 7482 (01); **Stutz, A.:** 2127 (26); **Sucre, D.:** 5002 (25), 5007 (26); **Svenson, U.:** 11442 (34); **Tameirão-Neto, E.:** 47 (42), 55 (42); **Tanner, G.:** 2240 (46); **Tapia, S. L.:** 992 (01); **Tate, L.:** 95 (24), 102 (24), 734 (04); **Tavares, S.:** 672 (01), 744 (16); **Teixeira, H.:** 505 (09), 505 (09), 104442 (46); **Teixeira, L. O. A.:** 505 (04), 647 (04); **Teixeira, W. A.:** 398 (28), 411 (05); **Tenório, E.:** 12300 (34), 67347 (10); **Thomas, E.:** 102436 (46), 162531 (46); **Thomas, W. W.:** 13701 (07); **Ton, G.:** 3091 (32), 3116 (34); **Tonduz, A.:** 12821 (09); **Toro, L. G.:** 596 (09); **Tressens, V.:** 1037 (04); **Trigueiro, E.:** 477 (21); **Trindade, A.:** s.n. (01); **Trinta, J.:** 689 (32), 744 (19); **Tschá, M.:** 735 (31); **Tsugaru, P.:** 173 (34), 1243 (34); **Tucker, F.:** 472 (34); **Tunha, L. H. S.:** 520 (42); **Turn, A.:** 369 (32); **Urban, L.:** 588 (32), 2510 (34); **Valente, A. S. M.:** 238 (42); **Vanilda, M.:** 133 (25); **Vanni, F.:** 1279 (01); **Vanni, R.:** 1279 (01); **Vasconcelos, J. M.:** 78 (42), 640 (42); **Vasconcelos, S. F.:** 12 (21); **Vega, K.:** 6112 (48); **Ventura, R.:** 4578 (42), 7082 (42), 9117 (34); **Viana, G.:** 118 (46), 276 (07), 701 (16), 994 (07), 1264 (01), 1550 (32), 1558 (34), 1630 (07), 1788 (04); **Viana, P. L.:** 711 (28); **Vimercat, J. M.:** 224 (19); **Vispo, G.:** 1195 (42); **Wallnofer, H.:** 245 (46), 9655 (34); **Wanderley, M. H. L.:** 44 (42); **Warnecke, B.:** 245 (46); **We, E.:** 6029 (46), 7576 (46); **Weberbauer, T.:** 6429 (32); **Weinberg, B.:** 156 (03); **Wiggins, G.:** 76 (01); **Wilbeu, R. L.:** 2712 (46); **Williams, D.:** 67 (42); **Wohlhauser, S.:** 606202 (46); **Wood, J.:** 27371 (20); **Wright, C.:** 3100 (46); **Wurdack, N.:** 175 (21), 39993 (10), 40977 (21); **Xavier, A. B.:** 12 (15); **Xena, M.:** 522 (32); **Zappi, D. C.:** 11996 (33); **Zappi, D.:** 9643 (37); **Zardini, D.:** 4279 (17), 11830 (17), 3843 (17), 3985 (17), 6740 (17), 7608 (17); **Zardini, E.:** 9911 (01); **Zaruma, G.:** 301 (34); **Zepelacio, G. M.:** 3535 (34); **Zuloaga, F. O.:** 6575 (04).